ELDORA

ELDORA MOUNTAIN RESORT
SKI AREA PROJECTS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

FEBRUARY 2014

USDA FOREST SERVICE
ROCKY MOUNTAIN REGION
ARAPAHO AND ROOSEVELT NATIONAL FORESTS
PAWNEE NATIONAL GRASSLAND

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (800) 795-3272 or (202) 720-6382 (TDD).

USDA is an equal opportunity provider and employer.

ABSTRACT

DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE

ELDORA MOUNTAIN RESORT SKI AREA PROJECTS

ARAPAHO AND ROOSEVELT NATIONAL FORESTS AND PAWNEE NATIONAL GRASSLAND BOULDER AND GILPIN COUNTIES, COLORADO

FEBRUARY 2014

Lead Agency: USDA Forest Service

Responsible Official: Glenn Casamassa, Forest Supervisor
Arapaho and Roosevelt National Forests and
Pawnee National Grassland

For Information Contact: Paul Alford
Boulder Ranger District
2140 Yarmouth Avenue
Boulder, Colorado 80301
(303) 541-2506

Abstract: This Draft Environmental Impact Statement (DEIS) has been prepared to analyze and disclose the estimated environmental effects of implementation of the Eldora Mountain Resort Ski Area Projects. Eldora Mountain Resort (EMR) is located on the Roosevelt National Forest managed by the administrative unit, Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP) in Boulder and Gilpin counties, Colorado and operates in accordance with the terms and conditions of a Special Use Permit, which is administered by the United States Department of Agriculture Forest Service (Forest Service). The Proposed Action includes the construction of 15 new ski trails (totaling approximately 58 acres), the creation of approximately 57 acres of new tree and gladed skiing areas and modifications to 43 acres of existing tree and gladed skiing across five areas. The terrain would be accessed by two new chairlifts: one on the front-side—the Jolly Jug chairlift—and one on the back-side—the Placer chairlift (refer to Figure 2). To improve access onto the mountain and circulation throughout the resort, strategic replacement of the Corona and Challenge chairlifts is also proposed (the proposed Challenge chairlift would replace the existing Challenge and Cannonball chairlifts with one improved chairlift). Snowmaking coverage is proposed on all new traditional trails, excluding the gladed terrain,

totaling approximately 58 acres. In addition, trail widening is proposed on four popular existing trails which are currently limited by their width, producing inefficient bottlenecks on the back-side of the resort. Finally, the remodel of The Lookout facility and the construction of a new on-mountain facility at the top of Challenge Mountain are proposed to better accommodate guests' needs and expectations. With the development of the proposed projects, the Comfortable Carrying Capacity (CCC) at EMR would increase by 1,470 guests, from 4,250 to 5,720 guests. A non-significant Forest Plan Amendment is proposed to assign and change Forest Plan management area allocations that would be within the proposed SUP boundary adjustment area. In addition to ski-related projects, the Proposed Action includes vegetation management projects to address forest health conditions.

Components of the Proposed Action are detailed in Chapter 2: Alternative 2 – Proposed Action.

This DEIS discusses the purpose and need for the Proposed Action; alternatives to the Proposed Action; potential direct, indirect, and cumulative impacts of implementing each alternative; and project design criteria. Three alternatives are analyzed in detail in this DEIS: Alternative 1 – No Action (required), Alternative 2 – Proposed Action, and Alternative 3.

Comments on this DEIS will be accepted for 45 days from publication of the Notice of Availability (NOA) in the Federal Register. The NOA provides the sole means of calculating the close of the DEIS comment period.

Executive Summary

EXECUTIVE SUMMARY

The proposed improvements analyzed in this document constitute a federal action, which has the potential to affect the quality of the human environment on public lands administered by the Forest Service. Therefore, these projects must be analyzed pursuant to the National Environmental Policy Act of 1969 (NEPA). Under NEPA, Federal Agencies must carefully consider environmental concerns in their decision making processes and provide relevant information to the public for review and comment.

The Forest Service has prepared this Draft Environmental Impact Statement (DEIS) in compliance with NEPA and other relevant federal and state laws and regulations. This DEIS contains analyses consistent with NEPA, Council on Environmental Quality (CEQ) regulations, and Forest Service policy. It discloses potential direct, indirect, and cumulative environmental effects on the human and biological environment anticipated to result with implementation of either the Proposed Action or an alternative to the Proposed Action. Additionally, it is intended to ensure that planning considers the environmental and social values of the project area and that potential resource conflicts are minimized or avoided.

A. SUMMARY OF THE PURPOSE AND NEED FOR THE PROPOSED ACTION

The Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP) has prepared this EIS in response to Eldora Mountain Resort's (EMR) request to implement projects from their accepted 2011 Eldora Mountain Resort Master Plan (Master Plan). The overall purpose of the proposed projects is to improve the guest experience and skier safety at the resort.[1] Additionally, the purpose of the proposed projects is to address forest health and vegetation management at the resort.

Purpose and Need – Recreation

In order to meet the needs and expectations of existing and potential guests and provide a safe skiing experience, the ARP, through its acceptance of EMR's 2011 Master Plan, has identified a need to:

1. Improve the reliability of chairlift and terrain offerings;
2. Address skier safety concerns during prevalent wind events;
3. Provide additional intermediate to expert ability level terrain and a new, more natural terrain experience;
4. Provide new and upgraded chairlift infrastructure to improve the quality of the alpine ski experience; and
5. Expand and improve on-mountain guest services.

[1] The terms "skier," "skiing," "ski," "ski trail," and "skiable" as used within this document are expressly inclusive of all forms of Alpine on-snow recreation including: snowboarding, telemark skiing, adaptive skiing, and other forms of allowable on-snow sliding.

Purpose and Need – Forest Health

In order to address vegetation management and forest health conditions at EMR, the ARP has identified a need to:

1. Maintain vegetation to improve forest health within the EMR boundaries in a manner that continues to be compatible with historic and future ski area uses; and
2. Reduce the spread of noxious weeds.

B. SUMMARY OF THE ALTERNATIVES ANALYZED IN THE DEIS

In addition to the No Action Alternative (analyzed in this document as Alternative 1), two action alternatives are analyzed. Refer to Chapter 2 for a full description of alternatives and Chapter 6 for alternative figures.

Among other differences, the boundary adjustment associated with each action alternative is a key point of contrast between Alternatives 2 and 3. Alternative 2 proposes to adjust the ski area boundary primarily on the northern side of the ski area towards Middle Boulder Creek. Alternative 3 proposes to adjust the ski area boundary exclusively on the southern ski of the ski area and does not include a Special Use Permit (SUP) boundary adjustment on the northern side of the ski area.

ALTERNATIVE 1 – NO ACTION

By definition, the No Action Alternative represents a continuation of existing management practices without changes, additions, or upgrades to existing conditions.

ALTERNATIVE 2 – PROPOSED ACTION

Alternative 2 includes additions and upgrades to the terrain and chairlift network, expansion of snowmaking coverage, additions and renovations to on-mountain facilities, expanded parking, vegetation management projects, and a Forest Plan amendment to assign and change Forest Plan management area allocations for areas within the existing SUP boundary and areas beyond the existing SUP boundary for the northern and southern SUP boundary adjustments.

Terrain

- Fifteen new ski trails (approximately 58 acres).
    - Of the new ski trails, five ski trails are associated with the Jolly Jug terrain, six are associated with the Placer terrain, and four are associated with the Corona terrain.
- Approximately 57 acres of new tree and gladed skiing areas and modifications to 43 acres of existing tree and gladed skiing areas.

- Of the new and/or modified tree and gladed skiing areas, approximately16 acres are associated with the Jolly Jug terrain, approximately 16 acres are associated with the Placer terrain, and approximately 68 acres are associated with the Corona terrain.

Chairlifts

- The new Jolly Jug chairlift would be installed as a detachable four- or six-person chairlift with a slope length of approximately 3,250 feet, a vertical rise of approximately 750 feet and a design capacity of 1,200 people per hour (pph). The bottom terminal of this chairlift would be located on private land and the top terminal would be located on National Forest System (NFS) lands.
- The new Placer Express chairlift would be installed as a detachable six-person chairlift with a slope length of approximately 3,250 feet, a vertical rise of approximately 950 feet and a design capacity of 2,400 pph.
- The existing four-person, fixed-grip Corona chairlift would be replaced with a new six-person, detachable chairlift. The existing chairlift would be removed and upgraded with the new chairlift in the same alignment with the same top and bottom terminal location. The upgraded Corona chairlift would have a design capacity of 2,400 pph.
- The existing Challenge and Cannonball chairlifts would be removed and replaced with one six-person, detachable chairlift in an alignment that provides direct out-of-base access to the summit of Challenge Mountain. The chairlift would have a slope length of approximately 4,100 feet, a vertical rise of approximately 1,000 feet and a design capacity of 3,000 pph.

Snowmaking

- Snowmaking coverage is proposed for all new ski trails, resulting in approximately 58 acres of additional snowmaking coverage.

On-Mountain Facilities

- The new Challenge Mountain Facility, located below the top terminal of the Indian Peaks chairlift, would be approximately 16,000 to 20,000 square feet and provide 850 seats for guests.
- The existing 3,000-square foot Lookout facility would be renovated, increasing its size to between 7,700 and 9,700 square feet, providing up to 300 more seats for guests.

Parking

- An additional 560 parking spaces are proposed on private lands.

Vegetation Management Projects

- Management prescriptions from EMR's Vegetation Management Plan would be applied to the SUP area and adjacent private lands to maintain and/or improve forest health and provide implementation guidance for ski area projects.

Forest Plan Amendment

- The Proposed Action increases EMR's SUP boundary by approximately 86 acres, requiring a Forest Plan amendment to assign and change Forest Plan management area allocations, Scenic Integrity Objectives (SIOs) and Recreation Opportunity Spectrum (ROS) classifications in the existing SUP boundary and for the northern and southern SUP boundary adjustments.

ALTERNATIVE 3

Alternative 3 includes several projects included in Alternative 2, but differs in terrain and chairlift projects, and would require a different Forest Plan amendment (compared to Alternative 2) to assign and change Forest Plan management area allocations for areas within the existing SUP boundary and areas beyond the existing SUP boundary for the southern SUP boundary adjustment.

Terrain

- Ten new ski trails (approximately 52 acres).
    - Of the new ski trails, five ski trails are associated with the Jolly Jug terrain, four are associated with the Corona terrain, and one is associated with the Indian Peaks terrain.
- Approximately 63 acres of new tree and gladed skiing areas and modifications to 135 acres of existing tree and gladed skiing areas.
    - Of the new and/or modified tree and gladed skiing areas, approximately 35 acres are associated with the Jolly Jug terrain, and approximately 163 acres are associated with the Corona terrain.

Chairlifts

- The new Jolly Jug chairlift would be installed as a detachable four- or six-person chairlift with a slope length of approximately 4,350 feet, a vertical rise of approximately 1,000 feet and a design capacity of 1,200 pph. The bottom terminal of this chairlift would be located on private land and the top terminal would be located on NFS lands.
- As with Alternative 2, the existing four-person, fixed-grip Corona chairlift would be replaced with a new six-person, detachable chairlift. The existing chairlift would be removed and upgraded with the new chairlift in the same alignment with the same top and bottom terminal location. The upgraded Corona chairlift would have a design capacity of 2,400 pph.

- As with Alternative 2, the existing Challenge and Cannonball chairlifts would be removed and replaced with one six-person, detachable chairlift in an alignment that provides direct out-of-base access to the summit of Challenge Mountain. The chairlift would have a slope length of approximately 4,100 feet, a vertical rise of approximately 1,000 feet and a design capacity of 3,000 pph.

Snowmaking

- Snowmaking coverage is proposed for all new ski trails, resulting in approximately 52 acres of additional snowmaking coverage.

On-Mountain Facilities

- As with Alternative 2, the new Challenge Mountain Facility, located below the top terminal of the Indian Peaks chairlift, would be approximately 16,000 to 20,000 square feet and provide 850 seats for guests.
- As with Alternative 2, the existing 3,000-square foot Lookout facility would be renovated, increasing its size to between 7,700 and 9,700 square feet, providing up to 300 more seats for guests.

Parking

- As with Alternative 2, an additional 560 parking spaces are proposed on private lands.

Vegetation Management Projects

- As with Alternative 2, management prescriptions from EMR's Vegetation Management Plan would be applied to the SUP and adjacent private lands to maintain and/or improve forest health and provide implementation guidance for ski area projects.

Forest Plan Amendment

- Alternative 3 would increase EMR's SUP boundary by approximately 18 acres, requiring a Forest Plan amendment to assign and change Forest Plan management area allocations, SIOs and ROS classifications in the existing SUP boundary and the proposed boundary locations.

C. PUBLIC INVOLVEMENT

A scoping notice, dated June 28, 2012, was mailed to approximately 220 community residents, interested individuals, public agencies, and other organizations. The information within the notice provided a brief description of the proposal, the Purpose and Need for action, and an illustrative map. This notice was specifically designed to elicit comments, concerns, and issues pertaining to the proposal. A Notice of

Intent (NOI) to prepare an Environmental Impact Statement was published in the Federal Register on July 6, 2012.

Immediately prior to scoping, EMR notified the ARP of a design change to the proposed Jolly Jug chairlift and terrain network. The June 28, 2012, scoping letter and map erroneously included EMR's design change for the proposed Jolly Jug chairlift and terrain network, and Special Use Permit (SUP) boundary adjustment rather than the ARP's Proposed Action. This possible design change clearly differed from the accepted 2011 Master Plan for EMR. The ARP distributed a *corrected* scoping letter, dated July 13, 2012, to the public documenting the correction and requesting the public comment on the ARP's Proposed Action, in addition to EMR's design change to the Jolly Jug chairlift and terrain network.

The corrected ARP Proposed Action for this environmental analysis is as described in the 2011 Master Plan. The ARP officially submitted a correction to the Federal Register for the NOI to prepare an Environmental Impact Statement (EIS), which was published on July 20, 2012. Due to the scoping notice and NOI correction, the ARP extended the scoping period through August 31, 2012. During the scoping period, two public open houses were held by the ARP—one on July 18, 2012 in Boulder, Colorado at the Boulder Ranger District office and a second on July 19, 2012 in Nederland, Colorado at the Nederland Community Center. Additional information was available on the project website (www.eldoraeis.com) and comment submissions were accepted on this website. Comments were accepted from the following sources: email, web submission, letter, public meetings, fax, and phone. During the scoping period, the ARP received approximately 1,400 comment submittals.

All of the submittals were reviewed and comments were extracted and categorized by resource or topic. These comments were reviewed by the ARP Interdisciplinary Team (ID Team) during and subsequent to the post-scoping ID Team meeting on October 10, 2012. The ID Team used comment disposition codes to identify issues and to formulate potential alternatives to the Proposed Action in response to external (public and agency) and internal (ARP) concerns. Resource issues and indicators are identified below.[2]

D. SUMMARY OF RESOURCE ISSUES ADDRESSED

Based on the results of ARP specialist and public scoping, the ARP identified specific areas of concern regarding proposed projects and classified them as either "*Issues Analyzed*" or "*Issues Dismissed*." Each of the following issue statements includes a list of indicators (refer to Chapter 1), which were identified as a means of measuring or quantifying the anticipated level of impact on a particular resource.

[2] The scoping comment disposition analysis is available in the project file.

HUMAN ENVIRONMENT

Recreation, Mountain Operations and Guest Services

- Proposed projects within EMR's existing and proposed SUP area and private lands have the potential to affect the skier recreational experience and guest safety at the ski area.
- Proposed projects have the potential to affect dispersed recreation within and adjacent to EMR's existing and proposed SUP area, as well as private lands.

Traffic, Parking and Air Quality

- Proposed projects could generate measurable increases in daily/seasonal visitation and lead to additional vehicular traffic on Boulder Canyon Drive through Nederland and on Shelf Road (the ski area access road). Proposed projects also could generate construction traffic on these roads, as well as County Road 130 through the Town of Eldora. Parking capacities may also be affected by proposed projects.
- Due to increases in ski area and construction traffic, air quality could be affected within the region.

Scenery Resources

- Development of proposed projects, including associated infrastructure, would be visible from locations beyond the ski area.

Cultural and Heritage Resources

- Implementation of proposed projects and associated ground disturbance may affect previously identified and unidentified cultural and heritage resources within the existing and proposed SUP area and on private lands.

Social and Economic Resources

- Through construction, operation and increased annual visitation, implementation of proposed projects could alter local employment, personal income (i.e., wages) and visitor spending—in both the short- and long-term—in Boulder and Gilpin counties (in compliance with Executive Order 12898), by increasing total annual visitation.

Noise

- Snowmaking and isolated rock blasting for trail construction has the potential to generate additional noise audible in the Town of Eldora.

BIOLOGICAL ENVIRONMENT

Forest Health

- Implementation of vegetation management projects, including insect abatement, could affect forest health within the existing and proposed SUP area and on private lands. The clearing of ski trails combined with the effects of Mountain Pine Beetle (MPB) mortality could change stand composition and fuel behavior.

Fish and Wildlife

- Development of proposed projects, including associated infrastructure, could affect individuals, populations, and/or habitat values for federally Proposed, Threatened or Endangered and/or Forest Service Rocky Mountain Region sensitive (PTES) fish and wildlife species, Management Indicator Species (MIS), migratory birds, and species of local concern (SOLC).

Plants

- Plant communities, PTES plant species, SOLC, and significant natural plant communities (SNPC) may be altered as a result of the proposed projects. Construction activity and ongoing maintenance of the ski area could increase presence of invasive plant species.

Watershed, Wetlands and Soils

- Implementation of terrain modifications associated with proposed projects (vegetation removal, grading, utility installation/burial, road reconstruction, and facilities construction and on-going maintenance after implementation) has the potential to affect soils, streams and riparian areas. Identified wetlands throughout the project area could be temporarily and/or permanently affected by construction and implementation of the proposed projects. Proposed ground disturbance and snowmaking may (individually and/or collectively) affect erosion and slope hazards.
- The additional snowmaking coverage on proposed ski trails would require additional water supply that must be consistent with the Endangered Species Act (indicators for this are covered under the Fish and Wildlife, as well as Plants issues above) and EMR's current water rights. The proposed ski trails would require the application of additional snowmaking coverage that could increase water yield across project area watersheds.

E. SUMMARY COMPARISON OF DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Table 2-5 in Chapter 2 includes a summary comparison of environmental consequences, by resource, for Alternatives 1, 2 and 3. Detailed information on affected environment and environmental consequences for each resource considered in this analysis can be found in Chapter 3.

Table of Contents

TABLE OF CONTENTS

1. PURPOSE AND NEED 1-1

A. INTRODUCTION 1-1
B. BACKGROUND 1-2
C. RELATIONSHIP TO PREVIOUS ANALYSES AND APPROVALS 1-3
D. PURPOSE AND NEED FOR THE PROPOSED ACTION 1-3
E. SUMMARY OF THE ACTION ALTERNATIVES 1-7
Alternative 2 – Proposed Action 1-7
Alternative 3 1-8
F. INTERAGENCY COORDINATION 1-8
G. PUBLIC INVOLVEMENT 1-8
H. RELEVANT CHANGES TO THE PROPOSED ACTION SINCE PROJECT SCOPING 1-9
I. ISSUES ANALYZED AND ISSUES DISMISSED 1-10
Issues Analyzed 1-10
Issues Dismissed 1-17
J. SCOPE OF THE ANALYSIS 1-19
Actions 1-19
Alternatives 1-19
Impacts 1-19
K. CONSISTENCY WITH FOREST SERVICE POLICY 1-20
Land and Resource Management Plan Consistency 1-20
L. DECISION TO BE MADE 1-20
M. OTHER NECESSARY PERMITS, LICENSES, ENTITLEMENTS AND/OR CONSULTATION 1-21

2. DESCRIPTION OF ALTERNATIVES 2-1

A. INTRODUCTION 2-1
B. ALTERNATIVES CONSIDERED IN DETAIL 2-1
Alternative 1 – No Action 2-2
Alternative 2 – Proposed Action 2-3
Alternative 3 2-11
C. PROJECT DESIGN CRITERIA INCORPORATED INTO ALTERNATIVES 2 AND 3 2-15
D. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL 2-39
E. COMPARISON OF ALTERNATIVES 2-45
F. SUMMARY COMPARISON OF DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES 2-47
G. IDENTIFICATION OF THE PREFERRED ALTERNATIVE 2-79

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES 3-1

INTRODUCTION 3-1
A. RECREATION, MOUNTAIN OPERATIONS AND GUEST SERVICES 3-3
Scope of the Analysis 3-3
Affected Environment 3-4
Direct and Indirect Environmental Consequences 3-12
Cumulative Effects 3-29
Irreversible and Irretrievable Commitment of Resources 3-36
B. TRAFFIC, PARKING AND AIR QUALITY 3-37
Scope of the Analysis 3-37
Affected Environment 3-38
Direct and Indirect Environmental Consequences 3-44
Cumulative Effects 3-56
Irreversible and Irretrievable Commitments of Resources 3-63
C. SCENERY RESOURCES 3-64
Scope of the Analysis 3-64
Management of the Scenic Environment on National Forest System Lands 3-65

Affected Environment *3-69*
Direct and Indirect Environmental Consequences *3-71*
Cumulative Effects *3-86*
Irreversible and Irretrievable Commitments of Resources *3-90*
D. CULTURAL RESOURCES 3-91
Scope of the Analysis *3-91*
Affected Environment *3-91*
Direct and Indirect Environmental Consequences *3-94*
Cumulative Effects *3-95*
Irreversible and Irretrievable Commitments of Resources *3-95*
E. SOCIAL AND ECONOMIC RESOURCES 3-96
Scope of the Analysis *3-96*
Affected Environment *3-97*
Direct and Indirect Environmental Consequences *3-105*
Cumulative Effects *3-115*
Irreversible and Irretrievable Commitment of Resources *3-118*
F. NOISE 3-119
Scope of the Analysis *3-119*
Affected Environment *3-120*
Direct and Indirect Environmental Consequences *3-124*
Cumulative Effects *3-131*
Irreversible and Irretrievable Commitments of Resources *3-132*
G. FOREST HEALTH 3-133
Scope of the Analysis *3-133*
Forest Service Direction *3-133*
Affected Environment *3-133*
Direct and Indirect Environmental Consequences *3-140*
Cumulative Effects *3-146*
Irreversible and Irretrievable Commitment of Resources *3-147*
H. FISH AND WILDLIFE 3-148
Scope of the Analysis *3-148*
Analysis Areas *3-148*
Forest Service Direction *3-151*
Affected Environment *3-151*
Direct and Indirect Environmental Consequences *3-194*
Cumulative Effects *3-245*
Irreversible and Irretrievable Commitment of Resources *3-256*
I. PLANTS 3-257
Scope of the Analysis *3-257*
Affected Environment *3-257*
Direct and Indirect Environmental Consequences *3-269*
Cumulative Effects *3-277*
Irreversible and Irretrievable Commitment of Resources *3-279*
J. WATERSHED, WETLANDS AND SOILS 3-280
Scope of the Analysis *3-280*
Forest Plan Direction *3-280*
Executive Order 11990 ..... *3-280*
Affected Environment *3-281*
Direct and Indirect Environmental Consequences *3-301*
Cumulative Effects *3-330*
Irreversible and Irretrievable Commitment of Resources *3-336*

4. CONSULTATION AND COORDINATION 4-1

A. PREPARERS 4-1
Forest Service Team 4-1
Consultant Team 4-1
B. AGENCIES, ORGANIZATIONS, TRIBAL GOVERNMENTS, AND PERSONS CONTACTED 4-3
Federal Government 4-3
Tribal Government 4-4
State Government 4-4
Local Government 4-4
Other Organizations 4-4
Individuals Who Commented During Scoping or Who Have Participated in the NEPA Process 4-4

5. REFERENCES 5-1

6. FIGURES 6-1

Vicinity Map
Figure 1: Alternative 1 – No Action
Figure 2: Alternative 2 – Proposed Action
Figure 3: Alternative 2 – Proposed Action Vegetation Management Projects
Figure 4: Alternative 3
Figure 5: Alternative 3 Vegetation Management Projects
Figure 6: Forest Plan SIOs and Critical Viewpoints
Figure 7: Critical Viewpoint 1 Fourth of July Road Visual Simulation
Figure 8: Critical Viewpoint 2 Hessie/Fourth of July Road Fork Visual Simulation
Figure 9: Critical Viewpoint 3 Eldorado Avenue/CR 130 Visual Simulation
Figure 10: Critical Viewpoint 4 Proposed Bridge 3D Rendering
Figure 11: Forest Plan Amendment
Figure 12: Water Resources and Alternative 2 Impacts
Figure 13: Water Resources and Alternative 3 Impacts

7. GLOSSARY 7-1

8. INDEX 8-1

APPENDICES

APPENDIX A: CUMULATIVE EFFECTS PROJECTS
APPENDIX B: PROPOSED FOREST PLAN AMENDMENTS

LIST OF TABLES

TABLE 1-1: LIFT-SERVED TERRAIN DISTRIBUTION BY ABILITY LEVEL – EXISTING CONDITIONS 1-5
TABLE 2-1: PROPOSED TERRAIN AREA BY ABILITY LEVEL – ALTERNATIVE 2 2-4
TABLE 2-2: PROPOSED TERRAIN AREA BY ABILITY LEVEL – ALTERNATIVE 3 2-12
TABLE 2-3: PROJECT DESIGN CRITERIA AND BEST MANAGEMENT PRACTICES 2-17
TABLE 2-4: SUMMARY COMPARISON OF ALTERNATIVES 2-45
TABLE 2-5: SUMMARY COMPARISON OF DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES 2-48
TABLE 3A-1: TOTAL ANNUAL SKIER VISITATION IN COLORADO COMPARED TO EMR 3-5
TABLE 3A-2: LIFT-SERVED TERRAIN DISTRIBUTION BY ABILITY LEVEL – EXISTING CONDITIONS 3-7
TABLE 3A-3: CHAIRLIFT WIND CLOSURES 3-9
TABLE 3A-4: EMR PROJECTED ANNUAL VISITATION – ALTERNATIVES 1 THROUGH 3 3-13
TABLE 3A-5: LIFT-SERVED TERRAIN DISTRIBUTION BY ABILITY LEVEL – ALTERNATIVE 2 3-17
TABLE 3A-6: LIFT-SERVED TERRAIN DISTRIBUTION BY ABILITY LEVEL – ALTERNATIVE 3 3-25
TABLE 3B-1: PEAK AM 4-HOUR ARRIVAL VEHICLE VOLUME & DAILY SKIER-DAY COUNT MARCH 26 THROUGH APRIL 1, 2012 3-40
TABLE 3B-2: RELATIONSHIP BETWEEN 10TH HIGHEST DAY VISITATION TO OTHER VISITATION DAYS 3-41
TABLE 3B-3: PRIMARY FORMS OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR SELECTED CRITERIA POLLUTANTS 3-43
TABLE 3B-4: 10TH HIGHEST DAY SHELF ROAD PEAK HOUR TRAFFIC VOLUMES BY ALTERNATIVE 3-45
TABLE 3B-5: STATE HIGHWAY 119 AT ELDORA ROAD 2035 DESIGN DAY PM PEAK HOUR TRAFFIC (VEHICLES PER HOUR) 3-46
TABLE 3B-6: TREE REMOVAL TRUCK TRIPS BY PROJECT COMPONENT 3-48
TABLE 3B-7: TREE REMOVAL TRUCK TRIPS BY YEAR 3-49
TABLE 3B-8: SUMMARY OF NONROAD2008 AND MOVES2010 EMISSIONS ESTIMATES FOR AND ACTION ALTERNATIVES DURING THE CONSTRUCTION PHASE FOR A WEEKDAY IN JULY 2015 3-50
TABLE 3B-9: SUMMARY OF MOVES2010 EMISSIONS ESTIMATES FOR EXISTING CONDITION AND ACTION ALTERNATIVES DURING THE OPERATION PHASE FOR A WEEKEND DAY IN JANUARY 2023 3-50
TABLE 3D-1: ISOLATED FINDS 3-93
TABLE 3E-1: STUDY AREA POPULATION TOTALS AND PROJECTIONS 1980–2040 3-98
TABLE 3E-2: RECENT & AVERAGE/ROUNDED ELDORA MOUNTAIN RESORT "BASELINE" VISITATION 3-101
TABLE 3E-3: EMR EMPLOYMENT *POSITIONS* 2010–2013 3-101
TABLE 3E-4: CONVERSION OF EMPLOYMENT POSITIONS TO FTES 3-102
TABLE 3E-5: DAILY, PER CAPITA EXPENDITURES – COLORADO SKIERS 3-103
TABLE 3E-6: ESTIMATED ANNUAL EXPENDITURES BY EMR VISITORS: CURRENT LEVEL ($MILLIONS) 3-103
TABLE 3E-7: TOTAL CURRENT FTE EMPLOYMENT AND DOLLAR FLOW IMPACT (ELDORA MOUNTAIN RESORT) . 3-104
TABLE 3E-8: BREAKDOWN OF TOTAL GENERAL REVENUE BY SOURCE IN FY 2007 3-105
TABLE 3E-9: ALTERNATIVE 2 – ECONOMIC IMPACT DURING PROJECTION PERIOD – PRIVATE AND PUBLIC SECTORS 3-111
TABLE 3E-10: ALTERNATIVE 3 – ECONOMIC IMPACT DURING PROJECTION PERIOD 3-115
TABLE 3F-1: SNOWMAKING OPERATING DAYS AND HOURS 3-120
TABLE 3F-2: TYPICAL SOUND LEVELS FROM SKI AREA SOURCES 3-123
TABLE 3F-3: NOISE LEVELS (DBA) FOR COMMON NOISE SOURCES 3-124
TABLE 3G-1: DISTURBANCE IMPACTS – ALTERNATIVE 2 3-143
TABLE 3G-2: DISTURBANCE IMPACTS – ALTERNATIVE 3 3-145
TABLE 3H-1: EXISTING HABITAT TYPES AND STRUCTURAL STAGES WITHIN THE PROJECT AREA 3-151
TABLE 3H-2: FEDERALLY LISTED AND PROPOSED ANIMAL SPECIES KNOWN TO OCCUR IN THE ACTION AREAS OR WITH POTENTIAL TO BE AFFECTED 3-153
TABLE 3H-3: LYNX HABITAT TYPES – EXISTING CONDITIONS 3-162
TABLE 3H-4: LYNX HABITAT STATISTICS FOR THE BOULDER LYNX ANALYSIS UNIT – ENVIRONMENTAL BASELINE 3-163
TABLE 3H-5: REGION 2 ARP FOREST SERVICE SENSITIVE ANIMAL SPECIES 3-167
TABLE 3H-6: MANAGEMENT INDICATOR SPECIES EVALUATION – EXISTING CONDITIONS 3-181
TABLE 3H-7: MIGRATORY BIRD SPECIES – EXISTING CONDITIONS 3-191
TABLE 3H-8: USFWS BIRDS OF CONSERVATION CONCERN FOR BCR – EXISTING CONDITIONS 3-192

TABLE 3H-9: HABITAT VALUES LOST OR RETAINED – ALTERNATIVE 2 3-195
TABLE 3H-10: EFFECTS TO FEDERALLY-LISTED ANIMAL SPECIES – ALTERNATIVES 1 THROUGH 3..... 3-196
TABLE 3H-11: LYNX HABITAT AFFECTED BY ALTERNATIVE 2 AND VMP PRESCRIPTIONS P1 TO P8..... 3-200
TABLE 3H-12: SUMMARY LYNX HABITAT AFFECTED BY ALTERNATIVE 2 PROJECT COMPONENTS..... 3-200
TABLE 3H-13: CHANGES TO BOULDER LAU STATISTICS FROM ALTERNATIVE 2 3-201
TABLE 3H-14: BOULDER LAU STATISTICS FROM IMPLEMENTATION OF ALTERNATIVE 2..... 3-202
TABLE 3H-15: HABITAT VALUES LOST OR RETAINED – ALTERNATIVE 3 3-223
TABLE 3H-16: LYNX HABITAT AFFECTED BY ALTERNATIVE 3 AND VMP PRESCRIPTIONS P1 TO P8..... 3-225
TABLE 3H-17: SUMMARY LYNX HABITAT AFFECTED BY ALTERNATIVE 3 PROJECT COMPONENTS..... 3-225
TABLE 3H-18: CHANGES TO BOULDER LAU FROM ALTERNATIVE 3..... 3-226
TABLE 3H-19: BOULDER LAU STATISTICS FROM IMPLEMENTATION OF ALTERNATIVE 3..... 3-227
TABLE 3I-1: FEDERALLY LISTED PLANTS CONSIDERED 3-259
TABLE 3I-2: USFS REGION 2 SENSITIVE PLANT SPECIES FOR ARP EAST OF THE CONTINENTAL DIVIDE 3-262
TABLE 3I-3: SURVEY RESULT SUMMARY OF SPECIES OF LOCAL CONCERN 3-268
TABLE 3J-1: AQUATIC RESOURCES IN THE STUDY WATERSHEDS – QUANTITATIVE DESCRIPTION..... 3-281
TABLE 3J-2: STUDY WATERSHEDS – EXISTING CONDITIONS 3-285
TABLE 3J-3: SUMMARY OF SNOWMAKING WATER USE FROM 2007–2012 EXISTING CONDITIONS..... 3-285
TABLE 3J-4: SNOWMAKING COVERAGE ON THE STUDY WATERSHEDS – EXISTING CONDITIONS..... 3-286
TABLE 3J-5: WRENNS MODEL OUTPUT FOR AN AVERAGE YEAR – BASELINE AND EXISTING CONDITIONS..... 3-287
TABLE 3J-6: WRENNS MODEL OUTPUT FOR DRY, AVERAGE, AND WET YEARS – EXISTING CONDITIONS 3-287
TABLE 3J-7: STREAM HEALTH CLASSES FOR ATTAINMENT OF FOREST PLAN DIRECTION (WCPH) 3-289
TABLE 3J-8: MIDDLE BOULDER CREEK NEAR EMR – STREAM HEALTH DATA..... 3-290
TABLE 3J-9: CONNECTED ROADS WITHIN THE STUDY WATERSHEDS – EXISTING CONDITIONS 3-292
TABLE 3J-10: CDA WITHIN THE STUDY WATERSHEDS – EXISTING CONDITIONS..... 3-293
TABLE 3J-11: FORESTED AREAS WITHIN EMR'S WIZ – EXISTING CONDITIONS..... 3-293
TABLE 3J-12: QUALITATIVE WETLAND ASSESSMENT RANKINGS 3-296
TABLE 3J-13: SUMMARY OF WETLAND FUNCTIONS AND VALUES IN THE STUDY AREA 3-297
TABLE 3J-14: DISTURBANCE ACRES – EXISTING CONDITIONS..... 3-301
TABLE 3J-15: ELDORA MOUNTAIN RESORT WATERSHEDS 3-302
TABLE 3J-16: COMPARISON OF EXISTING AND PROPOSED IMPACTS TO FORESTS AT EMR 3-304
TABLE 3J-17: PROPOSED CHANGES IN SNOWMAKING COVERAGE AND WATER USE – ALTERNATIVE 2..... 3-304
TABLE 3J-18: ESTIMATED CHANGES TO ANNUAL YIELD – ALTERNATIVE 2 3-306
TABLE 3J-19: ESTIMATED CHANGES TO PEAK FLOWS – ALTERNATIVE 2 3-306
TABLE 3J-20: PROPOSED TREE CLEARING WITHIN THE WIZ OF STUDY WATERSHEDS – ALTERNATIVE 2 3-308
TABLE 3J-21: DISTURBANCE ACRES – ALTERNATIVE 2 3-315
TABLE 3J-22: DIRECT IMPACTS TO SOIL RESOURCE – ALTERNATIVE 2..... 3-318
TABLE 3J-23: COMPARISON OF EXISTING AND ALTERNATIVE 3 IMPACTS TO FORESTS AT EMR..... 3-320
TABLE 3J-24: CHANGES IN SNOWMAKING COVERAGE AND WATER USE – ALTERNATIVE 3..... 3-321
TABLE 3J-25: ESTIMATED CHANGES TO ANNUAL YIELD – ALTERNATIVE 3 3-322
TABLE 3J-26: ESTIMATED CHANGES TO PEAK FLOWS – ALTERNATIVE 3 3-322
TABLE 3J-27: PROPOSED TREE CLEARING WITHIN THE WIZ OF STUDY WATERSHEDS – ALTERNATIVE 3 3-323
TABLE 3J-28: DISTURBANCE ACRES – ALTERNATIVE 3 3-328
TABLE 3J-29: DIRECT IMPACTS TO SOIL RESOURCE – ALTERNATIVE 3.....3-329

LIST OF CHARTS

CHART 3B-1: TURNING MOVEMENT VOLUMES AT THE STATE HIGHWAY 119/ELDORA ROAD INTERSECTION MARCH 2012 AND MARCH 2013.....3-41

LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
AAQS	Ambient Air Quality Standards
AAMP	Ambient Air Monitoring Program
ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AF	Acre feet
APE	Area of Potential Effect
ARP	Arapaho and Roosevelt National Forests and Pawnee National Grassland
ASOLC	Animal Species of Local Concern
BA	Biological Assessment
BCCP	Boulder County Comprehensive Plan
BCP	Bird Conservation Plan
BCR	Bird Conservation Region
BE	Biological Evaluation
BEIG	Built Environment Image Guide
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
BRD	Boulder Ranger District
CAA	Clean Air Act
CAGR	Compound Annual Growth Rate
CASTNET	Clean Air Status and Trends Network
CCC	Comfortable Carrying Capacity
CDA	Connected Disturbed Area
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CEQ	Council on Environmental Quality
CFS	Cubic Feet per Second
CH_4	Methane
CNHP	Colorado National Heritage Program
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CPW	Colorado Parks and Wildlife
CRCT	Colorado River Cutthroat Trout
CSCUSA	Colorado Ski Country USA
CWA	Clean Water Act
CWD	Course Woody Debris
dB	Decibel

dBA	Decibel measured on the A scale
dbh	Diameter at Breast Height
DE	Diesel Exhaust
DEIS	Draft Environmental Impact Statement
DHV	Design Hourly Volume
DOLA	Colorado Department of Local Affairs
DPS	Distinct Population Segment
DTD	Daily Travel Distances
dv	deciviews
EA	Environmental Assessment
EEPP	Eldora Environmental Preservation Plan
EIS	Environmental Impact Statement
EMR	Eldora Mountain Resort
EPA	Environmental Protection Agency
EO	Executive Order
EOR	Element Occurrence Record
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
Forest Service	United States Department of Agriculture Forest Service
FPCA	Forest Plan Consistency Analysis
FSH	Forest Service Handbook
FSM	Forest Service Manual
FT	Feet
FTE	Full-time-equivalent
GHG	Greenhouse Gas
GIS	Geographic Information System
GBCT	Greenback Cutthroat Trout
HUC	Hydrologic Unit Code
ID Team	Interdisciplinary Team
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPaC	Information, Planning, and Conservation
IRIS	Integrated Risk Information System
LAA	Likely to Adversely Affect
LAU	Lynx Analysis Unit
LHCF	Live Horizontal Conifer Foliage
LRMP	Land and Resource Management Plan
LWD	Large Woody Debris
M&E	Monitoring and Evaluation
MA	Management Areas
MAII	May Adversely Impact Individuals
Master Plan	Eldora Mountain Resort Master Plan

MBTA	Migratory Bird Treaty Act
mg/l	Milligrams Per Liter
mg/m	Milligrams Per Meter
µg/m	Micrograms Per Meter
MIS	Management Indicator Species
MM	Management Measures
mm	Millimeter
MOU	Memorandum of Understanding
MPB	Mountain Pine Beetle
MSAT	Mobile Source Air Toxics
MSO	Mexican Spotted Owl
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NADP	National Atmospheric Deposition Program
NAMS	National Air Monitoring Stations
NDIS	Natural Diversity Information
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NI	No Impact
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
NOA	Notice of Availability
NOI	Notice of Intent
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
O_3	Ozone
OAHP	Office of Archeology and Historic Preservation
PAMS	Photochemical Assessment Monitoring Stations
PDC	Project Design Criteria
PEM	Palustrine Emergent
PFO	Palustrine Forested
PHQ	Patrol Headquaters
$PM_{2.5}$	Particulate Matter under 2.5 microns
PM_{10}	Particulate Matter under 10 microns
PMJM	Preble's Meadow Jumping Mouse
PPH	People Per Hour
PPM	Parts Per Million
PRRIP	Platte River Recovery Implementation Program
PSD	Prevention of Significant Deterioration

PSS	Palustrine Shrub/Scrub
PTES	Proposed, Threatened or Endangered and Region 2 Sensitive Species
R2	Region 2
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RTD	Regional Transportation District
SHPO	State Historic Preservation Officer
SIO	Scenic Integrity Objective
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Stations
SMS	Scenery Management System
SNPC	Significant Natural Plant Communities
SO_2	Sulfur Dioxide
SOLC	Species of Local Concern
SPMS	Special Purpose Monitoring Stations
SPWRAP	South Platte Water Related Activities Program
SUP	Special Use Permit
Tg	Teragrams
TMDL	Total Maximum Daily Load
TSP	Total Suspended Particulate
USACE	US Army Corps of Engineers
USDA	United States Department of Agriculture
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
VMP	Vegetation Management Plan
VPD	Vehicles Per Day
WCPH	Watershed Conservation Practices Handbook
WIZ	Water Influence Zone
WPBR	White Pine Blister Rust
WRENSS	Water Resource Evaluation of Non-Point Silvicultural Sources

Chapter 1
Purpose and Need

1. PURPOSE AND NEED

A. INTRODUCTION

The proposed improvements analyzed in this document constitute a federal action, which has the potential to affect the quality of the human environment on public lands administered by the Forest Service. Therefore, these projects must be analyzed pursuant to the National Environmental Policy Act of 1969 (NEPA). Under NEPA, Federal Agencies must carefully consider environmental concerns in their decision making processes and provide relevant information to the public for review and comment.

The Forest Service has prepared this Draft Environmental Impact Statement (DEIS) in compliance with NEPA and other relevant federal and state laws and regulations. This DEIS contains analyses consistent with NEPA, Council on Environmental Quality (CEQ) regulations, and Forest Service policy. It discloses potential direct, indirect, and cumulative environmental effects on the human and biological environment anticipated to result with implementation of the Proposed Action or an additional action alternative. Additionally, it is intended to ensure that planning considers the environmental and social values of the project area and that potential resource conflicts are minimized or avoided. The document is organized into eight chapters:

- **Chapter 1 – Purpose and Need:** includes information on the history of the project proposal, the purpose of and need for the project, and the proposal for achieving that purpose and need. Chapter 1 details how the Forest Service informed the public of the proposal and how the public responded. Chapter 1 also describes issues raised through the scoping process.
- **Chapter 2 – Description of Alternatives:** provides a detailed description of the No Action Alternative, the Proposed Action, and an alternative to the Proposed Action (Alternative 3) that was formed in response to issues raised during scoping. This discussion also includes alternatives considered but eliminated from further analysis, and Project Design Criteria (PDC). Finally, Chapter 2 provides a summary table of the environmental consequences anticipated with each alternative.
- **Chapter 3 – Affected Environment and Environmental Consequences:** provides a description of the affected environment (i.e., existing conditions) by resource area, and describes the environmental effects of implementing the No Action Alternative, Proposed Action and Alternative 3. Chapter 3 is organized by resource topic.
- **Chapter 4 – Consultation and Coordination:** provides a list of preparers and agencies consulted during the development of this DEIS.
- **Chapter 5 – References:** provides complete references for documents cited within this DEIS.

- **Chapter 6 – Figures:** provides the maps, figures, visual simulations, and perspectives used throughout the analysis.
- **Chapter 7 – Glossary:** provides a definition of technical and non-technical terms used throughout this DEIS.
- **Chapter 8 – Index:** provides a list and page number of frequently used terms throughout this DEIS.
- **Appendices** – includes: (A) Cumulative Effects Projects; (B) Proposed Forest Plan Amendments.

Additional documentation, including more detailed analyses of project area resources, may be found in the project administrative record located at the Boulder Ranger District office of the Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP).

B. BACKGROUND

EMR is located partially on private land and partially on National Forest System (NFS) lands administered by the ARP, in Boulder and Gilpin Counties, Colorado (refer to Figure 1). The ski area is located outside of Nederland, approximately 21 miles west of Boulder, and 47 miles northwest of Denver, along Colorado's Front Range (refer to the Vicinity Map). EMR is accessed via a 3-mile side road off of State Highway 119 from both east and south. The ski area occupies approximately 1,204 acres of land: 524 acres of NFS lands; 220 acres are privately owned by EMR; and 460 acres are private lands leased by EMR. Elevations range from 9,200 feet elevation at the base of the ski slopes to 10,800 feet at the summit.

EMR operates under a Special Use Permit (SUP) from the Forest Service. The terms of the SUP require the preparation of a Master Plan, which identifies goals and opportunities for future management of the ski area on NFS lands. A Master Plan was prepared and submitted by EMR and approved through a Forest Service Decision Notice in 1994. In subsequent years, the 1994 Master Plan was revised and culminated in the 2011 Eldora Mountain Resort Master Plan (2011 Master Plan).[1] The 2011 Master Plan includes a list of proposed projects that, if analyzed and approved through the NEPA process, generally could be implemented in five to ten years. Major components of the 2011 Master Plan include improvements to chairlift infrastructure, additional terrain serviced by new chairlifts (Jolly Jug, Placer Express, and Moose Glades), and the construction of a new on-mountain guest service facility. Currently EMR includes skiing on approximately 336 acres of ski trails and tree and gladed skiing areas. Also

[1] Ski area Master Plans are conceptual in nature and contain desired conditions, objectives, and rationale for the comprehensive development of NFS lands within the SUP boundary *and* adjacent private lands. Master Plans are *accepted* by the Forest Service and provide a framework for identifying and prioritizing potential projects to be subsequently carried forward into a NEPA review and analysis.

included in the 2011 Master Plan is a suite of chairlift upgrades, improvements to guest service facilities and parking areas, and several terrain network improvements within the ski area boundary.

C. RELATIONSHIP TO PREVIOUS ANALYSES AND APPROVALS

This DEIS is consistent with and incorporates by reference several documents which are related to the management of EMR on NFS lands, including:

- 1994 Eldora Mountain Resort Master Plan (1994 Master Plan);
- 1997 Revision of the Arapaho and Roosevelt National Forests and Pawnee National Grassland Land and Resource Management Plan (1997 Forest Plan);
- 1997 Revision of the Arapaho and Roosevelt National Forests and Pawnee National Grassland Land and Resource Management Plan Final Environmental Impact Statement (1997 Forest Plan FEIS);
- 2010 Eldora Mountain Resort Corona Grading Project, Environmental Assessment, Decision Notice and Finding of No Significant Impact (2010 EMR EA); and
- 2011 Eldora Mountain Resort Master Plan (2011 Master Plan).

D. PURPOSE AND NEED FOR THE PROPOSED ACTION

The ARP has prepared this EIS in response to EMR's request to implement projects from their accepted Master Plan. The overall purpose of the proposed projects is to improve the guest experience and skier safety at the resort.[2] Additionally, the purpose of the proposed projects is to address forest health and vegetation management at the resort. The purpose and need is described in the following paragraphs.

Purpose and Need – Recreation

In order to meet the needs and expectations of existing and potential guests and provide a safe skiing experience, the ARP, through its acceptance of EMR's 2011 Master Plan, has identified a need to:

- **Improve the reliability of chairlift and terrain offerings;**
- **Address skier safety concerns during prevalent wind events;**
- **Provide additional intermediate to expert ability level terrain and a new, more natural terrain experience;**

[2] The terms "skier," "skiing," "ski," "ski trail," and "skiable" as used within this document are expressly inclusive of all forms of Alpine on-snow recreation including: snowboarding, telemark skiing, adaptive skiing, and other forms of allowable on-snow sliding.

- **Provide new and upgraded chairlift infrastructure to improve the quality of the alpine ski experience; and**
- **Expand and improve on-mountain guest services.**

EMR currently operates 8 chairlifts and 3 surface lifts, thereby providing access to 49 ski trails totaling approximately 184 acres of cleared ski trails and 152 acres of tree and gladed terrain. There are several identified deficiencies at EMR that detract from the guest experience and may contribute to the resort's inability to capture and retain market share.

1) Improve the reliability of chairlift and terrain offerings.

EMR routinely experiences wind events that force the closure of the Challenge, Cannonball, Indian Peaks and Corona chairlifts. As with all fixed-grip chairlifts, individual chairs are lightweight and susceptible to winds, and when these chairlifts are put on wind hold (particularly Challenge and Cannonball) EMR's available terrain becomes very limited, as the back-side terrain is not accessible.[3] Moreover, when these chairlifts are inoperable, the Comfortable Carrying Capacity (CCC) of EMR is reduced by 2,700 guests, from 4,250 to 1,550 guests.[4] Closures during wind events create major operational difficulties for the ski area, quickly diminish the guest experience, and decrease the overall reliability of the ski area operations from a guest standpoint.

2) Address skier safety concerns during prevalent wind events.

Wind events that force the closure of chairlifts also create safety concerns on the terrain that remains open to skiing. As stated above, in the event that Challenge, Cannonball, Indian Peaks and Corona chairlifts all close, the skiers that were using those chairlifts are shifted to primarily the front-side terrain on the EZ, Caribou, Sundance, and Race chairlifts. The result of this occurrence is high skier densities on ski trails served by EZ, Caribou, Sundance, and Race chairlifts. When combined, the Challenge, Cannonball, Indian Peaks and Corona chairlifts comprise approximately 60 percent of the overall chairlift capacity at EMR. When these chairlifts are temporarily stopped due to wind, (particularly Challenge and Cannonball) EMR's available terrain becomes restricted to the front-side of the ski area, which is limited to lower ability level terrain. The result of chairlift closures due to wind events is an increase of skier densities on the remaining open terrain, which leads to safety concerns due to skier densities and mixing of different skier ability levels on lower level terrain.

[3] A fixed-grip chairlift is an aerial tramway system on which chairs remain attached to a haul rope.
[4] Comfortable Carrying Capacity is a planning tool used to determine the optimum level of utilization that facilitates a pleasant recreational experience. This is a planning figure only and does not represent a regulatory cap on visitation. CCC is used to ensure that different aspects of a resort's facilities are designed to work in harmony, that capacities are equivalent across facilities, and sufficient to meet anticipated demand. CCC is based on factors such as vertical transport and ski trail capacities.

3) Provide additional intermediate to expert ability level terrain and a new, more natural terrain experience.

An examination of terrain distribution by ability level at EMR primarily indicates a deficiency in intermediate to expert ability level terrain. This deficiency is further exacerbated by the fact that intermediate ability level skiers make up the largest percentage of EMR's skier market. There is currently a surplus of beginner, novice and low intermediate terrain. EMR's existing traditional terrain distribution, and percentage of the skier market, by ability level is presented in the table below.

Table 1-1:
Lift-Served Terrain Distribution by Ability Level – Existing Conditions

Skier Ability Level		Trail Acreage	EMR Terrain Distribution[a]	Central Rockies Skier Ability Level (Market)
		(acres)	(%)	(%)
●	Beginner	4.3	7	5
●	Novice	17.1	17	15
■	Low Intermediate	44.6	34	25
■	Intermediate Ski Trail Tree and Gladed Skiing Area	*61.6* 52.5 9.1	32	35
◆	Advanced Intermediate Ski Trail Tree and Gladed Skiing Area	*70.1* 37.7 32.4	7	15
◆	Expert Ski Trail Tree and Gladed Skiing Area	*137.4* 27.1 110.3	4	5
	Total	**335.1**	**101**[b]	**100**

[a] EMR Terrain Distribution is based on terrain capacity.
[b] Due to rounding this number is greater than 100%.
Note: Acreage totals have been updated from the totals presented in the 2011 Master Plan to reflect more accurate GIS data.
Source: Eldora Mountain Resort, 2011

In addition, the Indian Peaks area at EMR is popular with intermediate ability level skiers and as such, it has higher ski trail densities than is ideal. High ski trail densities can feel uncomfortably crowded and affect the quality and safety of the recreation experience.

EMR currently provides 152 acres of tree and gladed skiing in five naturally gladed areas (limited thinning by EMR has occurred)—Jolly Jug, Placer, Bryan, Salto, and Moose. Depending on snow conditions, these five areas are popular destinations for EMR's more advanced guests. The desirability of the gladed experience is evidenced by the recent increase in use of existing tree and gladed skiing areas at the resort. Additional opportunities for glading have been identified across the back-side of the resort.

4) Provide new and upgraded chairlift infrastructure to improve the quality of the alpine ski experience.

Although well maintained, many of EMR's existing chairlifts are twenty years old or more and all utilize outdated fixed-grip technology. This fixed-grip technology provides a slower and less desirable experience than modern detachable chairlift technology. Additionally, some lift alignments are redundant or include features that result in operational inefficiencies.

5) Expand and improve on-mountain guest services.

On-mountain skier services at EMR are provided at the Lookout facility at the top of the Corona chairlift. Services provided by the Lookout include: limited food service, restrooms, a ski patrol area, a small 54-seat indoor seating area and an outdoor deck. The Lookout was built in 1972, has an inefficient layout and is undersized for existing visitation.

Furthermore, there is an overall deficiency of indoor seating capacity at EMR. Current outdoor seating that could help make up this deficit is often not utilized as a result of inclement weather, which can be common at EMR, particularly in regards to high winds.

Purpose and Need – Forest Health

In order to address vegetation management and forest health conditions at EMR, the ARP has identified a need to:

- **Maintain vegetation to improve forest health within the EMR boundaries in a manner that continues to be compatible with historic and future ski area uses; and**
- **Reduce the spread of noxious weeds.**

EMR has prepared a VMP and Noxious and Invasive Weed Management Plan for NFS and private lands at EMR. The plans address hazard trees, forest health and noxious weeds across the resort.

6) Maintain vegetation at EMR in a manner that continues to be compatible with historic and future ski area uses.

The Mountain Pine Beetle (MPB) epidemic has resulted in large numbers of standing dead trees that eventually will fall. Most research suggests these trees will begin to fall five to seven years after mortality. Not only do falling trees pose a safety hazard to all recreationists and ski area staff; they increase the fuel loads and wildfire potential during severe fire weather conditions. All the stands inventoried at EMR have some degree of infestation from the recent epidemic. In an attempt to maintain key lodgepole pine stands, EMR has been applying carbaryl to approximately within their operational boundary, annually since 2008. Additional vegetation management projects have been identified to address forest health concerns.

7) Reduce the spread of noxious weeds.

Eight species of Colorado State-listed Noxious Weeds have been documented at EMR. These include: Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans* subsp. *macrolepis*), houndstongue (*Cynoglossum officinale*), ox-eye daisy (*Leucanthemum vulgare*), toadflax (*Linaria vulgaris*), scentless chamomile (*Matricaria perforata*), chicory (Cichorum *intybus*), and mullein (*Verbascum thapsus*). A Noxious and Invasive Weed Management Plan has been developed for EMR that identifies control measures.

E. SUMMARY OF THE ACTION ALTERNATIVES

The projects analyzed in this DEIS are designed to address the Purpose and Need described above. This DEIS was assembled to enable the Responsible Official to determine whether or not all, portions of, or alternatives to the Proposed Action will be approved for implementation on NFS lands within the EMR SUP area.

As described below under "Public Involvement," the Proposed Action was introduced to the public in June 2012 when this project was scoped. A second, *corrected* scoping letter was distributed to the public in July 2012. The scoping notice indicated that the Proposed Action was being considered at that time as well as EMR's design change to the Jolly Jug chairlift and terrain network. The scoping notices also indicated that additional alternative actions could be considered as well in the EIS planning process. Alternative 3 is thus a logical outgrowth of the scoping process and based on public concerns.

A summary of the action alternatives is provided here, with a detailed description presented in Chapter 2.

ALTERNATIVE 2 – PROPOSED ACTION

The Proposed Action adds approximately 115 acres of new skiable terrain, includes two new chairlifts (Placer Express and Jolly Jug), replaces Challenge and Cannonball chairlifts with one chairlift, replaces Corona chairlift with an upgraded chairlift, includes a new on-mountain facility, and renovates the Lookout facility.[5] The Proposed Action increases EMR's SUP boundary by approximately 86 acres, requiring a Forest Plan amendment to assign and change Forest Plan management area allocations, Scenic Integrity Objectives (SIOs) and the Recreation Opportunity Spectrum (ROS) classification in the proposed boundary locations. In addition to ski-related projects, the Proposed Action includes vegetation management projects to address forest health conditions.

Components of the Proposed Action and details about adjustments made in response to scoping comments are presented in Chapter 2 Section B: Alternative 2 – Proposed Action.

[5] This acreage includes only new ski trail and new tree and gladed skiing areas. Modifications within existing tree and gladed skiing areas are excluded.

ALTERNATIVE 3

Alternative 3 responds to several issues raised internally by the ARP and externally by the public during the scoping process. Alternative 3 includes several projects included in the Proposed Action; however, to respond to identified issues, Alternative 3 does not include the Placer Express chairlift and terrain, and the associated SUP boundary adjustment at the north side of EMR.

Alternative 3 includes additional trails and tree and gladed skiing areas within the current SUP boundary. In addition, Alternative 3 also includes a reconfigured Jolly Jug chairlift and terrain alignment. The EMR Jolly Jug design option reflects the results of a continued planning process. This design incorporates a longer chairlift configuration and more skiable acreage in the form of ski trails and tree and gladed skiing areas, when compared to the Alternative 2 Jolly Jug alignment.

This alternative adds approximately 115 acres of new skiable terrain and would require a Forest Plan amendment to assign and change Forest Plan management area allocations, SIOs and the ROS classification for the proposed adjustment to the SUP boundary of approximately 18 acres on the southern border of the resort. Alternative 3 is described in detail in Chapter 2 Section B: Alternative 3.[6]

F. INTERAGENCY COORDINATION

In accordance with regulatory direction, and in furtherance of cooperative management among federal agencies charged with oversight of environmental and natural resources; federal, state, local, and tribal entities with a likely interest and/or jurisdiction in the Proposed Action were sent scoping notices and/or consulted prior to and throughout the NEPA process.

G. PUBLIC INVOLVEMENT

A scoping notice, dated June 28, 2012, was mailed to approximately 220 community residents, interested individuals, public agencies, and other organizations. The information within the notice provided a brief description of the proposal, the Purpose and Need for action, and an illustrative map. This notice was specifically designed to elicit comments, concerns, and issues pertaining to the proposal. A Notice of Intent (NOI) to prepare an Environmental Impact Statement was published in the Federal Register on July 6, 2012.

Immediately prior to scoping, EMR notified the ARP of a design change to the proposed Jolly Jug chairlift and terrain network. The June 28, 2012, scoping letter and map erroneously included EMR's design change for the proposed Jolly Jug chairlift and terrain network, and Special Use Permit (SUP) boundary adjustment rather than the ARP's Proposed Action. This possible design change clearly differed from the accepted 2011 Master Plan for EMR. The ARP distributed a *corrected* scoping letter, dated July

[6] This acreage includes only new ski trail and new tree and gladed skiing areas. Modifications within existing tree and gladed skiing areas are excluded.

13, 2012, to the public documenting the correction and requesting the public comment on the ARP's Proposed Action, in addition to EMR's design change to the Jolly Jug chairlift and terrain network.

The corrected ARP Proposed Action for this environmental analysis is as described in the 2011 Master Plan. The ARP officially submitted a correction to the Federal Register for the NOI to prepare an Environmental Impact Statement (EIS), which was published on July 20, 2012. Due to the scoping notice and NOI correction, the ARP extended the scoping period through August 31, 2012. During the scoping period, two public open houses were held by the ARP—one on July 18, 2012, in Boulder, Colorado at the Boulder Ranger District office and a second on July 19, 2012, in Nederland, Colorado at the Nederland Community Center. Additional information was available on the project website (www.eldoraeis.com) and comment submissions were accepted on this website. Comments were accepted from the following sources: email, web submission, letter, public meetings, fax, and phone. During the scoping period, the ARP received approximately 1,400 comment submittals.

All of the submittals were reviewed and comments were extracted and categorized by resource or topic. These comments were reviewed by the ARP Interdisciplinary Team (ID Team) during and subsequent to the post-scoping ID Team meeting on October 10, 2012. The ID Team used comment disposition codes to identify issues and to formulate potential alternatives to the Proposed Action in response to external (public and agency) and internal (ARP) concerns. Resource issues and indicators are identified below.[7]

H. RELEVANT CHANGES TO THE PROPOSED ACTION SINCE PROJECT SCOPING

As stated above, the project was originally scoped, internally and externally, in 2012. Since that time, several changes have occurred that are relevant to the planning process. These are disclosed below with a brief discussion on how the change has affected the DEIS and the analysis.

Modification to the Proposed Action: The Proposed Action described below differs from the ARP's Proposed Action as identified in the Scoping Notice, dated July 13, 2012. Adjustments were made to the proposed projects in response to information gained during scoping and through field visits to the project area. Field visits and ground-truthing of project elements revealed sensitive resources and other factors that warranted adjustments to certain project locations. Modifications to alternatives that would reduce significant impacts are permitted per the USDA Forest Service Handbook.[8] Further rationale for the dismissal of the ARP's Scoping Proposed Action is included in Chapter 2 Section D: Alternatives Considered but Not Analyzed in Detail. All changes in the Proposed Action are reflected in all analyses within this DEIS.

[7] The scoping comment disposition analysis is available in the project file.
[8] USDA Forest Service, 2012b

I. ISSUES ANALYZED AND ISSUES DISMISSED

Based on the results of ARP specialist and public scoping, the ARP identified specific areas of concern regarding proposed projects and classified them as either "*Issues Analyzed*" or "*Issues Dismissed*." *Issues Analyzed* may or may not warrant the generation of an alternative and will be analyzed in detail in the EIS. *Issues Analyzed* in some cases can be addressed by PDC. *Issues Dismissed* do not require further analysis due to various reasons, including the application of PDC or mitigation.

Each *Issue Analyzed* or *Issue Dismissed* below represents a concern voiced by ARP specialists, agencies or members of the public.

Based on these criteria, thirteen issues analyzed and six dismissed issues were identified.

ISSUES ANALYZED

Each of the following issue statements includes a list of indicators which were identified as a means of measuring or quantifying the anticipated level of impact on a particular resource. While some indicators are necessarily qualitative in nature, every effort was made to utilize indicators that are quantitative, measurable and predictable.

Human Environment

Recreation, Mountain Operations and Guest Services

***Issue Statement*: Proposed projects within EMR's existing and proposed SUP area and private lands have the potential to affect the skier recreational experience and guest safety at the ski area.**

Study Area: EMR's existing and proposed SUP area and adjacent private lands

Indicators:

- Quantification of existing and proposed terrain acreage by ability level
- Quantification of skier terrain densities (skiers/acre) under the existing and proposed conditions
- Quantitative analysis of existing and proposed guest service space and discussion of guest experiences
- Discussion and quantification of skier experience during wind events (skiers/acre)
- Discussion of ski patrol efforts recovering skiers beyond the current ski area operating boundary in the Jolly Jug area and near Middle Boulder Creek
- Discussion of effects to the EMR Nordic ski area under the proposed conditions

***Issue Statement*: Proposed projects have the potential to affect dispersed recreation within and adjacent to EMR's existing and proposed SUP area, as well as private lands.**

Study Area: Dispersed recreation areas adjacent to EMR

Indicators:

- Discussion of effects to dispersed recreationists on lands adjacent to EMR, including dispersed recreation areas north of EMR

Traffic, Parking and Air Quality

***Issue Statement*: Proposed projects could generate measurable increases in daily/seasonal visitation and lead to additional vehicular traffic on Boulder Canyon Drive, through Nederland and on Shelf Road (the ski area access road). Proposed projects also could generate construction traffic on these roads as well as County Road 130 through the Town of Eldora. Parking capacities may also be affected by proposed projects.**

Study Area: Primary roadway networks accessing EMR and parking areas on private lands

Indicators:

- Historic and projected traffic counts for roadway networks to access EMR
- Comparison of anticipated winter traffic volumes with existing winter traffic volumes and the design capacities of roadway networks accessing EMR
- Quantification/documentation of anticipated impacts to proposed construction/maintenance access roads and effects to Town of Nederland and Town of Eldora residents
- Quantification of existing and proposed parking capacity for day and destination skiers within EMR parking lots
- Quantification of legal parking spaces removed on CR 130 due to the construction of the bridge crossing Middle Boulder Creek and two road segments that would be constructed to connect CR 130 (north of Middle Boulder Creek) to the proposed Placer Express bottom terminal site.

***Issue Statement*: Due to increases in ski area and construction traffic, air quality could be affected within the region.**

Study Area: Boulder County, EMR's existing and proposed SUP area and adjacent private lands

Indicators:

- Narrative description of existing air quality in the study area, including: population centers, Class I and Class II areas in the vicinity); airshed classifications and baseline conditions at nearby population centers; disclosure of any regional concerns (e.g., ozone issues in the area); and trending of air quality at the nearby Class I area over the past several years
- Estimated daily increase in number of vehicles associated with the increased annual visitation

- Estimate emissions from mobile sources, including the effects of increased visitation
- Discussion of Greenhouse Gas (GHG) emissions from mobile sources, including the effects of increased visitation in relation to climate change
- Discussion of compliance with local, state and federal regulations regarding air quality

Scenery Resources

***Issue Statement*: Development of proposed projects, including associated infrastructure, would be visible from locations beyond the ski area.**

Study Area: EMR's existing and proposed SUP area as visible from identified critical viewpoints

Indicators:

- Compliance with Forest Plan standards and guidelines for scenery management within the SUP area and from established critical viewpoints by meeting Scenic Integrity Objectives
- Analysis of visual simulations from three identified critical viewpoints and one perspective rendering:
  - The Fourth of July Road
  - The parking area at the Hessie Road and Fourth of July Road fork
  - Eldorado Avenue/CR 130
  - Bridge location and bottom terminal of the Placer Express chairlift (perspective rendering)

Cultural and Heritage Resources

***Issue Statement*: Implementation of proposed projects and associated ground disturbance may affect previously identified and unidentified cultural and heritage resources within the existing and proposed SUP area and on private lands.**

Study Area: Area of Potential Effect, including EMR's existing and proposed SUP area and adjacent private lands

Indicators:

- Survey and document presence or absence of cultural resources
- Document impacts to any unevaluated sites, sites eligible for listing on the National Register of Historic Places (NRHP), or NRHP listed sites

Social and Economic Resources

***Issue Statement*: Through construction, operation and increased annual visitation, implementation of proposed projects could alter local employment, personal income (i.e., wages) and visitor spending—in both the short- and long-term—in Boulder and Gilpin counties (in compliance with Executive Order 12898), by increasing total annual visitation.**

Study Area: Boulder and Gilpin counties

Indicators:

- Potential effects to socioeconomic indicators (to be modeled in IMPLAN3) including:
    - Population
    - Employment (both inside the resort and outside of the resort, including a discussion of part-time/seasonal employment vs. full-time equivalents)
    - Personal income (i.e., wages)
    - Visitor spending (both inside and outside the resort)
    - County tax revenue
- Disclosure of compliance with Executive Order 12898, Environmental Justice

Noise

***Issue Statement*: Snowmaking and isolated rock blasting for trail construction has the potential to generate additional noise audible in the Town of Eldora.**

Study Area: Town of Eldora, Hessie Townsite, and dispersed recreation areas north of EMR

Indicators:

- Comparison of existing and proposed audible conditions (in decibels) related to construction, snowmaking, and resort operations based on manufacture's data and the duration of noise generating activities

Biological Environment

Forest Health

***Issue Statement*: Implementation of vegetation management projects, including insect abatement, could affect forest health within the existing and proposed SUP area and on private lands. The clearing of ski trails combined with the effects of Mountain Pine Beetle (MPB) mortality could change stand composition and fuel behavior.**

Study Area: EMR's existing and proposed SUP area

Indicators:

- Quantification (acreage) of lands affected by MPB (pure/mixed lodgepole pine) and projected impacted lands
- Effect of MPB and tree clearing on wind patterns and subsequent blow downs
- Disclosure of MPB treatment, locations, stand composition and fuels
- Quantification (acreage) and disclosure of regeneration potential
- Quantification of impacts to limber pine and old growth habitat
- Quantification (acreage) of proposed ground disturbance and overstory vegetation removal effects by species

Fish and Wildlife

***Issue Statement*: Development of proposed projects, including associated infrastructure, could affect individuals, populations, and/or habitat values for federally Proposed, Threatened or Endangered and/or Forest Service Rocky Mountain Region sensitive (PTES) fish and wildlife species, Management Indicator Species (MIS), migratory birds, and species of local concern (SOLC).**

Study Area: EMR's existing and proposed SUP area, adjacent NFS lands, including the Boulder Lynx Analysis Unit (LAU) boundary and north-south wildlife travel corridors, and areas downstream that could be affected by hydrologic changes

Indicators:

- Quantification (acres) and qualification of *existing* wildlife habitat and *proposed alteration*, *fragmentation*, or *removal* of wildlife habitat, by species. Include specifically lynx diurnal security habitat, winter forage habitat, and denning habitat
- Disclosure of effects to PTES species, MIS, migratory birds, animal SOLC, and "other habitats"
- Identification of, and effects within, immediate and adjacent LAUs
- Identification of impacts to water quality and stream health related to aquatic species through potential increases in sedimentation

Plants

***Issue Statement*: Plant communities, PTES plant species, species of local concern (SOLC), and significant natural plant communities (SNPC) may be altered as a result of the proposed projects. Construction activity and ongoing maintenance of the ski area could increase presence of invasive plant species.**

Study Area: EMR's existing and proposed SUP area and adjacent private lands, and areas downstream that could be affected by hydrologic changes

Indicators:

- Identification of occurrences of any PTES plant species, SOLC and SNPC
- Disclosure of direct, indirect and cumulative impacts to PTES plant species, SOLC and SNPC
- Qualification of effects to PTES plant species and SOLC from snow compaction and increased solar exposure
- Identify PDC and BMPs to avoid the spread of noxious or other undesirable weedy species and to manage existing populations toward eradication or acceptable levels when eradication is not realistic
- Identify PDC and BMPs to minimize impacts to existing vegetation

Watershed, Wetlands and Soils

***Issue Statement*: Implementation of terrain modifications associated with proposed projects (vegetation removal, grading, utility installation/burial, road reconstruction, and facilities construction and on-going maintenance after implementation) has the potential to affect soils, streams and riparian areas. Identified wetlands throughout the project area could be temporarily and/or permanently affected by construction and implementation of the proposed projects. Proposed ground disturbance and snowmaking may (individually and/or collectively) affect erosion and slope hazards.**

Study Area: EMR's existing and proposed SUP area and adjacent private lands, including streams tributary to Middle Boulder Creek

Indicators:

- A thorough characterization of existing watersheds and aquatic resources in the study area, including quality, quantity and location of aquifers, lakes, wetlands, rivers, streams and ephemeral drainages
- Quantification and discussion of existing drainage concerns and treatment areas, including areas of rilling and gullying
- Discussion of impacts to stream health and the water influence zone (WIZ) within the context of the following stream health metrics: bank stability, fine sediment, residual pool depth, wood frequency, macroinvertebrates, connected disturbed area (CDA) and length of connected channel

- Long-term and short-term impacts to surface and groundwater hydrology
- Long-term and short-term impacts to water quality; including the presence of and potential impacts to any Clean Water Act (CWA) Section 303(d) impaired or threatened waterbody segments
- Long-term and short-term impacts to special aquatic sites (mudflats, pool and riffle complexes)
- Evaluation of compliance with Watershed Conservation Practices Handbook and Forest Plan requirements
- Development and analysis of drainage management measures to maintain or improve stream health
- Quantification (acres) of ground disturbing activities as it pertains to stream health (e.g., permanent and temporary roads, chairlift terminals and towers, graded ski trails, etc.)
- Quantification (acres) of new development (e.g., ski trails, chairlift terminals, lift alignments, permanent and temporary roads) that occurs within 100 feet of perennial or intermittent streams
- Quantification of the number of stream crossings of perennial and intermittent streams created by new development (e.g., ski trails, chairlift terminals, lift alignments, permanent and temporary roads)
- Discussion of avoidance and minimization of impacts to “difficult-to-replace” resources (i.e., streams)
- A map and summary of all wetlands types and acreage in the analysis area with potential to be directly or indirectly impacted by the proposed ski area projects
- Disclosure of wetland functions and values within the project area
- Quantification of anticipated direct and indirect temporary and/or permanent impacts (acres/linear feet); including wetland habitat affected by increased solar exposure
- Quantification (acres) of new development (e.g., ski trails, chairlift terminals, lift alignments, permanent and temporary roads) that occurs within 100 feet of wetlands
- Discussion of existing geologic and soil resources within the study area
- Analysis of increased erosion hazard due to ground disturbance
- Analysis of slope stability and geological constraints associated with project components

***Issue Statement*: The additional snowmaking coverage on proposed ski trails would require additional water supply that must be consistent with the Endangered Species Act (indicators for this are covered under Fish and Wildlife and Plants issues above) and EMR's current water rights. The proposed ski trails would require the application of additional snowmaking coverage that could increase water yield across project area watersheds.**

Study Area: EMR's existing and proposed SUP area and adjacent private lands, including streams tributary to Middle Boulder Creek

Indicators:

- Anticipated temporary and permanent changes in water yield (acre feet) and peak flows (cubic feet per second), and subsequent watershed effects
- Assessment of water rights

ISSUES DISMISSED

The ID Team considered the following issues raised through the EIS scoping process; however, it was determined that there would be no measurable effects related to these issues, no difference from the No Action Alternative to the action alternatives or they are beyond the scope for this EIS. Therefore these issues were dismissed from further analysis in the DEIS.

Sufficient, quantifiable wind and skier visitation data is required to validate the Purpose and Need.

The Forest Service has developed a Purpose and Need statement, which the action alternatives reasonably address. EMR has proposed project locations based on an operational and market understanding; therefore, the issue has been dismissed from detailed analysis.

The proposed projects could both affect, and be affected by, climate change. Additional proposed infrastructure (e.g., chairlifts and facilities) could increase energy consumption and affect climate change due to greenhouse gas emissions. Proposed projects could also be susceptible to changing climatic conditions, which could jeopardize the long-term viability of project elements.

This issue is dismissed from further documentation because there would be no measureable differences between the alternatives in regards to climatic impacts. The spatial and temporal scale of climate change is many orders of magnitude larger than that of the projects outlined in this document. Thus, differences between alternatives would be immeasurable or negligible.

The proposed projects at EMR could result in skiers choosing to visit EMR instead of Summit and/or Eagle County resorts, which could reduce traffic and affect air quality along the I-70 corridor.

This issue is dismissed due to its speculative nature. An estimate of effects to traffic and air quality would require a prediction of the number of skiers persuaded to ski EMR instead of another resort, an assumption of the number of passengers in each vehicle, and a generalization about vehicular emissions. Therefore the analysis of this issue would be highly speculative and is thus dismissed.

The Placer chairlift and terrain development project, including the construction and emergency access bridge, could lead to the accumulation of additional vehicles illegally parked along County Road 130.

This issue is dismissed for the following reasons: skier access to the Placer chairlift and terrain from CR 130 and the bridge across Middle Boulder Creek would be prohibited; EMR maintenance and employees would be prohibited from parking on CR 130; and PDC such as a gate and appropriate signage on the proposed bridge would minimize other recreational access to the south side of Middle Boulder Creek. Therefore, these measures are anticipated to prevent additional vehicles from parking on CR 130 as a result of the proposed projects. Additional vehicles illegally parked on CR 130 as a result of other projects within the area are analyzed cumulatively and are not considered connected actions.

The objectivity of the ARP and SE Group in preparing this EIS is in question given the involvement of these entities with the project proponent, and their interest in the outcome of the decision.

The 2011 Master Plan was prepared by SE Group and includes an assessment of existing conditions and constraints at EMR as well as future plans to address the opportunities and constraints. SE Group is also the Prime Consultant for the preparation of this DEIS. Per 46 Federal Register 18026 (March 23, 1981), as amended, *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations* (question 17a.), disclosure statements indicating the Prime Consultant and all sub-consultants do not have financial or other interest in the outcome of the project are included in the project file. The Forest Service has determined that no conflict of interest exists with SE Group and its sub-consultants in the preparation of this EIS; therefore, SE Group and its sub-consultants were not disqualified from preparing the DEIS. This issue is dismissed in reference to the Code of Federal Regulations at 40 CFR Title 40, Part 1506.5(c), which addresses the use of the third party consulting firm for preparation of an EIS. If an EIS is prepared with the assistance of a consulting firm, the firm must execute a disclosure statement.

Impacts related to the Proposed Action may be inconsistent with land use guidance/prescriptions outlined in the Boulder County Comprehensive Plan (BCCP) and Eldora Environmental Preservation Plan (EEPP).

The Forest Service considered the guidance included in these plans through the preparation of the DEIS. The Forest Service will incorporate these plans to the extent reasonable and practical, but the governing regulations of the ARP Forest Plan will be the final standards and guidelines to which the projects will be measured against. Furthermore, PDC for the action alternatives are included to minimize impacts, and Alternative 3 was also developed to respond to issues raised during scoping that incorporate principles included in the BCCP and EEPP.

J. SCOPE OF THE ANALYSIS

Scope consists of the range of actions, alternatives, and impacts to be considered within this DEIS. Furthermore, it includes the spatial and temporal boundaries associated with the actions, alternatives, and impacts as the scope of the analysis relates to the Purpose and Need. Individual project elements are discussed in detail in Chapter 2 and illustrated in the alternative maps. A detailed scope of this environmental analysis is presented at the beginning of each resource section in Chapter 3. The study area is determined by individual resource analyses presented in Chapter 3 (e.g., the Watershed, Wetlands and Soils analysis study area is spatially different from the Fish and Wildlife analysis study areas). The CEQ has regulations for implementing NEPA that require federal agencies to consider the following types of actions, alternatives, and impacts in an environmental document.[9]

ACTIONS

1. *Connected Actions*: actions that are dependent on each other for their utility.
2. *Cumulative Actions*: actions which, when viewed with other proposed actions, have cumulatively significant impacts and should therefore be discussed in the same impact statement.
3. *Similar Actions*: actions which, when viewed with other reasonably foreseeable or proposed actions, have similarities that provide a basis for evaluating their environmental consequences together.

ALTERNATIVES

1. No Action.
2. The Proposed Action.
3. Other reasonable courses of action identified in response to substantive issues.
4. PDC (not in the Proposed Action).

IMPACTS

1. Direct impacts are caused by the action and occur at the same time and place.
2. Indirect impacts are later in time or farther removed in distance but are still reasonably foreseeable (i.e., likely to occur within the life of the project).
3. Cumulative impacts are the result of the incremental effects of any action when added to other past, present, and reasonably foreseeable future actions and can result from individually minor, but collectively significant actions taking place over an extended period of time.

[9] 40 CFR 1508.25

K. CONSISTENCY WITH FOREST SERVICE POLICY

LAND AND RESOURCE MANAGEMENT PLAN CONSISTENCY

EMR operations carried out on NFS lands within the SUP area must comply with the management direction as provided in the 1997 Forest Plan. The 1997 Forest Plan provides standards and guidelines for Ski-Based Resorts (Existing and Potential) in Management Area 8.22. The 1997 Forest Plan (p. 2-54) states,

> *Continue authorization of downhill skiing at Eldora Ski Area under their special-use permit and master development plan. Further improvements of the base facilities, infrastructure, and ski runs within the current boundary are expected.*

The 1997 Forest Plan Final Environmental Impact Statement (FEIS) states the ARP is a major recreation destination point for Colorado's Front Range population. The 1997 Forest Plan FEIS (page 3-433) provides the foundation for the need for this proposal, stating:

> *The current trend is to improve the quality of services and equipment in order to retain present customers and attract new ones.*

Additionally, in conjunction with each resource analysis presented in Chapter 3, a thorough review of the 1997 Forest Plan was conducted in order to determine consistency with standards and guidelines at the Forest and management area levels on the ARP. The Forest Plan Consistency Analysis is contained in project file. A Forest Plan amendment is proposed to assign and change Forest Plan management area allocations for areas within the project area. Management area changes include areas within and outside the current SUP boundary. Refer to Appendix B for additional information.

L. DECISION TO BE MADE

Based on preliminary internal Forest Service and external public scoping, and evaluation of the context and intensity factors contained in 36 CFR 1508.27, the Forest Service has determined that an EIS will be necessary to review, analyze, and document the potential impacts to the human and biological environment anticipated to result from the implementation of the proposed projects. This DEIS is a disclosure rather than a decision document and its purpose is to provide sufficient environmental analysis to support a Record of Decision (ROD).

Based on the analysis documented within this DEIS and a future FEIS, the Responsible Official, the Forest Supervisor for the ARP, will decide whether to select Alternative 2 (Proposed Action), Alternative 3, or the No Action Alternative. The Forest Supervisor is not required to choose either an action alternative or the No Action Alternative described herein, but may select components of an action alternative or develop an entirely new alternative created from components of each. In addition to determining which alternative to select, the Forest Supervisor will also determine any required PDC and

BMPs. The Forest Supervisor may also require additional PDC and/or BMPs not discussed within this document. The Forest Supervisor may also require monitoring of PDC. The Forest Supervisor will also make a decision whether to amend the Forest Plan.

In compliance with Forest Service Handbook 1909.15 chapter 18, the Forest Service will continually review the relevancy of the analysis and subsequent decision for new and changed conditions as any approved projects are advanced for implementation.

M. OTHER NECESSARY PERMITS, LICENSES, ENTITLEMENTS AND/OR CONSULTATION[10]

The Forest Service decision would apply only to NFS lands analyzed within this DEIS and would not apply to private property. However, other federal, state, and local entities may also have jurisdiction. Decisions by jurisdictions to issue or not issue approvals related to this proposal may be aided by the analyses presented in this DEIS. While the Forest Service assumes no responsibility for enforcing laws, regulations, or policies under the jurisdiction of other governmental agencies, Forest Service regulations require permittees to abide by applicable laws and conditions imposed by other jurisdictions. In addition to requisite Forest Service approvals, consultation with the following entities, or permits, may be required to implement any approved projects:

- USFWS, Endangered Species Act (ESA) Section 7 Consultation
- U.S. Army Corps of Engineers (USACE), Section 404 of the Clean Water Act Permit
- Colorado Department of Public Health and Environment
- State of Colorado, Stormwater Management Plan
- Boulder County, Site Plan Review and Grading Permit
- Gilpin County Construction Permit

[10] Per 40 CFR 1502.25(b)

Chapter 2
Description of Alternatives

2. DESCRIPTION OF ALTERNATIVES

A. INTRODUCTION

Chapter 2 describes the alternatives considered within this environmental analysis and summarizes the environmental consequences anticipated to result with the implementation of each. As required by the Council on Environmental Quality (CEQ), the alternatives considered are presented in comparative form.[11] Project Design Criteria (PDC) and Best Management Practices (BMPs), designed to lessen or avoid impacts anticipated to occur as a result of implementation of any of the action alternatives, are also detailed.

NEPA requires that an environmental analysis examine a range of alternatives, which are reasonably related to the purpose of the project.[12] Both CEQ Regulations and Forest Service Handbook direction emphasize that alternatives must meet the "reasonableness" criteria in order to warrant detailed analysis. Alternatives that were considered within the analysis process, but were determined not reasonable, were eliminated from detailed study with a brief discussion of the rationale for their elimination.[13]

The issues raised during the scoping process (detailed in Chapter 1) were utilized as the basis for determining the need for alternatives to the Proposed Action. Additionally, as explained in Chapter 1, modifications were made to the Proposed Action in response to issues raised during scoping and ground-truthing of project elements.

B. ALTERNATIVES CONSIDERED IN DETAIL

The range of alternatives the Forest Service Interdisciplinary Team (ID Team) considered for this analysis was bound by the Purpose and Need underlying the Proposed Action, as well as by the issues that arose from internal and external scoping. NEPA requires that an environmental analysis examine a range of alternatives, which are "reasonably related to the purpose of the project."[14] Furthermore, Forest Service Handbook 1909.15 directs the ID Team to "consider a full range of reasonable alternatives to the Proposed Action that address the significant issues and meet the Purpose and Need for the Proposed Action."

Among other differences, the boundary adjustment associated with each action alternative is a key point of contrast between Alternatives 2 and 3. Alternative 2 proposes to adjust the ski area boundary primarily on the northern side of the ski area towards Middle Boulder Creek. Alternative 3 proposes to adjust the

[11] 40 CFR 1502
[12] USDA Forest Service, 2012b
[13] 40 CFR 1502.14(a)
[14] 40 CFR 1502.14(d)

ski area boundary exclusively on the southern ski of the ski area and does not include a SUP boundary adjustment on the northern side of the ski area.

ALTERNATIVE 1 – NO ACTION

As required by NEPA, a No Action Alternative is included in this analysis for review alongside the action alternatives.[15] By definition, the No Action Alternative represents a continuation of existing management practices without changes, additions, or upgrades to existing conditions. Brief descriptions of existing on-mountain facilities and services are provided below. The No Action Alternative is depicted in Figure 1.

The No Action Alternative provides a baseline for comparing the effects of the action alternatives. No new facilities or recreational opportunities would be approved under the No Action Alternative. Projects at EMR that have been previously-approved, but not yet implemented (e.g., Corona Grading Project) are analyzed in the Cumulative Effects sections of Chapter 3 and are detailed in Appendix A of the EIS.

The following discussion is focused on existing facilities and operations.

Terrain

The existing network of ski trails and tree and gladed skiing areas at EMR accounts for a total of approximately 336 acres of skiable terrain, accommodating a range of skier ability levels from beginner to expert. The ski trail system is comprised of approximately 49 lift-served ski trails accounting for roughly 184 acres of skiable terrain. The network of tree and gladed skiing areas accounts for roughly 152 acres of skiable terrain. No additional terrain is proposed.

Chairlifts

Under the No Action Alternative, EMR's chairlift network would remain in its current configuration. The chairlift network is composed of two fixed-grip quad chairlifts, two fixed-grip triple chairlifts, four fixed-grip double chairlifts, and three surface lifts. No additional chairlifts, chairlift replacements or chairlift upgrades are proposed.

Snowmaking

The current snowmaking system covers nearly the entire ski trail network (the ski trail network does not include gladed areas). The only exceptions are *Pipeline* trail and the upper portion of the *West Ridge* trail that do not have snowmaking coverage. The total area covered by snowmaking is approximately 164 acres. No additional snowmaking is proposed.

[15] Ibid.

On-Mountain Facilities

On-mountain skier services are currently available at the top of the Corona chairlift at the Lookout facility. Services available at the Lookout are limited to food service, restrooms, and ski patrol. There is a small kitchen, indoor seating, and an outdoor deck. The Lookout facility is approximately 3,000 square feet and provides 54 indoor seats and 30 outdoor seats.

Skier service facilities in the base area on private lands include the Indian Peaks Lodge, Timbers Lodge, West Wing and East Wing. Together, these base area facilities total approximately 41,000 square feet and provide approximately 755 indoor and 550 outdoor seats.

Parking

Existing skier parking facilities have the capacity to park approximately 2,000 vehicles. All parking facilities are located on private land. No additional parking is proposed.

Vegetation Management

EMR currently conducts vegetation management within the SUP area in accordance with past ARP approval of forest health projects. Primarily, this management includes targeted pesticide application of Carbaryl in order to protect live pine or spruce trees from mountain pine beetle.

Forest Plan Amendment

The current SUP boundary is allocated as Management Area 8.22 Ski-Based Resorts in the Forest Plan. The SUP boundary would not change under Alternative 1 and no Forest Plan Amendment would be necessary.

ALTERNATIVE 2 – PROPOSED ACTION

The Proposed Action described below differs from the ARP's Proposed Action as identified in the Scoping Notice, dated July 13, 2012. Adjustments were made to the proposed projects in response to information gained during scoping and through field visits to the project area. Field visits and ground-truthing of project elements revealed sensitive resources (e.g., streams and wetlands) and other factors (e.g., specific topographic features) that warranted adjustments to certain project locations. Differences between the current Proposed Action and the Proposed Action presented during scoping include a realignment and reduction of trails in the Placer and Jolly Jug areas. Additionally, subsequent to the Scoping Notice, dated July 13, 2012, EMR prepared a Vegetation Management Plan (VMP) in accordance with the terms of the SUP to address forest health issues at EMR. Many of those projects spatially overlap proposed ski-related projects included in the Proposed Action. The projects identified in the VMP are now included in the Proposed Action. Modifications to alternatives that would reduce

significant impacts are permitted per the USDA Forest Service Handbook.[16] Further rationale for the dismissal of the ARP's Scoping Proposed Action is included in Section D Alternatives Considered but Not Analyzed in Detail.

Specific components of the proposed EMR ski area projects are detailed in the following paragraphs. The Proposed Action would require an adjustment to the SUP boundary of approximately 86 acres on the northern and southern borders of the resort. Alternative 2 is depicted in Figure 2.

Terrain

The Proposed Action includes the construction of 15 new ski trails (totaling approximately 58 acres), the creation of approximately 57 acres of new tree and gladed skiing areas and modifications to 43 acres of existing tree and gladed skiing across five areas.[17] The proposed tree and gladed skiing areas would include approximately 30 to 50 percent overstory vegetation removal.

Table 2-1:
Proposed Terrain Area by Ability Level – Alternative 2

Skier/Rider Ability Level	Ski Trails	Tree and Gladed Skiing Areas[a]	Total
	(acres)	(acres)	(acres)
Beginner	0	0	0
Novice	0	0	0
Low Intermediate	0	0	0
Intermediate	42	16	58
Advanced Intermediate	11	21	32
Expert	5	63	68
Total	**58**	**100**	**158**

[a] Tree and Gladed Skiing Areas accounts for existing areas to be modified and new areas to be created

Jolly Jug Terrain

The proposed Jolly Jug terrain includes the construction of five new ski trails (labeled as *JJ-1* through *JJ-5* on Figure 2), amounting to approximately 19 acres, and the development of approximately 16 acres of tree and gladed skiing areas (labeled as Jolly Jug Glades on Figure 2). The tree and gladed skiing areas within the Jolly Jug area would be closer to 50 percent overstory vegetation removal to achieve a "groomable glade" skiing experience. The proposal for the Jolly Jug terrain would add approximately 35 acres of intermediate terrain. This project component would require an adjustment to the SUP boundary

[16] USDA Forest Service, 2012b
[17] The tree and gladed skiing projects in all action alternatives include a combination of new tree and gladed skiing areas and improvements to existing tree and gladed skiing areas. For the purposes of this study, all areas that will receive treatment, improvement or other modification are considered as "proposed tree and gladed skiing areas."

of approximately 16 acres (refer to Forest Plan Amendment heading below for additional information). The majority of the Jolly Jug terrain would be located on private land. If this alternative is selected, EMR would re-negotiate a lease agreement with the landowner.

Placer Terrain

The proposed Placer terrain would include the construction of six new ski trails (labeled as *P-1* through *P-6* on Figure 2), amounting to approximately 22 acres, and the development of approximately 16 acres of tree and gladed skiing areas (labeled Placer Glades II on Figure 2). The addition of the Placer terrain would add approximately 15 acres of intermediate terrain, 7 acres of advanced intermediate terrain, and 16 acres of expert terrain. This project component would require an adjustment to the SUP boundary of approximately 70 acres (refer to the Forest Plan Amendment heading below for additional information).

Corona Terrain

The proposed Corona terrain would include the construction of four new ski trails (labeled as *C-1* through *C-4* on Figure 2), amounting to approximately 17 acres. Also, the development of/modification to approximately 68 acres of tree and gladed skiing areas (labeled as Salto Glades, Bryan Glades, Bryan Glades II, and Placer Glades on Figure 2) would occur. This terrain would be accessed primarily from the Corona chairlift. *Lower Diamondback* and *Lower Ambush* trails would also be widened approximately 30 feet on each side, amounting to approximately 2 acres.[18] The proposal for the Corona terrain would add approximately 8 acres of intermediate terrain, 25 acres of advanced intermediate terrain, and 52 acres of expert terrain.

Chairlifts

Included in the Proposed Action are two new chairlifts and two chairlift replacements.

Jolly Jug Chairlift

The new Jolly Jug chairlift is proposed as a detachable four- or six-person chairlift. The chairlift would have a slope length of approximately 3,250 feet, a vertical rise of approximately 750 feet and a design capacity of 1,200 people per hour (pph). The Jolly Jug chairlift bottom terminal would be located on private land, and the top terminal would be located on NFS lands to the south of the *Pipeline* trail near the top of Challenge Mountain. Ground disturbance (grading) would be required for the installation of the top and bottom terminals. The chairlift terminal structures would be colored to match the surrounding landscape and would utilize either a very low reflectivity or coated glass.

[18] The ARP recognizes that these ski trails are closer in proximity to Indian Peaks and the proposed Placer Express chairlift, but for organization of action alternatives, this project component is grouped with the Corona chairlift and terrain.

Power would be connected to the top and bottom terminals. A buried power line would extend from the top of the existing Challenge chairlift to the proposed Jolly Jug chairlift top terminal within a proposed access road. Power to the bottom terminal would be buried in the proposed access road from the top of the existing Sundance chairlift. The power lines would avoid streams and wetlands.

Placer Express Chairlift

The new Placer Express is proposed as a detachable six-person chairlift. The chairlift would have a slope length of approximately 3,250 feet, a vertical rise of approximately 950 feet and a design capacity of 2,400 pph. The Placer Express chairlift bottom terminal would be located near Middle Boulder Creek and the alignment would parallel a portion of the Indian Peaks chairlift. Ground disturbance (grading) would be required for the installation of the top and bottom terminals. The chairlift terminal structures would be colored to match the surrounding landscape and would utilize either a very low reflectivity or coated glass. The location of the chairlift responds to wind concerns; the alignment and top and bottom terminals are located in areas less susceptible to wind events. This location would allow the chairlift to operate when other chairlifts at EMR could be closed due to wind events.

Power would be connected to the top and bottom terminals. The power line would extend from the top of the existing Challenge chairlift down existing and proposed ski trails. The power lines would be buried and would avoid streams and wetlands.[19]

To facilitate construction, on-going maintenance and emergency access, a bridge crossing Middle Boulder Creek and two road segments would be constructed to connect CR 130 (north of Middle Boulder Creek) to the proposed Placer Express bottom terminal site. The bridge would be gated year-round and restricted to administrative use.

Corona Chairlift

The existing four-person, fixed-grip Corona chairlift is proposed to be replaced with a new six-person, detachable chairlift. The existing chairlift would be removed and upgraded with the new chairlift in the same alignment with the same top and bottom terminal location. The upgraded Corona chairlift would have a design capacity of 2,400 pph. Ground disturbance (grading) would be required for the installation of a larger bottom terminal, including raising the height of the existing retaining wall located below the bottom terminal. The top and bottom chairlift terminal structures would be colored to match the surrounding landscape and would utilize either a very low reflectivity or coated glass.

[19] The analysis and disturbance calculations account for utility installation. Mapping and shapefiles are available in the project file.

Power is currently provided to the top chairlift terminal location. Power would be buried to the bottom chairlift terminal location via the Corona road, extending from the proposed power line for the Placer Express chairlift.

Challenge Chairlift

The existing Challenge and Cannonball chairlifts would be removed and replaced with one six-person, detachable chairlift in an alignment that provides direct out-of-base access to the summit of Challenge Mountain. The chairlift would have a slope length of approximately 4,100 feet, a vertical rise of approximately 1,000 feet and a design capacity of 3,000 pph. Ground disturbance (grading) would be required for the installation of larger top and bottom terminals. The bottom terminal of the new Challenge chairlift would be located on private lands within the existing ski area parking lot. The new chairlift would follow a slightly different alignment from the existing Challenge and Cannonball chairlifts. The top terminal on NFS lands would be built with an enclosed structure that surrounds the terminal. This would protect the chairlift unload from the wind. The top terminal chairlift structure would be designed with an architectural theme that would be consistent with the Built Environment Image Guide.

Snowmaking

Snowmaking coverage is proposed for all new ski trails, excluding tree and gladed skiing areas. This would result in approximately 58 acres of additional snowmaking coverage.

On-Mountain Facilities

To improve the guest experience at EMR, a new food and beverage facility is proposed below the top terminal of the Indian Peaks chairlift. The new Challenge Mountain Facility would be approximately 16,000 to 20,000 square feet and provide 850 seats for guests. In addition to the proposed new food and beverage facility, EMR would also renovate the existing 3,000 square foot Lookout facility, increasing its size to between 7,700 and 9,700 square feet, providing up to 300 more seats for guests. The existing snowmaking system would continue to deliver potable drinking water to the Lookout and would begin delivering potable drinking water to the Challenge Mountain facility. On-site septic systems would accommodate sewage disposal for the proposed Lookout facility and Challenge Mountain Facility.[20] Both facilities will treat and dispose wastewater through a septic tank-leach field sewage disposal system.

Both facilities would be designed to meet the Built Environment Image Guide and design elements would be derived from the existing Indian Peaks Lodge to maintain a consistent architectural theme for the ski area into the future.

[20] The current septic system at the Lookout facility would be expanded to accommodate additional use.

Parking

In order to accommodate an increase in resort visitation due to proposed projects, additional 560 parking spaces are proposed on private lands (approximately 3.5 acres). This project component is not subject to ARP authorization but is analyzed in the EIS as a connected action.

Vegetation Management Projects

EMR has prepared a Vegetation Management Plan (VMP) in accordance with the SUP. Management prescriptions and locations are identified in Figure 3. Management prescriptions have been developed for the ski area to maintain and/or improve forest health within the SUP and adjacent private lands. The prescriptions primarily reflect ski area activities and in most instances propose implementation guidance for ski area projects.

EMR would continue the previously authorized (2007) application of carbaryl to selected stands in order to prevent the spread of Mountain Pine Beetle. In addition, a Weed Management Plan is a component of the VMP and measures are incorporated as PDC into the Proposed Action.

P1 New Ski Trail Construction

This prescription would guide the construction of formal ski trails and lift alignments, totaling approximately 59 acres. All new ski trails with no grading, individual tree removal, and chairlift corridors would be constructed by “flush cutting” removed trees. With this method, stumps would be cut to a height of 4 inches or less from the ground surface; the process may also include stump grinding. This trail preparation method minimizes the need to disturb the remaining stumps and/or surrounding soils, thereby reducing overall ground disturbance and existing vegetation. Prior to vegetation removal, clearing limits would be established.

P2 Existing Ski Trail Maintenance

This prescription would apply to approximately 184 acres of existing ski trails and lift alignments. If any of the proposed trails are approved, the new trails would be considered existing trails directly after construction of the trail is completed. If mowing occurs for ski trail maintenance the apparatus should be set to a minimum height of 12 inches above the ground to maintain ground cover.

P3 Defensible Space

This prescription ensures that the maintenance of vegetation provides defensible space from wildland fire and hazard trees around existing and proposed ski area facilities. This prescription would apply to approximately 9 acres surrounding the Lookout Facility, the proposed Challenge Mountain Facility, and the base area facilities. EMR would implement defensible space around all structures in forested areas utilizing Colorado State Forest Service Defensible Space Guidelines (http://csfs.colostate.edu/pages/defensible-space/.html). Other preventive measures could include outdoor

sprinkler systems to protect the exterior of the structures (e.g., on-mountain restaurants). Defensible space and fuel break treatments would occur around water, power and transmission infrastructure. Fuel breaks should meet the standards listed in the Colorado State Forest Service link (http://csfs.colostate.edu/pages/defensible-space/subdivisions.html). EMR would remove and dispose of dead and hazard trees up to 150 percent of the height of the tallest locally hazardous tree from the edge of infrastructure, including: roads, ski trails, recreation trails and facilities. Trees should be felled in the forest and away from infrastructure, limbed, and scattered on the forest floor. Fencing may be necessary to manage and maintain skier/public use in these areas.

P4 New Tree and Gladed Skiing Area Construction

This prescription applies to new tree and gladed skiing areas identified in the Proposed Action. Within these areas, the ground surface would not be graded and the natural ground cover would be maintained. This prescription would apply to approximately 100 acres of terrain.

P5 Existing Tree and Gladed Skiing Areas Maintenance

This prescription would remove dead, dying or diseased trees that have the potential to create a hazard to ski area guests in existing tree and gladed skiing areas across approximately 100 acres. More specifically, EMR would cut and remove all dead or beetle (e.g., MPB, Western Balsam Bark Beetle) infested trees, or trees that are in danger of structural failure from some other means. This prescription would manage insects, disease and damage within these areas.

P6 Sanitation/Salvage with Removal in Lodgepole Pine Stands

This prescription would remove all dead, dying or infested lodgepole pine 4 inches diameter at breast height (dbh) and larger. Live conifers within the treated area will also be removed to avoid windthrow potential and reduce potential fuel loadings. This treatment reduces fuel loading and accelerates regeneration of other species and increases age class diversity. This prescription would apply to approximately 63 acres of lodgepole pine stands.

P7 Sanitation/Salvage with Removal in Spruce/Fir Stands

This prescription would remove all dead, dying and infested Engelmann spruce and subalpine fir primarily located outside the ski trail network that have been affected by insect activity, disease or mechanical damage. EMR would harvest all dead or beetle (e.g., MPB, Western Balsam Bark Beetle) infested trees as individuals or in groups up to 2 acres in size, or trees that are in danger of structural failure from some other means. The location of dead and dying trees would determine the location and amount of trees that would be removed. Some areas of the stand containing a higher level of beetle infestation may require that the trees be removed in clumps and small groups, while other areas may not require any tree removal. Logs from live spruce trees not removed from the site, which are greater than 4 feet in length should be bucked to lengths less than 2 feet and placed in direct sunlight. This would reduce any potential spruce beetle population buildup in logging debris which can be excellent breeding

habitat for spruce beetles. Alternatively this material can be chipped or burned. Additionally, EMR would retain any healthy subalpine fir or Engelmann spruce trees that are not considered hazard trees even with the increased potential for windthrow. This prescription would apply to approximately 14 acres of spruce-fir stands.

P8 Continued Forest Monitoring

This prescription provides for the long-term assessment of forest health at EMR. Healthy stands may develop insect, disease, or damage issues in the future. This prescription provides guidance for future management should concerns arise. This prescription would apply to approximately 199 acres.

Construction Practices

As depicted on Figure 2, additional road spurs would be constructed and maintained for the following proposed chairlifts and facilities: Placer Express chairlift, Jolly Jug chairlift, and Challenge Mountain Facility. As mentioned above, construction of the bottom terminal of the Placer Express chairlift would necessitate the construction of an access road and bridge across Middle Boulder Creek. The road spur to access the Placer Express chairlift would be approximately 256 feet long (116 feet on the north side of Middle Boulder Creek and 140 feet on the south side of Middle Boulder Creek).

A road spur approximately 594 feet in length would be built to access the top terminal of the Placer Express chairlift. This road spur would also serve as a skier access trail during the ski season. The construction of the Jolly Jug chairlift would require an approximately 954 foot road spur to access the bottom terminal, and an approximately 247 foot road spur to reach the top terminal. The Challenge Mountain Facility would be reached by a road spur approximately 1,162 feet in length (this road would be built entirely on existing ski trails).

For the construction of chairlift terminals, equipment would be confined to existing and proposed roads and designated staging areas that would avoid identified sensitive resources. The proposed chairlift towers would be transported to the site by helicopter. Tower foundations would be poured concrete.

Ski trails would be constructed by flush cutting and/or stump grinding, except areas designated for full grading activities. Skidders would be used on proposed ski trails to remove trees and all temporary ground disturbance related to this activity would be restored. Areas proposed for tree and gladed skiing would be cut by chainsaw and, where appropriate, cut trees would be removed by hand or machinery, depending on the slope of the terrain and presence of any identified sensitive resources.

Building materials for the on-mountain facilities would be transported to the site via existing and proposed roads.

Forest Plan Amendment

A Forest Plan amendment is proposed to assign and change Forest Plan management area allocations for areas within the project area. Currently, the Forest Plan does not include an official management area allocation for several areas within the existing SUP boundary and the area associated with the Middle Boulder Creek SUP boundary adjustment on the northern side of the project area. (Note: the northernmost SUP boundary adjustment line has not been formally land surveyed. For the purposes of this analysis, the proposed boundary is defined by Middle Boulder Creek's southern stream bank. Boundary acreages presented herein are approximate.) Additionally, the SUP boundary adjustment areas on the southern side of the project area are currently allocated as Management Area 1.3 Backcountry Recreation (refer to Figure 11). The Proposed Action would amend the Forest Plan to assign Management Area 8.22 Ski-Based Resorts to the currently unallocated areas within the existing SUP boundary and the Middle Boulder Creek SUP boundary adjustment area on the northern side of the project area. Additionally, the Proposed Action would change the current Forest Plan management area associated with boundary adjustments on the southern side of the project area to Management Area 8.22 Ski-Based Resorts. If this alternative is selected, the expanded boundary would be authorized by amending EMR's permit and managed to comply with the Management Area 8.22 Ski-Based Resorts allocation. Through this process the Scenic Integrity Objectives (SIOs) and the Recreation Opportunity Spectrum (ROS) classification would be amended to correspond with Management Area 8.22 Ski-Based Resorts.

ALTERNATIVE 3

Alternative 3 includes several projects included in the Proposed Action; however, to respond to identified issues raised during scoping, Alternative 3 does not include the Placer Express chairlift and terrain and the associated SUP boundary adjustment to Middle Boulder Creek at the north side of EMR. Alternative 3 includes additional trails and tree and gladed skiing areas within the current SUP boundary.

In addition, Alternative 3 also includes a reconfigured Jolly Jug chairlift and terrain alignment. The EMR Jolly Jug design option reflects the results of a continued planning process. This design incorporates a longer chairlift configuration and more skiable acreage in the form of ski trails and tree and gladed skiing areas, when compared to the Alternative 2 Jolly Jug alignment.

This alternative adds approximately 115 acres of new skiable terrain and would require an adjustment to the SUP boundary of approximately 18 acres on the southern border of the resort. Alternative 3 is depicted in Figure 4.[21]

[21] This acreage includes only new ski trail and new tree and gladed skiing areas. Modifications within existing tree and gladed skiing areas are excluded.

Terrain

Alternative 3 includes the construction of ten new ski trails (totaling approximately 52 acres), the creation of approximately 63 acres of new tree and gladed skiing areas and modifications to 135 acres of existing tree and gladed skiing across six areas.

Table 2-2:
Proposed Terrain Area by Ability Level – Alternative 3

Skier/Rider Ability Level	Ski Trails	Tree and Gladed Skiing Areas[a]	Total
	(acres)	(acres)	(acres)
Beginner	0	0	0
Novice	0	0	0
Low Intermediate	0	0	0
Intermediate	43	35	78
Advanced Intermediate	4	43	47
Expert	5	120	125
Total	**52**	**198**	**250**

[a] Tree and Gladed Skiing Areas accounts for existing areas to be modified and new areas to be created

Jolly Jug Terrain

The Jolly Jug terrain in Alternative 3 would include the construction of five new ski trails (labeled as *JJ-1* through *JJ-5* on Figure 4), amounting to approximately 27 acres of terrain, and the development of approximately 35 acres of tree and gladed skiing areas (labeled as Jolly Jug Glades and Jolly Jug Glades *II* on Figure 4). The proposal for the Jolly Jug terrain would add approximately 62 acres of intermediate terrain. This project component would require an adjustment to the SUP of about 18 acres. A portion of the Jolly Jug terrain would be located on private land. If this alternative is selected by the ARP, EMR would re-negotiate a lease agreement with the landowner.

Corona Terrain

The Corona terrain in Alternative 3 would include the construction of four new ski trails (labeled as *C-1* through *C-4* on Figure 4), amounting to approximately 21 acres. Also, the development of/modification to 163 acres of tree and gladed skiing areas (labeled as Salto Glades, Bryan Glades II, Moose Glades and Placer Glades on Figure 4) would occur. This terrain would be accessed primarily from the Corona chairlift. The *Lower Diamondback* and *Lower Ambush* trails would also be widened approximately 30 feet on each side of the ski trails amounting to approximately 2 acres. The proposal for the Corona terrain would add approximately 12 acres of intermediate terrain, 47 acres of advanced intermediate terrain, and 125 acres of expert terrain.

Indian Peaks Terrain

The Indian Peaks terrain would include the construction of one new ski trail (labeled as *IP-1* on Figure 4), amounting to approximately 4 acres of terrain. This new ski trail would be accessible from the Corona, Indian Peaks, or Challenge chairlifts. The Indian Peaks terrain would add approximately 4 acres of intermediate terrain.

Chairlifts

Alternative 3 includes two chairlift replacements and one new installation.

Jolly Jug Chairlift

The new Jolly Jug chairlift in Alternative 3 is proposed as a detachable four- or six-person chairlift. The chairlift would have a slope length of approximately 4,350 feet, a vertical rise of approximately 1,000 feet and a design capacity of 1,200 pph. The Jolly Jug chairlift would ascend from a lower terminal near the existing "Deadman's Gulch" Nordic Trail at 9,350 elevation (located on private land) to an upper terminal located to the south of the *Pipeline* trail at 10,350 feet. Ground disturbance (grading) would be required for the installation of the top and bottom terminals. The chairlift terminal structures would be colored to match the surrounding landscape and would utilize either a very low reflectivity or coated glass.

Power would be connected to the top and bottom terminals. A buried power line would extend from the top of the existing Challenge chairlift to the proposed Jolly Jug chairlift top terminal within a proposed access road. Power to the bottom terminal would be buried in the existing access road. The power lines would avoid streams and wetlands.

Corona Chairlift

Alternative 3 is identical to Alternative 2. Please refer to the description of Alternative 2 for details.

Challenge Chairlift

Alternative 3 is identical to Alternative 2. Please refer to the description of Alternative 2 for details.

Snowmaking

Snowmaking coverage is proposed for all proposed ski trails, excluding tree and gladed skiing areas. This would result in approximately 52 acres of additional snowmaking coverage.

On-Mountain Facilities

Alternative 3 is identical to Alternative 2. Please refer to the description of Alternative 2 for details.

Parking

Alternative 3 is identical to Alternative 2. Please refer to the description of Alternative 2 for details.

Vegetation Management Projects

Alternative 3 would include a similar suite of vegetation management prescriptions as described in Alternative 2, but the prescriptions are proposed in different locations reflecting the project elements of Alternative 3. Please refer to Figure 5. The major difference in vegetation management between Alternative 3 and 2 is the application of the P4 New Tree and Gladed Skiing Area Construction prescription. As previously described, Alternative 3 includes a greater amount of modifications to existing tree and gladed skiing areas when compared to Alternative 2.

Refer to Alternative 2 for a description of the specific prescriptions. The following provides the acreage of each prescription for Alternative 3.

P1 New Ski Trail Construction

P1 would apply to approximately 53 acres of proposed ski trails and lift alignments.

P2 Existing Ski Trail Maintenance

P2 would apply to approximately 184 acres of existing and future ski trails that would be maintained under P2 after construction.

P3 Defensible Space

P3 would apply to approximately 9 acres surrounding the Lookout Facility, proposed Challenge Mountain Facility, and existing base area facilities.

P4 New Tree and Gladed Skiing Area Construction

P4 would apply to approximately 198 acres of proposed tree and gladed skiing terrain.

P5 Existing Tree and Gladed Skiing Areas Maintenance

P5 would apply to approximately 5 acres of existing tree and gladed skiing areas.

P6 Sanitation/Salvage with Removal in Lodgepole Pine Stands

P6 would apply to approximately 85 acres of lodgepole pine stands.

P7 Sanitation/Salvage with Removal in Spruce/Fir Stands

P7 would apply to approximately 14 acres of spruce-fir stands.

P8 Continued Forest Monitoring

P8 would apply to approximately 161 acres.

Construction Practices

Additional road spurs would be installed to construct and maintain the following proposed chairlifts and facilities: Jolly Jug chairlift, Challenge chairlift, and Challenge Mountain Facility.

The bottom terminal of the Jolly Jug chairlift would be accessed by an existing road, and a road spur of approximately 246 feet would be constructed to reach the top terminal. The Challenge Mountain Facility would be reached by a road spur approximately 1,162 feet in length.

Ski trails would be constructed by flush cutting and/or stump grinding, except areas designated for full grading activities. The proposed chairlift towers would be transported to the site by helicopter. Tower foundations would be poured concrete. Building materials for the on-mountain facilities would be transported to the site via existing and proposed roads.

Forest Plan Amendment

A Forest Plan amendment is proposed to assign and change the Forest Plan management area allocations for areas of the proposed SUP boundary adjustments (the SUP boundary adjustments are depicted in Figure 4). Currently, the Forest Plan does not include an official management area allocation for several areas within the existing SUP boundary on the northern side of the project area, and the SUP boundary adjustment areas on the southern side of the project area are currently allocated as Management Area 1.3 Backcountry Recreation (refer to Figure 11). Alternative 3 would amend the Forest Plan to assign Management Area 8.22 Ski-Based Resorts to areas within the existing SUP boundary on the northern side of the project area and change the current Forest Plan management area associated with boundary adjustments on the southern side of the project area to Management Area 8.22 Ski-Based Resorts. If this alternative is selected, the expanded boundary would be authorized by amending EMR's permit and managed to comply with Management Area 8.22 Ski-Based Resorts allocation. Through this amendment process the SIOs and ROS classification would be amended to correspond with Management Area 8.22 Ski-Based Resorts.

C. PROJECT DESIGN CRITERIA INCORPORATED INTO ALTERNATIVES 2 AND 3

In order to minimize potential resource impacts from construction and implementation of any approved projects, PDC have been incorporated into Alternatives 2 and 3 (Table 2-3).

PDC are devised in the pre-analysis and analysis phases to reduce environmental impacts and comply with applicable laws and regulations. They include, but are not limited to, BMPs, Forest Plan standards and guidelines, and standard operating procedures.

PDC were designed by the Forest Service and specialists involved in this analysis. The potential effects of implementing the Proposed Action and Alternative 3 (provided in Chapter 3) were analyzed with these PDC applied.

PDC come from Federal, State, and local laws, regulations and policies; forest plans, scientific research and from experience in designing similar projects. The majority of the PDCs are considered common practices which ski area managers have historically used in alpine and sub-alpine environments to prevent or decrease potential resource impacts. They are highly effective methods that can be planned in advance and adapted to site conditions, as needed.

Responsibility for ensuring that required PDCs are implemented rests with EMR and the Forest Service. The enforcement mechanism for implementation of the specified PDC would be the terms and conditions of the SUP, and would extend to the Forest Service Special Use Permit Administrator, the District Ranger and the Forest Supervisor.

Table 2-3:
Project Design Criteria and Best Management Practices

RECREATION
ARP would pursue an easement for the current location of Jenny Creek Trail on private land owned by EMR. The acquisition of a right-of-way for this trail is a desired condition of the ARP as identified in the 1997 Forest Plan, and would facilitate access to NFS lands, including the Indian Peaks Wilderness.
Manage the interface between resort skiers and backcountry skiers at the junction between the Jenny Creek Trail and EMR ski trails and tree and gladed skiing areas. Facilitate the passage of users of the Jenny Creek Trail through extensive signage and potentially an "uphill lane" where necessary.
Gate the proposed Placer access bridge year-round and restrict access to administrative use.
TRAFFIC, PARKING, AND SKI AREA ACCESS
Manage ski area parking to provide adequate parking spaces for guests.
Road maintenance measures would be undertaken on County Road 130 between the Town of Eldora and the bridge site to ensure the successful passage of construction vehicles.
Continue and increase (possibly through the use of guest incentives) the amount of mass transportation and ride sharing to manage traffic and parking capacities.
SCENIC RESOURCES
Avoid straight edges where removing trees. Where the vegetation is removed, use a variable density cutting (feathering) technique and/or "scalloping" to create a more natural edge that blends into the existing vegetation.
Follow FSM guidelines (Section 2380) and Built Environment Image Guide (BEIG) guidelines: • The scenic character will be protected through appropriate siting of buildings and the use of low-impact materials and colors (e.g., indigenous construction materials, such as stone and wood, as well as low-reflective glass and roofing materials). • Remain in context with the landscape (i.e., rustic, craftsman, and country lodge styles). Architecture, materials, and colors shall follow the Forest Service's Built Environment Image Guide (BEIG). Additionally, Forest Service Handbook No. 617, "National Forest Landscape Management for Ski Areas, Volume 2, Chapter 7," refers recommended colors for ski areas on page 37 of that handbook. The colors are darker colors; greens, browns, navy blue, grays and black.
Meet reflectivity guidelines when constructing facilities or structures, including buildings, chairlift terminals and chairs. This includes any reflective surfaces (metal, glass, plastics, or other materials with smooth surfaces), that do not blend with the natural environment. They should be covered, painted, stained, chemically treated, etched, sandblasted, corrugated, or otherwise treated to meet the solar reflectivity standards. The specific requirements for reflectivity are as follows: Facilities and structures with exteriors consisting of galvanized metal or other reflective surfaces will be treated or painted dark non-reflective colors that blend with the forest background to meet an average neutral value of 4.5 or less as measured on the Munsell neutral scale.
Final design of facilities would be reviewed and approved by the Forest Landscape Architect to ensure consistency with Forest Plan BEIG guidelines and ADA and ABA regulations.
Larger inter-trail tree islands would be maintained to minimize the impact of cleared trails.
Proposed roads would utilize natural benches to the greatest extent practicable to reduce the visual impact.
Utility lines would be buried, reducing the long-term scenery impact.

Table 2-3:
Project Design Criteria and Best Management Practices

CULTURAL AND HERITAGE RESOURCES
Although site-specific surveys have been conducted, if undocumented historic and/or prehistoric sites are located during ground disturbing activities or planning activities associated with approved construction activities, they will be treated as specified in 36 CFR 800.13 concerning Post Review Discoveries.
Clearly mark the limits of disturbance to avoid known cultural resource sites.
NOISE
EMR would transport employees from the resort to the construction sites in as few vehicles as possible to ensure noise from vehicles does not reach or exceed 80 dBA, the threshold established by the Boulder County Noise Ordinance.
When practicable, EMR would transport heavy equipment necessary for construction (back-hoes, skidders, etc.) from the base area of the resort to construction sites once and then store the equipment at the construction site for the rest of the construction season.
Construction of all project components except the Placer chairlift, terrain and associated developments is expected to be accessed through the base area of EMR and would not impact the Town of Eldora.
If possible, blasting necessary for the Placer terrain pod would occur in the springtime when snow is present to reduce noise impacts.
WILDLIFE
During construction, contractors should provide an on-site bear proof container for all edible and food related trash in order to minimize conflicts with black bears. No food products or food containers should be thrown in the larger roll-off type dumpsters.
All construction activities should be confined to daylight hours, excluding emergencies.
Construction workers are prohibited from bringing dogs to the construction site.
All vehicle windows should be kept closed and doors locked on all vehicles to prevent bear entry.
Survey for raptor nests (goshawks and flammulated and boreal owls) in areas proposed for tree removal that represent potential nesting habitat prior to tree cutting each year. A Forest Service wildlife biologist will determine where surveys are required, which may not include all tree cutting areas. A no-disturbance buffer will be required around active nests (i.e., those containing birds or eggs), with the exact time period and buffer distance to be determined based on the species and nest location, considering vegetation, topography and other factors. Removal of inactive raptor nests should be consistent with Williams (2003b) and be conducted only after authorization from the BRD following a nest inspection by a qualified biologist.
To protect cavity nesting birds, prior to tree removal, educate surveyors (marking trees for cutting) and sawyers regarding the identification and value of trees with nest cavities and the need to avoid cutting those trees. When glading, avoid cutting any tree containing a nest cavity by cutting other adjacent trees to provide the required clearing.
To the extent possible, if flamulated owl nests are detected within impact areas, direct mortality of eggs and/or nestlings could be avoided by conducting tree removal in potential nesting habitat outside of the June 25 to July 15 nesting (with eggs/young in the nest) period.
To the extent possible, if boreal owl nests are detected within impact areas, direct mortality of eggs and/or nestlings could be avoided by conducting tree removal in potential nesting habitat outside of the May 21 to July 15 nesting (with eggs/young in the nest) period.
To the extent possible, if olive-sided flycatcher nests are detected within impact areas, direct mortality of eggs and/or nestlings could be avoided by conducting tree removal in potential nesting habitat outside of the June 1 and July 15 nesting (with eggs/young in the nest) period.

Table 2-3:
Project Design Criteria and Best Management Practices

Vertical, open-topped pipes, tubes, and other such structures can be lethal to migratory birds and other wildlife. To minimize bird and other animal mortality caused by such structures on public lands, appropriately cap any existing and proposed uncapped vent pipes including restrooms, stove pipes, sign posts, gate posts, tubes protecting plants, and fence posts to prevent animal access, while maintaining their intended use and function (Weldon 2012). This includes any temporarily open hollow vertical pipes, such as snowmaking bases without guns.
To the extent possible, if American marten dens are detected within impact areas, direct mortality of current year recruitment could be avoided by conducting tree removal in potential denning habitat outside of the March 1 to June 15 period.
Maintain standing and down CWD, to provide beneficial foraging and breeding benefits to Canada lynx and many other wildlife species. Design CWD retention in VMP treatments to *at least* meet or exceed the minimums in Forest Plan Standard 56. For the "Sanitation/Salvage with Removal in Lodgepole Pine (P6) and Spruce-fir (P7) Stands" components of the VMP (SE Group 2013), remove only those standing and down trees that pose risks to the continued health of the forest stand. For example, a lodgepole killed by MPB three years earlier that no longer supports MPB need not be removed and treated to slow the progression of the MPB epidemic. Retention of standing and down CWD would also facilitate stand progression toward old growth in designated old growth development areas.
Design, construct, sign, and maintain the gate on the bridge over Middle Boulder Creek to exclude unauthorized human access from using the bridge to cross Middle Boulder Creek and access the otherwise relatively isolated wildlife habitat south of the creek.
VEGETATION
RARE PLANTS AND PLANT COMMUNITIES
Prior to implementation of any project tiering to ski area improvements or the Vegetation Management Plan, surveys would be required for threatened, endangered and sensitive plants as well as plant species of local concern (SOLC) and significant natural plant communities (SNPC) within the project area in coordination with a Forest Service Botanist or Botany Representative. If such plants or communities are present, they would be avoided or PDC would be undertaken to comply with the Forest Plan and Forest Service policy. Ski improvement areas not surveyed in 2012 include several areas of Alternative 3, including the proposed tree removal for Moose Glades and portions of Bryan Glades II and Placer Glades, as well as the proposed C2/C3 trail for Bryan Glades II and proposed ski trail IP1 near the Lower Diamondback Trail.
Prior to ground disturbing activities, coordinate with a Forest Service Botany Representative to discuss the demarcation of known R2 Sensitive or SOLC plant species or SNPC to ensure impacts are avoided to the greatest extent practicable and to ensure impacts fall within the analyzed impact determinations.
If any previously unknown occurrences of TE or R2 Sensitive plants are encountered within the project footprint prior to or during project implementation, a Forest Service Botany Representative will be notified to derive suitable measures to avoid or minimize impacts as appropriate. If TE plants were to be encountered or determined to have adverse impacts, consultation with the USFWS would occur as appropriate.
Individual conifer trees or stands that the Forest Service determines to be noteworthy for biological or recreational/aesthetic values will be considered for retention on the landscape or for receiving reduced treatment impacts, when practicable. Examples include very old trees or stands, "bonsai" trees, and genetic reserves of limber pine not yet succumbing to MPB or WPBR.
Slash and debris will not be piled in populations of any PTES, SOLC or SNPC.
Consult with USFWS regarding downstream PTES plant species.

Table 2-3:
Project Design Criteria and Best Management Practices

Prior to the replacement of the Cannonball and Challenge chairlifts on private land (Alternatives 2 and 3), protection measures will be implemented, if feasible, to avoid *Botrychium* spp. so they are not adversely impacted during chairlift replacement. Such protection measures may include demarcating these rare plants with orange construction fencing or other similar materials and educating construction personnel as to their location. If possible, these areas should be protected from ground disturbing activities or temporarily stockpiles of slash, debris, or construction materials or equipment.
FOREST HEALTH & REVEGETATION PRACTICES
Contact an ARP Forester or resource specialist if elevated levels of pest activity are observed.
Prior to ground-disturbing activities, EMR must submit for review a revegetation plan. EMR will be required to re-vegetate disturbed areas to attain cover densities that would control erosion and prevent sedimentation consistent with Forest Plan Standards. Revegetation would tier to the Forest Revegetation Policy and would use native plants as much as is practicable. Genetically local seed sources would be used if available (e.g., at the ecological subsection level). Seed mixtures and mulches will be noxious weed-free and would be derived in consultation with a Forest Service Botany Representative. To prevent soil erosion, non-persistent, non-native species may be used while desired vegetation becomes established. The Forest Service must approve the seed mixtures and, for substantial revegetation needs, the revegetation technique and timing prior to implementation. The Forest Service reserves the right to independently test seed prior to seeding implementation. If weed seed is present that is tested for by the All States Weed Exam or that is listed as a Colorado noxious weed or noxious weed seed as identified by the current Colorado Weed and Colorado Weed Seed Acts, or as identified as noxious by the Federal Plant Protection Act, if cheatgrass or smooth brome is present, or if any other weed species is present that the Forest Service deems potentially harmful to local ecosystems, the seed may be rejected by the Forest Service and such seed shall be replaced at the Permittee's expense and may be re-tested by the Forest Service. The seed and seed lot tags shall be made available to the Forest Service for testing and lot confirmation prior to implementation in a timely manner allowing for replacement seed, if needed, to be received and tested without causing undue project delay.
Use local zone-appropriate sources when transplanting seedlings or saplings, such as from ski trails or along access roads.
When possible, obtain containerized stock from the Forest Service nursery in Bessey, Nebraska, which stores seed by elevation and habitat types for all National Forests in Region 2.
Upon completion of ground-disturbing activities, disturbed areas would be effectively mulched as required by the Forest Service to minimize erosion and sedimentation. All mulch subject to weed free certification shall comply with Forest Service Rocky Mountain Region Order No. 02-2005-01 as described below, under Noxious Weeds.
Plant seed collected from harvest operations at EMR.
Tree clearing limits would be adequately marked to minimize mistakes in clearing limits during construction.
NOXIOUS WEEDS
Prior to any treatment in habitats where PTES plant species are likely to occur, surveys must be conducted at the time when the PTES plants are reliably identifiable to determine presence or absence of these species in the project area. Coordinate with the Forest Service District Weed Coordinator to determine if surveys would be needed.
Obtain Forest Service approval prior to treating any noxious weeds. Follow the ARP Noxious Weed Management plan contained within the Decision Notice and Finding of No Significant Impact for Noxious Weed Management Plan on the ARP (2003), and the July 2010 ARP Guidance to Herbicide Application on NFS lands by Non-Forest Service Personnel.

Table 2-3:
Project Design Criteria and Best Management Practices

Comply with Forest Service Rocky Mountain Region Order No. 02-2005-01 requiring use of certified weed-free hay, straw, or mulch in all activities on NFS lands. The Forest Service reserves the right to inspect hay, straw or mulch and to review inspection certificates. Local, Colorado-sourced weed-free material is preferred by the Forest Service to minimize introduction of out-of-State and West Slope weeds. The certification process must be State-sanctioned and enforceable through a State program. To best ensure use of weed-free mulch, preference should be given to use of non-agricultural mulch products such as wood straw or bonded fiber matrix.
Before ground-disturbing activities, survey project areas to document the presence of any pre-existing weed infestations. Treat infestations prior to ground-disturbing activities and remove all weed seed and propagules to prevent spread.
Minimize travel through weed-infested areas or restrict travel to periods when seed spread is least likely. Treat noxious weeds along travel routes prior to and during project construction. Travel routes include ski area access roads, not county-administered roads.
Before ground-disturbing activities begin, identify and locate all equipment staging areas on NFS lands tiering to the SUP. Locate and use weed-free project staging areas. When this is not possible, treat existing noxious weeds in these areas prior to the staging of any equipment, or relocate staging areas if deemed necessary by the Forest Service.
To minimize risk of noxious weed introduction and spread, require all equipment used for ground-disturbing activities for project activities (not including service trucks or other vehicles that remain on roadways) to be clean, i.e., free of mud, dirt, plant parts, and seeds, or other debris that could contain or hold plant parts or seeds, prior to entering the project area, and prior to leaving a weed-infested project area. Equipment will be considered free of soil and other debris when a visual inspection does not disclose such material. The Forest Service reserves the right to inspect equipment prior to equipment staging or use on NFS lands.
For equipment cleaning at EMR, such as cleaning when leaving a project site, identify sites where equipment cleaning will occur and monitor these sites closely for weed establishment.
Instruct workers to inspect their clothing and equipment and to remove and properly dispose of seeds and plants parts found. Proper disposal means bagging securely for either transport to a landfill or incineration if available.
RIPARIAN AREAS AND WETLANDS
Minimize the area of disturbance when crossing streams and wetlands; adequately mark disturbance limits.
Where impacts are necessary, restore the riparian environment upon completion of construction.
To minimize impacts to riparian areas remove riparian vegetation with methods approved by the Forest Service.
Flush-cut and leave stumps and root wads intact within riparian areas and wetlands, except in areas identified for grading activities.
A CWA Section 404 Permit would be required by the USACE prior to disturbance of any waters of the U.S., including wetlands. The permit application and permit would require the preparation and approval of a mitigation plan for the impacted stream channel and wetlands. This mitigation plan will also be submitted, reviewed and must be approved by the Forest hydrologist prior to implementation.
Wetlands that should be avoided within and adjacent to the project area will be delineated and flagged by a qualified individual prior to construction.
Slash and debris will not be placed in wetlands.

Table 2-3:
Project Design Criteria and Best Management Practices

WATERSHED AND AQUATIC RESOURCES
Avoid soil-disturbing actions during periods of heavy rain or wet soils. This measure reduces soil erosion and sediment transport during runoff events (MM-9 Design Criteria).
Silt fences, straw bales, straw wattles, and other standard erosion control BMPs shall be employed to contain sediment onsite.
Erosion-control monitoring: EMR shall inspect erosion control measures daily during construction. During the re-stabilization period following construction, EMR shall inspect erosion control measures weekly, or anytime 0.5 inch or more of precipitation occurs within a 24-hour time period.
Immediately after completion of construction re-vegetate disturbed areas, including log landings, skid trails, and new ski trails, with ARP-approved, local seed mixtures (MM-1). Attain cover densities that would conserve site moisture and manage runoff consistent with Forest Plan Standards.
Ground disturbances in or adjacent to streams/wetlands would occur during baseflow conditions to protect water quality and minimize impacts to wetland soils/vegetation, and with sufficient time to re-vegetate before the winter season.
Install jute-netting or appropriate erosion-control matting on steep cut or fill slopes (greater than 30%) if the surface rock content is less than 35%, or if erosion problems are developing, to protect soils and enhance conditions for vegetation re-establishment.
Immediately after completion of construction, re-vegetate disturbed areas, including log landings, skid trails, and new ski trails, with ARP-approved, local seed mixtures (MM-1). Attain cover densities that would conserve site moisture and manage runoff consistent with Forest Plan Standards.
Where possible, existing surface soils and O-horizon layers will be stockpiled and preserved for re-spreading following construction.
Apply hydromulch and/or straw mulch to enhance seed establishment.
Where necessary, import certified weed-free topsoil or organic amendments (based on approval by the Forest Service soil scientist) to re-establish an O-horizon capable of supporting plant growth. Monitor and manage these areas for weeds.
Re-vegetation monitoring: EMR shall review with the ARP, the success of project revegetation and site restoration annually for the first five years following construction. Details of the re-vegetation plan shall be adjusted in response to any deficiencies identified in follow-up monitoring.
CORONA AND INDIAN PEAKS WATERSHEDS (ALTERNATIVE 2)
Minimize impacts to stream health by disconnecting approximately 820 feet of existing roads in the vicinity of the existing Corona chairlift bottom terminal (MM-1 PDC) and implement the following PDC: • In-slope road surface (2 to 4% cross-slope) to drain road surface runoff into road-side ditch. • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control. For example, line ditch with adequate size rock and/or install check dams at adequate intervals (MM-10 Design Criteria). • Install road-relief culverts at a spacing adequate for the road slope and ditch characteristics. • Design, implement, and maintain standard sediment and erosion control BMPs (e.g., rip-rap, fiber logs and small sediment traps) at the discharge of road-side ditches and culverts. Where possible, discharge runoff into well vegetated areas, away from the WIZ.

Table 2-3:
Project Design Criteria and Best Management Practices

Minimize impacts to stream health by disconnecting 1,335 feet of the Corona Road and an additional 490 feet of an existing spur road off the Corona Road leading to the Indian Peaks chairlift bottom terminal (MM-1 Design Criteria) and implement the following PDC: • Stream channels currently cross these sections of roads through culverts and road-side ditches discharge directly into the streams. To disconnect these roads, design, install, and maintain BMPs for energy dissipation and erosion control (such as rip-rap) at the outlet of these culverts. • In-slope road surface (2 to 4% cross-slope) to drain road surface runoff into road-side ditch. • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Install road-relief culverts at a spacing adequate for the road slope and ditch characteristics (MM-10 Design Criteria). • To the extent possible, select the location of drains for roads and other graded areas to disperse runoff into stable, well vegetated areas away from the WIZ. • Design, install, and maintain standard BMPs for sediment and erosion control (e.g., rip-rap, fiber logs and small sediment traps) at the discharge of road ditches and culverts.
All new, permanent roads should be designed, constructed, and maintained to drain into the road-side ditch by insloping the road surface (achieve 2 to 4% cross slope). Route road drainage through adequate BMPs for erosion and sediment control and discharge into stable, well vegetated areas.
Construct new road sections to the proposed Challenge Mountain Facility, Challenge chairlift top terminal, and Placer chairlift top terminal and implement the following PDC: • Stabilize and maintain roads and other disturbed sites during and after construction to control erosion (MM-11). • Make cuts, fills, and road surfaces strongly resistant to erosion (MM-9 Design Criteria). • Provide appropriate road surface (i.e., dirt or gravel) on all new road sections. • In-slope road surface (2 to 4% cross-slope) to drain road surface runoff into road-side ditch. • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Design road ditches and cross drains to limit flow to ditch capacity and prevent erosion and failure (MM-10 Design Criteria). At a minimum, install cross drains at 100-foot intervals; if needed, adjust cross drain spacing according to standard practices. • To the extent possible, select the location of drains for roads and other graded areas to disperse runoff into stable, well vegetated areas. • Design, install, and maintain BMPs for erosion control (such as rip-rap, fiber logs and small sediment traps) at the outlet of road ditches and culverts.

Table 2-3:
Project Design Criteria and Best Management Practices

The following PDC apply to the design and construction of the new access road to the proposed Placer chairlift bottom terminal, to be constructed on both sides of Middle Boulder Creek, approximately 250 feet in total length: • Stabilize and maintain roads and other disturbed sites during and after construction to control erosion (MM-11). • Make cuts, fills, and road surfaces strongly resistant to erosion (MM-9 Design Criteria). • Minimize road surface erosion and associated sediment input into Middle Boulder Creek. Construct road surface with erosion-resistant materials, such as crushed rock or compacted gravel (MM-9 Design Criteria). • Limit road width and length to the minimum extent possible (MM-9). • Construct roads to minimize sediment discharge into Middle Boulder Creek (MM-10). Avoid down-road flow and ponding by cross sloping road surface 2 to 4%. Construct road with crown fill or in-slope road cross sections (based upon final grading plan). • Design and construct road-side ditches to drain surface runoff away from Middle Boulder Creek to the extent practicable. Do not discharge road runoff directly into the stream; instead, route road runoff through sediment and erosion control BMPs, such as fiber logs and small sediment traps. Inspect and maintain BMPs a minimum of twice annually: (1) in the spring, as soon as conditions allow; and (2) in the fall season, before snow covers the ground. • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Design road ditches and cross drains to limit flow to ditch capacity and prevent erosion and failure (MM-10 Design Criteria). At a minimum, install cross drains at 30-foot intervals.
The following PDC would minimize potential impacts associated with the proposed bridge over Middle Boulder Creek to access the bottom terminal of the Placer chairlift: • Design and construct bridge over Middle Boulder Creek to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of aquatic life (MM-4). Obtain all necessary State and USACE permits. • Design and construct bridge over Middle Boulder Creek to avoid any impacts to pool and riffle complexes in the stream. • Design and construct bridge over Middle Boulder Creek to sustain bank full dimensions of width, depth, and slope and keep streambeds and banks resilient (MM-4 Design Criteria). • Construct bridge over Middle Boulder Creek during periods of low stream flow, typically late summer or early fall. • Keep construction equipment out of streams, except if specifically authorized by the ARP or if protected by 1 foot packed snow minimum. This measure sustains stream integrity (MM-3 Design Criteria). If construction equipment is required to access the stream channel for construction of the proposed bridge over Middle Boulder Creek, EMR will obtain all necessary local, State, and Federal permits.

Table 2-3:
Project Design Criteria and Best Management Practices

The following PDC would minimize potential impacts for construction of the Placer chairlift bottom terminal and replacement of the Corona chairlift bottom terminal: • Before grading, remove and properly stockpile topsoil so it can be utilized during restoration. • Disconnect disturbed areas from stream networks (MM-1). • Stabilize and maintain site during and after construction to control erosion (MM-11). • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • Grade bottom terminals to drain surface runoff into well vegetated areas and away from stream channels. • Route surface runoff originating in graded terrain through BMPs for sediment and erosion control, such as fiber logs and sediment traps. • Properly compact fills (MM-11 Design Criteria). • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (MM-11 Design Criteria). • Inspect and maintain BMPs for sediment and erosion control at least twice annually: (1) in the spring, as soon as conditions allow; and (2) in the fall season, before snow covers the ground.
The following PDC would minimize potential impacts for construction of the following projects: (1) proposed Placer chairlift top terminal; (2) Corona chairlift replacement top terminal; (3) Challenge Mountain Facility; (4) Lookout facility expansion; (5) grading of sections of ski trails P-1, P-3, P-5, and P-6; and (6) various utility installation projects. • Before grading vegetated areas, remove and properly stockpile topsoil so it can be utilized during restoration. • Stabilize and maintain site during and after construction to control erosion (MM-11). • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • Properly compact fills (MM-11 Design Criteria). • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. • Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (MM-11 Design Criteria). • To the extent possible, avoid operating heavy equipment on slopes steeper than 30%.

Table 2-3:
Project Design Criteria and Best Management Practices

The following PDC would minimize potential impacts for construction of proposed ski trails in the Corona and Indian Peaks watersheds (approximately 35 acres of tree removal only, no grading).

- Prior to ski trail construction, clearly flag tree clearing limits.
- All new ski trails with no grading, individual tree removal, and chairlift corridors would be constructed by "flush cutting" removed trees.
- To the extent possible, avoid operating heavy equipment on slopes over 30%.
- Where it doesn't present a skier safety concern, fell trees into the intertrail islands (i.e., not in the proposed gladed skiing areas) within the WIZ to improve LWD density. Applies to trails C-4, P-5, P-6, and lower sections of C-2, P-3, and P-4.
- Where practicable, do not allow skiing within Middle Boulder Creek's WIZ outside of designated ski trails (i.e., skier's left of traverse to Placer chairlift bottom terminal). This measure would maximize vegetative growth in the riparian areas.
- To the extent practicable, water bars must be designed and constructed to discharge surface runoff originating within the proposed ski trails away from the WIZ and into well vegetated areas, effectively disconnecting disturbed areas from the stream network. This measure applies to those sections of proposed trails C-2; P-3; P-4; P5; and P-6 within 100 feet of stream channels tributary to Middle Boulder Creek.
- In instances where, due to terrain conditions, water bars discharge within 100 feet of a stream channel, the downstream end of water bars will include BMPs for sediment separation and dispersion of flow, such as sediment traps and fiber logs.
- Water bars and associated BMPs must be installed immediately after construction of the ski trail.
- Inspect water bars during the first snowmelt season following construction to ensure surface runoff is being conveyed and discharged adequately. Modify waterbars/construct additional waterbars as necessary.
- Periodically inspect and maintain waterbars and associated BMPs.

PETERSON LAKE WATERSHED (ALTERNATIVE 2)

Disconnect approximately 1,770 feet of the mountain road from the base area to the maintenance shop. This section of the road is located within 200 feet of a stream channel tributary to Peterson Lake.

- In-slope road surface (2 to 4% cross-slope) to drain road surface runoff into road-side ditch.
- Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control. For example, line ditch with adequate size rock and/or install check dams at adequate intervals (MM-10 Design Criteria).
- Install road-relief culverts at a spacing adequate for the road slope and ditch characteristics.
- Design, implement, and maintain standard sediment and erosion control BMPs (e.g., rip-rap, fiber logs and small sediment traps) at the discharge of road-side ditches and culverts. Where possible, discharge runoff into well vegetated areas, away from the WIZ.

Table 2-3:
Project Design Criteria and Best Management Practices

Disconnect approximately 0.4 acre of parking area and access road adjacent to and immediately upstream of the stream channel tributary to Peterson Lake. • Make parking area surface strongly resistant to erosion (MM-9 Design Criteria). • Provide and maintain parking area slopes to adequately drain surface runoff (i.e., avoid ponding and excessive flow velocities). • Design, construct, and maintain drainage ditches to collect runoff originating in the parking areas. Where possible, discharge runoff into well vegetated areas, away from the WIZ. • Minimize erosion in drainage ditches by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Minimize sediment discharge into streams, lakes, and wetlands (MM-10). Properly design, implement, and maintain standard sediment and erosion control BMPs (e.g., rip-rap, fiber logs and small sediment traps) at the discharge of parking lot drainage.
The following PDC would minimize impacts to stream health and watershed condition associated with vegetation clearing and terrain grading proposed for construction of additional parking: • Make cuts, fills, and parking area surface strongly resistant to erosion, such as crushed rock or compacted gravel (MM-9 Design Criteria). • Design and construct parking area to drain and discharge surface runoff through sediment control BMPs, such as sediment traps, to minimize sediment discharge into streams, lakes, and wetlands (MM-10). • Minimize erosion in drainage ditches by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • To the extent practicable, select the location of drains to disperse runoff into stable, well vegetated areas. • Stabilize and maintain site during and after construction to control erosion (MM-11).
The following PDC would minimize impacts associated with approximately 2 acres of tree removal and 1 acre of terrain grading needed for construction of the proposed Challenge chairlift replacement: • Prior to tree removal, clearly flag tree clearing limits. • Before grading, remove and properly stockpile topsoil so it can be used during site restoration. • Stabilize and maintain site during and after construction to minimize erosion. Properly compact fills (MM-11). • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • Properly compact fills (MM-11 Design Criteria). • Grade surfaces to drain runoff into well vegetated areas. • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. Install BMPs to control sediment and erosion until revegetation is successful (MM-11 Design Criteria). • Inspect BMPs for erosion and sediment control during first runoff season following construction. Maintain or improve BMPs as needed.

Table 2-3:
Project Design Criteria and Best Management Practices

JENNY CREEK-EMR WATERSHED (ALTERNATIVE 2)
The following PDC would offset impacts associated with construction of the Jolly Jug ski trails: • Prior to tree removal, clearly flag tree clearing limits. • All new ski trails with no grading would be constructed by "flush cutting" removed trees. • Water bars must be designed and constructed to discharge surface runoff originating within the proposed ski trails into well vegetated areas. • Water bars must be constructed immediately after completion of the ski trail. • Inspect water bars during the first snowmelt season following ski trail construction to ensure surface runoff is being conveyed and discharged adequately. Special attention should be paid to indications of erosion, such as rilling and headcutting, both along the waterbar and at its discharge. If necessary, install BMPs for erosion control, such as check dams along the waterbars to reduce flow velocities and small sediment traps with riprap-protected outlets at the outfall of waterbars. • Periodically inspect and maintain waterbars and associated BMPs during subsequent snowmelt seasons. • Immediately after completion of construction re-vegetate new ski trails, with ARP-approved seed mixtures (MM-1). Attain cover densities that would conserve site moisture and manage runoff consistent with Forest Plan Standards. • Where possible, existing surface soils and O-horizon layers will be stockpiled and preserved for re-spreading following construction. • Apply hydromulch and/or straw mulch to enhance seed establishment. • Where necessary, import certified weed-free topsoil or organic amendments (based on approval by the Forest Service soil scientist) to re-establish an O-horizon capable of supporting plant growth. Monitor and manage these areas for weeds.
The following PDC would minimize potential impacts to the watershed by the proposed tree removal and terrain grading required for construction of the Lookout Facility expansion and the Jolly Jug chairlift terminals and access road. These measures would effectively limit the extent of CDA and the length of total stream network in the Jenny Creek Watershed (MM-1 Design Criteria). • Stabilize and maintain sites during and after construction to control erosion (MM-11). • Before grading, remove and properly stockpile topsoil so it can be used during site restoration. • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • The road to the proposed Jolly Jug chairlift bottom terminal should be designed, constructed, and maintained to drain surface runoff by in-sloping its surface to the road-side ditch (achieve 2 to 4% cross slope). • Stabilize and maintain roads and other disturbed sites during and after construction to control erosion (MM-11). • Make cuts, fills, and road surfaces strongly resistant to erosion (MM-9 Design Criteria). • Limit road width and length to the minimum extent possible (MM-9). • Minimize road surface erosion; construct road surface with erosion-resistant materials, such as crushed rock or compacted gravel (MM-9 Design Criteria). • Avoid down-road flow and ponding by cross sloping road surface 2 to 4%.

Table 2-3:
Project Design Criteria and Best Management Practices

• Construct road-side ditch to capture and convey road surface runoff. • Design road ditches and cross drains to limit flow to ditch capacity and prevent erosion and failure (MM-10 Design Criteria). • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Route road ditch drainage through adequate BMPs for sediment control (such as fiber logs or small sediment traps) and discharge into well vegetated areas. • Grade chairlift terminals to drain surface runoff into well vegetated areas. • Select the location of drains to disperse runoff into stable, well vegetated areas. • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (MM-11 Design Criteria). • Inspect and maintain BMPs for sediment and erosion control during the first snowmelt season following construction to ensure surface runoff is being conveyed and discharged adequately. • Periodically inspect and maintain waterbars and associated BMPs during subsequent snowmelt seasons.
CORONA AND INDIAN PEAKS WATERSHEDS (ALTERNATIVE 3)
To the extent possible, avoid operating heavy equipment on slopes steeper than 30%.
Disconnect approximately 820 feet of existing roads in the vicinity of the existing Corona chairlift bottom terminal (MM-1 Design Criteria). • In-slope road surface (2 to 4% cross-slope) to drain road surface runoff into road-side ditch. • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control. For example, line ditch with adequate size rock and/or install check dams at adequate intervals (MM-10 Design Criteria). • Install road-relief culverts at a spacing adequate for the road slope and ditch characteristics. • Design, implement, and maintain standard sediment and erosion control BMPs (e.g., rip-rap, fiber logs and small sediment traps) at the discharge of road-side ditches and culverts. Where possible, discharge runoff into well vegetated areas, away from the WIZ.

Table 2-3:
Project Design Criteria and Best Management Practices

Disconnect 1,335 feet of the Corona Road and an additional 490 feet of an existing spur road off the Corona Road leading to the Indian Peaks chairlift bottom terminal (MM-1 Design Criteria). • Stream channels currently cross these sections of roads through culverts and road-side ditches discharge directly into the streams. To disconnect these roads, design, install, and maintain BMPs for energy dissipation and erosion control (such as rip-rap) at the outlet of these culverts. • In-slope road surface (2 to 4% cross-slope) to drain road surface runoff into road-side ditch. • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Install road-relief culverts at a spacing adequate for the road slope and ditch characteristics (MM-10 Design Criteria). • To the extent possible, select the location of drains for roads and other graded areas to disperse runoff into stable, well vegetated areas away from the WIZ. • Design, install, and maintain standard BMPs for sediment and erosion control (e.g., rip-rap, fiber logs and small sediment traps) at the discharge of road ditches and culverts.
All new, permanent roads should be designed, constructed, and maintained to drain naturally by in-sloping their surfaces to the road-side ditch (provide 2 to 4% cross slope). Route road drainage through adequate BMPs for sediment and erosion control and discharge into stable, well vegetated areas.
The following PDC would offset impacts due to construction of new road sections to the proposed Challenge Mountain Facility and Challenge chairlift top terminal. These PDC would effectively limit the extent of CDA and the length of total stream network in accordance with Design Criteria included in MM-1 of the WCPH: • Stabilize and maintain roads and other disturbed sites during and after construction to control erosion (MM-11). • Make cuts, fills, and road surfaces strongly resistant to erosion (MM-9 Design Criteria). • Provide appropriate road surface (i.e., dirt or gravel) on all new road sections. • In-slope road surface (2 to 4% cross-slope) to drain road surface runoff into road-side ditch. • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Design road ditches and cross drains to limit flow to ditch capacity and prevent erosion and failure (MM-10 Design Criteria). At a minimum, install cross drains at 100-foot intervals; if needed, adjust cross drain spacing. • To the extent possible, select the location of drains for roads and other graded areas to disperse runoff into stable, well vegetated areas. • Design, install, and maintain BMPs for erosion control (such as rip-rap, fiber logs and small sediment traps) at the outlet of road ditches and culverts.

Table 2-3:
Project Design Criteria and Best Management Practices

The following PDC would minimize potential impacts vegetation removal and terrain grading needed for the replacement of the Corona chairlift bottom terminal: • Before grading, remove and properly stockpile topsoil so it can be utilized during restoration. • Disconnect disturbed areas from stream networks (MM-1). • Stabilize and maintain site during and after construction to control erosion (MM-11). • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • Grade bottom terminal to drain surface runoff into well vegetated areas and away from stream channels. • Route surface runoff originating in graded terrain through BMPs for sediment and erosion control, such as fiber logs and sediment traps. • Properly compact fills (MM-11 Design Criteria). • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (MM-11 Design Criteria). • Inspect and maintain BMPs for sediment and erosion control at least twice annually: (1) in the spring, as soon as conditions allow; and (2) in the fall season, before snow covers the ground.
The following PDC would minimize potential impacts of vegetation removal and terrain grading needed for construction of the following projects: (1) Corona chairlift replacement top terminal; (2) Challenge Mountain Facility; (3) Lookout facility expansion; and (4) various utility installation projects. • Before grading vegetated areas, remove and properly stockpile topsoil so it can be utilized during restoration. • Stabilize and maintain site during and after construction to control erosion (MM-11). • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • Properly compact fills (MM-11 Design Criteria). • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. • Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (MM-11 Design Criteria).

Table 2-3:
Project Design Criteria and Best Management Practices

The following PDC would minimize potential impacts associated with proposed ski trails in the Corona and Indian Peaks watersheds: • Prior to ski trail construction, clearly flag tree clearing limits. • All new ski trails with no grading, individual tree removal, and chairlift corridors would be constructed by "flush cutting" removed trees. • Where it doesn't present a skier safety concern, fell trees into the intertrail islands (i.e., not in the proposed gladed skiing areas) within the WIZ to improve LWD density. Applies to lower sections of trails IP-1 and C-2. • To the extent practicable, water bars must be designed and constructed to discharge surface runoff originating within the proposed ski trails away from the WIZ and into well vegetated areas, effectively disconnecting disturbed areas from the stream network. This measure applies to those sections of proposed trails C-2 and IP-1 within 100 feet of stream channels tributary to Middle Boulder Creek. • In instances where, due to terrain conditions, water bars discharge within 100 feet of a stream channel, the downstream end of water bars will include BMPs for sediment separation and dispersion of flow, such as sediment traps and fiber logs. • Water bars and associated BMPs must be installed immediately after construction of the ski trail. • Inspect water bars during the first snowmelt season following construction to ensure surface runoff is being conveyed and discharged adequately. Modify waterbars/construct additional waterbars as necessary. • Periodically inspect and maintain waterbars and associated BMPs.
Immediately after completion of construction re-vegetate disturbed areas, including log landings, skid trails, and new ski trails, with ARP-approved, local seed mixtures (MM-1). Attain cover densities that would conserve site moisture and manage runoff consistent with Forest Plan Standards. • Where possible, existing surface soils and O-horizon layers will be stockpiled and preserved for re-spreading following construction. • Scarification of the soil surface layer in order to re-mix and increase tilth. • Apply hydromulch and/or straw mulch to enhance seed establishment. • Where necessary, import certified weed-free topsoil or organic amendments (based on approval by the Forest Service soil scientist) to re-establish an O-horizon capable of supporting plant growth. Monitor and manage these areas for weeds. • Re-vegetation monitoring: EMR shall review with the ARP, the success of project revegetation and site restoration annually for the first five years following construction. Details of the re-vegetation plan shall be adjusted in response to any deficiencies identified in follow-up monitoring.

Table 2-3:
Project Design Criteria and Best Management Practices

PETERSON LAKE WATERSHED (ALTERNATIVE 3)
Disconnect approximately 1,770 feet of the mountain road from the base area to the maintenance shop. This section of the road is located within 200 feet of a stream channel tributary to Peterson Lake. This PDC would offset the impacts of 0.5 acre of existing CDA and reduce the length of total stream network, as directed in MM-1 of the WCPH. • In-slope road surface (2 to 4% cross-slope) to drain road surface runoff into road-side ditch. • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control. For example, line ditch with adequate size rock and/or install check dams at adequate intervals (MM-10 Design Criteria). • Install road-relief culverts at a spacing adequate for the road slope and ditch characteristics. • Design, implement, and maintain standard sediment and erosion control BMPs (e.g., rip-rap, fiber logs and small sediment traps) at the discharge of road-side ditches and culverts. Where possible, discharge runoff into well vegetated areas, away from the WIZ.
Disconnect approximately 0.4 acre of parking area and access road adjacent to and immediately upstream of the stream channel tributary to Peterson Lake. • Make parking area surface strongly resistant to erosion (MM-9 Design Criteria). • Provide and maintain parking area slopes to adequately drain surface runoff (i.e., avoid ponding and excessive flow velocities). • Design, construct, and maintain drainage ditches to collect runoff originating in the parking areas. Where possible, discharge runoff into well vegetated areas, away from the WIZ. • Minimize erosion in drainage ditches by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Minimize sediment discharge into streams, lakes, and wetlands (MM-10). Properly design, implement, and maintain standard sediment and erosion control BMPs (e.g., rip-rap, fiber logs and small sediment traps) at the discharge of parking lot drainage.
The following PDC would minimize impacts to stream health and watershed condition associated with vegetation clearing and terrain grading proposed for construction of additional parking: • Make cuts, fills, and parking area surface strongly resistant to erosion (MM-9 Design Criteria). • Stabilize and maintain site during and after construction to control erosion (MM-11). • Design and construct parking area to drain and discharge surface runoff through sediment control BMPs, such as sediment traps, to minimize sediment discharge into streams, lakes, and wetlands (MM-10). • To the extent practicable, select the location of drains to disperse runoff into stable, well vegetated areas. • Inspect BMPs annually and implement necessary maintenance and improvements.

Table 2-3:
Project Design Criteria and Best Management Practices

The following PDC would minimize impacts associated with tree removal and terrain grading needed for construction of the proposed Challenge chairlift replacement: • Prior to tree removal, clearly flag tree clearing limits. • Before grading, remove and properly stockpile topsoil so it can be used during site restoration. • Stabilize and maintain site during and after construction to minimize erosion. Properly compact fills (MM-11). • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • Properly compact fills (MM-11 Design Criteria). • Grade surfaces to drain runoff into well vegetated areas. • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. Install BMPs to control sediment and erosion until revegetation is successful (MM-11 Design Criteria). • Inspect BMPs for erosion and sediment control during first runoff season following construction. Maintain or improve BMPs as needed.
JENNY CREEK-EMR WATERSHED (ALTERNATIVE 3)
The following PDC would minimize potential impacts vegetation removal and terrain grading needed for construction of the Jolly Jug chairlift bottom terminal. Under The PDC would disconnect the chairlift terminal from the stream network: • Before grading, remove and properly stockpile topsoil so it can be utilized during restoration. • Disconnect disturbed areas from stream networks (MM-1). • Stabilize and maintain site during and after construction to control erosion (MM-11). • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • Properly compact fills (MM-11 Design Criteria). • To the extent practicable, grade bottom terminal to drain surface runoff into well vegetated areas and away from the ephemeral swale. • Route all surface runoff originating in graded terrain through BMPs for sediment and erosion control, such as fiber logs and sediment traps. • Inspect and maintain BMPs for sediment and erosion control at least twice annually: (1) in the spring, as soon as conditions allow; and (2) in the fall season, before snow covers the ground. • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (MM-11 Design Criteria).
All new, permanent roads should be designed, constructed, and maintained to drain surface runoff by sloping their surfaces to the road-side ditch (achieve 2 to 4% cross slope). Route road drainage through adequate BMPs for erosion and sediment control and discharge into stable, well vegetated areas.

Table 2-3:
Project Design Criteria and Best Management Practices

The PDC apply to the design and construction of the access road to the Jolly Jug chairlift bottom terminal. The lower 400 feet of the planned road, closest to the chairlift terminal, are adjacent to a natural swale tributary to Jenny Creek. Implementing these measures would minimize potential impacts to the stream health of Jenny Creek associated with terrain grading needed for construction of this road: • Limit road width and length to the minimum extent possible (MM-9). • To minimize road surface erosion and associated sediment input into the stream system, construct road surface with erosion-resistant materials, such as crushed rock or compacted gravel (MM-9 Design Criteria). • Construct roads to minimize sediment discharge into the stream system (MM-10). Avoid down-road flow and ponding by cross sloping road surface 2 to 4%. • Design road ditches and cross drains to limit flow to ditch capacity and prevent erosion and failure (MM-10 Design Criteria). • Minimize erosion in road-side ditch by implementing and maintaining standard BMPs for erosion control (e.g., line ditch with adequate size rock, install check dams at adequate intervals). • Design and construct road-side ditch to drain surface runoff away from the existing swale to the extent practicable. Do not discharge road runoff directly into the swale; instead, route road runoff through sediment and erosion control BMPs, such as fiber logs and small sediment traps. Inspect and maintain BMPs a minimum of twice annually: (1) in the spring, as soon as conditions allow; and (2) in the fall season, before snow covers the ground. • Stabilize and maintain roads and other disturbed sites during and after construction to control erosion (MM-11).
The following PDC would minimize potential impacts of tree removal and terrain grading required for construction of the Lookout Facility expansion and the Jolly Jug chairlift top terminal and access road. These measures would effectively limit the extent of CDA and the length of total stream network in the Jenny Creek Watershed (MM-1 Design Criteria). • Stabilize and maintain sites during and after construction to control erosion (MM-11). • Before grading, remove and properly stockpile topsoil so it can be used during site restoration. • Make cuts, fills, and graded surfaces strongly resistant to erosion (MM-9 Design Criteria). • The road to the proposed Jolly Jug chairlift top terminal should be designed, constructed, and maintained to drain surface runoff by in-sloping their surface to the road-side ditch (achieve 2 to 4% cross slope). • Construct road-side ditch to capture and convey road surface runoff. • Design road ditch and cross drains to limit flow to ditch capacity and prevent erosion and failure (MM-10 Design Criteria). Route road ditch drainage through adequate BMPs for sediment control (such as fiber logs or small sediment traps) and discharge into well vegetated areas. • Limit road width and length to the minimum extent possible (MM-9). • Grade chairlift terminal to drain surface runoff into well vegetated areas. • Revegetate cuts and fills immediately after completion of grading using ARP-approved, native seeds. Install temporary BMPs for sediment and erosion control until planted vegetation provides erosion control (MM-11 Design Criteria).

Table 2-3:
Project Design Criteria and Best Management Practices

• Inspect and maintain BMPs for sediment and erosion control during the first snowmelt season following construction to ensure surface runoff is being conveyed and discharged adequately. • Periodically inspect and maintain waterbars and associated BMPs during subsequent snowmelt seasons.
The following PDC would offset impacts associated with tree removal needed for construction of the Jolly Jug ski trails: • Prior to tree removal, clearly flag tree clearing limits. • All new ski trails with no grading would be constructed by "flush cutting" removed trees. • Water bars must be designed and constructed to discharge surface runoff originating within the proposed ski trails into well vegetated areas. • Water bars must be constructed immediately after completion of the ski trail. • Inspect water bars during the first snowmelt season following ski trail construction to ensure surface runoff is being conveyed and discharged adequately. Special attention should be paid to indications of erosion, such as rilling and headcutting, both along the waterbar and at its discharge. If necessary, install BMPs for erosion control, such as check dams along the waterbars to reduce flow velocities and small sediment traps with riprap-protected outlets at the outfall of waterbars. • Periodically inspect and maintain waterbars and associated BMPs during subsequent snowmelt seasons. • Immediately after completion of construction re-vegetate new ski trails, with ARP-approved seed mixtures (MM-1). Attain cover densities that would conserve site moisture and manage runoff consistent with Forest Plan Standards. • Where possible, existing surface soils and O-horizon layers will be stockpiled and preserved for re-spreading following construction. • Where necessary, import certified weed-free topsoil or organic amendments (based on approval by the Forest Service soil scientist) to re-establish an O-horizon capable of supporting plant growth. Monitor and manage these areas for weeds.
AIR QUALITY
To the extent feasible, site improvements would be installed promptly in order to reduce the potential for dust emissions.
Grading areas, including chairlift terminal areas, would be watered as necessary and practical to prevent excessive amounts of dust. In the absence of natural precipitation, watering of these areas would occur as practical.
GEOLOGY AND SOILS
To the extent possible, operate on designated skid-trails and landings.
In areas to be graded, soil organic matter and topsoil would be stockpiled and re-spread after construction.
An ARP-approved seed mix would be applied to reclaimed areas and raked into the topsoil to ensure germination and establishment.
An ARP-approved hydromulch or straw mulch would be applied to reclaimed areas to enhance seed establishment and reduce the risk of erosion.
Appropriate construction equipment (skidders and/or forwarders) should be used for new trail construction to reduce impacts. Helicopters may be required on steeper slopes.
When logging over the snow, conditions should allow for 1 foot of packed snow to be continuous (i.e., not patchy) and competent enough so that wheeled or tracked vehicles do not break through. When logging over frozen ground, a minimum of 3 inches of continuous frozen ground should be present.

Table 2-3:
Project Design Criteria and Best Management Practices

Where necessary, surface netting in conjunction with mulching would be used to reduce the erosion hazard.
In areas where grading or soil disturbance will occur, if topsoil is available it would be stockpiled and re-spread following slope grading and prior to re-seeding.
Areas determined to have been compacted by construction activities may require mechanical subsoiling or scarification to the compacted depth to reduce bulk density and restore porosity.
Ground cover, as a combination of revegetation, surface rocks, and mulch will be 60 to 70% following reclamation activities to minimize erosion.
Following disturbance, all areas to be reclaimed should be scarified (if compacted), appropriate soil amendments incorporated, seeded with an ARP-approved seed mix, and erosion controls measures implemented where needed. On slopes with a high erosion classification, vegetation groundcover should exceed 40% in the first year and 60% by year 2 to minimize erosion and sedimentation.
Use existing routes for construction and routine maintenance of the proposed project components, where possible.
Outside areas where grading is proposed, and in sensitive areas, trees would be removed by flush cutting.
Areas determined to have been compacted by construction activities may require mechanical subsoiling or scarification to the compacted depth to reduce bulk density and restore porosity. Areas that may require de-compaction of soil include log landings, temporary roads, and skid trails (generally within 100 feet of landings). Follow de-compaction treatment with erosion control measures and revegetation as needed. This PDC may be waived site specifically if on-site inspection by a Soil Scientist determines de-compaction is not required.
Manage land treatments to maintain enough organic ground cover in each activity area to prevent harmful increased runoff. Ground cover, as a combination of revegetation, pine needle cover, surface rocks, and mulch, will be 60 to 70% following reclamation activities to minimize erosion. Revegetation success and ground cover effectiveness would be determined in consultation with the Forest Service resource specialists.
Ground cover, as a combination of revegetation and mulch applications, will meet requirements for the one and two years following completion of ground disturbing activities. Re-vegetation success and ground cover effectiveness would be determined in consultation with the Forest Service resource specialists.
If slash disposal is conducted by pile and burn, implement the following PDC to minimize impacts: • If possible, conduct pile burning over a protective layer of packed snow and/or frozen ground. • If snow/frozen ground is not present at the time of pile burning, doil organic matter and topsoil should be scraped and stockpiled prior to pile construction and re-spread after pile burning; till/scarify after burning to promote recovery by breaking up water repellent layers, increasing water infiltration, and mixing in organic material; and till/scarify after burning to promote recovery by breaking up water repellent layers, increasing water infiltration, and mixing in organic material.
Where chipping is the method used for slash disposal, implement the following PDC: • Depth of wood chips would not exceed 3 inches. • Distribute chips in discontinuous patches that do not result in a continuous chip mat (<40% of surface covered by 3 inches of chips). • Do not bury or mix the chips in with the soil.

Table 2-3:
Project Design Criteria and Best Management Practices

ALTERNATIVE 2
New ski trails that terminate near Middle Boulder Creek (P3, P4, P5 and P6) should be mulched/hydromulched and berms across ski trails should be constructed to divert runoff into the adjacent forest.
To minimize erosion, the road spur to the bottom terminal of the Jolly Jug chairlift would either be in-sloped with a rock armored ditch and cross drains at 200-foot intervals, or the road would have a gravel surface.
The road spur to the top terminal of the Placer Express chairlift would have cross drains constructed at 200-foot intervals and the road would be in-sloped with a rock ditch to minimize erosion transport.
The road spur to the bottom terminal of the Placer Express chairlift would have cross drains installed at 30-foot intervals (or an equivalent velocity limiting drainage management devise such as rock check dams or fiber logs) and the road would be an in-sloped, gravel surface with a rock ditch. Due to the proximity of the road to the Middle Boulder Creek, this road would also require proper placement of sediment traps, silt fences, straw waddles or other erosion control measures would contain sediment from entering the creek.
SUSTAINABILITY
Shuttle services to the ski area/other recreational areas in order to reduce air emissions.
Recycle replaced or removed chairlifts when possible.
Develop a renewable energy program.
If possible, LEED certify new buildings.
Develop a transportation program with Boulder County to reduce vehicle emissions.

D. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

The range of alternatives considered by the responsible official includes all reasonable alternatives to the Proposed Action that are analyzed in the document, as well as other alternatives eliminated from detailed study. Alternatives not considered in detail may include, but are not limited to, those that: fail to meet the purpose and need, are technologically infeasible or illegal, or would result in an unreasonable environmental harm.[22] Several alternatives were considered but eliminated from detailed analysis based on resource issues. These alternatives are discussed below; the project file at the Boulder Ranger District will contain additional information and documentation.

Scoping Proposed Action.

The Proposed Action in the July 13, 2012 Scoping Notice and July 20, 2012 NOI, proposed adding approximately 70 acres of ski trails and 70 acres of tree and gladed skiing areas. The Placer terrain included eight new ski trails and approximately 30 acres of tree and gladed skiing areas. The Corona terrain included three new ski trails and approximately 30 acres of tree and gladed skiing areas. The Jolly Jug terrain included four new ski trails and approximately 10 acres of tree and gladed skiing areas. The original alignments of ski trails, chairlifts, and tree and gladed skiing areas reflected the designs in the EMR Master Plan.

This alternative has been eliminated from detailed analysis in response to information gathered through public comments and field visits. The ground-truthing of project elements, including field review of projects in relation to sensitive resources and other physical factors, led to the revision of some project elements into the current Proposed Action presented as Alternative 2 in this document. In particular, the Jolly Jug, Placer and Corona project elements were modified following scoping and field visits. The tree and gladed skiing areas in the Corona area were adjusted to maximize acreage and access from multiple ski trails. The ski trails extending to the bottom terminal of the Placer Express chairlift were adjusted in order to avoid sensitive resources and address concerns raised by the public. Furthermore, ski trail alignments were modified or eliminated in the Placer terrain pod due to the presence of wetlands and streams, and ski trails were adjusted due to specific topographic features. The current Proposed Action includes six ski trails (22 acres) instead of eight ski trails (30 acres), which reduces tree removal within the proposed Placer area. Additionally, the Jolly Jug area was more accurately aligned in the field to reflect topography. The acreage of tree removal in the current Proposed Action is similar to the July 13, 2012 Scoping Notice description of Jolly Jug.

In-fill Alternative.

Commenters, including Middle Boulder Creek Coalition, suggested an alternative that would not increase the current EMR SUP boundary. Many reasons were offered by the public that justified the ID Team's

[22] USDA Forest Service, 2008d

consideration of this alternative subsequent to the scoping process, including: consideration of consistency with Forest Plan language relevant to the SUP boundary, impacts to the Middle Boulder Creek area, and impacts to the Jolly Jug area.

Specifically, members of the public and local municipalities requested an interpretation of language in the 1997 Forest Plan (page 54) which reads: "Continue authorization of downhill skiing at Eldora Ski Area under their special use permit and master development plan. Further improvements of the base facilities, infrastructure, and ski runs within the current boundary are expected. There will be no expansion of the area outside the boundaries currently specified in the Master Development Plan. It is anticipated that actual use levels will increase. There will, however, be no increase in the established maximum daily capacity." The EMR Master Plan, as well as the action alternatives included in this EIS, which all include variations of proposed SUP boundary adjustments, are consistent with the quoted language in the Forest Plan. The ARP interprets, "currently specified in the Master Development Plan" to apply to the "current" 2011 Master Plan which included SUP boundary adjustments. Because Alternative 3 in this EIS includes a SUP boundary adjustment that differs from the EMR 2011 Master Plan, should that alternative be approved through this process, the 2011 Master Plan would need to be amended to reflect the correct SUP boundary. For this reason, alternatives to the Proposed Action were not created in response to this specific concern and request.

Some commenters also requested the In-fill Alternative to respond to issues including resources and potential impacts associated with Middle Boulder Creek and Canada lynx. The ID Team explored several In-fill Alternatives that would address Purpose and Need Statements #1 and 2, yet not require either an adjustment to the SUP boundary or an impact to the Middle Boulder Creek corridor and associated habitat. Alternative configurations were explored for the Placer Express chairlift that would maintain the entire alignment within the existing SUP boundary and/or keep the bottom terminal further from Middle Boulder Creek and the associated lynx habitat. These alignments presented construction, operational and maintenance issues that would have created other resource issues. Two issues in particular were identified as having extensive impacts. First, if a road was necessary to an alternate location of the bottom terminal of the Placer Express chairlift, the road would have been extended from the bottom terminal of the Corona chairlift creating a considerable amount of additional vegetation removal and ground disturbance. Second, even without road access, the potential alternate bottom terminal locations would have required extensive grading to construct the chairlift and accommodate skier access. For these reasons, these planning alternatives were eliminated from detailed analysis.

The ARP has developed Alternative 3 (removal of projects that extend to Middle Boulder Creek) in response to the key issues of the Middle Boulder Creek Corridor and impacts to Canada lynx. During the alternative development process for Alternatives 3, the ID Team considered additional in-fill ski trails and tree and gladed skiing areas (in addition to what is included in Alternatives 3). Several ski trails were not

carried forward due to wind exposure, steepness of slopes and fragmentation of existing tree islands. Additional information is included in the project file.

The ID Team did not identify key issues associated with the Jolly Jug area. Therefore, this alternative was carried forward into detailed analysis.

Eliminate ski trail development below the current SUP boundary. Allow a cat track along current SUP boundary to egress to the bottom terminal of the Placer Express chairlift.

Under this design, the proposed Placer Express chairlift would be located in the same alignment as is proposed in Alternative 2. However, only the proposed ski trails and tree and gladed skiing areas within the current SUP boundary would be included in the alternative. A ski trail would be developed along the current SUP boundary and then following the lift-line to the bottom terminal of the Placer Express chairlift.

By developing ski terrain further from Middle Boulder Creek, impacts to the creek and tributaries would be minimized. EMR would gain additional ski trails inside the current SUP boundary, and one additional ski trail outside the current SUP boundary down to the chairlift station at the bottom of the mountain allowing for emergency access. This design would also discourage recreation access to the ski area by keeping the ski trails higher on the mountain. Impacts to dispersed recreation would also be minimized.

This design is eliminated from detailed analysis for two primary reasons: 1) Alternative 3 responds to watershed resource concerns by eliminating the Placer Express chairlift and terrain completely, and 2) in this design, the Placer terrain could not reasonably meet the purpose and need for of this project for more intermediate terrain in such a constrained area (Purpose and Need #3) and the short ski trail length would not provide a quality alpine experience (Purpose and Need #4).

Eliminate Ski Trail P-5 below the Corona chairlift and/or Placer Glades II. Provide a Cat Track from the Corona chairlift bottom terminal to the Center Ski Trail (Trail P-4), staying as high as possible.

This is a slightly more developed variation of the previous Alternative Considered but Eliminated. This design intends to eliminate potential watershed (stream health) and recreation (access) issues associated with the proposed Placer Express chairlift and terrain. Under this design only the western-most ski trail would be removed from the proposal. In its place, a cat track from the bottom terminal of the Corona chairlift would take skiers to ski trail *P-5* on Figure 3 and allow them to egress to the bottom terminal of the Placer Express chairlift.

This design was eliminated from detailed analysis for the reasons outlined above. In addition, between scoping and release of this Draft EIS, one of the ski trails in the Placer area was eliminated from the Proposed Action, in part to respond to potential resource impact issues identified during scoping.

Shorten the Placer Express lift alignment to minimize impacts to Middle Boulder Creek.

This design would minimize potential resource impacts (e.g., watershed, wildlife, scenery) in the Middle Boulder Creek area. The alternative is addressed above under the "In-fill Alternative" heading.

Combine the Indian Peaks chairlift and the Proposed Placer Express chairlift into one chairlift.

Under this design, the Indian Peaks chairlift would be removed and replaced with a longer Placer Express chairlift. The chairlift would extend from the proposed bottom terminal of the Placer Express chairlift to the current top terminal location of Indian Peaks chairlift.

This design is eliminated from detailed analysis because it does not adequately address Purpose and Need #1 and #2, to improve reliability of chairlift and terrain offerings and address skier safety concerns during prevalent wind events. The top terminal of the Indian Peaks chairlift is highly susceptible to wind closures and the proposed alignment of the Placer Express chairlift is designed to shelter it and allow it to operate during wind events.

Eliminate the Placer Express chairlift and add a mid-station to the Indian Peaks chairlift.

This eliminates the inclusion of the Placer Express chairlift and proposes to install an unload mid-station on the Indian Peaks chairlift where the top of the Placer Express chairlift is proposed. This was eliminated from detailed analysis because it does not address Purpose and Need #1 and #2, to improve reliability of chairlift and terrain offerings and address skier safety concerns during prevalent wind events.

Chairlift closures due to wind occur because of the dangers of swinging chairs. Since the top terminal of the Indian Peaks chairlift would not be relocated, the top portion of the chairlift would remain in operation, still be in the wind, and empty chairs would still be blown. Having skiers unload at a mid-station would actually make the issue worse by having more empty chairs in the wind at the summit.

Upgrade Indian Peaks as a heavier, detachable chairlift and not include Placer Express chairlift.

Many commenters presented this option as an alternative to the Placer Express chairlift as a means to address Purpose and Need statement # 1 and 2. The existing Indian Peaks primarily serves as a supplemental chairlift to the Corona chairlift. As many commenters have correctly indicated, EMR currently does not operate the Indian Peaks chairlift during average visitation days. This is because the Corona chairlift can serve all of the terrain that Indian Peaks serves with the exception of two ski trail segments on the east end of the back-side below Corona Road. For this reason, EMR would not financially commit to a new chairlift in that location. For this reason, this alternative was eliminated from detailed analysis.

Consider developing more glades instead of ski trails.

Under this, more new terrain throughout EMR would be gladed rather than cleared and maintained as ski trails. This alternative does not meet the Purpose and Need statement # 2 to improve the availability of intermediate terrain for visitors to EMR. Tree and gladed skiing areas are not suitable for all intermediate level skiers, thus the proposed projects incorporate appropriate combinations of ski trails and gladed skiing based on visitors to EMR.

Upgrade more guest service facilities, especially in the base area.

Additional new and upgraded guest service facilities was considered; however, this consideration was eliminated from further analysis because the upgrades to guest service facilities outlined in the proposal are designed to adequately meet the needs of current and proposed resort guests. On-mountain facilities are particularly popular among guests due to their proximity to the terrain being used; the new Challenge Mountain Facility and improvements to the Lookout facility were designed to meet this need. Additionally the base area is located on private lands and thus any expansion there would not be under the jurisdiction of ARP.

Alternatives and design options related to the Jenny Creek Trail and the Proposed Jolly Jug chairlift and terrain.

Several alternatives and project design concepts were identified by the public with respect to the proposed interface between the existing Jenny Creek Trail and the Jolly Jug area. The Jenny Creek Trail is non-motorized within private lands and motorized once within the ARP. The trail provides access to the Indian Peaks Wilderness and other areas of the ARP. Proposed Jolly Jug terrain would cross the Jenny Creek Trail which could lead to potential user conflict.

Members of the public requested the ARP explore opportunities to re-route the existing Jenny Creek Trail alignment around the Jolly Jug area. This concept responds to concerns that the terrain in the Jolly Jug area interferes with the use of Jenny Creek Trail by dispersed recreationists. This design is eliminated from detailed analysis because the user conflict can be minimized and/or avoided through appropriate signage and specification of an uphill lane where necessary.

Members of the public requested the ARP and EMR explore the potential for EMR to provide chairlift rides, snowmobile rides, or other methods to transport backcountry recreationists beyond the ski area boundary. This design presents another option to reduce conflict for users of the Jenny Creek Trail. Under this design, dispersed recreationists would be able to avoid user conflicts with downhill skiers by being transported beyond the SUP boundary by EMR. This design is eliminated from further analysis because user conflict can be minimized and/or avoided through appropriate signage and specification of an uphill lane where necessary.

Several members of the public also requested the ARP consider the construction of a tunnel or bridge for Jenny Creek Trail users to be separated from Alpine skiers. This design is eliminated from further analysis because user conflict can be minimized and/or avoided through appropriate signage and specification of an uphill lane where necessary.

Accommodation of dispersed recreation.

Members of the public requested the ARP analyze the potential for EMR to accommodate dispersed recreation with additional parking in the EMR base area and a summer/winter trail. This alternative would include a trail from the EMR parking lot to the current Hessie/Fourth of July Road trailhead. Allowing dispersed recreationists to park at the EMR parking lot would ease some of the parking issues at the current Hessie trailhead.

This concept is eliminated from detailed analysis for several reasons. 1) This concept does not address the identified Purpose and Need, 2) the EMR parking lots are located on private land and thus are not under the jurisdiction of ARP, and 3) the ARP believes this issue is beyond the scope of this EIS and better addressed through trailhead management.

Mountain bike access.

Members of the public requested the ARP consider a project that would provide mountain bike access on the service road between Jenny Creek, Tennessee Mountain and West Magnolia. This project element is beyond the scope of this EIS and would not address the Purpose and Need.

Long distance Nordic trails.

Members of the public requested the ARP consider the incorporation of long distance Nordic trails into the action alternatives. This project element is beyond the scope of this EIS and would not address the Purpose and Need.

No Jolly Jug chairlift and terrain due to southern exposure.

This alternative would eliminate the Jolly Jug chairlift and terrain from analysis due to its southern exposure. Commenters were concerned that the sun exposure on this terrain would render it not viable for parts of the ski season. The No Action Alternative includes no Jolly Jug chairlift and terrain as a project element. The action alternatives include Jolly Jug chairlift and terrain as it responds to the Purpose and Need for intermediate terrain and responds to wind issues at EMR. Through additional planning that was completed subsequent to scoping, ski trails have been configured to limit southern exposure (refer to the action alternative figures). Furthermore, southern exposure does not necessarily preclude the viability of the terrain.

Off-site alternatives to avoid wetland impacts.

This alternative would include the development of projects similar to those included in the action alternatives, but would be developed at another location, outside of EMR. This alternative has been eliminated from further analysis within this EIS because it would not meet the ARP's Purpose and Need to meet the needs and expectation of existing and potential guests and provide a safe skiing experience at EMR. Alternative projects that do not occur at EMR would inherently fail to meet these criteria. In addition, it is not feasible for EMR to consider off-site alternatives through this Forest Service NEPA process. Wetland impacts due to proposed projects would be minimal and mitigated in accordance with the Clean Water Act and Executive Order 11990.

Avoidance of impacts to Waters of the U.S., including Wetlands.

Under this alternative, projects with impacts to wetlands and waters of the U.S. would be eliminated. The No Action Alternative would not involve impacts to waters of the U.S., including wetlands. Alternative 3 addresses impacts to waters of the U.S., including wetlands near Middle Boulder Creek by eliminating type conversion wetland impacts associated with the Placer terrain. The replacement of the Corona chairlift would result in less than 0.10 acre of impacts to waters of the U.S., including wetlands, and these impacts would be mitigated in accordance with the Clean Water Act. Furthermore, the replacement of the Corona chairlift is important to the fulfillment of the Purpose and Need. The replaced Corona chairlift would not be as susceptible to wind closure, and thus would improve the recreational experience at EMR.

E. COMPARISON OF ALTERNATIVES

Table 2-4 provides a comparison of project elements associated with each alternative.

Table 2-4:
Summary Comparison of Alternatives

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
SUP AREA (ACRES)			
Proposed SUP Boundary Adjustment	0 (No Adjustment)	+86 (70 Placer Express Chairlift/Terrain 16 Jolly Chairlift/Terrain)	+18 (18 Jolly Jug Chairlift/Terrain)
Total SUP Area	*524 (existing)*	*524+86 = 610*	*524+18 = 542*
TERRAIN (ACRES)			
Total Ski Trails	184 (existing)	184+58 = 242	184+52 = 236
Existing Tree and Gladed Skiing Areas	152	152	152

Table 2-4:
Summary Comparison of Alternatives

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
New Tree and Gladed Skiing Areas	0	57	63
Modifications to Existing Tree and Gladed Skiing Areas	0	43	135
New Tree and Gladed Skiing Areas + Modifications to Existing Tree and Gladed Skiing Areas	0	100	198
Total Lift-Served Terrain	*336 (existing)*	*451*	*451*
NEW CHAIRLIFT SPECIFICS			
New Chairlifts	0	2 (Placer Express Chairlift and Jolly Jug Chairlift)	1 (Jolly Jug Chairlift)
Carrier Capacity (people per chair)	N/A	6 Placer and 4 or 6 Jolly Jug	4 or 6 Jolly Jug
Uphill Capacity (pph)	N/A	2,400 Placer and 1,200 Jolly Jug	1,200 Jolly Jug
Length (slope feet)	N/A	3,050 Placer and 3,250 Jolly Jug	4,400 Jolly Jug
CHAIRLIFT UPGRADE SPECIFICS			
Number of Chairlifts Upgrades	0	2 (Corona and Challenge/Cannonball)	2 (Corona and Challenge/Cannonball)
Corona Carrier Capacity (people per chair)	4	6	6
Corona Uphill Capacity (pph)	1,800	2,400	2,400
Challenge/Cannonball Carrier Capacity (people per chair)	3 Challenge 2 Cannonball	6	6
Challenge/Cannonball Uphill Capacity (pph)	1,800 Challenge 1,127 Cannonball	3,000	3,000
ON-MOUNTAIN GUEST SERVICES FACILITIES			
New Challenge Mountain Facility	N/A	16,000–20,000 sq. ft. 850 seats	16,000–20,000 sq. ft. 850 seats
Upgrade the Lookout facility	3,000 sq. ft 54 seats (existing)	7,700–9,700 sq. ft. ~300 seats	7,700–9,700 sq. ft. ~300 seats

Table 2-4:
Summary Comparison of Alternatives

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
ACCESS ROADS			
New Access Roads (linear feet)	No New Access Roads	+3,212	+1,408
PARKING			
Approximate Number of Parking Spaces	2,000 (existing)	2,000+560 = 2,560	2,000+560 = 2,560
SNOWMAKING COVERAGE (ACRES)			
Coverage[a]	164 (existing)	164+58 = 222	164+52 = 216

[a] Existing and proposed snowmaking coverage would occur on ski trails only. Gladed areas do not receive snowmaking coverage.

F. SUMMARY COMPARISON OF DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Per direction provided in 40 CFR 1502.14, Table 2-5 provides a comparison of environmental impacts by alternative.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
RECREATION, MOUNTAIN OPERATIONS AND GUEST SERVICES		
Issue Statement: Proposed projects within EMR's existing and proposed SUP area and private lands have the potential to affect the skier recreational experience and guest safety at the ski area.		
Indicator: Quantification of existing and proposed terrain acreage by ability level		
Ski Trails: Beginner: 4 acres Novice: 17 acres Low Intermediate: 45 acres Intermediate: 53 acres Advanced Intermediate: 38 acres Expert: 27 acres Total: 184 acres **Tree and Gladed Skiing Areas:** Intermediate: 9 acres Advanced Intermediate: 33 acres Expert: 110 acres Total: 152 acres **Total Terrain: 336 acres**	**Ski Trails:** Beginner: 4 acres Novice: 17 acres Low Intermediate: 45 acres Intermediate: 95 acres Advanced Intermediate: 49 acres Expert: 32 acres Total: 242 acres **Tree and Gladed Skiing Areas:** Intermediate: 19 acres Advanced Intermediate: 53 acres Expert: 137 acres Total: 209 acres **Total Terrain: 451 acres**	**Ski Trails:** Beginner: 4 acres Novice: 17 acres Low Intermediate: 45 acres Intermediate: 96 acres Advanced Intermediate: 42 acres Expert: 32 acres Total: 236 acres **Tree and Gladed Skiing Areas:** Intermediate: 38 acres Advanced Intermediate: 55 acres Expert: 122 acres Total: 215 acres **Total Terrain: 451 acres**
Indicator: Quantification of skier terrain densities (skiers/acre) under the existing and proposed conditions		
Under Alternative 1, the total density index is 79%, which indicates a slight surplus of overall terrain capacity when compared to CCC.	With development of the Proposed Action, the density index would increase to approximately 90%. At 90%, projected trail densities would be below the desired trail densities on existing and proposed trails.	With development of Alternative 3, the density index would remain similar to existing conditions at approximately 78%. At 78%, projected trail densities would be below desired trail densities on existing and proposed trails.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Indicator: Quantitative analysis of existing and proposed guest service space and discussion of guest experiences		
Base Area: 41,000 square feet The Lookout: 3,000 square feet The Lookout is the only on-mountain guest service facility at EMR and is unable to meet the present demand for services.	Alternative 2 would provide a 16,000–20,000 square foot facility below the top terminal of the Indian Peaks chairlift. Additionally, the Lookout would be renovated and its footprint increased to 7,700–9,000 square feet.	Alternative 3 would provide a 16,000–20,000 square foot facility below the top terminal of the Indian Peaks chairlift. Additionally, the Lookout would be renovated and its footprint increased to 7,700–9,000 square feet.
Indicator: Discussion and quantification of skier experience during wind events (skiers/acre)		
Under Alternative 1, windy conditions would continue to frequently force the Challenge, Indian Peaks, and Corona chairlifts to close. Challenge, Indian Peaks, and Corona chairlifts represent approximately 60% of the overall chairlift capacity at EMR. Thus, when these chairlifts are inoperable, the effective CCC of EMR is reduced by 2,700 guests, from 4,250 to 1,550 guests. During an approximately 1-hour period those guests (approximately 2,700 guests) would congest key egress trails, increasing densities above 30 skiers/acre. This results in safety concerns and a negative impact to the recreational experience.	Under Alternative 2, the new Placer and Jolly Jug chairlifts and replaced Challenge and Corona chairlifts would improve operations during wind events. If these chairlifts are able to remain open during wind events, skiers would be dispersed across an even larger area of terrain, resulting in skier densities consistent with targets outlined in Table 2-3 of the 2011 Master Plan.	Under Alternative 3, the new Jolly Jug chairlift and replaced Challenge and Corona chairlifts would improve operations during wind events. However, density issues could remain on the back-side terrain if the smaller Indian Peaks chairlift was forced to close, potentially resulting in higher trail densities on the *Muleshoe* trail in excess of the desired density of 10 skiers/acre, potentially creating safety concerns.
Indicator: Discussion of ski patrol efforts recovering skiers beyond the current ski area operating boundary in the Jolly Jug area and near Middle Boulder Creek		
Ski patrol is often called to make rescues outside the current operational boundary near Middle Boulder Creek and the Jolly Jug area.	Under Alternative 2, ski patrol efforts would be reduced because skiers would no longer be lost or stranded near Middle Boulder Creek and in the Jolly Jug area. New ski trails and chairlifts in these areas would collect skiers at natural convergence points and prevent them from getting lost.	Under Alternative 3, ski patrol efforts would be reduced in the Jolly Jug area but would remain unchanged near Middle Boulder Creek. Skiers would continue to ski below the operational boundary near Middle Boulder Creek and become stranded. New ski trails and a chairlift in the Jolly Jug area would reduce ski patrol efforts in this area.
Indicator: Discussion of effects to the EMR Nordic ski area under the proposed conditions		
The EMR Nordic Center has 40km of network trails.	Under Alternative 2, the access road to the bottom terminal of the Jolly Jug chairlift could interfere with the "Porcupine Park Loop" Nordic trail.	Under Alternative 3, the Jolly Jug chairlift and associated ski terrain would interfere with two EMR Nordic Center trails: "Porcupine Park Loop" and "Deadman's Gulch." Both of these trails would close.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

<table>
<tr><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th></tr>
<tr><td colspan="3">Issue Statement: Proposed projects have the potential to affect dispersed recreation within and adjacent to EMR's existing and proposed SUP area, as well as private lands.</td></tr>
<tr><td colspan="3">Indicator: Discussion of effects to dispersed recreationists on lands adjacent to EMR, including dispersed recreation areas north of EMR.</td></tr>
<tr><td>The Jenny Creek Trail and the Hessie/Fourth of July Road areas are popular year-round recreation areas near EMR. A portion of the Jenny Creek Trail is currently located on EMR ski trails. Alternative 1 would not impact dispersed recreation.</td><td>Alternative 2 would impact the dispersed recreation experience on the Jenny Creek Trail and in the Hessie/Fourth of July Road area. Users of the Jenny Creek Trail would encounter EMR infrastructure. Recreationalists in the Hessie/Fourth of July area would see new ski trails associated with the Corona and Placer chairlifts. Road improvements to County Road 130 for construction activities between the Town of Eldora and the bridge site could attract more recreationalists and could impact the recreational experience in this area.</td><td>Alternative 3 would impact the dispersed recreation experience on the Jenny Creek Trail and in the Hessie/Fourth of July Road area. Users of the Jenny Creek Trail would encounter EMR infrastructure. Recreationalists in the Hessie/Fourth of July area would see new ski trails associated with the Corona chairlift.</td></tr>
<tr><td colspan="3">TRAFFIC, PARKING AND AIR QUALITY</td></tr>
<tr><td colspan="3">Issue Statement: Proposed projects could generate measurable increases in daily/seasonal visitation and lead to additional vehicular traffic on Boulder Canyon Drive, through Nederland and on Shelf Road (the ski area access road). Proposed projects also could generate construction traffic on these roads as well as County Road 130 through the Town of Eldora. Parking capacities may also be affected by proposed projects.</td></tr>
<tr><td colspan="3">Indicator: Historic and projected traffic counts for roadway networks to access EMR</td></tr>
<tr><td>SH 119 at Eldora Road Design Day PM Peak Hour Traffic (vehicles per hour)
<table>
<tr><th></th><th>North of Eldora Road</th><th>South of Eldora Road</th></tr>
<tr><td>Existing Volume</td><td>513</td><td>374</td></tr>
<tr><td>2035 Background</td><td>980</td><td>800</td></tr>
<tr><td>Additional EMR Trips</td><td>375</td><td>75</td></tr>
<tr><td>2035 Total Volume</td><td>1,355</td><td>875</td></tr>
</table></td>
<td>SH 119 at Eldora Road Design Day PM Peak Hour Traffic (vehicles per hour)
<table>
<tr><th></th><th>North of Eldora Road</th><th>South of Eldora Road</th></tr>
<tr><td>Existing Volume</td><td>513</td><td>374</td></tr>
<tr><td>2035 Background</td><td>980</td><td>800</td></tr>
<tr><td>Additional EMR Trips</td><td>530</td><td>100</td></tr>
<tr><td>2035 Total Volume</td><td>1,510</td><td>900</td></tr>
</table></td>
<td>SH 119 at Eldora Road Design Day PM Peak Hour Traffic (vehicles per hour)
<table>
<tr><th></th><th>North of Eldora Road</th><th>South of Eldora Road</th></tr>
<tr><td>Existing Volume</td><td>513</td><td>374</td></tr>
<tr><td>2035 Background</td><td>980</td><td>800</td></tr>
<tr><td>Additional EMR Trips</td><td>455</td><td>85</td></tr>
<tr><td>2035 Total Volume</td><td>1,435</td><td>885</td></tr>
</table></td></tr>
</table>

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

<table>
<tr><th>Alternative 1</th><th>Alternative 2</th><th>Alternative 3</th></tr>
<tr><td colspan="3">Indicator: Comparison of anticipated winter traffic volumes with existing winter traffic volumes and the design capacities of roadway networks accessing EMR</td></tr>
<tr><td>SH 119 at Eldora Road Design Day PM Peak Hour Traffic (vehicles per hour)
<table>
<tr><th></th><th>Existing Volume</th><th>2035 Background</th><th>Alt. 1</th></tr>
<tr><td>North of Eldora Road</td><td>513</td><td>980</td><td>1,355</td></tr>
<tr><td>South of Eldora Road</td><td>374</td><td>800</td><td>875</td></tr>
</table>
Alternative 1 would not result in 10th Highest Day traffic volumes that would exceed CDOT’s Design Capacity of 1,700 vehicles per hour for this segment of highway.</td>
<td>SH 119 at Eldora Road Design Day PM Peak Hour Traffic (vehicles per hour)
<table>
<tr><th></th><th>Existing Volume</th><th>2035 Background</th><th>Alt. 2</th></tr>
<tr><td>North of Eldora Road</td><td>513</td><td>980</td><td>1,510</td></tr>
<tr><td>South of Eldora Road</td><td>374</td><td>800</td><td>900</td></tr>
</table>
When compared with Alternative 1, Alternative 2 would result in approximately 155 additional vph on SH 119 north of Eldora Road, and 25 additional vph on SH 119 south of Eldora Road during a PM Peak Hour on a Design Day. Alternative 2 would not result in 10th Highest Day traffic volumes that would exceed CDOT’s Design Capacity of 1,700 vehicles per hour for this segment of highway.</td>
<td>SH 119 at Eldora Road Design Day PM Peak Hour Traffic (vehicles per hour)
<table>
<tr><th></th><th>Existing Volume</th><th>2035 Background</th><th>Alt. 2</th></tr>
<tr><td>North of Eldora Road</td><td>513</td><td>980</td><td>1,435</td></tr>
<tr><td>South of Eldora Road</td><td>374</td><td>800</td><td>885</td></tr>
</table>
When compared with Alternative 1, Alternative 3 would result in approximately 80 additional vph on SH 119 north of Eldora Road, and 10 additional vph on SH 119 south of Eldora Road during a PM Peak Hour on a Design Day. Alternative 3 would not result in 10th Highest Day traffic volumes that would exceed CDOT’s Design Capacity of 1,700 vehicles per hour for this segment of highway.</td></tr>
<tr><td colspan="3">Indicator: Quantification/documentation of anticipated impacts to proposed construction/maintenance access roads and effects to Nederland and Eldora residents</td></tr>
<tr><td>Under Alternative 1 there are no anticipated impacts to proposed construction/maintenance access roads. Typical traffic for operations and maintenance would continue through Nederland and Eldora similar to existing conditions.</td>
<td>Under Alternative 2, the construction of proposed projects would result in impacts to access roads and Nederland and Eldora residents. Construction of the Placer Express chairlift would require a bridge across Middle Boulder Creek and the improvement of County Road 130 between Eldora and the bridge location. This activity would result in increased construction traffic through the Town of Eldora. Additionally, the removal of trees for proposed projects would require approximately 276 truckloads, or approximately 552 total truck trips. These trips would contribute to traffic increases on access roads near Nederland and Eldora as the trucks carry their load to a processing facility near Boulder, CO. As the majority of construction employees are assumed to live in Boulder, the commutes of these employees could impact traffic in Nederland.</td>
<td>Under Alternative 3, the construction of proposed projects would not result in some additional traffic on access roads near Nederland and Eldora. Projects would be accessed from the front-side of EMR, and thus there would be no traffic impacts in the Town of Eldora. The removal of trees for proposed projects would require approximately 314 truckloads, or approximately 628 total truck trips. These trips would contribute to traffic increases on access roads near Nederland as the trucks carry their load to a processing facility near Boulder, CO. As the majority of construction employees are assumed to live in Boulder, the commutes of these employees could impact traffic in Nederland.</td></tr>
</table>

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Indicator: Quantification of existing and proposed parking capacity for day and destination skiers within EMR parking lots		
Under the No Action Alternative 2,000 parking spaces are provided for car, RTD bus, charter bus and employee parking. This is more than the 1,696 spaces required to handle the current CCC at EMR.	The increased CCC in Alternative 2 would result in the need for additional parking at EMR. Under Alternative 2 there would be a need for 2,340 parking spaces. Although not subject to ARP authorization, creation of an additional 560 parking spaces is analyzed in the EIS as a connected action. Total 2,560 parking spaces would be provided.	The increased CCC in Alternative 3 would result in the need for additional parking at EMR. Under Alternative 3 there would be a need for 2,070 parking spaces. Although not subject to ARP authorization, creation of an additional 560 parking spaces is analyzed in the EIS as a connected action. Total 2,560 parking spaces would be provided.
Indicator: Quantification of legal parking spaces removed on CR 130 due to the construction of the bridge crossing Middle Boulder Creek and two road segments that would be constructed to connect CR 130 (north of Middle Boulder Creek) to the proposed Placer Express bottom terminal site.		
Under Alternative 1, parking for the Hessie Trailhead would continue to be provided within the Hessie Trailhead lot and allowed to overflow onto CR 130 when necessary.	Under Alternative 2, parking for the Hessie Trailhead would continue to be provided within the Hessie Trailhead lot and allowed to overflow onto CR 130 when necessary; however, due to construction of the bridge crossing approximately eight car lengths of parking along CR 130 would no longer be available.	Under Alternative 3, parking for the Hessie Trailhead would continue to be provided within the Hessie Trailhead lot and allowed to overflow onto CR 130 when necessary.
Issue Statement: Due to increases in ski area and construction traffic, air quality could be affected within the region.		
Indicator: Narrative description of existing air quality in the study area, including: population centers, Class I and Class II areas in the vicinity); airshed classifications and baseline conditions at nearby population centers; disclosure of any regional concerns (e.g., ozone issues in the area); and trending of air quality at the nearby Class I area over the past several years		
Air quality is recorded by four monitors within the study area. Data collected from these monitors showed that the greater Denver area resides in the carbon monoxide non-attainment area, EMR is not in the boundaries of this classification. In summary, monitors nearest EMR for the National Ambient Air Quality Standards (NAAQS) for selected criteria pollutants include readings that are consistently are well below the NAAQS for PM2.5 and PM10. However, the 8-hr ozone NAAQS is routinely exceeded at the Eldora monitor. Ozone levels do appear to be on a downward trend since 2006.	Given the small increments in estimated emissions due to EMR expansion activities under Alternative 2, it is expected that there would be little impact to the existing air quality in and immediately surrounding EMR.	Given the small increments in estimated emissions due to EMR expansion activities under Alternative 3, it is expected that there would be little impact to the existing air quality in and immediately surrounding EMR.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Indicator: Estimated daily increase in number of vehicles associated with the increased annual visitation		
Under Alternative 1, with a CCC of 4,463 the number of vehicles parked at noon on the tenth highest day is projected to be roughly 1,780	Under Alternative 2, EMR's CCC would increase to 5,859 which would translate to an additional 560 vehicles (approximately) parked at noon on the tenth highest day, when compared to Alternative 1, for a total of 2,340 vehicles	Under Alternative 3, EMR's CCC would increase to 5,177 which would translate to an additional 290 vehicles (approximately) parked at noon on the tenth highest day, when compared to Alternative 1, for a total of 2,070 vehicles
Indicator: Estimate emissions from mobile sources, including the effects of increased visitation		
Emissions Estimates for Existing Condition Total Hydrocarbons 3.906 tons/day CO 104.838 tons/day NOX 10.937 tons/day SO2 0.047 tons/day PM10 0.406 tons/day CO2 6,824.540 tons/day N2O 0.068 tons/day CH4 0.544 tons/day	There is a very small increment in the emissions from on-road mobile sources predicted to occur during the construction and operation phases of the action alternatives.	There is a very small increment in the emissions from on-road mobile sources predicted to occur during the construction and operation phases of the action alternatives.
Indicator: Discussion of Greenhouse Gas (GHG) emissions from mobile sources, including the effects of increased visitation in relation to climate change		
Because greenhouse gases from vehicle emissions mix readily into the global pool of greenhouse gases, it is not currently possible to accurately discern the effects of the EMR's operations under Alternative 1 from the effects of all other greenhouse gas sources worldwide. CO_2 emissions are presented above.	It is impossible to measure the incremental cumulative impact on global climate from emissions associated with EMR's planned operations. CO_2 emissions are presented above.	It is impossible to measure the incremental cumulative impact on global climate from emissions associated with EMR's planned operations. CO_2 emissions are presented above.
Indicator: Discussion of compliance with local, state and federal regulations regarding air quality		
Denver area resides in the carbon monoxide non-attainment area and monitors near EMR show that the 8-hr ozone NAAQS is routinely exceeded.	Given the small increments in estimated emissions due to EMR expansion activities, it is expected that there would be little impact to the existing air quality in and immediately surrounding EMR. The 8-hr ozone NAAQS would continue to be exceeded, although records do show a downward trend and Denver is expected to be a non-attainment area for carbon monoxide.	Given the small increments in estimated emissions due to EMR expansion activities, it is expected that there would be little impact to the existing air quality in and immediately surrounding EMR. The 8-hr ozone NAAQS would continue to be exceeded, although records do show a downward trend and Denver is expected to be a non-attainment area for carbon monoxide.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
SCENERY RESOURCES		
Issue Statement: Development of proposed projects, including associated infrastructure, would be visible from locations beyond the ski area.		
Indicator: Compliance with Forest Plan standards and guidelines for scenery management within the SUP area and from established critical viewpoints by meeting Scenic Integrity Objectives		
Under the No Action Alternative, EMR's existing chairlift and trail network, all related infrastructure, maintenance and guest operation buildings would continue to meet the 1997 Forest Plan SIO designation (*Low*) for the SUP area, as well as forest-wide and Management Area 8.22 standards and guidelines for scenery management.	As a component of Alternative 2, a Forest Plan amendment is proposed to change the Forest Plan management area allocations for areas of the SUP boundary adjustments. Through this process, the SIOs within the adjusted SUP boundary would be amended to *Low* to correspond with Management Area 8.22 Ski-Based Resorts. With the Forest Plan amendment, all of the projects within Alternative 2 would meet the SIO designation of *Low* throughout the existing and proposed SUP area, as well as forest-wide and Management Area 8.22 standards and guidelines for scenery management.	As a component of Alternative 3, a Forest Plan amendment is proposed to change the Forest Plan management area allocations for areas of the SUP boundary adjustment in the Jolly Jug area. Through this process the SIO within the adjusted SUP boundary would be amended to *Low* to correspond with Management Area 8.22 Ski-Based Resorts. With the Forest Plan amendment, all of the projects within Alternative 3 would meet the SIO designation of *Low* throughout the existing and proposed SUP area, as well as forest-wide and Management Area 8.22 standards and guidelines for scenery management.
Indicator: Analysis of visual simulations from three critical viewpoints and one perspective rendering		
Critical Viewpoint #1 Fourth of July Road (Figure 7): Currently visible ski area development from this viewpoint, from east to west or left to right on the photo, include: the very bottom of *Lower Diamondback* trail on private lands, a very small segment of *Corona Road* trail, *Muleshoe* trail, *Corona* trail, Corona chairlift, *Cascade* trail, and *West Ridge* trail. *Muleshoe* and *Corona* trails are the most distinctive ski area features from this viewpoint. **Critical Viewpoint #2 Hessie/Fourth of July Fork (Figure 8):** Due to the lower elevation of this viewpoint, only Corona chairlift and trail and *West Ridge* trail are visible from this viewpoint. The top and bottom terminal of the Corona chairlift are not visible from this viewpoint.	Proposed projects would vary in levels of visibility. The following descriptions list project elements and their potential visibility from each viewpoint. **Critical Viewpoint #1 Fourth of July Road (Figure 7):** • Placer chairlift top terminal and towers (slightly discernible at a distance of approximately 3,800 to 4,500 feet); • Trails P-4 and P-3 (new trail clearing would be visible but would blend with the surroundings due to adjacent vegetation); • Placer Glades (tree thinning would blend with the existing tree island); • Placer Glades II (tree thinning would blend with the existing condition);	Proposed projects would vary in levels of visibility. The following descriptions list project elements and their potential visibility from each viewpoint. **Critical Viewpoint #1 Fourth of July Road (Figure 7):** • Trail IP-1 (lower segment is partially visible); • Placer Glades (tree thinning would blend with the existing tree island); • Junction of trails C-3 at Corona Road (would be slightly visible); • Upper portion of trail C-2 (visible as a new trail); • Upper portion of trail C-1 (visible as a new trail); • Bryan Glades II, Salto Glades and Moose Glades (indiscernible as the tree thinning should blend with the existing tree islands).

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Critical Viewpoint #3 Eldorado Avenue/CR 130 (Figure 9): Four components of the existing ski area are currently visible from this viewpoint: Indian Peaks chairlift, *Lower Ambush* trail, Corona chairlift and trail, and *West Ridge* trail. **Critical Viewpoint #4 Proposed Bridge Location (Figure 10):** From this location along Eldorado Avenue/CR 130, the existing ski area is not visible. The existing roadway is visible, although with a view into a forested area.	• Junction of trails C-3 and P-5 at Corona Road (would be slightly visible); • P-6 (visible); • Upper portion of trail C-2 (visible as a new trail). **Critical Viewpoint #2 Hessie/Fourth of July Fork (Figure 8)** • Placer chairlift top terminal and several chairlift towers along the upper portion of the lift-line (slightly visible at a distance of approximately 3,400 feet); • Trail C-2 (skiers left side of the new trail would be visible in the location where it is adjacent to Bryan Glades II); • Lower portion of trail P-6 (distinguishable through the existing vegetation as the trail begins to parallel Middle Boulder Creek); • Placer Glades (tree thinning would blend with the existing tree island); and • Corona chairlift (visible from this viewpoint, but the upgrade from a four-person chairlift to a six-person chairlift would not be distinguishable). **Critical Viewpoint #3 Eldorado Avenue/CR 130 (Figure 9):** • Placer chairlift top terminal, as well as several of the chairlift towers (top terminal visible at a distance of approximately 3,600 feet and a chairlift tower visible at a distance of approximately 1,500 feet); • Upper segment of trail P-3 and a segment of P-3 below *Around the Horn* and Corona Road trail (visible);	**Critical Viewpoint #2 Hessie/Fourth of July Fork (Figure 8):** • Trail C-2 (skiers left side of the new trail would be visible in the location where it is adjacent to Bryan Glades II); • Placer Glades (tree thinning would blend with the existing tree island); [a] • Trail C-4 (lower portion of this new trail would be visible); • Corona chairlift (visible from this viewpoint, but the upgrade from a four-person chairlift to a six-person chairlift would not be distinguishable); and • Bryan Glades II, Salto Glades and upper Moose Glades (indiscernible as the tree thinning should blend with the existing tree islands). **Critical Viewpoint #3 Eldorado Avenue/CR 130 (Figure 9):** • Placer Glades (tree thinning would blend with the existing tree island); • Trail C-3 (visible as a new trail); • Corona chairlift (visible from this viewpoint, but the upgrade from a four-person chairlift to a six-person chairlift would not be distinguishable); and • Salto Glades (tree thinning would blend with the existing tree island). **Critical Viewpoint #4 Proposed Bridge Location (Figure 10):** • As no bridge, chairlift or trails is proposed under Alternative 3 in this area, no visual change is expected from this viewpoint and no perspective renderings have been completed.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
	• Trail P-4 (partially visible near the confluence with the proposed Placer lift-line). • Placer Glades (tree thinning would blend with the existing tree island); • Trail C-3 (visible as a new trail); • Trail P-5 (visible above the existing SUP boundary); • Corona chairlift (visible from this viewpoint, but the upgrade from a four-person chairlift to a six-person chairlift would not be distinguishable); and • Salto Glades (tree thinning would blend with the existing tree island). **Critical Viewpoint #4 Proposed Bridge Location (Figure 10):** • The proposed bridge, as well as the road spur leading to the bridge from Eldorado Avenue/CR 130, would be visible in the immediate foreground from this location With the proposed Forest Plan amendment for the lower section of this terrain and implementation of project PDCs, the area would be consistent with the SIO of *Low*.	
CULTURAL AND HERITAGE RESOURCES		
Issue Statement: Implementation of proposed projects and associated ground disturbance may affect previously identified and unidentified cultural and heritage resources within the existing and proposed SUP area and on private lands.		
Indicator: Survey and document presence or absence of cultural resources		
Eighteen isolated finds, eight sites (5BL11081, 5BL11082, 5BL11083, 5BL11938, 5GL22), and one historic cultural landscape (5BL485) were recorded during the inventory of NFS lands. The second inventory, which was entirely on private land, identified four cultural resources: two segments of a newly recorded historic road (5BL12041.1 and	The 21 isolated historic sites found within the APE were recorded and found to be not eligible for inclusion on the NRHP. The other nine sites and one historic cultural landscape that fall within the APE will not be affected, with implementation of PDC including avoidance.	The 21 isolated historic sites found within the APE were recorded and found to be not eligible for inclusion on the NRHP. The other nine sites and one historic cultural landscape that fall within the APE will not be affected, with implementation of PDC including avoidance.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
5BL12041.2) and three historic isolated finds (5BL12040, 5BL12042, and 12043).		
Indicator: Document impacts to any unevaluated sites, sites eligible for listing on the National Register of Historic Places (NRHP), or NRHP listed sites		
Implementation of Alternative 1 would have "no effect" on any known NRHP listed or eligible historic properties.	Implementation of the Proposed Action was determined to have "no adverse effect" on any known NRHP listed or eligible historic properties.	Implementation of the Proposed Action was determined to have "no adverse effect" on any known NRHP listed or eligible historic properties.
SOCIAL AND ECONOMIC RESOURCES		
Issue Statement: Through construction, operation and increased annual visitation, implementation of proposed projects could alter local employment, personal income (i.e., wages) and visitor spending—in both the short- and long-term—in Boulder and Gilpin counties (in compliance with Executive Order 12898), by increasing total annual visitation.		
Indicator: Potential effects to socioeconomic indicators (to be modeled in IMPLAN3) in Boulder and Gilpin counties including: population, employment (both inside the resort and outside of the resort, including a discussion of part-time/seasonal employment vs. full-time equivalents), personal income (i.e., wages), visitor spending (both inside and outside the resort), county tax revenue		
Population: Colorado State Demography Office population growth projections expect strong growth for Boulder and Gilpin Counties' resident population between 2010 and 2040. Over the 30-year period from 2010 to 2040 an additional 58,184 residents would likely be added, representing a 17% increase over current population levels. **Employment:** Currently, EMR generates 170 FTE employment positions. Alternative 1 would create no new jobs at EMR, however, incremental increases in visitation would result in a total of three to four new, long-term FTEs being created—this employment would continue into the future. **Personal Income:** This additional labor income generated by ongoing employment growth at EMR is not anticipated to meaningfully affect personal income in the study area. **Visitor Spending and Tax Revenue:** Incremental increases in visitation under Alternative 1	**Population:** Alternative 2 is not anticipated to measurably affect (positively or negatively) this overall population trend. **Employment:** The cumulative impact of Alternative 2 construction activity would be to generate 240+ FTEs. These impacts would occur over a 5-year period (2015–2019), providing an annual average of 48 FTEs per year. At the completion of the 10-year projection, Alternative 2 would generate 27.8 FTEs within the resort. Increases in visitation would result in a cumulative total of 75+ new, long-term FTEs regionally. **Personal Income:** The additional labor income generated by the proposed projects is not anticipated to meaningfully affect personal income in the study area. **Visitor Spending and Tax Revenue:** Alternative 2 would result in approximately $83 million in dollar flows over the 10-year projection period. This increased economic activity is projected to generate	**Population:** Alternative 3 is not anticipated to measurably affect (positively or negatively) this overall population trend. **Employment:** The cumulative impact of Alternative 3 construction activity would be to generate 225+/- FTEs. These impacts would occur over a 5-year period (2015–2019), providing an annual average of 45 FTEs per year. At the completion of the 10-year projection, Alternative 3 would generate 23 FTEs within the resort. Increases in visitation would result in a cumulative total of 53+ new, long-term FTEs regionally **Personal Income:** The additional labor income generated by the proposed projects is not anticipated to meaningfully affect personal income in the study area. **Visitor Spending and Tax Revenue:** The combined on-going operations and construction activity of Alternative 3 would result in approximately $63 million in dollar flows over the 10-year projection

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
would result in an increase of economic (dollar) activity in the study area. This increased economic activity is projected to generate a cumulative total of $340,000 in state and local taxes within the study area. This increased public revenue is not anticipated to meaningfully affect the breakdown of total general revenue by source or the day to day operations of Boulder or Gilpin Counties.	$3.94 million in state and local taxes within the study area. This increased public revenue is not anticipated to meaningfully affect the breakdown of total general revenue by source; however, these additional revenues would help to support the day to day operations of Boulder or Gilpin Counties.	period. This increased economic activity is projected to generate $2.57 million in state and local taxes within the study area. This increased public revenue is not anticipated to meaningfully affect the breakdown of total general revenue by source; however, these additional revenues would help to support the day to day operations of Boulder or Gilpin Counties.
Indicator: Disclosure of compliance with Executive Order 12898, Environmental Justice		
Alternative 1 is consistent with EO 12898.	Alternative 2 is consistent with EO 12898.	Alternative 3 is consistent with EO 12898.
NOISE		
Issue Statement: Snowmaking and isolated rock blasting for trail construction has the potential to generate additional noise audible in the Town of Eldora.		
Indicator: Comparison of existing and proposed audible conditions (in decibels) related to construction, snowmaking, and resort operations based on manufacture's data and the duration of noise generating activities		
The resort uses a variety of motorized and mechanized equipment which generate noise to carry out resort operations, namely snowmaking guns (typical sound levels are approximately 71 dBA at a distance of 250 feet), snowmobiles (typical sound levels are approximately 71 dBA at a distance of 250 feet) and passenger vehicles (53 to 57 dBA at a distance of 250 feet). In the summer, maintenance activities require some motorized and mechanized noise generating equipment, such as chain saws and pick-up trucks. This equipment will continue to be used.	**Construction:** Construction of the project components is expected to involve sound-generating motorized equipment, including backhoes, excavators, bulldozers, chain saws, log skidders and wood chippers, among others, however, most project components are expected to be of sufficient distance, and separated by considerable landforms, from the Town of Eldora, the Hessie Townsite and dispersed recreation areas north of EMR, which would cause construction noise heard in these areas to be minimal and negligible. Noise from vehicles on roads are not expected to reach or exceed the 88 dBA threshold established by the Boulder County Noise Ordinance for vehicles with a manufacturer's gross vehicle rating of 10,000 lbs. or more. **Blasting:** EMR would conduct limited rock blasting through the use of dynamite within the Placer chairlift and terrain	**Construction:** Construction of the project components is expected to involve sound-generating motorized equipment, including backhoes, excavators, bulldozers, chain saws, log skidders and wood chippers, among others, however, most project components are expected to be of sufficient distance, and separated by considerable landforms, from the Town of Eldora, the Hessie Townsite and dispersed recreation areas north of EMR, which would cause construction noise heard in these areas to be minimal and negligible. All construction project areas are expected to be accessed through the base area of EMR; no project sites would be accessed through the Town of Eldora. **Blasting:** No blasting is proposed to occur. **Snowmaking:** Although 52 additional acres of snowmaking is proposed, the average number of snow guns that are

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
	pod. The acoustic levels of airblast, or air pressure, is measured in dB. The maximum airblast limits range from 129 dB to 134 dB. Blasting would occur over an approximate 15 minute period over several days during construction. To reduce noise impacts, blasting could occur in the springtime when snow is still present. **Snowmaking:** Although 58 additional acres of snowmaking is proposed, the average number of snow guns that are used at one time at EMR is not expected to change; remaining in the 30 to 35 range. The highest number of guns used at one time is also expected to remain within the range of plus or minus 66 guns and remain at approximately 90 days for the duration of the snowmaking season. New snowmaking infrastructure would be closer to the Town of Eldora (2,600 feet from town), Hessie Townsite (1,500 feet from town) and the dispersed recreation areas north of EMR (300 feet from the parking area for the Hessie Trailhead). **Operations:** In the winter, snowmobiles, grooming vehicles and the operation of the Placer chairlift may be able to be heard in dispersed recreation areas north of EMR, particularly along Eldorado Avenue and at the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads. In the summer, maintenance activities require some motorized and mechanized noise generating equipment, such as chain saws and pick-up trucks. This equipment will continue to be used.	used at one time at EMR is not expected to change; remaining in the 30 to 35 range. The highest number of guns used at one time is also expected to remain within the range of plus or minus 66 guns and remain at approximately 90 days for the duration of the snowmaking season. New snowmaking infrastructure would be closer to the Town of Eldora (3,185 feet from town), Hessie Townsite (1,900 feet from town—same as existing) and the dispersed recreation areas north of EMR (1,700 feet from the parking area for the Hessie Trailhead—same as existing). **Operations:** The physical distance and landforms present between the proposed projects of Alternative 3 and the Town of Eldora, the Hessie Townsite and dispersed recreation areas north of EMR would make the change from existing noise conditions in these areas minimal and negligible. In the summer, maintenance activities require some motorized and mechanized noise generating equipment, such as chain saws and pick-up trucks. This equipment will continue to be used.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
FOREST HEALTH		
Issue Statement: Implementation of vegetation management projects, including insect abatement, could affect forest health within the existing and proposed SUP area and private lands. The clearing of ski trails combined with the effects of Mountain Pine Beetle (MPB) mortality could change stand composition and fuel behavior.		
Indicator: Quantification (acreage) of lands affected by MPB (pure/mixed lodgepole pine) and projected impacted lands		
Stands throughout the analysis area exhibit MPB mortality ranging from 15 to 80%. Approximately 750 acres of lodgepole and mixed pine forests exhibit some affects from MPB. The effect would vary commensurate with the amount of lodgepole pine composing the stands.	Approximately 65 acres of clearing/grading would occur in stands susceptible to MPB infestation. Additionally, approximately 270 acres of glading and vegetation management treatments would occur in stands potentially affected by MPB. These activities would focus on removing infested trees and minimizing future infestation risk.	Approximately 60 acres of clearing/grading would occur in stands susceptible to MPB infestation. Additionally, approximately 294 acres of glading and vegetation management treatments would occur in stands potentially affected by MPB. These activities would focus on removing infested trees and minimizing future infestation risk.
Indicator: Effect of MPB and tree clearing on wind patterns and subsequent blow downs		
All 750 acres of lodgepole and mixed pine forests in the analysis area exhibit some MPB mortality. Trees that are affected will eventually fall, resulting in openings in the forest canopy and an increased risk for blow downs. This risk is expected to be minimal.	Approximately 65 acres of vegetation clearing would occur in forested stands. This would create openings in the forest canopy and increase the risk of blow downs. Additional openings in the canopy due to MPB mortality, vegetation management, and glading would contribute to this risk.	Approximately 60 acres of vegetation clearing would occur in forested stands. As with Alternative 2, there is a potential risk for increased blow downs.
Indicator: Disclosure of MPB treatment and locations, stand composition and fuels		
The application of carbaryl would continue to occur under this alternative according to Forest Service application specifications (the front-side of the mountain, along the ridgeline to the west and in critical areas that serve as screens or windbreaks). Management of the MPB epidemic serves to protect the diversity of stand composition at EMR. Vegetation management projects would address dangerous fuel loads by removing dead trees where practicable.	The application of carbaryl would continue to occur under this alternative according to Forest Service application specifications. Management of the MPB epidemic serves to protect the diversity of stand composition at EMR. Vegetation management projects would address dangerous fuel loads by removing dead trees where practicable.	The application of carbaryl would continue to occur under this alternative according to Forest Service application specifications. Management of the MPB epidemic serves to protect the diversity of stand composition at EMR. Vegetation management projects would address dangerous fuel loads by removing dead trees where practicable.
Indicator: Quantification (acreage) and disclosure of regeneration potential		
All stands except stand 112 (refer to EMR's VMP) at EMR are expected to continue to have adequate stocking levels to ensure natural regeneration.	Approximately 30 acres of clearing/grading would occur in forest stands which are currently experiencing good natural regeneration. Under Alternative 2, 57 acres of new tree and gladed	Approximately 60 acres of clearing/grading would occur in forest stands which are currently experiencing good natural regeneration. Under Alternative 3, 63 acres of new tree and gladed

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
	skiing would be offered at EMR. Currently, natural regeneration is adequate within these acres, however skiing in these stands is anticipated to reduce regeneration success. Proposed vegetation management projects would improve regeneration potential in forested stands across EMR.	skiing would be offered at EMR. Currently, natural regeneration is adequate within these acres, however skiing in these stands is anticipated to reduce regeneration success. Proposed vegetation management projects would improve regeneration potential in forested stands across EMR.
Indicator: Quantification of impacts to limber pine and old growth habitat		
There are approximately 26 acres of limber pine forest in the analysis area. Under this alternative there would be no impact on these areas.	The impacts to limber pine forest would be less than 1 acre resulting from projects within Salto Glades. Approximately 12 acres of vegetation management projects would occur in limber pine forest. There is no identified old growth forest within the study area.	Approximately 13 acres of glading within limber pine forest resulting from projects within Moose and Salto glades. There is no identified old growth forest within the study area.
Indicator: Quantification (acreage) of proposed ground disturbance and overstory vegetation removal effects by species		
Under Alternative 1 no new projects would be implemented, and no new impacts to forest stands would be expected.	Approximately 348 acres of disturbance (including grading and vegetation removal for ski trails, selective tree removal for glading, and vegetation management projects). Disturbance impacts by species: Grassland/Forb: 5.3 acres ski trails, 0.0 acre glading, 8.0 acres veg. mgmt. Lodgepole Pine: 37.1 acres ski trails, 50.1 acres glading, 80.5 acres veg. mgmt. Limber Pine: 0.0 acre ski trails, 0.9 acre glading, 12.1 acres veg. mgmt. Spruce-Fir: 27.6 acres ski trails, 46.9 acres glading, 79.1 acres veg. mgmt.	Approximately 366 acres of disturbance (including grading and vegetation removal for ski trails, selective tree removal for glading, and vegetation management projects). Clearing/grading impacts by species: Grassland/Forb: 8.3 acres ski trails, 0.0 acre glading, 5.6 acres veg. mgmt. Lodgepole Pine: 34.3 acres ski trails, 105.7 acres glading, 62.4 acres veg. mgmt. Limber Pine: 0.0 acre ski trails, 13.1 acres glading, 0.0 acre veg. mgmt. Spruce-Fir: 24.5 acres ski trails, 74.6 acres glading, 37.6 acres veg. mgmt.
FISH AND WILDLIFE		
Issue Statement: Development of proposed projects, including associated infrastructure, could impact individuals, populations, and/or habitat values for federally Proposed, Threatened or Endangered and/or Forest Service Rocky Mountain Region sensitive species (PTES) fish and wildlife species, Management Indicator Species (MIS), migratory birds, and species of local concern (SOLC).		
Indicator: Quantification (acres) and qualification of existing wildlife habitat and proposed alteration, fragmentation, or removal of wildlife habitat, by species. Include specifically lynx diurnal security habitat, winter forage habitat, and denning habitat		

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
No impacts would occur under Alternative 1. Existing conditions include: **Threatened and Endangered Species** Pallid sturgeon, whooping crane, piping plover, least tern: No habitat or no additional depletions Greenback cutthroat trout: No known genetically pure populations in the action area Mexican spotted owl: No known populations in the action area Preble's meadow jumping mouse: No designated critical habitat in the action area North American wolverine: No known population or habitat in Colorado Canada lynx: Diurnal Security Habitat large areas of effective diurnal security habitat surrounding EMR Winter Foraging Habitat 378.6 acres (includes habitat on NFS and private lands) Denning Habitat 439.6 acres (includes habitat on NFS and private lands) Other Habitat 243.7 acres (includes habitat on NFS and private lands) **Region 2 Sensitive Species** The following species are potentially present: Rocky Mountain capshell snail, Hudsonian emerald, boreal toad, northern leopard frog, American peregrine falcon, bald eagle, boreal owl, Brewer's sparrow, flammulated owl, northern goshawk, olive-sided flycatcher, white-tailed ptarmigan, American marten, fringed myotis, hoary bat, pygmy shrew, river otter, Townsend's big-eared bat	**Threatened and Endangered Species** Canada lynx: Alternative 2 impacts to lynx habitat types would total approximately 363.2 acres Diurnal Security Habitat values maintained Winter Foraging Habitat 34.2 acres (includes habitat on NFS and private lands) Denning Habitat 205.0 acres (includes habitat on NFS and private lands) Other Habitat 97.1 acres (includes habitat on NFS and private lands) Non-habitat 26.9 acres (includes habitat on NFS and private lands) **Region 2 Sensitive Species** Rocky Mountain capshell snail: Impacts on habitat minimized through PDC Hudsonian emerald: No impact on habitat Boreal toad: Impacts on habitat minimized through PDC, potential reduction of habitat connectivity Northern leopard frog: Impacts on habitat minimized through PDC American peregrine falcon: Minimal loss of foraging habitat Bald eagle: No impact on habitat Boreal owl: Impacts on 212.3 acres of potential habitat; conversion of 35.8 acres to non-habitat; potential nesting habitat loss of 27.7 acres	**Threatened and Endangered Species** Canada lynx: Alternative 3 impacts to lynx habitat would total approximately 381.8 acres Diurnal Security Habitat values maintained Winter Foraging Habitat 29.9 acres (includes habitat on NFS and private lands) Denning Habitat 201.4 acres (includes habitat on NFS and private lands) Other Habitat 124.5 acres (includes habitat on NFS and private lands) Non-habitat 26.1 acres (includes habitat on NFS and private lands) **Region 2 Sensitive Species** Rocky Mountain capshell snail: Impacts on habitat minimized through PDC Hudsonian emerald: No impact on habitat Boreal toad: Impacts on habitat minimized through PDC, potential reduction of habitat connectivity Northern leopard frog: Impacts on habitat minimized through PDC American peregrine falcon: Minimal loss of foraging habitat Bald eagle: No impact on habitat Boreal owl: Impacts on 205.8 acres of potential habitat; conversion of 33.2 acres to non-habitat; potential nesting habitat loss of 25.2 acres

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Management Indicator Species: The following species are potentially present: Greenback cutthroat trout, brook trout, brown trout, boreal toad, hairy woodpecker, pygmy nuthatch, warbling vireo, mountain bluebird, golden-crowned kinglet, Wilson's warbler, elk, mule deer	Brewer's sparrow: Minimal loss of potential secondary foraging habitat and potential loss of active nests during construction Flammulated owl: Loss of potential migratory habitat and secondary nesting habitat; nest losses minimized through PDC Northern goshawk: Impacts on 334.4 acres of potential habitat; conversion of 64.8 acres to non-habitat Olive-sided flycatcher: Impacts on 212.3 acres of potential habitat; conversion of 35.8 acres to non-habitat; nest losses minimized through PDC White-tailed ptarmigan: No impact on habitat American marten: Impacts on 212.3 acres of potential habitat; conversion of 35.8 acres to non-habitat; den losses minimized through PDC Fringed myotis: Impacts on 212.3 acres of potential habitat; conversion of 35.8 acres to non-habitat Hoary bat: Impacts on 334.4 acres of potential habitat; conversion of 64.8 acres to non-habitat Pygmy shrew: Impacts on 358.3 acres of potential habitat; conversion of 64.8 acres of habitat River otter: Impacts on habitat minimized through PDC Townsend's big-eared bat: Impacts on 334.4 acres of potential habitat; conversion of 64.8 acres to non-habitat	Brewer's sparrow: Minimal loss of potential secondary foraging habitat and potential loss of active nests during construction Flammulated owl: Loss of potential migratory habitat and secondary nesting habitat; nest losses minimized through PDC Northern goshawk: Impacts on 352.4 acres of potential habitat; conversion of 58.9 acres to non-habitat Olive-sided flycatcher: Impacts on 205.8 acres of potential habitat; conversion of 33.2 acres to non-habitat; nest losses minimized through PDC White-tailed ptarmigan: No impact on habitat American marten: Impacts on 205.8 acres of potential habitat; conversion of 33.2 acres to non-habitat; den losses minimized through PDC Fringed myotis: Impacts on 205.8 acres of potential habitat; conversion of 33.2 acres to non-habitat Hoary bat: Impacts on 352.4 acres of potential habitat; conversion of 58.9 acres to non-habitat Pygmy shrew: Impacts on 376.8 acres of potential habitat; conversion of 58.9 acres of habitat River otter: Impacts on habitat minimized through PDC Townsend's big-eared bat: Impacts on 352.4 acres of potential habitat; conversion of 58.9 acres to non-habitat

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
	Management Indicator Species Greenback cutthroat, brook, and brown trout: Potential increased sedimentation could lead to minimal degradation of aquatic habitat Boreal toad: Impacts on habitat minimized through PDC Hairy woodpecker: Impacts on 334.4 acres of potential habitat; conversion of 64.8 acres to non-habitat Pygmy nuthatch: Impacts on 334.4 acres of potential habitat; conversion of 64.8 acres to non-habitat Warbling vireo: Loss of 11 acres of potential habitat Mountain bluebird: Net positive impact on habitat; protection of nesting habitat through PDC Golden-crowned kinglet: Loss of 27.7 acres of potential habitat Wilson's warbler: Small, permanent effects on foraging and nesting habitat Elk and mule deer: Loss of 64.8 acres of potential habitat	**Management Indicator Species** Greenback cutthroat, brook, and brown trout: Potential increased sedimentation could lead to minimal degradation of aquatic habitat Boreal toad: Impacts on habitat minimized through PDC Hairy woodpecker: Impacts on 352.4 acres of potential habitat; conversion of 58.9 acres to non-habitat Pygmy nuthatch: Impacts on 352.4 acres of potential habitat; conversion of 58.9 acres to non-habitat Warbling vireo: No impact on habitat Mountain bluebird: Net positive impact on habitat; protection of nesting habitat through PDC Golden-crowned kinglet: Loss of 25.1 acres of potential habitat Wilson's warbler: Small, permanent effects on foraging and nesting habitat Elk and mule deer: Loss of 58.9 acres of potential habitat
Indicator: Disclosure of effects to PTES species, MIS, migratory birds, animal SOLC, and "other habitats"		
No impacts associated with Alternative 1.	**Threatened and Endangered Species** Pallid sturgeon, whooping crane, piping plover, least tern: May affect, likely to adversely affect Greenback cutthroat trout, Mexican spotted owl, Preble's meadow jumping mouse: No effect North American wolverine: Not likely to jeopardize	**Threatened and Endangered Species** Pallid sturgeon, whooping crane, piping plover, least tern: May affect, likely to adversely affect Greenback cutthroat trout, Mexican spotted owl, Preble's meadow jumping mouse: No effect North American wolverine: Not likely to jeopardize

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
	Canada lynx: May affect, likely to adversely affect **Region 2 Sensitive Species** Rocky Mountain capshell snail, Hudsonian emerald, bald eagle, white-tailed ptarmigan: No impacts Boreal toad, northern leopard frog, northern goshawk, American peregrine falcon, flammulated owl, boreal owl, Brewer's sparrow, olive-sided flycatcher, pygmy shrew, fringed myotis, hoary bat, Townsend's big-eared bat, American marten, river otter: Minimal impacts are anticipated **Management Indicator Species** Alternative 2 would not influence the overall ARP-wide amount, distribution, or condition of the Management Indicator Communities represented by the analyzed MIS. **Migratory Birds** Alternative 2 would be consistent with all applicable Forest Plan direction related specifically to migratory birds and their habitat. **Animal SOLC:** Beaver: Potential effect to a single beaver family Moose: Some temporary and permanent displacement, loss of cover and forage opportunities Other mammals: Temporary displacement Other birds: Temporary displacement and insignificant effects to foraging habitat	Canada lynx: May affect, likely to adversely affect **Region 2 Sensitive Species** Rocky Mountain capshell snail, Hudsonian emerald, bald eagle, white-tailed ptarmigan: No impacts Boreal toad, northern leopard frog, northern goshawk, American peregrine falcon, flammulated owl, boreal owl, Brewer's sparrow, olive-sided flycatcher, pygmy shrew, fringed myotis, hoary bat, Townsend's big-eared bat, American marten, river otter: Minimal impacts are anticipated **Management Indicator Species** Alternative 3 would not influence the overall ARP-wide amount, distribution, or condition of the Management Indicator Communities represented by the analyzed MIS. **Migratory Birds** Alternative 3 would be consistent with all applicable Forest Plan direction related specifically to migratory birds and their habitat. **Animal SOLC:** Beaver: No effect Moose: Some temporary and permanent displacement, loss of cover and forage opportunities Other mammals: Temporary displacement Other birds: Temporary displacement and insignificant effects to foraging habitat

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
	Other Habitats: Impacts to Old Growth, Effective Habitat, Interior Forest, Aspen, Riparian/Wetlands, Corridors, and Key Winter Range discussed in Chapter 3 Section H.	**Other Habitats:** Impacts to Old Growth, Effective Habitat, Interior Forest, Aspen, Riparian/Wetlands, Corridors, and Key Winter Range discussed in Chapter 3 Section H.
Indicator: Identification of, and effects within, immediate and adjacent LAUs		
No impacts associated with Alternative 1.	Alternative 2 would have barely discernable effects on the overall statistics of the Boulder LAU. The only change in the percent of any lynx habitat type in the LAU would be for denning habitat on NFS lands, which would change from 12% to 11% (11.4%). Habitat connectivity through the Boulder LAU and between contiguous LAUs would be maintained.	Alternative 3 would have barely discernable effects on the overall statistics of the Boulder LAU. The only change in the percent of any lynx habitat type in the LAU would be for denning habitat on NFS lands, which would change from 12% to 11% (11.3%). Habitat connectivity through the Boulder LAU and between contiguous LAUs would be maintained.
Indicator: Identification of impacts to water quality and stream health related to aquatic species through potential increases in sedimentation		
No impacts associated with Alternative 1.	Under Alternative 2 there would be no net change to the streamflow in South Boulder Creek below the Howard Ditch headgate, or in Boulder Creek, the Saint Vrain River, or the South Platte River. As a result, there would be no project-related depletion effects extending downstream to potential and occupied South Platte River species habitats. Construction of the Placer pod could increase sediment levels in Middle Boulder Creek, potentially affecting trout spawning and aquatic habitat quality. PDC would be enforced to minimize sedimentation during and after construction.	Under Alternative 3 there would be no net change to the streamflow in South Boulder Creek below the Howard Ditch headgate, or in Boulder Creek, the Saint Vrain River, or the South Platte River. As a result, there would be no project-related depletion effects extending downstream to potential and occupied South Platte River species habitats. Construction of the Jolly Jug pod could increase sediment levels in Jenny Creek, potentially affecting trout spawning and aquatic habitat quality. PDC would be enforced to minimize sedimentation during and after construction.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
PLANTS		
Issue Statement: Plant communities, PTES plant species, species of local concern (SOLC), and significant natural plant communities (SNPC) may be altered as a result of the proposed projects. Construction activity and ongoing maintenance of the ski area could increase presence of invasive plant species.		
Indicator: Identification of occurrences of any PTES plant species, SOLC and SNPC		
Threatened and Endangered Species: No habitat was identified for three of the four potentially present species, the fourth species, western prairie fringed orchid was previously consulted on. **Region 2 Sensitive Species:** 16 R2 Sensitive plant species have potential habitat within the analysis area. However, no known or new occurrences were documented. Botanical surveys were restricted to ski area improvement projects only. **Species of Local Concern**: Nine SOLC were found within the analysis area in over 50 different locations. **Significant Natural Plant Communities**. High quality wetland fens, wetland spring/seeps, and old-age limber pine stands were documented.	Identical to Alternative 1.	Identical to Alternative 1.
Indicator: Disclosure of direct, indirect and cumulative impacts to PTES plant species, SOLC and SNPC		
Alternative 1 would not result in any direct or indirect effects to threatened and endangered, R2 Sensitive plant species. There could potentially be minor direct impacts to SOLC and SNPC from ongoing management activities and indirect effects from continued spread of noxious and invasive weeds as well as erosion and sedimentation from ski area roads. The No Action alternative would not result in any identified new cumulative effects to Region 2 Sensitive Plant Species. Cumulative effects to SOLC and SNPCs, such as old-age limber pine stands, would likely be inconsequential in their contribution to cumulative impacts.	There would be no impacts to threatened and endangered species. No occurrences to R2 Sensitive plant species were found during surveys focused in ski area improvement project locations. However, there is uncertainty for a majority of the VMP project area, which will be surveyed in the future when these projects are more defined. Overall, the Proposed Action would not compromise the viability of SOLC or SNPC within the planning area or rangewide. In fact, over the long term, increased ski-terrain may actually benefit *Botrychium* subsp. as they prefer open, disturbed and stabilized sites. Direct and indirect impacts to other SOLC and SNPC will occur, but will be reduced with PDC. Any impacts to R2 Sensitive, SOLC, and SNPC would be inconsequential in	There would be no impacts to threatened and endangered species. No occurrences to R2 Sensitive plant species were found during surveys focused in ski area improvement project locations. However, there is uncertainty for a majority of the VMP project area, which will be surveyed in the future when these projects are more defined. Overall, Alternative 3 would not compromise the viability of SOLC or SNPC within the planning area or rangewide. In fact, over the long term, increased ski-terrain may actually benefit *Botrychium* subsp. as they prefer open, disturbed and stabilized sites. Direct impacts to other SOLC and SNPC will be slightly less under Alternative 3 than the Proposed Action. Any impacts to R2 Sensitive, SOLC, and SNPC would be

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
	their contribution to cumulative impacts, as although individual plants may be harmed, overall populations would be anticipated to remain viable at impacted sites due to implementation of the PDC.	inconsequential in their contribution to cumulative impacts, as although individual plants may be harmed, overall populations would be anticipated to remain viable at impacted sites due to implementation of the PDC.
Indicator: Qualification of effects to PTES plant species and SOLC from snow compaction and increased solar exposure		
There would be no increased snow compaction or increased solar exposure under the No Action Alternative and hence no effects to PTES, SOLC and SNPC plants or plant communities.	There would be no impacts from snow compaction and increased solar exposure to Threatened and Endangered plants. However, snow compaction may potentially affect R2 Sensitive (if found), SOLC or SNPC, such as wetlands.	Identical to Alternative 2
Indicator: Identify PDC and BMPs to avoid the spread of noxious or other undesirable weedy species and to manage existing populations toward eradication or acceptable levels when eradication is not realistic		
No BMPs or PDC would be implemented under Alternative 1 to avoid the spread of noxious and invasive plant species. If left untreated, noxious weeds could spread into the areas occupied by plants and communities of local concern and compete with individual plants for light, nutrients, and water. Invasive weeds would also degrade the functions and values of plant communities of concern.	A Noxious and Invasive Weed Management plan would be implemented to help minimize the potential for introduction and spread of weeds during ground-disturbing activities.	Identical to Alternative 2.
Indicator: Identify PDC and BMPs to minimize impacts to existing vegetation		
No BMPs or PDC would be implemented under Alternative 1. Impacts to vegetation under Alternative 1 are currently managed by EMR Summer Operation Plans.	BMPs and PDC to protect and minimize adverse impacts to botanical resources would be implemented. These are detailed in Table 2-3 and include additional surveys for R2 Sensitive, SOLC and SNPC, avoidance when possible.	Identical to Alternative 2.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
WATERSHED, WETLANDS AND SOILS		
Issue Statement: Implementation of terrain modifications associated with proposed projects (vegetation removal, grading, utility installation/burial, road reconstruction, and facilities construction and on-going maintenance after implementation) has the potential to affect soils, streams and riparian areas. Identified wetlands throughout the project area could be temporarily and/or permanently affected by construction and implementation of the proposed projects. Proposed ground disturbance and snowmaking may (individually and/or collectively) affect erosion and slope hazards.		
Indicator: A thorough characterization of existing watersheds and aquatic resources in the study area, including quality, quantity and location of aquifers, lakes, wetlands, rivers, streams and ephemeral drainages		
Study watersheds include: **The Corona Watershed:** Four perennial stream channels, approximately 6,753 feet long. Several intermittent channels, approximately 3,906 feet long. No lakes exist in the Corona Watershed. Approximately 10.3 acres of wetlands and no lakes. **The Indian Peaks Watershed:** One perennial stream channel, approximately 746 feet long. Several discontinuous, intermittent channels, approximately 4,668 feet long. Approximately 11.5 acres of wetlands and no lakes. **The Lake Peterson Watershed:** Three perennial streams, approximately 9,980 feet long. Two intermittent streams, approximately 1,186 feet long. 1,800 feet of piped stream channel. Approximately 9.2 acres of wetlands, three reservoirs and four small ponds. Total surface area approximately 31 acres. **The Jenny Creek Watershed:** One perennial stream, approximately 3,300 feet long. Approximately 7.2 acres of wetlands and no lakes.	Identical to Alternative 1.	Identical to Alternative 1
Indicator: Quantification and discussion of existing drainage concerns and treatment areas, including areas of rilling and gullying		
Field observations indicate that a substantial component of the snowmelt runoff occurring on most ski trails rapidly infiltrates into the ground. This is consistent with information contained in the soils survey for the ARP Area. Ski trails are generally well vegetated and indications of active surface runoff, such as rilling and	Identical to Alternative 1.	Identical to Alternative 1.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
sediment deposition, were seldom observed near stream channels. However, mountain roads exhibited signs of erosion due to surface runoff and a portion of EMR's parking area was also determined to be hydrologically connected to the adjacent channel. Under the No Action Alternative, EMR would continue current summer and winter seasonal operations. Due to the soil types, regular, on-going maintenance appears to be successful in most areas at minimizing erosion based on the lack of rilling and sediment deposition within the Activity Area.		
Indicator: Discussion of impacts to stream health and the water influence zone (WIZ) within the context of the following stream health metrics: bank stability, fine sediment, residual pool depth, wood frequency, macroinvertebrates, connected disturbed area (CDA) and length of connected channel		
Stream health parameters were measured on a study reach on Middle Boulder Creek. Since the WCPH stream health management measures apply to third-order and larger streams, no formal health surveys were conducted for Jenny Creek or the tributaries to Middle Boulder Creek, which are first or second-order streams. Disturbance of the WIZ has a direct impact in stream health metrics, such as channel sedimentation and woody frequency. Existing forested areas within the study watersheds WIZ: Corona Watershed: 42 acres (74% of baseline) Indian Peaks Watershed: 31 acres (90% of baseline) Peterson Lake Watershed: 66 acres (83% of baseline) Jenny Creek EMR: 35 acres (99% of baseline) The aquatic communities found in the drainages sampled in the vicinity of the proposed improvements to EMR were relatively healthy, except for the Peterson Return Ditch. No fish were collected at the Peterson Return	Approximately 12 acres of tree clearing, including 1.3 acres of grading, are proposed to occur within the Study Watersheds' WIZ. Forested areas within the study watersheds WIZ under Alternative 2: Corona Watershed: 39 acres (69% of baseline) Indian Peaks Watershed: 22 acres (65% of baseline) Peterson Lake Watershed: 66 acres (83% of baseline) Jenny Creek EMR: 35 acres (99% of baseline)	Approximately 2.4 acres of tree clearing would occur within the Study Watershed's WIZ; terrain grading would not occur within the WIZ. Forested areas within the study watersheds WIZ under Alternative 3: Corona Watershed: 40 acres (72% of baseline) Indian Peaks Watershed: 30 acres (87% of baseline) Peterson Lake Watershed: 66 acres (83% of baseline) Jenny Creek EMR: 35 acres (99% of baseline)

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Ditch site, and the macroinvertebrate community inhabiting this harsh flow limited environment was stressed and in poor condition. CDA within the study watersheds: Corona Watershed: 0.2 acre (0%) Indian Peaks Watershed: 0.7 acre (1%) Peterson Lake Watershed: 3.3 acres (3%) Jenny Creek EMR: 1.0 acre (6%) Under the No Action Alternative, EMR would continue current summer and winter seasonal operations. This alternative would have no direct or indirect effects to stream health or the WIZ.		
Indicator: Long-term and short-term impacts to surface and groundwater hydrology		
Under the No Action Alternative, EMR would continue current summer and winter seasonal operations. This alternative would have no direct or indirect effects surface and groundwater hydrology.	Alternative 2 would result in a change to surface and groundwater yields. The change in relative peak flows are anticipated to be: Corona Watershed: -2% Indian Peaks Watershed: +22% Peterson Lake Watershed: -2% Jenny Creek EMR Watershed: +6% The change in Annual Yield is anticipated to be: Corona Watershed: 0% Indian Peaks Watershed: +14% (Tributary to MBC the Corona and Indian Peaks watersheds are direct tributaries to MBC: +4%) Peterson Lake Watershed: -2% Jenny Creek EMR Watershed: +8%	Alternative 3 would result in a change to surface and groundwater yields. The change in relative peak flows are anticipated to be: Corona Watershed: -2% Indian Peaks Watershed: -21% Peterson Lake Watershed: -2% Jenny Creek EMR Watershed: +11% The change in Annual Yield is anticipated to be: Corona Watershed: 4% Indian Peaks Watershed: -15% (Tributary to MBC the Corona and Indian Peaks watersheds are direct tributaries to MBC: -2%) Peterson Lake Watershed: -2% Jenny Creek EMR Watershed: +13%

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Indicator: Long-term and short-term impacts to water quality; including the presence of and potential impacts to any Clean Water Act (CWA) Section 303(d) impaired or threatened waterbody segments		
None of the stream segments or lakes within the Study Watersheds is listed on the Colorado State 303(d) list as impaired waters under the Clean Water Act. EMR would continue current summer and winter seasonal operations. This alternative would have no direct or indirect effects to water quality.	Guidelines establish that reasonable periodic collection and testing of effluent samples may be necessary to insure compliance with the rules and regulations. No impact to the water quality of the Study Watersheds is anticipated to occur as a consequence of installation of the described sewage disposal systems.	Same as Alternative 2.
Indicator: Long-term and short-term impacts to special aquatic sites (mudflats, pool and riffle complexes)		
The only "special aquatic sites" within the study area are riffle/pool complexes (Middle Boulder Creek and Jenny Creek) and jurisdictional wetlands. No direct or indirect effects to pool-riffle complexes.	There would be no impacts to pool-riffle complexes.	Same as Alternative 2.
Indicator: Evaluation of compliance with Watershed Conservation Practices Handbook and Forest Plan requirements		
No direct or indirect effects on compliance with the Watershed Conservation Practices Handbook and Forest Plan requirements.	Construction and implementation of the Proposed Action following the PDC would be consistent with the WCPH and Forest Plan standards, would not adversely impact the health stream health of Middle Boulder Creek and would not adversely impact the health of watersheds within the analysis area.	Same as Alternative 2.
Indicator: Development and analysis of drainage management measures to maintain or improve stream health		
No new projects or drainage management measures are proposed under the No Action Alternative. On-going maintenance appears would continue within the study area.	Construction and implementation of the Proposed Action within the Corona and Indian Peaks watersheds following the PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the long-term stream health of Middle Boulder Creek. Implementation of the Proposed Action within the Peterson Lake Watershed following the PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of the watershed.	Construction of the Alternative 3 projects in the Corona, Indian Peaks, Peterson Lake and Jenny Creek watersheds following the PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of the watersheds.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
	Construction and implementation of the Proposed Action, following the PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of Jenny Creek.	
Indicator: Quantification (acres) of ground disturbing activities as it pertains to stream health (e.g., permanent and temporary roads, chairlift terminals and towers, graded ski trails, etc.)		
No new projects or ground disturbance is proposed.	Approximately 55 acres of tree clearing for new ski trails, with snowmaking. Total 25 acres of grading would be necessary under Alternative 2, 10.6 acres on NFS lands and 14.4 acres on private lands.	Approximately 49 acres of tree clearing for new ski trails, with snowmaking. Total 21.6 acres of grading would be necessary under Alternative 3, 6.3 acres on NFS lands and 15.3 acres on private lands.
Indicator: Quantification (acres) of new development (e.g., ski trails, chairlift terminals, lift alignments, permanent and temporary roads) that occurs within 100 feet (the WIZ) of perennial or intermittent streams		
No new projects or ground disturbance is proposed within 100 feet of streams.	Approximately 12 acres of tree clearing, including 1.3 acres of grading within the Corona and Indian Peaks watersheds' WIZ. No impacts to the Peterson Lake or Jenny Creek watershed's WIZ.	Approximately 2.4 acres would occur within the Corona and Indian Peaks watershed's WIZ; terrain grading would not occur within the WIZ. No impact to the Peterson Lake or Jenny Creek watershed's WIZ would occur under Alternative 3.
Indicator: Quantification of the number of stream crossings of perennial and intermittent streams created by new development (e.g., ski trails, chairlift terminals, lift alignments, permanent and temporary roads)		
No new projects or stream crossing are proposed.	The Proposed Action includes construction of one stream crossing: a bridge over Middle Boulder Creek to access the bottom terminal of the proposed Placer chairlift (for construction and maintenance only).	No stream crossings are proposed under Alternative 3.
Indicator: Discussion of avoidance and minimization of impacts to "difficult-to-replace" resources (i.e., streams)		
No new projects or impacts to "difficult-to-replace" resources would occur.	Alternative 2 was designed to avoid impacts to special aquatic sites such as pool-riffle complexes, and avoid and minimize impacts to streams, wetlands and riparian areas.	Same as Alternative 2.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Indicator: A map and summary of all wetlands types and acreage in the analysis area with potential to be directly or indirectly impacted by the proposed ski area projects		
No impacts to wetlands are proposed to occur.	Alternative 2 would directly impact 0.07 acre of wetland for the construction of the proposed Corona chairlift bottom terminal. There would also be temporary impacts to 0.02 acre of wetlands for the installation of utility lines. Indirect impacts to wetlands through forest overstory removal is expected to impact 1.41 acres of wetlands including 0.11 acre of the Corona fen. Overall, there would be little change to wetland functions and values under Alternative 2. Refer to Figure 12.	Alternative 3 would directly impact 0.07 acre of wetlands for the construction of the proposed Corona chairlift bottom terminal. There would also be temporary impacts to 0.05 acre of wetlands for the installation of utility lines. Indirect impacts to wetlands through forested overstory removal is expected to impact 0.51 acre of wetlands. Overall, there would be little change to wetland functions and values under Alternative 3. Refer to Figure 13.
Indicator: Disclosure of wetland functions and values within the project area		
Middle Boulder Creek Stream and Terrace Wetlands: Groundwater discharge function: Moderate Groundwater recharge function: Moderate Velocity reduction function: Moderate Erosion protection function: High Floodwater retention/peak flood reduction function: Low Water quality functions, sediment removal and Nutrient retention/removal: Moderate Wildlife habitat function: High **Fen Wetlands:** Groundwater discharge function: Very High Groundwater recharge function: None Velocity reduction function: Low Erosion protection function: Low Floodwater retention/peak flood reduction function: Low Water quality functions, sediment removal: Low Nutrient retention/removal: Moderate Wildlife habitat function: High **Wetlands on Ski Trails:** Groundwater discharge function: Low to Moderate Groundwater recharge function: None	Overall, there would be little change to wetland functions and values under Alternative 2.	Overall, there would be little change to wetland functions and values under Alternative 3.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Velocity reduction function: Low Erosion protection function: Low Floodwater retention/peak flood reduction function: None Water quality functions, sediment removal: Low Nutrient retention/removal: Low Wildlife habitat function: Low to Moderate **Forested Wetland Seeps:** Groundwater discharge function: Moderate to High Groundwater recharge function: None Velocity reduction function: Low to Moderate Erosion protection function: Low to Moderate Floodwater retention/peak flood reduction function: None Water quality functions, sediment removal: Low Nutrient retention/removal: Low Wildlife habitat function: Low to Moderate **Pond Wetlands:** Groundwater discharge function: Moderate Groundwater recharge function: None or insignificant Velocity reduction function: None or insignificant Erosion protection function: None or insignificant Floodwater retention/peak flood reduction function: None or insignificant Water quality functions, sediment removal: None to Low Nutrient retention/removal: None to Low Wildlife habitat function: High		

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Indicator: Quantification of anticipated direct and indirect temporary and/or permanent impacts (acres/linear feet); including wetland habitat affected by increased solar exposure		
No impacts to wetlands are proposed to occur.	Direct permanent impacts would occur to 0.7 acre of wetlands for the construction of the Corona chairlift bottom terminal. Additionally, 0.02 temporary impacts to wetlands would occur for installation of utility lines, which would be restored post-construction. Indirect impacts to wetlands through forest overstory removal is expected to impact 1.41 acres of wetlands including 0.11 acre of the Corona fen.	Direct permanent impacts would occur to 0.7 acre of wetlands for the construction of the Corona chairlift bottom terminal. Additionally, 0.05 temporary impacts to wetlands would occur for installation of utility lines, which would be restored post-construction. Indirect impacts to wetlands through forest overstory removal is expected to impact 0.51 acre of wetlands.
Indicator: Quantification (acres) of new development (e.g., ski trails, chairlift terminals, lift alignments, permanent and temporary roads) that occurs within 100 feet of wetlands		
No impacts within 100 feet wetlands are proposed to occur.	Impacts occurring under Alternative 2 within 100 feet of wetlands would total 54.6 acres, including: Vegetation Clearing: 14.1 Grading: 1.2 Vegetation Clearing and Grading: 1.6 Glading: 9.0 Vegetation Management: 28.8	Impacts occurring under Alternative 3 within 100 feet of wetlands would total 43.3 acres, including: Vegetation Clearing: 4.7 Grading: 1.3 Vegetation Clearing and Grading: 0.4 Glading: 18.5 Vegetation Management: 18.7
Indicator: Discussion of existing geologic and soil resources within the study area		
There are twelve soil map units and two miscellaneous map units defined in the Soil Survey of Arapaho-Roosevelt National Forest Area that occur in the Activity Area. A brief description of each soil type can be found in the project file. Soil interpretations, limitation and physical and chemical characteristics are summarized in Chapter 3 Section J.	Approximately 25.0 acres of soil would be disturbed by grading, of which 10.6 acres would be on NFS lands and 14.4 acres on private lands. Areas that would be disturbed by grading include sections of certain proposed ski trails, new roads, new or upgraded mountain facilities, parking lots, chairlift terminals, and utility lines. All utility lines, however, would be buried in access roads or under new and existing ski trails.	Approximately 21.6 acres of soil would be disturbed by grading, of which 6.3 acres would be on NFS lands and 15.3 acres on private lands. Areas that would be disturbed by grading include sections of certain proposed ski trails, new roads, new or upgraded mountain facilities, parking lots, chairlift terminals, and utility lines. All utility lines, however, would be buried in access roads or under new and existing ski trails.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Indicator: Analysis of increased erosion hazard due to ground disturbance		
Minor erosion and sedimentation continue to occur on existing roads and ski trails. These impacts are more pronounced in areas that had been graded. Better application and maintenance of BMPs are needed to further reduce existing erosion.	Impacts from ground disturbance activities in Alternative 2 would include an increase in soil erosion and sedimentation, changes to soil physical and chemical characteristics reducing soil productivity, permanent loss of soil resources, and a potential increase in landslide and slump hazards. If the Proposed Action is carefully managed with effective erosion control, considering the low to moderate erodibility of soil management units these projects could be implemented without further impacts to the soils resource, and would not affect the soil management unit as a whole.	Same as Alternative 2.
Indicator: Analysis of slope stability and geological constraints associated with project components		
No projects are proposed that could impact areas of slope stability or geological constraints.	Approximately 2.7 acres of grading would occur in areas classified as moderate landslide potential (all of these acres occur on NFS lands, primarily on the northeast sloping mountainside above Middle Boulder Creek). The grading would occur on proposed ski trails only. The slope contains areas of saturated soils and minor, seasonal flowing water, so if water is encountered, surface and subsurface drainage structures may be required to intercept seepage and flow that could affect slope stability. Cut and fill slopes should be immediately stabilized with revegetation measures, mulch, erosion control fabrics, if needed, and other appropriate BMPs.	No areas of severe landslide potential were identified.

Table 2-5:
Summary Comparison of Direct and Indirect Environmental Consequences

Alternative 1	Alternative 2	Alternative 3
Issue Statement: The additional snowmaking coverage on proposed ski trails would require additional water supply that must be consistent with the Endangered Species Act (indicators for this are covered under Fish and Wildlife and Plants issues above) and EMR's current water rights. The proposed ski trails would require the application of additional snowmaking coverage that could increase water yield across project area watersheds.		
Indicator: Anticipated temporary and permanent changes in water yield (acre feet) and peak flows (cubic feet per second), and subsequent watershed effects		
There would be no change in water yield or peak flow.	Change relative to existing water yield Corona Watershed: 2 AF (0%) Indian Peaks Watershed: 36 AF (14%) Tributary to MBC: 34 AC (4%) Peterson Lake: -13 AF (-2%) Jenny Lake EMR: 33 AF (8%) Change relative to existing peak flows Corona Watershed: -0.1 cfs (-2%) Indian Peaks Watershed: 0.4 cfs (21%) Peterson Lake: -0.2 (-2%) Jenny Lake EMR: 0.3 cfs (6%)	Change relative to existing water yield Corona Watershed: 23 AF (4%) Indian Peaks Watershed: -38 AF (-15%) Tributary to MBC: -15 AC (-2%) Peterson Lake: -12 AF (-2%) Jenny Lake EMR: 55 AF (13%) Change relative to existing peak flows Corona Watershed: 0.1 cfs (2%) Indian Peaks Watershed: -0.5 cfs (-21%) Peterson Lake: -0.2 (-2%) Jenny Lake EMR: 0.5 cfs (11%)
Indicator: Assessment of water rights		
Under the No Action Alternative, EMR would continue current summer and winter seasonal operations. There would be no changes to water use and rights under this alternative.	Indoor and landscape irrigation water uses and associated depletions under Alternative 2 are expected to increase to approximately 7 AF for use at the Lookout Facility and Challenge Mountain Facility and can be accommodated under EMR's existing augmentation plan. No changes to water use and stream depletions due to snowmaking operations are expected to result from implementation Alternative 2.	Same as Alternative 2.

G. IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The Preferred Alternative is the alternative which the agency believes would best fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors. At this time, considering the environmental impacts to public lands and the opportunities for use of those lands that would benefit the most people over the longest term, the Responsible Official has not identified a preferred alternative.

Following review of public and agency comments on this DEIS, the Responsible Official will make a final determination as to which alternative, in part or in whole, best serves the public interest on NFS lands. Based on public and agency comments, modification of the preferred alternative may occur between Draft and Final EIS.

Chapter 3

Affected Environment and Environmental Consequences

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

CEQ regulations direct agencies to succinctly describe the environment that may be affected by the alternatives under consideration.[23] As such, Chapter 3 describes the existing physical, biological, social, and economic components of the study area which have potential to be affected by implementing any of the alternatives (i.e., the Affected Environment). Each Affected Environment description is followed by an Environmental Consequences discussion that provides an analysis of the potential effects of implementation of each of the alternatives.

Chapter 3 is organized by resource area, and follows the organization of issues and resources requiring further analysis (and indicators) as presented in Chapter 1. Each resource section in Chapter 3 is organized in the following order:

SCOPE OF THE ANALYSIS

The scope of the analysis briefly describes the geographic area(s) potentially affected by the alternatives for each issue and its indicator(s). The scope of analysis varies according to resource area and may be different for direct, indirect, and cumulative effects.

AFFECTED ENVIRONMENT

The Affected Environment section provides a description of the environment potentially affected, as based upon current uses and management activities/decisions.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

This section provides an analysis of Direct and Indirect Environmental Consequences of implementing each of the alternatives, according to the issues or resources requiring additional analysis and indicators identified in Chapter 1. Cumulative Effects are discussed separately.

Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable (i.e., likely to occur within the duration of the project).

CUMULATIVE EFFECTS

Cumulative Effects are the result of the incremental direct and indirect effects of any action when added to other past, present, and reasonably foreseeable future actions and can result from individually minor

[23] 40 CFR 1502.15

but collectively major actions taking place over a period of time. A summary description of past, present and reasonably foreseeable future actions is included in Appendix A.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible commitment is a permanent or essentially permanent use or loss of resources; it cannot be reversed, except in the extreme long-term. Examples include minerals that have been extracted or soil productivity that has been lost. An irretrievable commitment is a loss of production or use of resources for a period of time. One example is the use of timber land for a logging road. Timber growth on the land is irretrievably lost while the land is a road, but the timber resource is not irreversibly lost because there will be no loss in site productivity to grow trees. The Forest Service recognizes the fact that certain management activities will produce irreversible or irretrievable commitments of resources.

A. RECREATION, MOUNTAIN OPERATIONS AND GUEST SERVICES

SCOPE OF THE ANALYSIS

This analysis addresses recreational opportunities available at, and adjacent to, EMR. EMR's on-mountain operations are conducted on NFS lands administered by the ARP and private lands owned or leased by EMR. Surrounding public and private lands are also available for recreation. Therefore, spatially, this recreation analysis considers terrain within the ski area SUP boundary, terrain associated with the EMR Nordic Center, and dispersed recreation areas to the north and south of EMR's SUP boundary.

A number of specific terms are used frequently within this analysis. The following section provides definitions for these terms and describes how this analysis considers each term:

- *Special Use Permit Boundary:* EMR's Forest Service-administered SUP boundary encompasses approximately 524 acres of NFS lands. The SUP boundary identifies the current and potential future extent of EMR's operations on public lands managed by the ARP. As described in Chapter 1, EMR's SUP is within Management Area 8.22, which includes lands allocated in the 1997 Forest Plan for Ski-Based Resorts.[24] Alternatives 2 and 3 (discussed in the Environmental Consequences section) include proposed SUP boundary adjustments (refer to Figures 1, 2 and 4). Currently these areas included in the proposed SUP boundary adjustments are managed as 1.3: Backcountry Recreation, 4.3: Dispersed Recreation and 7.1: Intermix.
- *Ski Area Operational Boundary:* Within the SUP boundary, EMR identifies and maintains its ski area operational boundary, which is the current extent of developed and undeveloped terrain on which ski patrol conducts snow safety activities and maintains a presence.

While this analysis incorporates a variety of qualitative and quantitative tools to measure the quality of the recreational experience at EMR (refer to the indicators identified in Chapter 1), the parameters which are most consequential include: comfortable carrying capacity (CCC), terrain distribution by ability level, trail densities, and skier circulation.

- *Comfortable Carrying Capacity (CCC):* CCC is a planning parameter used to determine the optimum level of daily utilization for a resort—one that facilitates a pleasant recreational experience without overburdening the resort's infrastructure. This is a planning figure only and does not represent a regulatory cap on visitation. CCC is used to ensure that capacities are balanced across the resort's facilities and are sufficient to meet anticipated demand. CCC is based on a comparison of uphill vertical chairlift supply to downhill vertical skiing demand. The

[24] USDA Forest Service, 1997a

accurate calculation of a ski area's CCC is an important metric, whereby other related skier service facilities can be evaluated and planned based on the proper identification of the CCC. The existing CCC at EMR is 4,250 guests per day.

- *Terrain Distribution by Ability Level:* The distribution of skiers is analyzed as a comparison of *terrain capacity* by ability level. This approach looks at both the acreage of terrain of each ability level and the acceptable skier density on that terrain (as a general rule, higher ability level terrain supports a lower density of skiers). Each ability level has a standard design density for the ideal number of skiers occupying each acre of terrain at one time. The number of acres of terrain designated to each ability level is multiplied by the standard design density for each ability level. The total for each ability level is expressed as a percentage of the total number of skiers. This percentage is then compared with the market demand for each ability level.
- *Trail Densities:* The metric used in this analysis for trail density is "skiers per acre." It is understood that certain trails within the ski area operational boundary receive more skier use due to a variety of factors, including but not limited to: ability level, fall-line or off fall-line, width, visibility at entrance, and the chairlift providing service. It is unrealistic to assume that all guests disperse ubiquitously across the operational boundary during the entire ski day or that skiers per acre are similar on similar terrain (discussed in greater detail in Affected Environment).
- *Skier Circulation:* How guests move around the ski area is a function of skier circulation. For this EIS, skier circulation is analyzed in relation to the effects of wind closures of chairlifts on guest circulation. Skier circulation affects the overall guest experience.

AFFECTED ENVIRONMENT

EMR is located outside of Nederland, approximately 21 miles west of Boulder, and 47 miles northwest of Denver, along Colorado's Front Range. There are no other ski areas in the immediate vicinity of EMR, with the nearest similar ski area (Loveland Ski Area) being located approximately 60 miles in driving distance west along the I-70 corridor from EMR. On most weekdays and non-peak weekends, actual daily visitation levels at EMR are below the calculated CCC of 4,250 guests per day, meaning that long chairlift lines are uncommon, and most skier service facilities are not over-burdened. The diversity of terrain and manageable size attracts families from the surrounding area to visit for day trips and EMR accommodates the entire range of skier ability levels from first-time beginners to experts. In addition, EMR provides base area and on-mountain skier service facilities to address guests' needs.

Annual Visitation

EMR's market is primarily composed of day skiers from Boulder and the Front Range. Because there is no overnight lodging at the ski area, and limited lodging available in Nederland, destination visitors make up a much smaller portion of EMR's skier market and tend to stay in Boulder and surrounding

communities. As a resort that primarily attracts day skiers, EMR does a major portion of its business during weekends and holiday periods.

Annual skier visits at EMR have averaged approximately 195,000 annual visits during the last three seasons. Table 3A-1 includes total annual skier visitation data for Colorado and EMR between the 2010/11 and 2012/13 seasons.

Table 3A-1:
Total Annual Skier Visitation in Colorado Compared to EMR

Season	Annual Colorado Skier Visits	Annual EMR Skier Visits
2012/13	11,545,496	197,363
2011/12	11,031,409	207,979
2010/11	12,275,826	182,603
Average Visitation	*11,617,577*	*~195,000*

Source: NSAA, 2013; Eldora Mountain Resort; Colorado Ski Country, 2012

Daily Visitation

On most weekdays and non-peak weekends EMR's daily visitation is within the calculated CCC and recreationists are comfortably accommodated within EMR's ski area infrastructure. However, on peak weekends and during holiday periods visitation is often at or above the CCC, resulting in longer chairlift lines at popular chairlifts and crowded guest service facilities due to the overall deficit of space and seating. In addition, as discussed in Purpose and Need statement #2 in Chapter 1, chairlift closures during wind events can reduce the quality of the recreation experience at EMR. These issues are discussed in greater detail in the following sections.

Chairlift Network

EMR's chairlift network consists of two fixed-grip quad chairlifts, two fixed-grip triple chairlifts, four fixed-grip double chairlifts, and three surface lifts (refer to Figure 1). The chairlift network is generally antiquated; besides a new surface conveyor, all chairlifts are at least ten years old. Six chairlifts are over thirty years old. Old chairlift technology can impact the guest experience in a variety of ways: mechanical shutdowns occur more often, old chairlifts entail a longer chairlift ride-time, and loading and unloading can be difficult. Additionally, smaller two-person chairlifts are lighter and more sensitive to high winds, which can force these chairlifts to close in wind events. For existing chairlift specifications, refer to the 2011 Master Plan in the project file. The Tenderfoot, Little Hawk, EZ, Caribou, and Sunkid chairlifts service beginner and novice terrain on the east side of the resort near the base area. The Sundance and Race chairlifts are also on the eastern portion of the resort and service low intermediate and intermediate terrain. The configuration of these chairlifts and terrain provides a quality experience for the lower ability level guest, mostly separated from upper ability level guests. Several terrain parks are also located within

this area; one serviced by Sundance and two by Race. The location of the terrain parks do result in some mixing of ability levels on certain trails.

The Challenge and Cannonball chairlifts, which provide out-of-base access to the summit of Challenge Mountain, are parallel and redundant. They provide repeat chairlift service to runs on the front-side and back-side of the resort. They are often not operated at the same time. Challenge is typically operated more frequently, and Cannonball is essentially a back-up for Challenge during holiday periods and on busy weekends. Additionally, Cannonball is sometimes operated midweek in place of Challenge. While the Challenge chairlift is twenty years newer than the Cannonball chairlift, they are both older chairlifts. The Challenge chairlift is operated on natural gas.

The Indian Peaks and Corona chairlifts service back-side terrain on Bryan Mountain. The Indian Peaks chairlift provides access to intermediate, advanced intermediate, and expert terrain and acts as the link between the front-side and the Corona chairlift. This chairlift is relatively new, in good condition, services the terrain in an efficient manner, and has enough capacity to provide both repeat skiing and circulation across the mountain. This chairlift occasionally shuts down during high wind events that occur along the upper elevations of the lift-line. To access Indian Peaks chairlift, guests must ride Challenge or Cannonball chairlift, which as previously stated, shut down due to wind conditions, thereby closing access to the Indian Peaks chairlift. The Corona chairlift services advanced intermediate and expert terrain, as well as numerous gladed areas, on EMR's back-side terrain. This is extremely popular terrain, particularly when snow is good. The Corona chairlift has similar access issues as the Indian Peaks chairlift during wind events.

Ski Area Terrain

The existing network of ski trails and tree and gladed skiing areas at EMR accounts for approximately 336 acres of lift-served skiable terrain (refer to Figure 1).

Ski Trails and Tree and Gladed Skiing Areas

EMR's ski terrain network is comprised of 49 ski trails (approximately 184 acres) and five tree and gladed skiing areas (approximately 152 acres). Developed ski trails are the foundation of terrain at EMR as they are where the majority of skiers spend their time and they are the only place to ski and ride during early season, periods of poor or undesirable snow conditions, and certain weather events. More recently, terrain variety, such as the natural, unstructured terrain offered by the Jolly Jug, Placer, Bryan, Salto and Moose glades is becoming more important to meet guest expectations.

Due to the limited amount of intermediate terrain at EMR, ski trails and tree and gladed skiing areas served by the Challenge/Cannonball, Corona and Indian Peaks chairlifts constitute popular terrain among visitors. Trails serviced by these chairlifts are also popular because they are longer trails offering more

vertical feet than trails near the base area and parking lots. Long trails with more vertical feet offer a better recreational experience for the more advanced ability level skiers.

Distribution of terrain by ability level for EMR's lift-served terrain is provided in Table 3A-2. Terrain ability levels presented in this section are based on the 2011 Master Plan and are established according to slope angle.

Table 3A-2:
Lift-Served Terrain Distribution by Ability Level – Existing Conditions

Skier Ability Level		Trail Acreage	EMR Terrain Distribution[a]	Central Rockies Skier Ability Level
		(acres)	(%)	(%)
●	Beginner	4.3	7	5
●	Novice	17.1	17	15
■	Low Intermediate	44.6	34	25
■	Intermediate Ski Trail Tree and Gladed Skiing Area	*61.6* 52.5 9.1	32	35
◆	Advanced Intermediate Ski Trail Tree and Gladed Skiing Area	*70.1* 37.7 32.4	7	15
◆	Expert Ski Trail Tree and Gladed Skiing Area	*137.4* 27.1 110.3	4	5
	Total	**335.1**	**101**[b]	**100**

[a] EMR Terrain Distribution is based on terrain capacity.
[b] Due to rounding this number is greater than 100%.
Source: Eldora Mountain Resort, 2011, revised, with accurate GIS data

As evidenced in Table 3A-2, EMR has a shortage of intermediate terrain and a surplus of low intermediate and expert terrain. When considered together, the intermediate and advanced intermediate ability levels represent 50 percent of the Central Rockies skier market. To meet that percentage, half of the lift-served terrain capacity at EMR should serve intermediate and advanced intermediate ability level skiers. Currently, just under 40 percent of the resort terrain serves guests of these ability levels.

Due to topography, there are no open bowls, natural meadows, or chutes at EMR. However, EMR provides tree and gladed skiing areas amidst the developed trails. Five tree and gladed skiing areas—Jolly Jug, Placer, Bryan, Salto, and Moose—have primarily been kept in their natural condition. These gladed areas can be relatively tight tree skiing and due to the mountain pine beetle epidemic there are many down logs that can prevent skiing until sufficient depth of snow has been established.

Skier Terrain Densities

The density analysis breakdown by chairlift and terrain acreage for the existing conditions at EMR is illustrated in the 2011 Master Plan. The total density index is 79 percent, due to a greater target trail density than the modeled density. A balanced relationship of target and modeled trail density would be a density index of 100 percent. This calculation indicates a slight surplus of overall terrain capacity when compared to CCC. The overall downhill trail capacity was calculated at 5,862 guests, approximately 38 percent higher than the overall CCC of 4,250 guests. Downhill trail capacity considers existing trail acreages and target trail densities. This situation is desirable from the quality of skiing perspective, and is reflected in the generally low average modeled trail densities. However, even with the overall low average densities, densities at specific locations can vary dramatically. Additionally, since EMR has a deficit of existing intermediate terrain (refer to Table 3A-2), trail densities are certain to be higher than targets on intermediate trails.[25]

This is an indication that overall, trail crowding is not a common occurrence at EMR. Note that specific trails, such as egress trails towards the end of the day, can consistently have high densities. However, the low density numbers also indicate under-utilization of the existing terrain, indicating that there may be more skiers than necessary waiting in chairlift lines or on slow chairlifts. As discussed below, wind events cause chairlift and trail closures that significantly impact densities on trails that remain open. Again, a proportion of EMR's chairlift capacity can be lost, which then displaces those guests to a limited amount of trail acreage.

Skier Circulation and Skier Densities During Wind Events/Holds

As discussed in Chapter 1 of this EIS, EMR has identified a need to address skier safety concerns during prevalent wind events. This need primarily refers to increases in skier densities on front-side terrain due to wind closures that render back-side terrain inaccessible. Wind events at EMR can force the closure of the Challenge, Cannonball, Indian Peaks and Corona chairlifts, shifting skiers to beginner and intermediate terrain on the front-side served by the EZ, Caribou, Sundance, and Race chairlifts.

Wind events occur at EMR due to natural terrain and weather patterns. Winds at EMR come primarily from the north to northwest. Topographic features serve to funnel the wind towards the back-side of EMR, particularly affecting the exposed upper portions of the lift-lines and top terminals of the Challenge, Cannonball, Indian Peaks and Corona chairlifts. Chairlifts are forced to close during high winds because swinging chairs can hit towers or terminals. The table below presents chairlift closure data (chairlift closures due to weather) from EMR.

[25] Since intermediates represent 35 percent of the overall market, it can be assumed that 35 percent of the skiers (on average) are intermediates. Since Table 3A-2 shows that less than 35 percent of the terrain capacity is intermediate level, it can be assumed that demand for intermediate terrain is high and that densities would be above target design densities.

Table 3A-3:
Chairlift Wind Closures

Season	Instances of Wind Closures[a]
2007/08	16
2008/09	17
2009/10	9
2010/11	11
2011/12	6
2012/13	1
Average	**10**

[a] This is a record of the number of times per operating season EMR was forced to close one or more chairlifts due to weather. The chairlift was not necessarily closed all day.

Through the past six ski seasons at EMR there have been an average of ten weather related chairlift closures per season. This data illustrates the frequency of wind closures at EMR. On days when some chairlifts are unable to operate, the guest experience at EMR is severely degraded as oftentimes the entire back-side and Challenge Mountain trails will become inaccessible. The variety of terrain becomes limited to the relatively short beginner and intermediate trails on the front-side served by the EZ, Caribou, Sundance, and Race chairlifts and congestion issues emerge on the ski trails that remain accessible. Congestion occurs due to two primary factors; the first is that the effective CCC at EMR is reduced when Challenge Mountain and the back-side terrain is closed. Challenge, Indian Peaks, and Corona chairlifts represent approximately 60 percent of the overall chairlift capacity at EMR. Thus, when these chairlifts are inoperable, the effective CCC of EMR is reduced by 2,700 guests, from 4,250 to 1,550 guests.

The second factor of congestion is the mixing of different ability levels on lower ability level terrain. Beginner and intermediate skiers make more turns, stop more often and ski at slower speeds than advanced intermediate and expert skiers. With higher trail densities it becomes more difficult for skiers of all ability levels to safely and comfortably pass through groups of people on these trails.

These congestion issues can be better understood in the context of trail densities. The calculation of a ski area's capacity is based, in part, on the reference number of skiers that can be accommodated, on average, on a typical acre of terrain (based on ability level classification) at any given time. Mountain planners calculate trail density for each chairlift pod by dividing the number of guests assumed to be on each trail by the acreage of available terrain for that chairlift pod.[26] When the CCC is reduced by approximately 60 percent, trail densities increase and longer chairlift lines are noticeable. High trail densities would occur subsequent to the wind closure as skiers are egressing the mountain or transitioning to chairlifts that remain in operation on the front-side of EMR. During an approximately one-hour period those guests

[26] A "pod" is defined by a chairlift and all of the terrain that is serviced by that chairlift.

(approximately 2,700 guests) would congest key egress trails, increasing densities above 30 skiers/acre. This density creates safety concerns on trails on the front-side of the mountain. Along with issues of congestion and safety, wind closures drive some skiers to leave the resort completely. Instead of skiing limited terrain on the front-side, some skiers may choose to sit inside and wait for the weather to improve, or leave for the day. News of wind closures could even cause some skiers to turn around before they have even arrived, resulting in a frustrating experience. Thus, wind closures can have numerous negative impacts on the recreational experience.

Mountain Operations

Ski patrol regularly conducts skier assistance and recovery efforts and maintains a presence within the current ski area operational boundary that includes the ski trails and tree and gladed skiing areas at EMR. However, a reoccurring issue at EMR has been identified concerning stranded skiers. Skiers do become stranded downhill of the *Corona Road* or the *Jolly Jug* ski trail, outside the ski area operational boundary, requiring ski patrol to respond to lost skiers (refer to Figure 1).

In both areas, *Corona Road* and *Jolly Jug*, the fall line naturally pulls skiers outside the operational boundary. Near *Corona Road* the fall line encourages skiers to ski below the road towards Middle Boulder Creek. Outside the ski area boundary the density of trees and vegetation limits skiers wanting to access Middle Boulder Creek. At *Jolly Jug* the fall line encourages skiers to go south towards the Deadman's Gulch Nordic Trail, below the *Jolly Jug* ski trail and the current ski area operational boundary. There is no ski area or public infrastructure in either of these areas currently, and stranded skiers frequently call for the assistance of ski patrol. Providing this assistance can be time consuming, taking resources away from the ski resort, and can put ski patrol in situations where they are making rescues that carry into the evening after dark.

Guest Services

Guest service facilities are located throughout the base area and in certain on-mountain buildings. Guest service facilities function as receiving areas for guests and provide services such as ticket sale, rentals, food and beverage and restrooms. Skier service facilities in the base area include the Indian Peaks Lodge, the Timbers Lodge, West Wing and East Wing. Together, these base area facilities total approximately 41,000 square feet and provide approximately 755 indoor and 550 outdoor seats. On-mountain skier services are available at the top of the Corona chairlift, in the Lookout facility. Services available at the Lookout are limited to food service, restrooms, and ski patrol. There is a small kitchen, indoor seating, and an outdoor deck. The Lookout facility is approximately 3,000 square feet and provides 54 indoor seats and 30 outdoor seats. The small size and condition of the Lookout likely limits the demand placed on it. The Lookout is the only guest service structure located on-mountain and on NFS lands within EMR's SUP area. All other guest services facilities are located within the base area on private lands. On

busy weekends, guests are often observed sitting on the floor with their lunch tray on their lap. This is not an ideal guest experience.

EMR's base area and on-mountain food service seating presently provides 809 indoor seats. The 2011 Master Plan determined that EMR should provide 1,734 seats to provide adequate seating for their current guests.[27] Therefore, EMR presently has a deficit of approximately 925 seats across the base area and on-mountain facilities.[28] Even if all outdoor seats are included in the analysis (580), there is still a shortage of seats.[29] It is important to note that inclement weather is not uncommon at EMR, particularly in regards to high winds, so the outdoor seating is often not used.

Nordic Center Trails

EMR's Nordic Center consists of an extensive network of trails totaling 40 kilometers, ranging in difficulty from "Easiest" to "Most Difficult." These trails accommodate classic and skate skiing as well as snowshoeing. All Nordic Center trails are located on private lands owned or leased by EMR.

The Nordic trails "Porcupine Park Loop" and "Deadman's Gulch" are of particular interest to this analysis. "Porcupine Park Loop" is a classic-only trail with a difficulty rating of "More Difficult." "Deadman's Gulch" is rated as "More Difficult." All of the trails within EMR's Nordic center are popular and well used. Refer to Figure 1 for the location of existing Nordic trails.

Dispersed Recreation

The area around EMR's SUP offers opportunities for dispersed recreation on both private and NFS lands during both summer and winter months. Two primary access points to recreation opportunities north and south of EMR are the Hessie Trailhead and the Jenny Creek Trail.

To the north of EMR is a recreation area accessed from the Hessie Trailhead and Fourth of July Road. These trailheads provide access to the Indian Peaks Wilderness, a very popular area for winter and summer recreation.

To the south of EMR is the Jenny Creek Trail, a popular access point to the Indian Peaks and James Peak Wilderness areas and the Arestua Hut in both summer and winter. The Jenny Creek Trail begins on private land owned and leased by EMR before crossing onto NFS lands.

[27] EMR, 2011
[28] Ibid.
[29] Ibid.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Table 3A-4 provides a comparison of projected annual visitation at EMR under Alternative 1, 2 and 3. "Year 1" is the first year after project implementation. The following paragraphs provide a discussion of how skier visit projections were estimated by alternative. Certain stated assumptions are imbedded into the projections to disclose how each alternative might result in a different annual visitation amount at EMR and have effects to the recreation experience. It is important to disclose: 1) projecting visitation is difficult and could be incorrect because visitation is dependent on many variables; 2) the Forest Service considered other projections; and 3) the Forest Service has concluded these projections are the most reasonable.

Alternative 1 – No Action does not include any projects that would address the Purpose and Need. Several previously-approved projects that could partially address the Purpose and Need are disclosed and analyzed in the Cumulative Effects section below. Under this alternative, skier visit growth is projected to be minimal, based on the relative stability in actual visits over the past three winter seasons (average of about 195,000 visits during that period). As such, the projected five-year compound annual growth rate (CAGR) is 0.45 percent annually and the ten-year compound annual growth rate is 0.30 percent annually. The visit increase is projected to be minimal, only 4,475 over five years and 5,993 over ten years. Similar to past seasons, the Forest Service assumes EMR would continue similar resort marketing strategies of existing resort offerings and amenities under the No Action Alternative. This growth would result in a potential 201,838 visitors by Year 5, and a potential 203,356 visitors by Year 10. Additional information is provided in the project file.

Among other projects, Alternative 2 would increase terrain variety and acreage and would include high-speed detachable chairlifts across the mountain, including Jolly Jug and Placer. The Proposed Action includes projects that would meet the Purpose and Need to improve the reliability of chairlift and terrain offerings, provide additional intermediate to expert terrain, improve guest services across the resort, and address skier safety concerns during wind events. These improvements increase visits, most dramatically in the first year, and then with diminishing increases in subsequent years. The projected five-year CAGR under this scenario is 4.39 percent annually, and the ten-year CAGR is 3.37 percent annually, the highest of the three scenarios. Visits are projected to increase by 47,304 by Year 5 (to 244,667 visits) and by 77,432 by Year 10 (to 274,795 visits). This CAGR is comparable with other similar ski areas in similar conditions.

Alternative 3 has fewer improvements than in Alternative 2, though the replacement of Challenge and Corona, as well as expansion into Jolly Jug, are still anticipated to increase visits at EMR. Alternative 3 includes projects that would partially meet the Purpose and Need. Again, the visits rise most dramatically in the first year, and then with diminishing increases in subsequent years. The projected five-year CAGR under this scenario is 3.10 percent annually, and the ten-year CAGR is 2.19 percent annually. Visits are

projected to increase by 32,508 by Year 5 (to 229,871 visits) and by 47,838 by Year 10 (to 245,201 visits).

Table 3A-4:
EMR Projected Annual Visitation – Alternatives 1 through 3

Year	Alternative 1		Alternative 2		Alternative 3	
	Average Annual Growth Rate: 0.45% for the first 5 years, 0.30% over 10 years		Average Annual Growth Rate: 4.39% for the first 5 years, 3.37% over 10 years		Average Annual Growth Rate: 3.10% for the first 5 years, 2.19% over 10 years	
	Visitation Projection[a]	Difference	Visitation Projection[a]	Difference	Visitation Projection[a]	Difference
	197,363	--	197,363	--	197,363	--
1	199,337	1,974	210,192	12,829	206,244	8,881
2	200,333	997	221,752	11,561	213,463	7,219
3	201,335	1,002	230,622	8,870	219,867	6,404
4	201,838	503	237,541	6,919	225,363	5,497
5	201,838	0	244,667	7,126	229,871	4,507
6	202,343	505	251,395	6,728	233,893	4,023
7	202,343	0	257,052	5,656	236,232	2,339
8	202,849	560	263,478	6,426	239,776	3,543
9	202,849	0	268,748	5,270	242,174	2,398
10	203,356	507	274,795	6,047	245,201	3,027
Total	**--**	**5,993**	**--**	**77,432**	**--**	**47,838**

[a] This visitation projection is based on skier visits during the 2012/13 ski season.
Source: RRC, 2013

Alternative 1 – No Action

As a true "no action alternative," Alternative 1 does not include any projects that would address the Purpose and Need. However, the Cumulative Effects analysis at the end of this chapter identifies previously-approved/unimplemented projects (reasonably foreseeable future actions) that EMR may choose to pursue regardless of which alternative is selected. The Cumulative Effects analysis discusses each alternative in the context of past, present and reasonably foreseeable future actions.

Annual Visitation

Alternative 1 would result in a relatively low annual level of visitation increase. Alternative 1 does not include any projects that would address the Purpose and Need. Skier visits are projected to increase in ten years to approximately 203,356.[30]

[30] RRC Associates, 2013

Daily Visitation

The CCC would remain at 4,250 people per day. As discussed under the existing conditions, this number comfortably accommodates EMR's recreationists. However, on peak weekends and during holiday periods visitation is often at or above the CCC, resulting in longer chairlift lines at popular chairlifts and crowded guest service facilities due to the overall deficit of space and seating. Chairlift closures during wind events would continue to increase skier densities and exacerbate intermediate ability level terrain deficiencies and the shortage of guest service facilities and seating.

Chairlift Network

The chairlift network at EMR would be identical to the existing conditions. Challenge, Cannonball and Corona, being somewhat lighter weight chairlifts, would continue to be more susceptible to wind events.

Ski Area Terrain

The network of ski trails and tree and gladed skiing areas at EMR would continue to total approximately 336 acres of lift-served skiable terrain.

Ski Trails and Tree and Gladed Skiing Areas

No new ski trails or tree and gladed skiing areas would be constructed. There would still be a deficiency in intermediate and advanced intermediate terrain. However, EMR would continue to provide a surplus in low intermediate and expert terrain. Again, stated surpluses and deficiencies are based on planning criteria that does not account for variable conditions, including: weather, wind, snowfall, seasonal terrain availability, etc.

Skier Circulation and Skier Densities During Wind Events/Holds

Alternative 1 would not address skier safety concerns during prevalent wind events. As described in the Affected Environment section above, wind events at EMR are known to result in chairlift closures and the concentration of skiers on limited front-side terrain. Additionally, wind events that result in the closure of chairlifts and terrain oftentimes cause guests to simply leave EMR for the day. This situation creates reliability issues and is not a positive experience for guests of EMR. Alternative 1 would not provide additional front-side terrain to disperse skiers during wind events. Overall, Alternative 1 makes no improvements to the chairlift network and thus the likelihood of chairlifts closing during wind events would not change.

Mountain Operations

Ski patrol could still be called upon to respond to skiers lost outside EMR's current operating boundary, particularly near the Jolly Jug trail and the Corona Road, which naturally funnel skiers away from existing terrain.

Guest Services

On-Mountain guest services would continue to be provided at the Lookout, located at the top of the Corona chairlift. As discussed in the Affected Environment, the size and condition of this facility would continue to limit demand.

Nordic Center Trails

The Nordic Center trail network would not change. All trails would be located in the current configuration.

Dispersed Recreation

There would be no change to dispersed recreation on the Jenny Creek Trail or in the Hessie/Fourth of July Road area. Winter and summer access would both continue in their current states.

Alternative 2 – Proposed Action

All changes to the quality of recreational opportunities within the SUP boundary adjustment and adjacent NFS lands would be performed with the goal of enhancing the recreation experience for EMR and Forest Service visitors. Please refer to Chapter 1 for the Purpose and Need and Chapter 2 for a detailed description of components of the Proposed Action.

Annual Visitation

Table 3A-4 shows annual net increases in visitation that are expected under Alternative 2. Net visitation increases refer to visitation levels in excess of the "baseline" value of 197,363 annual skier visits.

Visitation at EMR is anticipated to increase most in the first year after implementation. Over the first five years the projected CAGR would be 4.39 percent followed by a reduced rate of 3.37 percent annually through ten years. As presented in Table 3A-4, Year 10 annual skier visits could be approximately 274,795, an increase of approximately 77,432 over the current visitation of 197,363.

Daily Visitation

EMR's CCC would increase to 5,580 people per day. These visitors would be dispersed throughout an expanded terrain network serviced by chairlifts less susceptible to wind closure. The proposed upgrades to the chairlift network would reduce the risk of wind closure for most chairlifts; however, the Indian Peaks chairlift would not be upgraded and would thus remain susceptible. If the Indian Peaks chairlift were to close, the CCC would decrease by approximately 15 percent, to 4,370 people per day. Refer to the section below on Skier Circulation and Skier Densities During Closures for a discussion on impacts to the recreational experience.

Chairlift Network

As described in Chapter 2, the Proposed Action would involve the installation of two new chairlifts and two chairlift replacements. The two new chairlifts, Placer Express and Jolly Jug, would provide access to new intermediate, advanced intermediate, and expert terrain. Additionally, the placement of these chairlifts was chosen to minimize wind exposure and thereby decrease the likelihood of wind closures. The top terminal of the new Jolly Jug chairlift would be located slightly off the ridge so that in the event that the new Challenge chairlift was closed, the Jolly Jug chairlift would provide access to the back-side of the resort (via Sundance and Jolly Jug). Furthermore, the proposed Jolly Jug chairlift would also provide a secondary access route for guests, especially from the east end of the existing parking lots. In addition, the new Placer chairlift would be located lower on the mountain to reduce its exposure to wind events (discussed in further detail below).

The replacement of the Challenge and Corona chairlifts is intended to address wind closure issues, as well as improve operational efficiencies by removing the redundant chairlifts and providing a chairlift that is better suited to service lower ability level skiers. Regarding the upgraded Challenge chairlift, the heavier, detachable chairlifts with an enclosed top terminal would be better able to withstand high winds, more comfortable for lower ability level skiers, and offer a smoother load and unload experience than the older fixed grip chairlifts.

Together, these chairlift additions and improvements would improve reliability of the chairlift network at EMR, thereby improving the quality of the alpine ski experience, responding to needs stated in Chapter 1 of this EIS. Additionally, these improvements to the chairlift network would beneficially impact skier circulation and skier densities during wind closures, as discussed in further detail in the following section.

Ski Area Terrain

Ski Trails and Tree and Gladed Skiing Areas

Ski area terrain at EMR would increase by approximately 115 acres. This would include approximately 58 acres of new ski trails, approximately 57 acres of new tree and gladed skiing areas. In addition, 43 acres of existing tree and gladed skiing areas would be modified (refer to Figure 2). Table 3A-5 depicts terrain distribution by ability level.

Table 3A-5:
Lift-Served Terrain Distribution by Ability Level – Alternative 2

Skier Ability Level		Existing Terrain Acreage	Proposed Terrain Additions Acreage	Proposed Total Terrain Acreage	EMR Proposed Terrain Distribution[a]	Central Rockies Skier Ability Level (Market)
		(acres)	(acres)	(acres)	(%)	(%)
●	Beginner	4.3	0	4.3	5	5
●	Novice	17.1	0	17.1	12	15
■	Low Intermediate	44.6	0	44.6	25	25
■	Intermediate Ski Trail Tree and Gladed Skiing Area	*61.6* 52.5 9.1	*52* 42 10	*113.6* 94.2 19.1	37	35
◆	Advanced Intermediate Ski Trail Tree and Gladed Skiing Area	*70.1* 37.7 32.4	*32* 11 21	*102.1* 48.7 53.4	14	15
◆	Expert Ski Trail Tree and Gladed Skiing Area	*137.4* 27.1 110.3	*32* 4 27	*169.4* 32.1 137.3	7	5
	Total	**335.1**	**115**	**450.1**	**100**	**100**

[a] EMR Terrain Distribution is based on terrain capacity.
Source: Eldora Mountain Resort, 2011, revised with accurate GIS data

Compared to existing conditions, and therefore Alternative 1, the Proposed Action would address the existing current deficit of intermediate and advanced intermediate ability level terrain distribution. In addition, Alternative 2 would create better alignment with respect to market demand for low intermediate ability level terrain distribution. Alternative 2 would also develop an additional 58 acres of new tree and gladed skiing terrain and 43 acres of modifications to existing tree and gladed skiing terrain in response to the Purpose and Need stated in Chapter 1 to provide a new, more natural terrain experience.

The following text describes the impacts to recreation for each component of terrain improvements.

Jolly Jug Terrain

The proposed Jolly Jug terrain would add approximately 35 acres of intermediate terrain. The project includes the addition of five new ski trails (JJ-1 through JJ-5) amounting to approximately 19 acres and the development of approximately 16 acres of tree and gladed skiing areas (Jolly Jug Glades). As discussed above, EMR currently does not have sufficient intermediate terrain to serve the market demand. The proposed Jolly Jug terrain would help address this terrain deficit. The tree and gladed skiing areas would further provide a “new, more natural terrain experience”; a need identified in Chapter 1. This terrain would also address reliability and safety concerns as the associated Jolly Jug chairlift would not be as susceptible to wind events. For this reason, this terrain would add to an enjoyable guest experience for intermediate ability level guests.

At a desired density of approximately 10 skiers/acre, the trails (JJ-1 through JJ-5) would have an approximate skier capacity of 190 guests, and at a desired density of approximately 0.5 skier/acre, the Jolly Jug Glades would have a capacity of approximately eight guests. Therefore, the Jolly Jug project would have a total near 200 guests on ski terrain. (Note: guests within the Jolly Jug area would also be in the chairlift line, on the chairlift, and milling.)

Placer Terrain

The proposed Placer terrain would add approximately 15 acres of intermediate terrain (P-1, P-2, P-3, P-4, P-5), 7 acres of advanced intermediate terrain (P-3 and P-6), and 16 acres of expert terrain (Placer Glades II).[31] The terrain would include six new ski trails amounting to approximately 22 acres and the development of approximately 16 acres of tree and gladed skiing areas. The Placer terrain would help to address the deficit in intermediate terrain at EMR. Overall, the proposed ski trails and tree and gladed skiing areas would meet the need for "additional intermediate to expert ability level terrain and a new, more natural terrain experience" identified in Chapter 1. Also, this terrain is specifically designed address susceptibility to wind events as the lift-alignment and terrain would be located lower on the back-side of EMR. If other chairlifts close due to wind and/or other terrain is not as ideal of a skiing experience due to wind exposure, the Placer chairlift and terrain would likely operate and address those issues. This terrain would also improve the skier safety during wind events as guests skiing in other locations that close could continue to ski in the Placer pod. Furthermore, the Placer terrain would address the current conditions where many guests simply leave EMR when certain chairlifts within their ability level range close to skiing during wind closures.

From a trail planning standpoint, with a desired density of approximately 10 skiers/acre, the intermediate ability level trails within the Placer pod (P-1, P-2, P-3, P-4, P-5) would have an approximate skier capacity of 150 guests. The advanced intermediate ability level trails (P-3 and P-6) would have a desired density of approximately 7 skiers/acre and a capacity of 49 guests. The expert ability level glades (Placer Glades II) would have a desired density of approximately 0.5 skier/acre and a capacity of approximately eight guests. Therefore, the Placer project would have a total of approximately 205 guests on the ski terrain. (Note: guests within the Placer pod would also be in the chairlift line, on the chairlift, and milling.)

Corona Terrain

The proposed Corona terrain would add approximately 8 acres of intermediate terrain (C-2, C-4, *Lower Ambush* widening, *Lower Diamondback* widening), 25 acres of advanced intermediate terrain (C-1, Bryan Glades II), and 52 acres of expert terrain (C-3, Salto Glades, Placer Glades). The terrain would include four new ski trails amounting to approximately 17 acres and the development of/modification to approximately 68 acres of tree and gladed skiing areas. Overall, the proposed ski trails and tree and

[31] Segments of trail P-3 include terrain that would be intermediate and advanced intermediate ability levels.

gladed skiing areas would meet the need for "additional intermediate to expert ability level terrain and a new, more natural terrain experience" identified in Chapter 1.

From a trail planning standpoint, with a desired density of approximately 10 skiers/acre, the intermediate ability level trails within the Corona pod (C-2, C-4, *Lower Ambush* widening, *Lower Diamondback* widening) would have an approximate skier capacity of 80 guests. The advanced intermediate ability level trail (C-1) would have a desired density of approximately 7 skiers/acre and a capacity of 28 guests. The expert ability level trail (C-3) would have a desired density of approximately 3 skiers/acre and a capacity of approximately 12 guests. The new and modified proposed tree and glade skiing areas (Bryan Glades II, Salto Glades and Placer Glades) would have a desired density of approximately 0.5 skier/acre and a capacity of 34 guests. Therefore, the Corona pod would have a total of approximately 154 guests on the terrain. (Note: guests within the Corona pod would also be in the chairlift line, on the chairlift, and milling.)

Skier Terrain Densities

The Affected Environment discloses the total density index is 79 percent, due to a greater target trail density than the modeled density. Again, a balanced relationship of target and modeled trail density would be a density index of 100 percent. With development of the Proposed Action, the density index would increase to approximately 90 percent. At 90 percent, projected trail densities would be below the desired trail densities on existing and proposed trails. The increase in density when compared to existing conditions is due to the additional chairlift capacity (upgrade of existing chairlifts and installation of new chairlifts with newer technology) combined with lesser degree of trail development. This situation is desirable from the quality of skiing perspective, and is reflected in the generally low average modeled trail densities and faster and easier loading chairlifts.

Skier Circulation and Skier Densities During Closures

As discussed above in the Affected Environment section, wind events at EMR are known to result in chairlift closures which lead to numerous negative impacts on the recreation experience. When the Challenge, Indian Peaks, and Corona chairlifts are forced to close some skiers could leave or delay their visit and others could be limited to the low front-side terrain. Projects in the Proposed Action are designed to address this concern. Chapter 1 identifies a need to "improve the reliability of chairlift and terrain offerings" and "address skier safety concerns during prevalent wind events." The Proposed Action contains multiple project components to address these needs.

First, the Placer Express and Jolly Jug chairlifts are designed to improve operations during wind events. The chairlifts and terminals are aligned to avoid the highest elevations and ridges to stay out of the highest winds. Because the Placer Express and Jolly Jug chairlifts would be less susceptible to wind closures, the Placer and Jolly Jug terrain would remain open more consistently, thereby providing additional terrain to disperse skiers on windy days. The Jolly Jug chairlift would be accessible from the Sundance chairlift and would thus be accessible even if the Challenge chairlift were forced to close.

Skiers would no longer be limited to front-side terrain served by EZ, Caribou, Sundance, and Race chairlifts and skier densities would be lower across EMR.

Second, the replacement of the Challenge and Corona chairlifts would reduce the likelihood that the Challenge and Corona chairlifts would be forced to close due to wind. If these chairlifts are able to remain open, skiers would be dispersed across an even larger area of terrain, thereby reducing density and circulation issues. Because almost the entire back-side would be serviced by new six-person chairlifts that are less susceptible to wind (Corona and Placer Express), if the smaller Indian Peaks chairlift were forced to close, only the very top sections of *Ambush* trail would be affected.

If a wind event were to close the Indian Peaks chairlift, those guests would presumably continue to ski the upgraded Corona chairlift (upgraded as a heavier chairlift to withstand greater wind speeds) and proposed Placer chairlift. Assuming all of the guests utilizing the Indian Peaks chairlift transitioned to the proposed Placer chairlift and the Corona chairlift, to remain on the back-side of EMR, the chairlift wait times for Placer and Corona could increase to approximately ten minutes immediately subsequent to the wind closure of Indian Peaks. Because the proposed Placer chairlift and the Corona chairlift can effectively serve the majority of the back-side terrain, should the Indian Peaks chairlift close, skier densities would remain consistent with target densities as specified in Table 2-3 of the 2011 Master Plan. Also, Placer chairlift would provide a skiing experience that is more protected from windy conditions and would make for a better guest experience during inclement weather conditions. More than likely, during a wind event a percentage of guests would go to the proposed Challenge Mountain Facility and would transition to the front-side of the mountain, including the proposed Jolly Jug pod. This would spread those guests across the entire ski area more effectively where those guests can be absorbed by guest service facilities and other chairlifts and trails.

Mountain Operations

The Proposed Action would result in the development of ski area infrastructure north and south of the current ski area operational boundary. These projects would help collect skiers at natural stopping points, therefore reducing ski patrol efforts in these areas. As discussed earlier, skiers at EMR are known to ski beyond the ski area operational boundary towards Middle Boulder Creek. The Placer Express chairlift and associated terrain would collect skiers that skied towards Middle Boulder Creek outside the operational and SUP boundaries.

The Jolly Jug chairlift and associated terrain would improve access to skiers pulled towards the "Deadman's Gulch" Nordic Trail. This Jolly Jug alignment would stop short of providing access to the area where people most often get stuck, but increase the maintained area that ski patrol could use to get to the area people most often get stranded. The presence of infrastructure in these areas would reduce the instances of ski patrollers responding to calls of skiers lost beyond the operational boundary.

Guest Services

The Proposed Action would include the construction of a new on-mountain food and beverage facility and the renovation of the Lookout facility. The new Challenge Mountain Facility would be located downhill from the top terminal of the Indian Peaks chairlift and would provide approximately 850 additional indoor seats. The renovated Lookout facility would provide approximately 300 additional indoor seats. Together the upgrades to on-mountain guest services would provide approximately 1150 additional restaurant seats.

These expanded on-mountain guest service facilities would help to address the deficiency in restaurant seating across EMR. As discussed above, the current resort-wide deficit of restaurant seats is approximately 925 seats. The 1150 additional restaurant seats included in these proposed guest service projects would adequately address this deficit.

Additionally, on-mountain restaurant facilities are often preferable to base area facilities for skiers because of their convenience. The Challenge Mountain Facility would be accessible from the Challenge, Indian Peaks, and Corona chairlifts. For skiers on the back-side of EMR (skiing terrain associated with the Placer Express, Indian Peaks, and Corona chairlifts), the location of the Challenge Mountain Facility would be much more convenient than the base area.

Nordic Center Trails

The Proposed Action would not impact EMR's Nordic Center trails. The access road to the bottom terminal of the Jolly Jug chairlift would parallel a segment of the Porcupine Park Loop trail.

Dispersed Recreation

The Proposed Action would impact the dispersed recreation experience on the Jenny Creek Trail and in the Hessie/Fourth of July Road recreation area.

The alignment of the Jenny Creek Trail conflicts with the proposed Jolly Jug chairlift and associated terrain. Under the Proposed Action, users of the Jenny Creek Trail would encounter ski trails, a chairlift, and tree and gladed skiing terrain while on property owned by EMR. During the winter while EMR is open, conflicts between dispersed recreationalists and alpine skiers would be mitigated through signage and the creation of uphill travel corridors and ski trail crossing zones. The designated route for users of the Jenny Creek Trail would provide a safe path to traverse EMR. A PDC is incorporated into the project for the ARP to pursue an easement for the current location of Jenny Creek Trail on private land owned by EMR. Should this occur, the ARP would manage the Jenny Creek Trail where it crosses private lands. The trail would remain in its current alignment.

The recreation areas accessed from the Hessie trailhead and the Fourth of July Road could be affected by the development of ski area infrastructure on the back-side of EMR. The Placer Express chairlift, Placer

terrain, Corona chairlift replacement, and Corona terrain would be visible from the Hessie/Fourth of July Road recreation areas. The proposed projects at EMR would impact scenic resources in this area, and could take away from the experience of remoteness and primitiveness. In addition to impacts on scenic resources, the proposed projects could produce additional noise. The new Placer and Corona terrain would be served by snowmaking infrastructure, which could result in elevated noise levels early in the ski season while EMR will be preparing to open ski trails across the resort. Chairlifts could produce additional noise as well. Refer to the Noise and Scenery sections of Chapter 3 for a more detailed discussion of impacts to these resources.

The construction, on-going maintenance and emergency access bridge across Middle Boulder Creek could impact recreation in the Hessie/Fourth of July Road areas. The bridge is designed to facilitate the transportation of construction materials to the site of the bottom terminal of the Placer Express chairlift as well as on-going maintenance access, and thus is designed to accommodate large and heavy loads. County Road 130, which leads to the bridge, thus also must be able to accommodate these loads. Road maintenance measures would be undertaken on County Road 130 between the Town of Eldora and the bridge site to ensure the successful passage of construction vehicles. These road improvements could attract more recreationalists to the Hessie/Fourth of July Road areas, and construction could temporarily displace users that walk on this road.

Although, the bridge across Middle Boulder Creek could provide an access point for recreationalists to the south side of Middle Boulder Creek, the bridge would be gated year-round and restricted to administrative use. Currently the south side of Middle Boulder Creek is very lightly used by recreationalists, a bridge would enable people to cross the stream and travel along the south side of Middle Boulder Creek which could alter the recreation experience in this area. EMR would mitigate these effects by limiting use of the bridge to authorized personnel.

Forest Plan Amendment

As discussed in Chapter 2, the Proposed Action includes a Forest Plan amendment to assign and change the Management Areas, SIOs and ROS in areas included in the current and proposed SUP boundary. The Forest Plan amendment would define all areas within the current and proposed SUP boundary as Management Area 8.22 – Ski-Based Resorts. Under the Proposed Action, approximately 11 acres of lands within the existing SUP boundary that are not officially designated as Management Area 8.22 would be assigned Management Area 8.22, approximately 21 acres of lands in the Middle Boulder Creek area that are not officially designated would be assigned Management Area 8.22, and approximately 10 acres of Management Area 7.1 – Residential-National Forest Intermix and 11 acres of Management Area 1.3 – Backcountry Recreation would be changed to Management Area 8.22. This change may affect current backcountry and dispersed recreation users that value these areas for the solitude of the current recreational experience which is expected to change as Management Area 8.22 is designed to concentrate

developed recreation opportunities. Refer to Appendix B for a quantification of acreages as they relate to management areas and recreation across the ARP.

Alternative 3

Under Alternative 3, all changes to the quality of recreational opportunities within the SUP area and adjacent NFS lands would be performed with the goal of enhancing the recreation experience for EMR and National Forest visitors. Please refer to Chapter 2 for a detailed description of components of Alternative 3.

Annual Visitation

Alternative 3 projects are anticipated to increase daily and annual visitation at EMR. Table 3A-4 shows annual net increases in visitation that are expected with Alternative 3. Net visitation increases refer to visitation levels in excess of the "baseline" value of 197,363 annual skier visits.

Visitation at EMR is anticipated to increase most in the first year after implementation. Over the first five years the projected CAGR would be 3.10 percent followed by a reduced rate of 2.19 percent annually through ten years. As presented in Table 3A-4, Year 10 annual skier visits could be approximately 245,201, an increase of approximately 47,838 over the current visitation of 197,363.

Daily Visitation

Under Alternative 3 EMR's CCC would increase to 4,930 people per day. These visitors would be dispersed throughout an expanded terrain network serviced by chairlifts less susceptible to wind closure. The proposed upgrades to the chairlift network would reduce the risk of wind closure for most chairlifts; however, the Indian Peaks chairlift would not be upgraded and would thus remain susceptible. If the Indian Peaks chairlift were to close, the CCC would decrease by approximately 17 percent, to 4,080 people per day. Refer to the section below on Skier Circulation and Skier Densities During Closures for a discussion on impacts to the recreational experience.

Chairlift Network

As described in Chapter 2, Alternative 3 would involve the installation of one new chairlift and two chairlift replacements. The new chairlift, Jolly Jug, would provide access to new intermediate terrain. Additionally, the placement of this chairlift was chosen to minimize wind exposure and thereby decrease the likelihood of wind closures. As with the Jolly Jug chairlift in Alternative 2, the top terminal of the new Jolly Jug chairlift under Alternative 3 would be located slightly off the ridge so that in the event that the new Challenge chairlift was closed, the Jolly Jug chairlift would provide access to the back-side of the resort (via Sundance and Jolly Jug). Similar to as stated in the Proposed Action, the proposed Jolly Jug chairlift would also provide a secondary access route for guests, especially from the east end of the existing parking lots.

As described under Alternative 2, the replacement of the Challenge and Corona chairlifts is intended to address wind closure issues as well as improve operational efficiencies by removing the redundant chairlifts and providing one that is better suited to service lower ability level skiers. The heavier, detachable chairlifts (Challenge chairlift would also have an enclosed top terminal) are better able to withstand high winds, more comfortable for lower ability level skiers, and offer a smoother load and unload experience than the older fixed grip chairlifts.

Together, these chairlift additions and improvements would improve reliability of the chairlift network at EMR, thereby improving the quality of the alpine ski experience, responding to needs stated in Chapter 1 of this EIS. Alternative 3 would not address the Purpose and Need as effectively as Alternative 2 with respect to the need to "address skier safety concerns during prevalent wind events" because it does not include the Placer chairlift. These improvements to the chairlift network would, however, beneficially impact skier circulation and skier densities during wind closures, as discussed in further detail in the following section.

Ski Area Terrain

Ski Trails and Tree and Gladed Skiing Areas

Under Alternative 3, ski area terrain at EMR would increase by approximately 115 acres. This would include approximately 52 acres of new ski trails and approximately 63 acres of new tree and gladed skiing areas. In addition, Alternative 3 would modify approximately 135 acres of existing tree and gladed skiing areas. Table 3A-6 provides terrain distribution by ability level information for Alternative 3.

Table 3A-6:
Lift-Served Terrain Distribution by Ability Level – Alternative 3

Skier Ability Level		Existing Terrain Acreage	Proposed Terrain Additions Acreage	Proposed Total Terrain Acreage	EMR Proposed Terrain Distribution[a]	Central Rockies Skier Ability Level (Market)
		(acres)	(acres)	(acres)	(%)	(%)
●	Beginner	4.3	0	4.3	5	5
●	Novice	17.1	0	17.1	12	15
■	Low Intermediate	44.6	0	44.6	25	25
■	Intermediate Ski Trail Tree and Gladed Skiing Area	*61.6* 52.5 9.1	*72* 43 29	*133.6* 95.2 38.1	39	35
◆	Advanced Intermediate Ski Trail Tree and Gladed Skiing Area	*70.1* 37.7 32.4	*26* 4 22	*96.1* 41.4 54.4	13	15
◆	Expert Ski Trail Tree and Gladed Skiing Area	*137.4* 27.1 110.3	*17* 5 12	*154.4* 32.1 122.3	6	5
	Total	**335.1**	**115**	**450.1**	**100**	**100**

[a] EMR Terrain Distribution is based on terrain capacity.
Source: Eldora Mountain Resort, 2011

Compared to existing conditions, and therefore Alternative 1, Alternative 3 would address the existing current deficit of intermediate and advanced intermediate ability level terrain distribution. In addition, Alternative 3 would create better alignment with respect to market demand for low intermediate ability level terrain distribution. Alternative 3 would also develop an additional 63 acres of new tree and gladed skiing terrain and 135 acres of modifications to existing tree and gladed skiing terrain in response to the Purpose and Need stated in Chapter 1 to provide a new, more natural terrain experience.

The following text describes to impacts to recreation for each component of terrain improvements.

Jolly Jug Terrain

The Jolly Jug terrain in Alternative 3 would add approximately 62 acres of intermediate terrain. This includes the addition of five new ski trails (JJ-1 through JJ-5) amounting to approximately 27 acres and the development of approximately 35 acres of tree and gladed skiing areas (Jolly Jug Glades and Jolly Jug Glades II). As discussed above, EMR currently does not have sufficient intermediate terrain to serve the market demand. The proposed Jolly Jug terrain would help address this terrain deficit. The tree and gladed skiing areas would further provide a “new, more natural terrain experience;” a need identified in Chapter 1. This terrain would also address reliability and safety concerns as the associated Jolly Jug chairlift would not be as susceptible to wind events. For this reason, this terrain would add to an enjoyable guest experience for intermediate ability level guests.

At a desired density of approximately 10 skiers/acre, the trails (JJ-1 through JJ-5) would have an approximate skier capacity of 270 guests, and at a desired density of approximately 0.5 skier/acre, the Jolly Jug Glades would have a capacity of approximately 18 guests. Therefore, the Jolly Jug project would have a total near 290 guests on ski terrain. (Note: guests within the Jolly Jug area would also be in the chairlift line, on the chairlift, and milling.) Alternative 3 would have a greater positive impact on the recreation experience and terrain capacities compared to Alternative 2.

Corona Terrain

The Corona terrain in Alternative 3 would add approximately 12 acres of intermediate terrain (C-2, C-4, *Lower Ambush* widening, *Lower Diamondback* widening), 47 acres of advanced intermediate terrain (C-1, Bryan Glades and Bryan Glades II), and 125 acres of expert terrain (C-3, Salto Glades, Moose Glades, Placer Glades). This includes the addition of four new ski trails amounting to approximately 21 acres and the development of/modification to approximately 163 acres of tree and gladed skiing areas. Overall, the proposed ski trails and tree and gladed skiing areas would meet the need for "additional intermediate to expert ability level terrain and a new, more natural terrain experience" identified in Chapter 1.

From a trail planning standpoint, with a desired density of approximately 10 skiers/acre, the intermediate ability level trails within the Corona pod (C-2, C-4, *Lower Ambush* widening, *Lower Diamondback* widening) would have an approximate skier capacity of 120 guests. The advanced intermediate ability level trail (C-1) would have a desired density of approximately 7 skiers/acre and a capacity of 28 guests. The expert ability level trail (C-3) would have a desired density of approximately 3 skiers/acre and a capacity of approximately 12 guests. The new and modified proposed tree and glade skiing areas (Bryan Glades, Bryan Glades II, Salto Glades, Moose Glades, and Placer Glades) would have a desired density of approximately 0.5 skier/acre and a capacity of 82 guests. Therefore, the Corona pod would have a total of approximately 290 guests on the terrain. (Note: guests within the Corona pod would also be in the chairlift line, on the chairlift, and milling.)

Indian Peaks Terrain

The Indian Peaks terrain in Alternative 3 would add approximately 4 acres of intermediate terrain (IP-1). This includes the addition of one new ski trail amounting to approximately 4 acres of terrain. This trail would help meet the need for "additional intermediate…ability level terrain" identified in Chapter 1. The Indian Peaks terrain would further reduce the deficit in intermediate terrain at EMR. From a trail planning standpoint, with a desired density of approximately 10 skiers/acre, this trail would add approximately 40 guests to the capacity of the area. Skiers would access this trail from the existing Indian Peaks chairlift.

Terrain Densities

The Affected Environment discloses the total density index is 79 percent, due to a greater target trail density than the modeled density. Again, a balanced relationship of target and modeled trail density would be a density index of 100 percent. With development of Alternative 3, the density index would remain similar to existing conditions at approximately 78 percent. This situation is desirable from the

quality of skiing perspective, and is reflected in the generally low average modeled trail densities and faster and easier loading chairlifts.

Skier Circulation and Skier Densities During Wind Events/Holds

Like the Proposed Action, projects in Alternative 3 are planned to reasonably address the Purpose and Need to improve skier safety during wind events. Alternative 3 contains multiple project components to "improve the reliability of chairlift and terrain offerings" and "address skier safety concerns during prevalent wind events," needs identified in Chapter 1.

First, the Jolly Jug chairlift is designed to improve operations during wind events. The chairlift and terminals are aligned to avoid the highest elevations and ridges to stay out of the highest winds. Because the Jolly Jug chairlift would be less susceptible to wind closures, the Jolly Jug terrain would remain open more consistently, thereby providing additional terrain to disperse skiers on windy days. The Jolly Jug chairlift would be accessible from the Sundance chairlift and would thus be accessible even if the Challenge chairlift were forced to close. Skiers would no longer be limited to front-side terrain served by EZ, Caribou, Sundance, and Race chairlifts and skier densities would be lower across EMR.

Second, as mentioned above, the replacement of the Challenge and Corona chairlifts would reduce the likelihood that the Challenge and Corona chairlifts would be forced to close due to wind. If these chairlifts are able to remain open, skiers would be dispersed across an even larger area of terrain, thereby reducing density and circulation issues. The replacement of the Corona chairlift with a new six-person chairlift that is less susceptible to wind would improve the accessibility of back-side terrain. If the smaller Indian Peaks chairlift were forced to close, the lower sections of *Lower Ambush*, *Lower Diamondback*, and IP-1 would be affected.

If a wind event were to close the Indian Peaks chairlift, those guests would presumably continue to ski the upgraded Corona chairlift (upgraded as a heavier chairlift to withstand greater wind speeds). Assuming <u>all</u> of the guests utilizing the Indian Peaks chairlift transitioned to the Corona chairlift, to remain on the back-side of EMR, the chairlift wait times for Corona could increase to approximately 10 to 15 minutes immediately subsequent to the wind closure of Indian Peaks. Under this scenario, guests would ski *Muleshoe* trail down to the bottom terminal of the Corona chairlift. Higher trail densities in excess of the desired density of 10 skiers/acre occur during this period, potentially creating safety concerns. Additionally, from a guest experience standpoint, the wind event that causes the closure of Indian Peaks would typically create unfavorable conditions for a guest to ski. Furthermore, there would continue to be wind exposure during these periods of time for guests skiing on the back-side of EMR, causing an unfavorable skiing experience. More than likely, during a wind event a percentage of guests would go to the proposed Challenge Mountain Facility and would transition to the front-side of the mountain, including the proposed Jolly Jug pod. This would spread those guests across the entire ski area more effectively where those guests can be absorbed by guest service facilities and other chairlifts and trails.

Mountain Operations

Alternative 3 would result in the development of ski area infrastructure south of the current ski area operational boundary. These projects would help collect skiers at natural stopping points, therefore reducing ski patrol efforts in these areas. As discussed earlier, skiers at EMR are known to ski beyond the ski area towards the "Deadman's Gulch" Nordic Trail. The Jolly Jug chairlift and associated terrain would improve access to skiers pulled to the south of the ski area. Under Alternative 3, the bottom terminal of the Jolly Jug chairlift is located in a low spot, thereby maximizing the chances of collecting skiers in this area. Thus the Jolly Jug chairlift and associated terrain would minimize lost or stranded skiers and reduce ski patrol search efforts in this area.

Skiers at EMR are known to ski beyond the ski area operational boundary towards Middle Boulder Creek. This situation would continue to occur under Alternative 3.

Guest Services

Alternative 3 contains the same on-mountain guest service projects as the Proposed Action. Please refer to the discussion above for details on the impact to recreation.

Nordic Center Trails

Alternative 3 would impact the "Porcupine Park Loop" trail associated with EMR's Nordic Center on private lands. Jolly Jug trails JJ-2, JJ-4 and Jolly Jug Glades II would intersect the "Porcupine Park Loop." Under this alternative, EMR would close the "Porcupine Park Loop" Nordic trail and potentially find an alternative alignment. The bottom terminal of the Jolly Jug chairlift would also interfere with the "Deadman's Gulch" Nordic trail; however, this interaction can be managed by EMR through signage and guest awareness.

Dispersed Recreation

Alternative 3 would impact the dispersed recreation experience on the Jenny Creek Trail and in the Hessie/Fourth of July Road recreation area.

The alignment of the Jenny Creek Trail conflicts with the proposed Jolly Jug chairlift and associated terrain. Users of the Jenny Creek Trail would encounter ski trails, a chairlift, and tree and gladed skiing terrain primarily while on property owned by EMR, but also a short distance on NFS lands near the intersection with the proposed Jolly Jug chairlift alignment. During the winter while EMR is open, conflicts between dispersed recreationalists and alpine skiers would be mitigated through signage and the creation of uphill travel corridors and ski trail crossing zones. The designated route for users of the Jenny Creek Trail would provide a safe path to traverse EMR. A PDC is incorporated into the project for the ARP to pursue an easement for the current location of Jenny Creek Trail on private land owned by EMR. Should this occur, the ARP would manage the Jenny Creek Trail where it crosses private lands. The trail would remain in its current alignment.

Under Alternative 3, the distance from the closest snowmaking infrastructure to Hessie would not change and would remain approximately 1,900 feet from the edge of Hessie. New tails would be constructed in the Corona area (C-1 through C-4). The upper portions of these trails would be visible from this location, but a ridgeline would block the lower (and closer) portions of these trails from the townsite. The impact to dispersed recreation at the Hessie/Fourth of July Road recreation area is limited to a slight change in snowmaking noise heard at Hessie, which is expected to be minimal under Alternative 3.

Forest Plan Amendment

As discussed in Chapter 2, Alternative includes a Forest Plan amendment to assign and change the Management Areas, SIOs and ROS in areas included in the current and proposed SUP boundary. The Forest Plan Amendment would define all areas within the current and proposed SUP boundary as Management Area 8.22: Ski-Based Resorts. Under Alternative 3, approximately 11 acres of lands within the existing SUP boundary that are not officially designated as Management Area 8.22 would be assigned Management Area 8.22, and approximately 10 acres of Management Area 1.3 – Backcountry Recreation and 0.5 acre of Management Area 4.3 – Dispersed Recreation would be changed to Management Area 8.22. This change may affect current backcountry and dispersed recreation users that value these areas for the solitude of the current recreational experience which is expected to change as Management Area 8.22: Ski-Based Resorts are designed to concentrate developed recreation opportunities. Refer to Appendix B for a quantification of acreages as they relate to management areas and recreation across the ARP.

CUMULATIVE EFFECTS

Scope of the Analysis

For a detailed description of past, present, and reasonably foreseeable future projects within the cumulative effects analysis area, the reader is referred to Appendix A in this document.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for recreational resources extends from EMR's inception as a ski area in 1961, through the foreseeable future in which EMR can be expected to operate (EMR's current 30-year SUP expires December 31, 2021; however, this analysis assumes the SUP would be reissued).

Spatial Bounds

The spatial bounds for this cumulative effects analysis focuses on NFS lands within, and adjacent to, EMR's SUP area.

Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable actions that affect recreation resources within the analysis area are related to development of public and private lands dating back to the 1960s. These past, present, and reasonably foreseeable actions include:

- 2011 Master Plan
- Past Ski Area Projects
- Annual EMR Operating Plans
- Corona Grading Project EA
- Forest Legacy Conservation Easement
- Lump Gulch Fuels Treatment Project
- Forsythe Fuels Reduction Project
- Nederland Water Treatment Plant Fuels Reduction Project
- Jenny Creek Restoration and Reroute of Motorized Trail
- Recreational Use Outside of the Ski Area
- Public and Private Road Infrastructure

Alternative 1 – No Action

2011 Master Plan

EMR did not propose all projects in the 2011 Master Plan for site specific environmental review in the EIS. Therefore, the projects in the Master Plan that are not part of the Proposed Action and/or Alternative 3 are considered reasonably foreseeable future actions.

Key projects that have received Forest Service acceptance include the Moose Glade Express chairlift and terrain and the Four O'Clock chairlift. The details of each of these projects are presented in Appendix A. The Forest Service did not "require" either of these projects to be analyzed after acceptance of the 2011 Master Plan. However, this analysis assumes these projects are reasonably foreseeable future developments.

It is reasonable to anticipate that the installation of the Moose Glade Express chairlift would improve ski area operations during wind events, as the lower elevation of the chairlift would offer protection. The Moose Glade terrain would be primarily expert ski trails and tree and gladed skiing areas. This new terrain would not address the current deficit of intermediate terrain at EMR. The development of the Moose Glade pod could impact dispersed recreation in the Hessie/Fourth of July Road recreation areas.

This development could impact scenic resources, which could in turn impact the quality of dispersed recreation in the area.

The Four O'Clock chairlift would provide an important link in the "learning progression" for skiers who have advanced past beginner and novice terrain served by the teaching surface lifts, and the Little Hawk, EZ, Caribou and Sundance chairlifts. Additionally, the Four O'Clock chairlift would provide access to back-side chairlifts and terrain, including Placer and Moose Glade, if the Challenge chairlift were closed due to wind.

Past Ski Area Projects

Since EMR opened as a ski area in 1961 there have been numerous changes to the recreation experience within the SUP boundary as well as in surrounding NFS and private lands. The ski area has developed to provide a high quality recreation experience for alpine skiers, snowboarders, and Nordic skiers. The development of ski area infrastructure across the SUP boundary has impacted dispersed recreation as well. The Jenny Creek Trail currently traverses EMR ski trails near the Tenderfoot and Little Hawk chairlifts.

Annual EMR Operating Plans

EMR's annual winter and summer operating plans within the SUP boundary have cumulatively benefited recreation at EMR through routine maintenance to keep chairlifts, ski trails, etc. in good condition. These activities improve the safety and quality of the recreational experience. Maintaining chairlifts minimizes break-downs thereby improving the recreational experience for visitors, and ski trail maintenance protects skiers from obstacles like felled trees and shrub growth. These operating plans are required by the Ski Area SUP, and will continue into the future to maintain the condition and function of current infrastructure.

Corona Grading Project EA

In 2011, a Decision Notice was signed on the Corona Grading Project Environmental Assessment (EA). This approved a grading project on EMR's Corona ski trail. The project was designed to respond to safety concerns and skier congestion on the Corona ski trail. The project includes widening the trail to an average width of 90 feet, including grading the existing trail and removing some overstory vegetation adjacent to the trail. This project would improve skier congestion and safety on the Corona ski trail, but would not otherwise affect the recreational experience at EMR.

Forest Legacy Conservation Easement

The proposed conservation easement on private lands adjacent to EMR would preserve the characteristics of the recreational experience in this area. The easement would allow for the continuation of current EMR operations on the property (e.g., Nordic Center Trails).

Lump Gulch Fuels Treatment Project

This project could impact dispersed recreation near Nederland and Eldora. This project could require temporary trail closures that could drive more users to the trails surrounding EMR. Additional users in the Fourth of July Road/Hessie area could impact the recreation experience by reducing the quality of the wilderness experience that many users desire. However, the impacts to the recreational experience would be minimal due to the temporary nature of disturbance.

Forsythe Fuels Reduction Project

As with the Lump Gulch Fuels Treatment Project, this project could impact dispersed recreation near Nederland and Eldora. Mechanical treatment could require temporary trail closures that could displace recreational users. These recreational users could choose to utilize trails surrounding EMR which could increase crowds in this area, thereby potentially impacting the dispersed recreation experience. However, the impacts to the recreational experience would be minimal due to the temporary nature of disturbance.

Nederland Water Treatment Plant Fuels Reduction Project

As with the Lump Gulch and Forsythe fuels reduction projects discussed above, this project could impact dispersed recreation near Nederland and Eldora. Disruptions to recreation in the fuels treatment area could drive recreationalists to utilize other nearby trails, resulting in more crowds and changes to the dispersed recreation experience. However, the impacts to the recreational experience would be minimal due to the temporary nature of disturbance.

Jenny Creek Restoration and Reroute of Motorized Trail

The restoration and relocation of a segment of motorized trail in Jenny Creek could impact dispersed recreation in this area. This project could result in a temporary trail closure or detour that would affect users on the Jenny Creek Trail. However, due to the temporary nature of the disturbance these impacts would be minimal.

Recreational Use Outside of the Ski Area

Dispersed recreation on NFS and private lands surrounding EMR has become increasingly popular over time. A growing population along the Front Range has driven more and more people into the mountains for hiking, biking, and other outdoor activities. While the quality of recreation surrounding EMR is high, increased use could take away from the experience of solitude often valued in dispersed recreation.

Public and Private Road Infrastructure

The continued construction and maintenance of road infrastructure could improve access to recreational areas, and could alter the character of roads currently used for recreation. Improved access could increase the quantity of trail users in the area surrounding EMR. Maintenance of roads can also change their character and their role in recreation. For example, roads that are currently not maintained in the winter can be popular ski and snowshoeing routes. If town utilities decide to plow them, they become

unavailable for this type of recreation. These impacts to recreation are generally incidental and minimal when considered at the scale of regional recreation opportunities.

Alternative 2 – Proposed Action

2011 Master Plan

Cumulatively, EMR would provide greater chairlift capacity for intermediate, advanced intermediate, and expert ability level guests when combining the Placer, Corona, and Jolly Jug projects with the new Moose Glade pod. Additionally, the quality of the alpine recreation experience during wind events would be significantly improved. Proposed and planned projects emphasize access to ski terrain and infrastructural capability to withstand high winds. In total, proposed and planned projects would reduce skier densities and congestion during wind events, thereby improving the recreational experience for EMR's guests.

As discussed in Alternative 1, the Moose Glade pod could impact dispersed recreation in the Hessie/Fourth of July Road recreation areas. Cumulatively, the Placer and Corona chairlifts and ski terrain and the Moose Glade pod could impact scenic resources, which could in turn impact the quality of dispersed recreation in the area.

Under Alternative 2, the Four O'Clock chairlift would have the same impact on recreation as Alternative 1, discussed above.

Past Ski Area Projects

Projects included in Alternative 2 would build on past ski area projects and existing infrastructure to further improve the recreational experience at EMR. The expanded chairlift network, terrain variety, and guest services infrastructure would all improve the recreational experience.

Annual EMR Operating Plans

As discussed above under Alternative 1, annual winter and summer operating plans under Alternative 2 are required, and will continue into the future to maintain infrastructure. Under Alternative 2 these plans would be expanded to include the maintenance of new infrastructure. The implementation of these plans has a positive effect on recreation, as described above under Alternative 1.

Corona Grading Project EA

Cumulatively, the Corona Grading Project and the development of new ski terrain at EMR would improve the recreational experience for guests and improve skier congestion and safety on the Corona ski trail.

Forest Legacy Conservation Easement

As described above under Alternative 1, this proposed conservation easement would preserve the characteristics of recreation within this area. Additionally, the easement would allow for future expansion

of the Jolly Jug chairlift by EMR, should EMR obtain all necessary government approvals and landowner agreements for the expansion.

Lump Gulch Fuels Treatment Project

As described above under Alternative 1, this project could increase the number of dispersed recreation users on NFS and private lands surrounding EMR. The increase in users could affect the dispersed recreation experience, as discussed above. The projects included in Alternative 2 could impact the view from the Hessie/Fourth of July Road recreation area, thereby further impacting the recreation experience in this area. However, Alternative 2 would not increase dispersed recreation surrounding EMR, so the cumulative impact would be negligible.

Forsythe Fuels Reduction Project

As described above under Alternative 1, this project could increase the number of dispersed recreation users on NFS and private lands surrounding EMR. The increase in users could affect the dispersed recreation experience, as discussed above. The projects included in Alternative 2 could impact the view from the Hessie/Fourth of July Road recreation area, thereby further impacting the recreation experience in this area. However, Alternative 2 would not increase dispersed recreation surrounding EMR, so the cumulative impact would be negligible.

Nederland Water Treatment Plant Fuels Reduction Project

As described above under Alternative 1, this project could increase the number of dispersed recreation users on NFS and private lands surrounding EMR. The increase in users could affect the dispersed recreation experience, as discussed above. The projects included in Alternative 2 could impact the view from the Hessie/Fourth of July Road recreation area, thereby further impacting the recreation experience in this area. Combined with other projects, Alternative 2 would not increase dispersed recreation surrounding EMR, so the cumulative impact would be negligible.

Jenny Creek Restoration and Reroute of Motorized Trail

As discussed above under Alternative 1, this project could require a temporary trail closure and/or detour which could impact the recreational experience for users of the Jenny Creek Trail. Under Alternative 2, as discussed in the Direct and Indirect Environmental Consequences section, users of the Jenny Creek Trail would encounter ski area infrastructure associated with the Jolly Jug chairlift and associated trails. Because of the temporary nature of the disturbance related to this trail restoration project, its impact on the recreational experience would be minimal.

Recreational Use Outside of the Ski Area

Under Alternative 2, proposed projects could impact the views from recreation areas including the Hessie/Fourth of July Road area. As discussed above under Alternative 1 and the fuels treatment projects, this change to views combined with general increases in users to the area could negatively impact the

recreational experience surrounding EMR. However, these impacts are not anticipated to decrease the amount of use in these areas.

Public and Private Road Infrastructure

The potential impact of road infrastructure projects under Alternative 2 is identical to that described above under Alternative 1. Additionally, as discussed in the Direct and Indirect Environmental Consequences section for Alternative 2, construction of the Placer Express chairlift and associated trails would require a bridge across Middle Boulder Creek and maintenance of County Road 130 from the Town of Eldora to the bridge location. Cumulatively, such road maintenance projects could have incremental impacts on dispersed recreation, including the user's experience.

Alternative 3

2011 Master Plan

Cumulatively, EMR would provide greater chairlift capacity for intermediate, advanced intermediate, and Expert ability level guests when combining the Corona, Indian Peaks, and Jolly Jug projects with the new Moose Glade pod. These projects would have a positive cumulative effect on the recreational experience at EMR during wind events similar to the Alternative 2 analysis, with the exception of the positive impacts associated with the Placer chairlift and terrain.

As discussed in Alternative 1, the Moose Glade pod could impact dispersed recreation in the Hessie/Fourth of July Road recreation areas. Cumulatively, the Corona chairlift and ski terrain and the Moose Glade pod could impact scenic resources, which could in turn impact the quality of dispersed recreation in the area.

Past Ski Area Projects

As with Alternative 2, projects included in Alternative 3 would build on existing infrastructure at EMR to improve the recreational experience.

Annual EMR Operating Plans

Annual winter and summer operating plans are required, and will continue into the future to maintain ski area infrastructure. These plans improve the recreational experience. Refer to the discussions under Alternatives 1 and 2 for more detail.

Corona Grading Project EA

Cumulatively, the Corona Grading Project and the development of new ski terrain at EMR would improve the recreational experience for guests and improve skier congestion and safety on the Corona ski trail.

Forest Legacy Conservation Easement

As discussed above under Alternative 2, this proposed easement would preserve the characteristics of the recreational experience in this area and would allow for future expansion of the Jolly Jug chairlift by EMR, should EMR obtain all necessary governmental approvals and landowner agreements for the expansion.

Lump Gulch Fuels Treatment Project

This project could impact traffic and dispersed recreation on NFS and private lands surrounding EMR, as discussed in the No Action Alternative and Alternative 2 analysis.

Forsythe Fuels Reduction Project

This project could impact traffic and dispersed recreation on NFS and private lands surrounding EMR, as discussed in the No Action Alternative and Alternative 2 analysis.

Nederland Water Treatment Plant Fuels Reduction Project

This project could impact traffic and dispersed recreation on NFS and private lands surrounding EMR, as discussed in the No Action Alternative and Alternative 2 analysis.

Jenny Creek Restoration and Reroute of Motorized Trail

As discussed above under Alternative 1, this project could require a temporary trail closure and/or detour which could impact the recreational experience for users of the Jenny Creek Trail. Under Alternative 3, as discussed in the Direct and Indirect Environmental Consequences section, users of the Jenny Creek Trail would encounter ski area infrastructure associated with the Jolly Jug chairlift and associated trails. Because of the temporary nature of the disturbance related to this trail restoration project, its impact on the recreational experience would be minimal.

Recreational Use Outside of the Ski Area

Under Alternative 3 the impacts related to recreational use outside of the ski area would be similar to those discussed under Alternative 2. Alternative 3 would lead to fewer impacts to the views seen by recreationalists in the Hessie/Fourth of July Road area, but the impacts to recreation would be similar.

Public and Private Road Infrastructure

The potential impact of road infrastructure projects under Alternative 3 is identical to that described above under Alternative 1.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

There would be no irreversible or irretrievable commitments of recreational resources as a result of the implementation of proposed projects.

B. TRAFFIC, PARKING AND AIR QUALITY

SCOPE OF THE ANALYSIS

This analysis of air quality resources is primarily based on the impacts of traffic and parking in the study area. The principal air quality concerns derive from emissions related to both construction traffic and guest trips. Given the inherent connections between these resources, the impacts to traffic, parking, and air quality are analyzed together in this EIS.

The following analysis is a summary of resource data from TDA, Inc. (traffic and parking data) and Alpine Geophysics, LLC. (air quality data) that are contained in the project file.[32]

Traffic and Parking

The scope of the traffic and parking assessment includes Eldora Road (Boulder CR 130), Lake Eldora Ski Road (CR 140), also known as Shelf Road, and the intersection of Eldora Road and State Highway (SH) 119. These roads represent virtually all of EMR's guest and worker travel routes. The guest trips translate into parking quantities. Existing road conditions and traffic volume data, where available, are presented in this analysis for these road segments.

The following definitions are used in this analysis:

- *AADT*: Annual Average two-way Daily Traffic volume. AADT represents the total traffic on a section of roadway for the year, divided by 365. It includes both weekday and weekend traffic volumes. Raw data is processed and converted to AADT volumes. AADT can be adjusted to compensate for monthly and daily fluctuations in traffic; the basic intent being to provide traffic volumes which best approximate the use of a given highway section for a typical day of year.
- *VPD*: Vehicles Per Day. VPD represents the total two-way daily traffic volume on a section of roadway.
- *Trip*: a single or one-direction vehicle movement with either the origin or the destination inside a study area. A vehicle leaving the highway and entering a property is 1 trip. Later, when the vehicle leaves the property it is a second trip.
- *DHV*: Design Hourly Volume. DHV represents the total traffic in both directions during the 30th highest hourly volume of the year.

Air Quality

This air quality analysis focuses on EMR's existing and proposed SUP boundary adjustments (NFS lands), areas proximate to EMR on private lands, and Boulder County. As mentioned above, this analysis

[32] TDA, 2013; Alpine Geophysics, 2013

is primarily based upon the impacts of EMR traffic, and thus considers air quality in Boulder County generally as it relates to potential changes in traffic.[33] The analysis provides a screening assessment of air quality impacts in the region resulting from construction-related emissions and air emissions from guest vehicle trips. Air emissions for on-road mobile sources were estimated using EPA's Motor Vehicle Emissions Simulator (MOVES2010b). This analysis follows regulatory direction and applicable air quality regulations. This information is available in the project file.

AFFECTED ENVIRONMENT

Ski Area Access

State Highway 119

SH 119 is the principal arterial facility through Gilpin County starting at Highway 6 south of Black Hawk continuing north into Boulder County through Nederland, Boulder and Longmont, connecting to I-25 east of Longmont. SH 119 is the primary ski area access for the majority of EMR guests from Boulder.

Within the study area SH 119 has two travel lanes. The posted speed is 35 mph, reducing to 25 mph about a quarter-mile north of the Eldora Road intersection in the Town of Nederland. The road descends gradually from the Eldora Road intersection through the center of Nederland.

Eldora Road (CR 130)

Eldora Road (CR 130) is a two-lane Boulder County Road that connects SH 119 with the Town of Eldora. EMR is accessed from this road via Shelf Road (CR 140). The road alignment is gently curving and flat, generally following Middle Boulder Creek.

Shelf Road (CR 140)

CR 140 is a two-lane paved road that begins at a Y-intersection with Eldora Road and climbs steadily, passes Peterson Lake and terminates at the EMR main parking lot.

State Highway 119/Eldora Road Intersection

The SH 119/Eldora Road intersection is the gateway intersection for EMR guests and workers. Eldora Road has a single-lane Stop sign controlled approach. There are no SH 119 auxiliary left- or right-turn lanes. The junction operates as a three-leg one-way Stop T-intersection.

Public Transportation

The Denver Regional Transportation District (RTD) provides scheduled bus service between RTD's 14th & Walnut transportation center in downtown Boulder to the front of the Main Lodge at EMR, via

[33] Air quality in Gilpin County is not considered an issue warranting analysis due to the amount of vehicular traffic projected.

Nederland. The Regional N route has 7 trips each way each day between downtown Boulder and EMR. A number of Boulder Valley schools also transport students to EMR outings via school buses.

Traffic

State Highway 119

2010 AADT volume on the study area segment of SH 119 is 4,500 VPD north of the Eldora Road intersection and 2,800 VPD south of the intersection.[34] Traffic counts performed for this study during a March 2012 Spring Break week (3/26–4/1/2012) yield an average weekday volume of 4,700 VPD north of the Eldora Road intersection and 3,450 VPD south of the intersection. Saturday volumes north and south of the Eldora Road intersection were the highest at 6,050 and 4,420 VPD, respectively. Sunday volumes fell between average weekday and Saturday volumes: 5,475 VPD north of the Eldora Road intersection and 3,970 VPD south of the intersection.

The highest SH 119 weekday hourly volume, 501 vehicles, was recorded on Friday north of Eldora Road between 4:00 and 5:00 PM with 260 vehicles heading north (toward Nederland) and 241 vehicles heading south. Saturday peak hour volume, 595 vehicles, occurred between 3:00 and 4:00 PM with 392 vehicles heading north and 203 traveling south. Sunday peak hour volume was similar to the Saturday count: 587 vehicles between 3:00 and 4:00 PM with 375 vehicles heading north and 212 traveling south.

Eldora Road (CR 130)

Boulder County counts indicate 1,086 AADT west of SH 119, 807 VPD west of the Shelf Road intersection and 411 VPD in the Town of Eldora. During the Spring Break 2012 7-day count performed for this study, average weekday volume was 1,537 VPD, Saturday volume was 2,053 VPD and Sunday, April 1 volume was 2,109 VPD. The highest hourly volume was recorded on Saturday, 246 vehicles between 3:00 and 4:00 PM, with 195 vehicles heading east (toward SH 119) and 51 vehicles westbound.

Shelf Road (CR 140)

Boulder County counts show 139 AADT just south of the Eldora Road intersection. The 2012 Spring Break counts indicate average weekday volume of 1,081 VPD, 1,575 VPD on Saturday, March 31 and 1,567 VPD on Sunday, April 1. The highest hourly volume, 241 vehicles, was recorded on Saturday morning between 8:00 and 9:00 AM with 230 vehicles heading toward EMR and 11 heading away. Departing volume begins to exceed arrivals starting in the 11:00 AM to Noon hour, peaking in the 3:00 to 4:00 PM hour at 172 northbound vehicles.

[34] Colorado Department of Transportation, 2013

Table 3B-1 depicts the ratio of the morning maximum 4-hour volume of vehicles arriving at the EMR base area to the corresponding skier-day count during the March 26 to April 1, 2012 traffic count period. The ratio was highest, 0.625 vehicle to one guest, on Saturday.

Table 3B-1:
Peak AM 4-Hour Arrival Vehicle Volume & Daily Skier-Day Count
March 26 through April 1, 2012

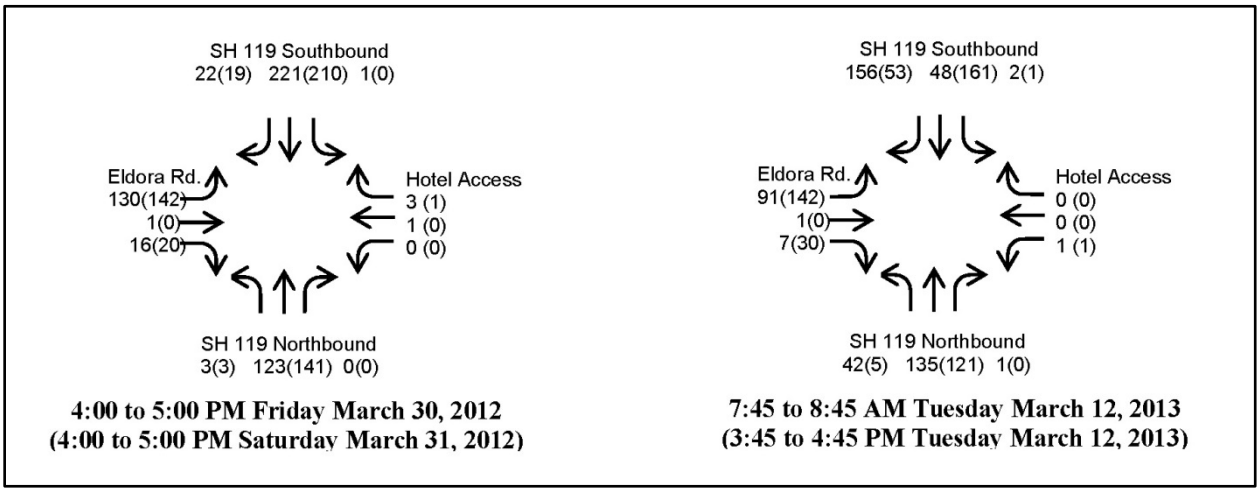
Day of Week	Monday March 26	Tuesday March 27	Wednesday March 28	Thursday March 29	Friday March 30	Saturday March 31	Sunday April 1
AM Period	8:00–Noon	8:00–Noon	8:00–Noon	8:00–Noon	8:00–Noon	7:00–11:00	7:00–11:00
#Vehicles Arriving	285	354	370	320	410	563	487
Skier-Day Count	600	689	805	666	890	900	948
Index	0.475	0.513	0.460	0.480	0.460	0.625	0.514

Source: Eldora Mountain Resort

State Highway 119/Eldora Road Intersection: Turning Movement Counts

Peak hour turning movements at the SH 119 intersection were recorded on several occasions for this study. During the same 7-day March to April, 2012 period that mechanical counts were being recorded (as discussed above), PM peak period turning movements were recorded on the Spring Break Friday and Saturday afternoons. To obtain typical ski season traffic data when the High School was in session, AM and PM peak period counts were performed on Tuesday, March 12, 2013. (A total of 54 passenger vehicles and one bus were counted in the Nederland High School front and back lots during the early afternoon of the traffic count.) As shown in Chart 3B-1, there is a strong orientation of skier traffic to/from the north, about 85 percent, toward Nederland and Boulder. The highest turning volume was 155 southbound right turns between 7:45 and 8:45 AM during the Tuesday, March 12, 2013 count. The corresponding return movement, 142 eastbound left turns between 3:45 and 4:45 PM, was the second highest turning volume. As shown, a similar left turn volume was recorded on Saturday afternoon between 4:00 and 5:00 PM in the March 2012 observation. Through traffic on SH 119 was heavier in the northbound direction in the AM with the reverse condition through the PM period.

Chart 3B-1:
Turning Movement Volumes at the State Highway 119/Eldora Road Intersection
March 2012 and March 2013



Source: TDA, 2013

10th Highest Day Traffic Volumes

Common practice for assessing winter resort transport system adequacy evaluates the 10th Highest Day of the 140- to 150-day ski season. The 10th Highest Day portrays traffic and delay conditions that would only be exceeded nine days during the season. The nine days commonly fall during Christmas Week, President's Day Weekend and/or Spring Break—periods when guests anticipate longer chairlift lines, full parking lots and slower traffic. With daily skier-day counts provided by EMR for the past three seasons, the 2011/12 season was selected for analysis as this season had the highest number of annual visits (207,979 guests) and the highest 10th ranked day (3,654 guests, Monday, January 2, 2012). The relationship of the 10th Highest Day relative to other key visitation data is shown below.

Table 3B-2:
Relationship Between 10th Highest Day Visitation
to other Visitation Days

	2011/12 Guests	Index
Annual Visits	207,979	56.9
Peak Day (2/5/2012)	4,704	1.29
10th Highest Day (1/2/2013)	3,654	1.00
Average Day	1,387	0.38

This data shows that traffic volumes on the 10th Highest Day would likely be about 2.5 times the traffic of an "average day."

Based on the relationship of 10th Highest Day (January 2, 2012) visitation and visitation during the March 26th to April 1, 2012 traffic counts, 10th Highest Day volumes at the EMR base could have been 720 vehicles in the AM peak hour and 670 vehicles in the PM peak hour.

Parking

Day Skier Parking Capacity

EMR currently provides approximately 2,000 parking spaces. Currently, EMR reserves 100 spaces for employees, 25 for charter buses (at a rate of 4.5 car spaces per bus space), and 1,571 for general car parking. Based on current visitation, 1,696 total spaces are needed. Thus, the current parking facilities provide a surplus of approximately 304 parking spaces. However, parking can reach capacity on busy days, forcing employees to park at the nearby Nederland High School and be bused to EMR. The existing facilities also provide parking for charter buses, with 25 personal vehicle spaces reserved for this purpose. Approximately 7 percent of EMR guests arrive by RTD bus, 5 percent by charter bus, and 88 percent arrive by car.

Parking Lot Count (3/30/2102)

On Friday, March 30, 2012, during the week of Spring Break traffic counts, vehicles and guest arriving at the EMR base were observed entering the parking lot between 8:20 and 10:00 AM. Average vehicle occupancy (AVO) was 2.47 persons per vehicle. Nine vehicles dropped off guests and left. At noon there were 364 parked vehicles.

Air Quality

The ARP bounds a mountainous area on the eastern and western side of the continental divide of the Front Range in Larimer County and Boulder County. In Larimer County, it includes the upper valleys of the Cache la Poudre and Big Thompson Rivers. It includes forested areas along both sides of the Poudre Canyon and along the north and east sides of Rocky Mountain National Park. Smaller parts of the ARP also extend into northern Gilpin and extreme northwestern Jefferson counties.

EMR experiences warm to boreal conditions depending on the time of year. Per the Colorado Life Zone classification, EMR exists in the Montane and Subalpine environments, with temperatures less than -15C in the winter and typically around 25C in the summer. In addition to the Montane and Subalpine environments, numerous Riparian Life Zones exist within 5 kilometers of EMR including those around Peterson Lake, Lake Eldora, Lost Lake, Jenny Creek, and Middle Boulder Creek.

There are no readily accessible data on the state of observed greenhouse gases in the area.

Summary of Air Quality in Areas Near EMR

Table 3B-3 lists the current National Ambient Air Quality Standards (NAAQS) for selected criteria pollutants.

Table 3B-3:
Primary Forms of the National Ambient Air Quality Standards for Selected Criteria Pollutants

Pollutant	Citation	Averaging Time	Level	Form
Carbon Monoxide	76 FR 54294, Aug 31, 2011	8-hour	9 ppm	Not to be exceeded more than once per year
Ozone	73 FR 16436, Mar 27, 2008	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over three years
PM2.5	Particle Pollution, Dec 14, 2012	Annual	12 ug m-3	Annual Mean averaged over three years
PM10	Particle Pollution, Dec 14, 2012	24-hour	150 ug m-3	Not to be exceeded more than once per year on average over three years

Source: www.epa.gov/air/criteria.html

Among other parameters, PM2.5 and PM10 are measured twice each week for a 24 hour period at each Interagency Monitoring of Protected Visual Environments (IMPROVE) site. Data contained in the project file shows the historical PM2.5 (annual average value averaged over three years) and PM10 (daily average) values for the three IMPROVE monitors nearest to EMR along with the attendant NAAQS. The three IMPROVE monitors consistently are well below the NAAQS.

As part of the IMPROVE program, visibility is estimated from the measured data. Please note that there is no standard to achieve per-se in regards to visibility. Instead, the Regional Haze Rule governing visibility in Class I areas requires states to establish goals for each affected Class I area to: 1) improve visibility on the haziest days, and 2) ensure no degradation occurs on the clearest days over the period of each implementation plan.[35] The visibility metric has units of deciviews (dv) where a 1-deciview change is what is perceptible to the human eye. Lower deciview readings indicate better visibility with a zero reading indicating no visibility degradation due to haze. Data contained in the project file shows the historical visibility at the three IMPROVE monitors nearest to EMR. Though the data are available to estimate visibility beyond 2005, the purveyors of the data discontinued the publication of the visibility calculation results in 2005. The visibility range based on the 30-day average for the poorest periods at Rocky Mountain National Park is roughly 13 deciviews (equivalent to visibility of about 75 miles) and the best visibility periods of about 4 deciviews (equivalent to visibility of about 160 miles) at White River National Forest.

Continuous 1-hr ozone measurements are available for the two Clean Air Status and Trends Network (CASTNET) monitors nearest to EMR. These data were used to estimate the three-year running average of the fourth highest observed 8-hour ozone. The three-year average of the annual fourth highest 8-hour

[35] U.S. Environmental Protection Agency, 2001

ozone routinely exceeds the NAAQS though there does appear to be a noticeable downward trend starting in 2003 from both monitors.

Based on the 8-hour ozone record from the EMR monitor from EPA's AirData database, there are observations only for the approximate period July through September 2008, 2009, 2010, and 2011 from which a three-year average of the fourth highest 8-hour ozone is estimated to be 75 ppb in 2010 and 74 ppb in 2011.[36] The 8-hour ozone NAAQS is routinely exceeded at the monitor though this does appear to be on a downward trend since 2006.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Traffic

Visitation

The traffic impact assessment includes SH 119 in the vicinity of the SH 119/Eldora Road (CR 130) intersection, the SH 119/Eldora Road intersection, Eldora Road from the junction with SH 119 to Shelf Road (CR 140), and Shelf Road from Eldora Road to the EMR base area parking lot. Traffic volume projections for each EMR alternative are presented in this section. Future PM peak hour volumes are assessed at the SH 119/Eldora Road and along SH 119 in the vicinity for the initial year of EMR expansion operation and 20 years in the future per Boulder County and CDOT traffic analysis standards. The 4:00 to 5:00 PM peak hour was selected for analysis of impacts since this period represents the most probable delay situation for skiers and other motorists at the Eldora Road stop-controlled approach to SH 119. Table 3B-4 depicts Shelf Road estimated 10th Highest Day peak hour vehicle volume and guest mode of arrival for each development alternative.

Design Day PM peak hour volumes on Shelf Road range from 670 vehicles for Alternative 1, 880 vehicles for Alternative 2 and 780 vehicles for Alternative 3. On an average winter day, traffic volume would be less than half the Design Day volumes.

[36] Air Resource Specialists, 1993

Table 3B-4:
10th Highest Day Shelf Road Peak Hour Traffic Volumes By Alternative

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
Comfortable Carrying Capacity (*guests and others*)	**4,463**	**5,859**	**5,177**
10TH HIGHEST DAY			
Number of Day-Guests	**3,654**	**4,800**	**4,250**
AM Peak Arrival Hour (8:00–9:00 AM)			
Arriving Vehicles	640	840	740
Departing Vehicles	80	105	95
Total Vehicles	*720*	*945*	*835*
Peak Hour Guests by Mode of Arrival			
RTD Route N	60 (3.3%)	80 (3.3%)	70 (3.3%)
School/Charter Bus	180 (9.9%)	240 (10%)	210 (9.95%)
Drop-off	75 (4.1%)	100 (4.1%)	90 (4.2%)
Via Parked Car	1,510 (82.7%)	1,980 (82.6%)	1,750 (82.5%)
Total Guests Arriving in Peak Hour	*1,825 (100%)*	*2,400 (100%)*	*2,120 (100%)*
PM Peak Departure Hour (4:00–5:00 PM)			
Arriving Vehicles	75	100	90
Departing Vehicles	595	780	690
Total Vehicles	*670*	*880*	*780*
Total Vehicles Parked at Noon	**1,780**	**2,340**	**2,070**

Sources: TDA Colorado; SE Group, Eldora Mountain Resort

Table 3B-4 depicts 10th Highest Day estimated peak hour volumes and mode of guest arrival for each development alternative. Hourly traffic counts by direction on Shelf Road and Eldora Road collected between Monday, March 26 and Sunday, April 1, 2012 were then used to project future hourly variations.

Mode of arrival indicates buses, either RTD scheduled regional service from Boulder via Nederland and school or charter buses, account for 13 percent of peak hour (8:00 to 9:00 AM) arrivals. Parked cars are the mode for about 83 percent of all guests for each alternative.

CDOT's 20-year growth factor for this segment of highway (Mile Marker 25.115) is 2.0 or about 3.5 percent per year. This accounts for continuing growth along the SH 119 travel corridor in this vicinity. To adjust for the 23-year period from the time the March 2012 Eldora Road/SH 119 intersection turning movement counts were performed to the 2035 analysis year, a factor of 2.2 was applied to the 2012 recorded highway through movements. Future skier and non-skier traffic turning to and from SH 119 distributed 85 percent to/from the north (Nederland) and 15 percent to the south per the recorded March 2012 data.

Table 3B-5 depicts 2035 10th Highest Day PM peak hour volumes on SH 119 north of the Eldora Road intersection and south of the intersection for each EMR development alternative. **None of the**

alternatives result in 10th Highest Day volumes that would exceed CDOT's Design Capacity of 1,700 vehicles per hour for this segment of highway. On average ski days the resulting volumes would be noticeably lower and hence there would be more reserve capacity on the highway.

Table 3B-5:
State Highway 119 at Eldora Road 2035 Design Day PM Peak Hour Traffic
(vehicles per hour)

10th Highest Day Traffic Volume Indicators	Alternative 1 No Action		Alternative 2 Proposed Action		Alternative 3	
	North of Eldora Road	South of Eldora Road	North of Eldora Road	South of Eldora Road	North of Eldora Road	South of Eldora Road
Existing Volume[a]	513	374	513	374	513	374
2035 Background[b]	980	800	980	800	980	800
Additional EMR Trips[c]	375	75	530	100	455	85
2035 Total Volume	1,355	875	1,510	900	1,435	885
2035 Volume/Capacity Ratio[d]	0.80	0.51	0.89	0.53	0.85	0.52

Source: TDA Colorado
[a] Traffic Count, Sat. 3/31/2012, 4:00 to 5:00 PM peak hour, All Traffic Data Services
[b] CDOT Traffic Information, SH 119 MM 25, 2.04 20-year thru movement growth factor
[c] 10th Highest Skier-Day, see Table 3B-4, 85% oriented north, 15% oriented south, net change
[d] 1,700 vehicle-per-hour design capacity (CDOT SH 119 Corridor Straight Line Diagram, MM 25.1)

Since the Design Day peak hour volumes would represent more than a 20 percent increase in turning movement volumes at the SH 119/Eldora Road intersection, a new CDOT Access Permit would likely be required. As a public road intersection Boulder County would be the applicant with EMR possibly signing as a co-applicant.

Construction

It is assumed EMR would transport employees from the base area of the resort to construction sites in two high-occupancy vehicles (van or large SUV). The construction season is assumed to last from May 1 through November 1, consisting of approximately 130 working days. With 4 employee trips each day (1 trip each way), a total of 520 construction employee trips are assumed to occur in each of the five construction seasons. Although most trips would be less, the distance of these employee trips is assumed to be approximately 7 miles—a generous estimate of the distance traveled from the parking lots at EMR along the Shelf Road, on Eldorado Ave and up to the base of the proposed Placer chairlift. Construction employee trips to all other project locations would be shorter. The majority of construction employees are assumed to live in Boulder, thus these employee commutes are expected to affect traffic in Nederland.

It is assumed EMR would transport heavy equipment necessary for construction (back-hoes, skidders, etc.) from the base area of the resort to construction sites once and then store the equipment at the construction site. It is assumed five heavy equipment vehicles would be needed. Assuming two project components are constructed each year, this would constitute a total of 20 equipment trips each construction season, with 5 equipment trips in each direction from two sites. Although most trips would be less, the distance of these equipment trips is assumed to be approximately 7 miles—a generous estimate of the distance traveled from the parking lots at EMR along the shelf road, on Eldorado Ave and up to the base of the proposed Placer chairlift. Construction equipment trips to all other project locations would be shorter.

Although the cubic feet of timber per acre of any stand varies by a number of factors, including age and species composition, the average of all stands inventoried within the project area is approximately 2,654 cubic feet per acre (average of lodgepole pine and Douglas-fir stands of age class greater than 65 years). Each cubic foot removed is assumed to constitute approximately 30.5 pounds of timber (average of lodgepole pine and Douglas-fir stands at 12 percent moisture content), thus approximately 80,950 pounds or 40 tons of timber are assumed to be removed per acre. New trail, infrastructure and facility construction is assumed to involve complete removal of timber. Glading areas are assumed to involve removal of 50 percent of timber to achieve a “groomable glade” skiing experience, although in some cases glading projects would remove a lower percentage of timber. Vegetation management projects outside of the already accounted for project areas are assumed to remove an average of 25 percent of the timber (this value is estimated at the highest possible range to account for the worst case scenario; it is likely timber removal in these areas would be considerably less). Assuming an average long logger truck can carry approximately 25 tons of timber, it would require 1.6 truck trips per acre of complete tree removal, 0.8 trip per acre of glading, and 0.4 trip per acre of vegetation management projects. Based on the tree removal by project component, a total of 276 tree removal truck loads would be necessary under Alternative 2 and a total of 314 truckloads would be necessary under Alternative 3. As each truck load would require 2 trips (1 trip to EMR from the processing facility and 1 trip to the facility from EMR) Alternative 2 would require approximately 552 trips and Alternative 3 would require approximately 628 trips. Table 3B-6 demonstrates the tree removal truck loads and trips by project component.

Table 3B-6:
Tree Removal Truck Trips by Project Component

Project	Tree Removal (acres)	Glading (acres)	Tons of Timber Removed	Truck Loads	Total Trips
JOLLY JUG CHAIRLIFT AND TERRAIN					
Alternative 2	21	16	1160	46	92
Alternative 3	30	35	1900	76	152
PLACER CHAIRLIFT AND TERRAIN					
Alternative 2	25	16	1320	53	106
Alternative 3	0	0	0	0	0
CORONA CHAIRLIFT AND TERRAIN					
Alternative 2	18	68	2080	83	166
Alternative 3	24	162	4200	168	336
INDIAN PEAKS TERRAIN					
Alternative 2	0	0	0	0	0
Alternative 3	4	0	160	6	12
CHALLENGE CHAIRLIFT REPLACEMENT					
Alternative 2	3	0	120	5	10
Alternative 3	3	0	120	5	10
LOOKOUT FACILITY					
Alternative 2	1	0	40	2	4
Alternative 3	1	0	40	2	4
CHALLENGE MOUNTAIN FACILITY					
Alternative 2	2	0	80	3	6
Alternative 3	2	0	80	3	6
PARKING					
Alternative 2	6	0	240	10	20
Alternative 3	6	0	240	10	20
VEGETATION MANAGEMENT PROJECTS (OUTSIDE PROJECT AREAS)					
Alternative 2	0	184	1840	74	148
Alternative 3	0	110	1100	44	88
TOTAL LOADS/TRIPS					
Alternative 2				**276**	**552**
Alternative 3				**314**	**628**

Table 3B-7 demonstrates the number of tree removal truck trips that would be necessary each year under each action alternative, based on the proposed construction schedule.

Table 3B-7:
Tree Removal Truck Trips by Year

	2015	2016	2017	2018	2019	Total Trips
Alternative 2	272	260	10	6	4	**552**
Alternative 3	196	412	10	6	4	**628**

Of the 272 tree removal truck trips projected for Alternative 2 in 2015, 106 (trips associated with the Placer chairlift and terrain) are expected to start the proposed bridge site near the bottom of the proposed Placer chairlift and travel through the Town of Eldora on Eldorado Avenue. All other tree removal truck trips are expected to start on the mountain and travel through the EMR base area, without passing through the Town of Eldora. The distance of each of these tree removal truck trips is assumed to be approximately 35 miles, traveling from EMR to a processing facility around Boulder, Colorado.

Air Quality

There are two major categories of activities under the action alternatives that would result in increased emissions to the atmosphere due to the expansion of EMR—(1) construction and (2) operation. NONROAD2008 and MOVES2010b have been used to estimate emissions from each activity. NONROAD2008 is used to estimate emissions from gasoline and diesel fired engine activities that occur off of major roadways such as construction sites, logging, and agricultural venues. MOVES2010b is used to estimate emissions from diesel and gasoline fired vehicles traveling on roadways. Each model is used in order to provide a base line estimate of the emissions. The default conditions are then modified to account for engine activities associated with the construction and operation phases of the proposed EMR expansion. In each case, the highest activity conditions for the alternatives of the proposed EMR expansion were assumed in order to estimate the presumed highest level of emissions.

Two action alternatives have been identified, Alternatives 2 and 3. In order to estimate the emissions from each activity using NONROAD2008 and MOVES2010b, the highest activity levels from each alternative were used in the modeling exercises. Therefore, the resulting emissions estimates are the greatest expected to occur. Use of the lower activity estimates from the two alternatives would result in lower emissions estimates; thus having a lower predicted impact on air quality. From a modeling perspective, the differences between Alternative 2 and 3 are negligible. Construction-related emissions were estimated using both NONROAD2008 and MOVES2010b. A summary of assumptions for these models is available in the project file.

The summary NONROAD2008 and MOVES2010b emission estimates for the existing condition (and No Action) and the action alternatives related to the construction phase are presented in Table 3B-8. The summary MOVES2010b emission estimates for the existing condition and action alternatives related to the operation phase are presented in Table 3B-9.

Table 3B-8:
Summary of NONROAD2008 and MOVES2010b Emissions Estimates for and Action Alternatives during the Construction Phase for a Weekday in July 2015

Pollutant	NONROAD2008			MOVES2010b			Total Difference (tons/day)
	Existing Condition (tons/day)	Action Alternative (tons/day)	Difference (tons/day)	Existing Condition (tons/day)	Action Alternative (tons/day)	Difference (tons/day)	
Total Hydrocarbons	4.42	4.52	0.10	4.22	4.22	0.00	0.10
CO	66.52	66.82	0.30	38.59	38.59	0.00	0.30
NO_X	4.02	4.94	0.92	18.23	18.23	0.00	0.92
SO_2	0.01	0.01	0.00	0.05	0.05	0.00	0.00
PM_{10}	0.50	0.52	0.02	0.70	0.70	0.00	0.02
CO_2	944.50	1,215.17	270.67	7,031.01	7,031.18	0.17	270.84
N_2O	Not estimated	Not estimated	--	0.09	0.09	0.00	0.00
CH_4	Not estimated	Not estimated	--	0.25	0.25	0.00	0.00

Examination of Table 3B-8 and Table 3B-9 indicates that there is a very small increment in the emissions from on-road mobile sources predicted to occur during the construction and operation phases of the action alternatives. There is a slightly larger increase in predicted emissions from off-road mobile sources (Table 3B-8, NONROAD2008) during the shorter lived construction activities.

Table 3B-9:
Summary of MOVES2010b Emissions Estimates for Existing Condition and Action Alternatives during the Operation Phase for a Weekend Day in January 2023

Pollutant	MOVES2010b		
	Existing Condition (tons/day)	Action Alternative (tons/day)	Difference (tons/day)
Total Hydrocarbons	3.906	3.908	0.002
CO	104.838	104.915	0.077
NO_X	10.937	10.939	0.002
SO_2	0.047	0.047	0.000
PM_{10}	0.406	0.046	0.000
CO_2	6,824.540	6,826.973	2.433
N_2O	0.068	0.068	0.000
CH_4	0.544	0.544	0.000

Greenhouse Gas Emissions and Carbon Dioxide

Because greenhouse gases from vehicle emissions mix readily into the global pool of greenhouse gases, it is not currently possible to accurately discern the effects of the EMR's operations under Alternatives 1, 2, or 3 from the effects of all other greenhouse gas sources worldwide, nor is it expected that attempting to do so would provide a practical or meaningful analysis of project effects. Currently, the Forest Service does not have a standard tool for measuring greenhouse gas emissions. However, the EPA has provided guidance on how to calculate GHG emissions related to mobile sources, this guidance was used to determine the impact of the anticipated increase in vehicle trips associated with EMR's operations. It is important to note that it is impossible to measure the incremental cumulative impact on global climate from emissions associated with EMR's existing and planned operations. Tables 3B-8 and 3B-9 present estimates of CO_2 emissions.

Alternative 1 – No Action

Ski Area Access

There would be no changes to the existing road network that serves skier traffic. SH 119 south of the Town of Nederland would continue to be the principal arterial route for day skiers traveling by personal vehicle or transit buses. Eldora Road (CR 130) and Shelf Road (CR 140) would continue to serve as the primary access routes between SH 119 and EMR.

Traffic

Future traffic volumes on SH 119 would be the combination of daily volume generated by the respective development alternative plus traffic growth in the SH 119 travel corridor. The No Action Alternative does not propose any development. Refer to Table 3B-4 for information about traffic volumes.

Table 3B-5 above presents an analysis of traffic at the SH 119 and Eldora Road intersection as projected for the year 2035. Converting the 10th Highest Day peak PM hour volumes from Table 3B-4 to daily volumes by this ratio suggest daily volumes on Shelf Road of 5,825 VPD for Alternative 1. Again, on an average winter day the volume would be less than half the 10th Highest Day volume. If 95 percent of the Shelf Road volume passes through the SH 119 intersection, the Eldora Road weekday volume west of SH 119 on one of the busier days of the year could reach 6,600 VPD for Alternative 1. While this volume would be in the high range for a two-lane county collector road they would not be sustained for most of the 150-day ski season. And, as most of the higher volume days fall within holiday periods, Eldora Road would experience few high traffic volume days when Nederland High School is in session.

The intersection of Eldora Road is essentially a t-intersection. There is a low-volume private driveway directly opposite Eldora Road. Similar to other street intersections with SH 119 there are no right- or left-turn deceleration or acceleration lanes along the highway. With continuing traffic growth along the highway, the predominate movement from Eldora Road—left turns onto northbound SH 119 at peak travel times would experience noticeable delays. The Eldora Road volumes on a daily basis would not

likely achieve sustained 4-hour or 8-hour approach volumes to warrant traffic signalization, nor would a traffic signal installation at this isolated location be anticipated by many highway travelers. During high traffic ski days manual traffic control by a public safety officer may be advisable during the afternoon departure period.

Parking

Alternative 1 does not propose any additional parking spaces. The total existing parking facilities (2,000 spaces) provide parking for approximately 5,222 guests based on current transportation habits, which is above the 1,696 spaces required to handle the CCC of EMR. Current travel practices indicate approximately 7 percent of guests arrive by RTD bus, 5 percent by charter bus, and roughly 88 percent by car. The RTD buses do not park for extended periods at EMR and do not require parking spaces. Charter buses require 5.6 bus parking spaces, or about 25 car parking spaces (each bus takes approximately 4.5 car spaces). Based on existing travel conditions 1,571 spaces are required for guest vehicles and 100 spaces are set aside for employee parking. On peak days employees must park at Nederland High School, 3.5 miles away, and be shuttled to EMR.

Peak parking accumulation at noon for each alternative is derived from hourly traffic counts by taking the difference between total arriving and departing vehicles for the period between 8:00am and Noon. The 10th Highest Day derived estimates are 1,780 vehicles parked at noon for Alternative 1. Accordingly, the planned parking supply would adequately meet demand for most days of the ski season under this Alternative.

Peak day skier visitation is not expected to dramatically increase, but it is expected to grow over time. As daily visitation on peak days is not anticipated to increase substantially under the No Action, the current parking supply would continue to meet demand, even on a peak day. High season conditions would continue to be accommodated by moving employee parking to Nederland High School on peak days and encouraging the use of RTD transit buses.

Air Quality

There would be no changes to the existing public road network that serves skier traffic and no changes to the parking at EMR. Additionally, because no projects would be developed there would be no construction or equipment trips beyond the existing conditions. The number of guests and personal vehicles would not grow dramatically under the No Action Alternative; however, visitation and traffic rates may increase gradually over time. Refer to Tables 3B-8 and 3B-9 (Existing Condition) for a discussion of air quality impacts of Alternative 1.

Alternative 2 – Proposed Action

Ski Area Access

There would be no changes to the existing road network that serves skier traffic. SH 119 south of the Town of Nederland would continue to be the principal arterial route for day skiers traveling by personal vehicles or transit buses. Eldora Road (CR 130) and Shelf Road (CR 140) would continue to serve as the primary access routes between SH 119 and EMR.

Traffic

Visitation

Future traffic volumes on SH 119 would be the combination of daily volume generated by the respective development alternative plus traffic growth in the SH 119 travel corridor. The planning horizon for roadway operation assessment is typically 20 years from initial substantial development. The Proposed Action projects are presumed to be substantially complete by the 2015/16 season for the purposes of this analysis. This leads to setting 2035 as the future traffic impact analysis year.

Table 3B-5 depicts 2035 10th Highest Day PM peak hour volumes on SH 119 north of the Eldora Road intersection and south of the intersection for each EMR development alternative. When compared to Alternative 1, the Proposed Action would result in approximately 155 more vehicles on the highway north of the intersection and 25 more south of the intersection. The Proposed Action does not result in 10th Highest Day volumes that would exceed CDOT's Design Capacity of 1,700 vehicles per hour for this segment of highway. On average ski days the resulting volumes would be noticeably lower and hence there would be more reserve capacity on the highway.

Alternative 2 would result in a capacity of 5,859 people per day (CCC + non-skiing guests). The projected 10th Highest Day would anticipate 4,800 day guests and 945 vehicles at the peak arrival hour (8:00–9:00 AM), and 880 total vehicles at the peak departure hour (4:00–5:00 PM).

Converting the 10th Highest Day peak PM hour volumes from Table 3B-5 to daily volumes by this ratio suggest daily volumes on Shelf Road of 7,650 VPD for Alternative 2. Again, on an average winter day the volume would be less than half the 10th Highest Day volume. If 95 percent of the Shelf Road volume passes through the SH 119 intersection, the Eldora Road weekday volume west of SH 119 on one of the busier days of the year could reach 8,350 daily vehicles for Alternative 2. While these volumes would be in the high range for a two-lane county collector road they would not be sustained for most of the 150-day ski season. And, as most of the higher volume days fall within holiday periods, Eldora Road would experience few high traffic volume days when Nederland High School is in session.

Relative to the No Action Alternative, the Proposed Action alternatives would increase typical winter day traffic on SH 119 north of Eldora Road by 11 percent in 2035. On one of the highest skier traffic days of

the season (10th Highest Day), SH 119 would continue to operate within design capacity (volume to capacity ratio of 0.89 is less than 1.0). Similarly, daily volume on Eldora Road during high skier visitation days would be about 27 percent higher for the Proposed Action than the No Action alternative. The 10th Highest Day volume for Alternative 2, 8,350 vehicles is in the upper capacity range for a two-lane county collector road. Volume during an average skier day would be about one-half the 10th Highest Day volume.

High season traffic volumes could be reduced, particularly during peak travel periods, by promoting higher vehicle occupancy and greater use of RTD's scheduled bus service, and group travel on charter and school buses.

Construction

Based on the tree removal by project component as presented in Table 3B-6, a total of 276 tree removal truck loads would be necessary for the construction of project components contained in Alternative 2. As each truck load would require 2 trips (1 trip to EMR from the processing facility and 1 trip to the facility from EMR) Alternative 2 would require approximately 552 total trips. Construction of the Placer Express chairlift would add to traffic volumes in the Town of Eldora. Construction employees commuting from Boulder could impact traffic in Nederland.

Parking

EMR's capacity (CCC + non-skiing guests) would increase to 5,859 and parking would need to accommodate the greater number of guests. The 10th Highest Day derived estimates are 2,340 vehicles parked at noon for Alternative 2. Assuming the continuation of existing commuting trends, 88 percent of guests would arrive by car, 7 percent by RTD bus, and 5 percent by charter bus. Thus, 2,062 parking spaces would be required for cars, 33 for charter buses (7.3 bus parking spaces are the equivalent of 4.5 car spaces), and 100 for employees. Employees would continue to park at Nederland High School during peak days and be shuttled to EMR to allow for greater parking capacity. The existing parking supply at the base is 2,000 spaces. Parking is considered a Connected Action in this EIS, as the location is on private lands and not subject to ARP authorization. An additional 560 spaces would be provided for a total of 2,560 spaces. Accordingly, the planned parking supply would be adequate to meet demand for most days of the ski season for Alternative 2.

Dispersed Trailhead Parking

As part of the Proposed Action, an access bridge would be constructed near the bottom terminal of the proposed Placer chairlift. The result would be a loss of some parking that is currently used for dispersed recreation at the Hessie Trailhead. While the area is busy due to recreational use, the loss of parking (approximately eight car lengths) is not substantial and would not prevent users from parking nearby. EMR would need to work with Boulder County prior to potential implementation for the appropriate access permit for this access point.

Air Quality

Tables 3B-8 and 3B-9 present emissions estimates for construction and operation of a maximum possible build alternative. From a qualitative point of view, given the small increments in estimated emissions due to proposed projects, it is expected that there would be little impact to the existing air quality in and immediately surrounding EMR. Further, given the large distances to populated centers and existing Class I areas (> ~25 kilometers) coupled with the small predicted emissions changes due to on-road and off-road mobile sources from the proposed projects, it is unlikely that the proposed projects would impact existing air quality in those areas. However, in order to truly quantify the predicted impacts to air quality (e.g., visibility, 8-hour ozone) in the domain due to incremental, predicted emissions from the proposed projects, it would be necessary to use a photochemical model (e.g., CAMx, CMAQ) though application of such models is very resource intensive. The ARP determined the preparation of this model was not warranted.

Alternative 3

Ski Area Access

There would be no changes to the existing road network that serves skier traffic. SH 119 south of the Town of Nederland would continue to be the principal arterial route for day skiers traveling by personal vehicles or transit buses. Eldora Road (CR 130) and Shelf Road (CR 140) would continue to serve as the primary access routes between SH 119 and EMR.

Traffic

Visitation

Table 3B-5 depicts 2035 10th Highest Day PM peak hour volumes on SH 119 north of the Eldora Road intersection and south of the intersection for each EMR development alternative. When compared to the No Action Alternative, Alternative 3 would result in about 80 more vehicles on the highway north of the intersection and 10 more south of the intersection, somewhat less than the Proposed Action. Alternative 3 does not result in 10th Highest Day volumes that would exceed CDOT's Design Capacity of 1,700 vehicles per hour for this segment of highway. On average ski days the resulting volumes would be noticeably lower and hence there would be more reserve capacity on the highway.

Alternative 3 results in a capacity of 5,177 people per day (CCC + non-skiing guests). The projected 10th Highest Day would anticipate 4,250 day guests and 835 vehicles at the peak arrival hour (8:00–9:00 AM), and 880 total vehicles at the peak departure hour (4:00–5:00 PM).

Converting the 10th Highest Day peak PM hour volumes from Table 3B-4 to daily volumes by this ratio suggest daily volumes on Shelf Road of 6,780 VPD for Alternative 3. Again, on an average winter day the volume would be less than half the 10th Highest Day volume. If 95 percent of the Shelf Road volume passes through the SH 119 intersection, the Eldora Road weekday volume west of SH 119 on one of the

busier days of the year could reach 7,500 VPD for Alternative 3. While these volumes would be in the high range for a two-lane county collector road they would not be sustained for most of the 150-day ski season. And, as most of the higher volume days fall within holiday periods, Eldora Road would experience few high traffic volume days when Nederland High School is in session.

Construction

Based on the tree removal by project component as presented in Table 3B-6, a total of 314 truck loads would be necessary for the construction of project components contained in Alternative 3. As each truck load would require 2 trips (1 trip to EMR from the processing facility and 1 trip to the facility from EMR) Alternative 3 would require approximately 628 trips. Construction employees commuting from Boulder could impact traffic in Nederland.

Parking

EMR's capacity (CCC + non-skiing guests) would increase to 5,177 and parking would need to accommodate the greater number of guests. The 10th Highest Day derived estimates are 2,070 vehicles parked at noon for Alternative 3. Assuming the continuation of existing commuting trends, 88 percent of guests would arrive by car, 7 percent by RTD bus, and 5 percent by charter bus. Thus, under Alternative 3, 1,822 parking spaces would be required for cars, 29 for charter buses (6.5 bus parking spaces are the equivalent of 4.5 car spaces), and 100 for employees. Employees would continue to park at Nederland High School during peak days and be shuttled to EMR to allow for greater parking capacity. The existing parking supply at the base is 2,000 spaces. An additional 560 spaces would be provided for a total of 2,560 spaces. Accordingly, the planned parking supply would be adequate to meet demand for most days of the ski season for Alternative 3.

Air Quality

Tables 3B-8 and 3B-9 present emissions estimates for construction and operation of Alternative 3. As described above, the impact to air quality from Alternative 3 is expected to be the same as detailed in Alternative 2.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the cumulative effects section apply to all alternatives, including the No Action Alternative. This section of the analysis includes a detailed description of past, present, and reasonable foreseeable future projects. The following projects are expected to cumulatively have short- and long-term effects on traffic, parking, air quality, and ski area access.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for traffic, ski area access, parking, and air quality extend until 2035, assuming project completion by the 2015/16 season.

Spatial Bounds

The spatial bounds for this cumulative effects analysis are limited to SH 119 in the vicinity of the SH 119/Eldora Road (CR 130) intersection, the SH 119/Eldora Road intersection, Eldora Road from the junction with SH 119 to Shelf Road (CR 140), and Shelf Road from Eldora Road to the EMR base area parking lot. Parking is limited to the area of existing and proposed parking related to EMR. Because of the nature of air quality, air resources were viewed in the context of the Denver Metro Area/North Front Range 8-hour ozone non-attainment area and other Class I and Non-attainment Areas. Air quality effects are directly tied to the impacts of traffic and parking, and therefore share many of the same spatial bounds to access roads and parking facilities.

Past, Present, and Reasonably Foreseeable Projects

Past, present, and reasonably foreseeable actions that affect traffic, parking and air quality resources within the analysis area are related to development of public and private lands dating back to the 1960s. These past, present, and reasonably foreseeable actions include:

- 2011 Master Plan
- Past Ski Area Projects
- Annual EMR Operating Plans
- Continued Nederland and Eldora Residential Build-out
- Lump Gulch Fuels Treatment Project
- Forsythe Fuels Reduction Project
- Nederland Water Treatment Plant Fuels Reduction Project
- Recreational Use Outside of the Ski Area

Alternative 1 – No Action

2011 Master Plan

EMR did not propose all projects in the 2011 Master Plan for site specific environmental review in the EIS. Therefore, the projects in the Master Plan that are not part of the Proposed Action and/or Alternative 3 are considered reasonably foreseeable future actions.

EMR's 2011 Master Plan includes a number of projects that could impact traffic, parking, and air quality resources within the analysis area. Construction related to chairlift additions, terrain improvements, and

guest services renovation could lead to increased levels of traffic and emissions for limited periods of time. Upgrades to ski area infrastructure such as the development of the Moose Glades pod would lead to an increase in EMR's CCC and thus visitation. These infrastructural upgrades thus could lead to increases in traffic and emissions. The CCC of the 2011 Master Plan, at full build-out, is 6,580 guests. The reasonably foreseeable future projects that would contribute to this increase include Moose Glade chairlift, Four O'Clock chairlift and the replacement of Tenderfoot I and II.

However, under the No Action Alternative, only these additional chairlift projects would be built and add to the existing condition. The existing capacity (skiers and non-skiers) for EMR is 4,463 guests.

Per Table 5-5 of the Master Plan, the aforementioned projects would add 662 (630 guests + 32 non-skiing guests) guests for a total of 5,125 guests under Alternative 1. On the 10th Highest Day, this would equate to approximately 4,200 guests. The projected 10th Highest Day volume would not exceed CDOT's Design Capacity of 1,700 vehicles per hour for this segment of highway on SH 119 north and south of the Eldora Road intersection. The additional guests and vehicles would be accommodated in the parking lot (which could be expanded, though appropriate County approvals, as it is located on private lands). These additional vehicles would have a negligible impact on air quality within the region as described under the Direct and Indirect Environmental Consequences heading above.

Past Ski Area Projects

Since EMR opened as a ski area in 1961 there have been changes to traffic quantities, parking, and regional air quality. A large fraction of traffic on County Road 130, and to a lesser extent SH 119, is a result of EMR's operations. A growing population in Boulder County has resulted in more skiers traveling to EMR. The gradual increase in visitation has also required parking expansions at EMR. As described above, given the scale of regional air quality metrics, the role of EMR's visitation and operations is negligible. Under Alternative 1, population trends would continue to result in increased traffic on access roads, but parking supplies at EMR are expected to be sufficient.

Annual EMR Operating Plans

EMR's annual winter and summer operating plans within the SUP boundary have cumulatively included a number of small construction and maintenance projects. These plans have resulted in minimal traffic impacts related to construction projects.

Continued Nederland and Eldora Residential Build-out

Continued development in the residential areas surrounding EMR could lead to increases in traffic and emissions in the analysis area. Impacts to traffic and air quality could result from construction activity as well as general increases in population in these areas. The population of these areas has been gradually growing, leading to a greater number of vehicles on the roads in the analysis area. Further development could impact traffic in the Town of Eldora, Nederland, and on Boulder Canyon Road east of Nederland.

Growth estimates are calculated into CDOTs roadway projection estimates in year 2035 as background growth.

Lump Gulch Fuels Treatment Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 1 would not measurably contribute to or change local or regional air quality.

Forsythe Fuels Reduction Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 1 would not measurably contribute to or change local or regional air quality.

Nederland Water Treatment Plant Fuels Reduction Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 1 would not measurably contribute to or change local or regional air quality.

Recreational Use Outside of the Ski Area

The NFS and private lands surrounding EMR are very popular recreation areas. The Hessie/Fourth of July Road Trailhead is particularly popular and draws many visitors, primarily in the summer months when the ski area is not operating. The popularity of this recreational area has increased and has contributed to some traffic through the Town of Eldora. The popularity of this recreation area has also stressed parking resources on CR 130. It is reasonable to expect that the popularity of this area would continue to grow and lead to some minimal increases to traffic in the analysis area.

Alternative 2 – Proposed Action

2011 Master Plan

EMR did not propose all projects in the 2011 Master Plan for site specific environmental review in the EIS. Therefore, the projects in the Master Plan that are not part of the Proposed Action and/or Alternative 3 are considered reasonably foreseeable future actions.

EMR's 2011 Master Plan includes a number of projects that could impact traffic, parking, and air quality resources within the analysis area. Construction related to chairlift additions, terrain improvements, and guest services renovation could lead to increased levels of traffic and emissions for limited periods of time. Upgrades to ski area infrastructure such as the development of the Moose Glades pod would lead to an increase in EMR's CCC and thus visitation. These infrastructural upgrades thus could lead to increases in traffic and emissions. The reasonably foreseeable future projects that would contribute to this increase include Moose Glade chairlift, Four O'Clock chairlift and the replacement of Tenderfoot I and II.

Combined with the Proposed Action, the total guests anticipated with full build-out of the 2011 Master Plan would be 6,521 guests (662+5,859). On the 10th Highest Day, this would equate to approximately

5,350 guests. This amount of guests would equate to approximately 1,085 total vehicles in the AM Peak Arrival Hour and approximately 1,010 in the PM Peak Departure Hour.

The projected 10th Highest Day volume would not exceed CDOT's Design Capacity of 1,700 vehicles per hour for this segment of highway on SH 119 north and south of the Eldora Road intersection. The additional guests and vehicles would be accommodated in the parking lot (which could be expanded, though appropriate County approvals, as it is located on private lands). These additional vehicles would have a negligible impact on air quality within the region as described under the Direct and Indirect Environmental Consequences heading above.

Past Ski Area Projects

As discussed above under Alternative 1, EMR's development has played a role in traffic levels and parking supply. Alternative 2 would result in additional traffic on access roads and would include the addition of parking spaces (on private land).

Annual EMR Operating Plans

As discussed above under Alternative 1, annual operating plans include some small construction projects which result in limited traffic impacts to access roads. Projects contained in Alternative 2 would result in some additional construction-related traffic, as discussed above.

Continued Nederland and Eldora Residential Build-out

Continued development in the residential areas surrounding EMR could lead to increases in traffic and emissions in the analysis area. Impacts to traffic and air quality could result from construction activity as well as general increases in population in these areas. The population of these areas has been gradually growing, leading to a greater number of vehicles on the roads in the analysis area. Further development could impact traffic in the Town of Eldora, Nederland, and on Boulder Canyon Road east of Nederland. Growth estimates are calculated into CDOTs roadway projection estimates in year 2035 as background growth.

Lump Gulch Fuels Treatment Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 2 would not measurably contribute to or change local or regional air quality.

Forsythe Fuels Reduction Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 2 would not measurably contribute to or change local or regional air quality.

Nederland Water Treatment Plant Fuels Reduction Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 2 would not measurably contribute to or change local or regional air quality.

Recreational Use Outside of the Ski Area

As discussed above under Alternative 1, the popularity of recreation areas surrounding EMR has resulted in some impacts to traffic and parking near the Town of Eldora and the Hessie/Fourth of July Road Trailhead. The discussion of Dispersed Trailhead Parking above under the Proposed Action states that the proposed construction access bridge across Middle Boulder Creek could impact parking for these recreation areas. With further increases in visitation to nearby recreation areas there could be a deficiency in parking resources in the area. Improved maintenance of Country Road 130 past the Town of Eldora to the proposed bridge site could draw additional users to the Hessie/Fourth of July Road Trailhead, resulting in minimal traffic impacts in the Town of Eldora.

Alternative 3

2011 Master Plan

EMR did not propose all projects in the 2011 Master Plan for site specific environmental review in the EIS. Therefore, the projects in the Master Plan that are not part of the Proposed Action and/or Alternative 3 are considered reasonably foreseeable future actions.

EMR's 2011 Master Plan includes a number of projects that could impact traffic, parking, and air quality resources within the analysis area. Construction related to chairlift additions, terrain improvements, and guest services renovation could lead to increased levels of traffic and emissions for limited periods of time. Upgrades to ski area infrastructure such as the development of the Moose Glades pod would lead to an increase in EMR's CCC and thus visitation. These infrastructural upgrades thus could lead to increases in traffic and emissions. The CCC of the 2011 Master Plan, at full build-out, is 6,580 guests. The reasonably foreseeable future projects that would contribute to this increase include Moose Glade chairlift, Four O'Clock chairlift and the replacement of Tenderfoot I and II.

Combined with Alternative 3, the total guests anticipated with full build-out of the 2011 Master Plan would be 5,839 guests (662+5,177). On the 10th Highest Day, this would equate to approximately 4,790 guests. This amount of guests would equate to approximately 960 total vehicles in the AM Peak Arrival Hour and approximately 900 in the PM Peak Departure Hour.

The projected 10th Highest Day volume would not exceed CDOT's Design Capacity of 1,700 vehicles per hour for this segment of highway on SH 119 north and south of the Eldora Road intersection. The additional guests and vehicles would be accommodated in the parking lot (which could be expanded, though appropriate County approvals, as it is located on private lands). These additional vehicles would

have a negligible impact on air quality within the region as described under the Direct and Indirect Environmental Consequences heading above.

Past Ski Area Projects

As discussed above under Alternative 1, EMR's development has played a role in traffic levels and parking supply. Alternative 3 would result in additional traffic on access roads and would include the addition of parking spaces (on private land).

Annual EMR Operating Plans

As discussed above under Alternative 1, annual operating plans include some small construction projects which result in limited traffic impacts to access roads. Projects contained in Alternative 3 would result in some additional construction-related traffic, as discussed above.

Continued Nederland and Eldora Residential Build-out

Continued development in the residential areas surrounding EMR could lead to increases in traffic and emissions in the analysis area. Impacts to traffic and air quality could result from construction activity as well as general increases in population in these areas. The population of these areas has been gradually growing, leading to a greater number of vehicles on the roads in the analysis area. Further development could impact traffic in the Town of Eldora, Nederland, and on Boulder Canyon Road east of Nederland. Growth estimates are calculated into CDOTs roadway projection estimates in year 2035 as background growth.

Lump Gulch Fuels Treatment Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 3 would not measurably contribute to or change local or regional air quality.

Forsythe Fuels Reduction Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 3 would not measurably contribute to or change local or regional air quality.

Nederland Water Treatment Plant Fuels Reduction Project

This project could involve pile burning of slash which could impact local air quality. As discussed above, Alternative 3 would not measurably contribute to or change local or regional air quality.

Recreational Use Outside of the Ski Area

As discussed above under Alternative 1, the popularity of recreation areas surrounding EMR has resulted in some impacts to traffic and parking near the Town of Eldora and the Hessie/Fourth of July Road Trailhead. Projects contained in Alternative 3 would not contribute to traffic or parking issues near the Town of Eldora and the Hessie/Fourth of July Road Trailhead.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Traffic

The alternatives would not necessitate roadway or highway widening. As traffic growth continues on SH 119 skiers and others turning left onto northbound SH 119, the predominate movement during the afternoon departure period, would experience greater and greater delays. Stationing a public safety officer to control traffic flow during the busier skier days would be a no-impact means to reduced seasonal left turn delay.

There are no other irreversible and irretrievable commitments of transportation access resources associated with this project.

Parking

There are no irreversible and irretrievable commitments of parking resources associated with any of the alternatives analyzed in this section.

Air Quality

There are no irreversible and irretrievable commitments of air quality resources associated with any of the alternatives analyzed in this section. All projects would be in compliance with local, state and federal regulations regarding air quality.

C. SCENERY RESOURCES

SCOPE OF THE ANALYSIS

This scenery resources analysis is focused on EMR's existing and proposed SUP area as visible from identified critical viewpoints. As prescribed by the Forest Service Handbook for Scenery Management, existing travelways and use areas were identified and classified in order to determine which critical viewpoints would be used in this scenery analysis. Based on the context of viewers, the duration of view, the degree of discernible detail, seasonal variations, and the number of viewers, the four critical viewpoints listed below were identified for use in this analysis.[37] The ARP recognizes that there are other vantage points from which the analysis area can be seen; however, analyzing an infinite number of vantage points is neither practical nor necessary.

Critical Viewpoints

The four critical viewpoints listed below include views from both the immediate foreground/foreground (from viewer to 0.5 mile out) and middleground viewpoints (0.5 mile to 4 miles). The location of each of these critical viewpoints is identified on Figure 6.

- *Critical Viewpoint #1 – Fourth of July Road*: This location was determined to be a critical viewpoint because viewers in this location are likely to have a high concern for scenery and will see the project area in the middleground from a primary travelway in the area. Also, this location represents a travelway containing a relatively high number of viewers. The view direction simulated from this location looks directly at the project area to best represent the change in the landscape that would be perceived by viewers in this location. The distance from the photo location to the top of Corona chairlift is approximately 1.1 miles, and the distance to the base of the Corona chairlift is approximately 0.5 mile.
- *Critical Viewpoint #2 – Hessie/Fourth of July Fork*: This location serves as the primary parking area for the Hessie Trail (although not the official trailhead for the Hessie Trail). This location was determined to be a critical viewpoint because viewers in this location are likely to have a high concern for scenery and will see the project area in the middleground from a primary use area. Finally, this location contains the highest number of viewers in the area because it is the primary parking area for trails along Hessie Road and users of the Fourth of July Road will also have to pass through this location. The view direction simulated from this location looks directly at the project area to best represent the change in the landscape that would be perceived by viewers in this location. The distance from the photo location to the top of Corona chairlift is approximately 1 mile, the distance to the base of Corona chairlift is approximately 0.3 mile, and the distance to the base of Indian Peaks chairlift is approximately 0.4 mile.

[37] USDA Forest Service, 1995

- *Critical Viewpoint #3 – Eldorado Avenue/CR 130*: This location was determined to be a critical viewpoint because viewers in this location are likely to have a high concern for scenery and will see the project area in the middleground from a primary travelway in the area. The view from this location represents a travelway containing a relatively high number of viewers as most visitors entering the area are expected to pass through this location. The view from this location has an important viewing context in that is it the first view of the project area that visitors will see when they enter the area. The view direction simulated from this location looks directly at the project area to best represent the change in the landscape that would be perceived by viewers in this location. The distance from the photo location to the top of Corona chairlift is approximately 1.2 miles, the distance to the base of Corona chairlift is approximately 0.6 mile, and the distance to the base of Indian Peaks chairlift is approximately 0.3 mile.
- *Critical Viewpoint #4 – Proposed Bridge Location*: This location was determined to be a critical viewpoint because viewers in this location would see changes to the scenic environment in the immediate foreground of Eldorado Avenue/CR 130. Although the duration of view would be relatively short, changes in the scenic environment would occur in the immediate foreground, increasing the importance of this view. Three view directions of the proposed bridge have been simulated with a 3D perspective: a ground view from Eldorado Avenue and two bird's eye views. The ground view perspective is taken from the southern edge of Eldorado Avenue, at the junction of Eldorado Avenue and the proposed road spur. The bird's eye perspectives look directly at the proposed bridge and terminal sites (from approximately the proposed P-3 trail and an elevated view from across Eldorado Avenue) to best represent the changes at this site. These perspectives are presented in Figure 10.

MANAGEMENT OF THE SCENIC ENVIRONMENT ON NATIONAL FOREST SYSTEM LANDS

The Scenery Management System (SMS) was adopted in 1995 as the primary scenery management direction by the Forest Service. In 2006, the ARP Forest Plan was amended to replace the Visual Management System (VMS) with the SMS. In brief, the SMS is a systematic approach for assessing scenic resources in a project area and then using the assessment findings to help make management decisions on the project.

Scenic Integrity Objectives

The ARP Forest Plan, as amended, establishes acceptable limits of change for Scenic Resources.[38] The acceptable limits of change in a particular area (e.g., Management Area, as defined in the Forest Plan) are the documented Scenic Integrity Objectives (SIO), which serve as management goals for scenic

[38] USDA Forest Service, 1997a

resources. SIOs provide a measure of visible disruption of landscape character, ranging from "*Very High*" to "*Unacceptably Low.*" In order of least-to-most altered, SIOs are:

- **Very High** (unaltered)
- **High** (appears unaltered)
- **Moderate** (slightly altered)
- **Low** (moderately altered)
- **Very Low** (heavily altered)
- **Unacceptably Low** (extremely altered)

For reference, *Very High* SIOs are typically found in designated wilderness areas and special interest areas. While there is no standard for SIOs in relation to ski area SUP areas on NFS lands, in most cases, they fall somewhere between *Very Low* and *Moderate*. This is in recognition of the developed nature of ski areas, which tend to operate in scenic environments (i.e., assigning an artificially high SIO at a developed ski area would be unachievable, just as assigning an artificially low SIO would not incentivize the ski area to strive to minimize visual impacts).

As indicated in the 1997 Forest Plan, as amended, the majority of EMR's SUP area is designated as *Low.* Through this DEIS analysis process, the Forest Service identified mapping errors in two areas of the southern part of the SUP area: 1) near the existing Jolly Jug Glades, and 2) just south of the existing Lookout facility. The 1997 Forest Plan, as amended, erroneously designated these two areas within the existing SUP boundary as Management Area 1.3 – Backcountry Recreation with a SIO of *High* (refer to Figure 6 for the corrected SIO mapping). The ARP has determined this was a mapping error and all of the NFS lands within the existing SUP boundary should be designated as *Low*; therefore, this correction has been made to the mapping for this EIS process.[39] The following are descriptions of SIOs relevant to the project area.

The *Low* SIO is defined as:[40]

> *The valued landscape character "appears moderately altered." Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings, changes in vegetation types, or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed, but they should be compatible or complementary to the character within.*

[39] The Forest Plan mapping changes are included in the Forest Plan project file.
[40] USDA Forest Service, 1995

The *Moderate* SIO is defined as:[41]

> *The valued landscape character "appears slightly altered." Noticeable deviations must remain visually subordinate to the landscape character being viewed.*

The *High* SIO is defined as:[42]

> *The valued landscape character "appears" intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.*

Scenery Management System Distance Zones

Viewing distance is important in determining how change is perceived across a landscape. Distance zones are divisions of a particular landscape being viewed, and are used to describe the part of a characteristic landscape that is being inventoried or evaluated.

- *Immediate Foreground*: This zone begins at the viewer and extends to about 300 feet. Individual leaves, flowers, twigs, bark texture, and other details dominate this view.
- *Foreground*: This zone is usually limited to areas within 300 feet to 0.5 mile (not to exceed 0.5 mile) of the observer, but it must be determined on a case-by-case basis, as should any distance zoning. Generally, detail of landforms is more pronounced when viewed from within the foreground zone.
- *Middleground*: Alterations in the middleground (0.5 to 4 miles from the observer) are less distinctive. Texture is normally characterized by the masses of trees in stands or uniform tree cover.
- *Background*: This zone extends from middleground (minimum of 4 miles between the observer and the area being viewed) to infinity. Shape may remain evident beyond 10 miles, especially if it is inconsistent with other landscape forms. Beyond 10 miles, alteration in landscape character becomes obscure.

While EMR's SUP area is visible in the foreground, middleground, and background zones (depending on the viewpoint), the four identified critical viewpoints utilized in this analysis are within the *immediate foreground* and *middleground* distance zones.

Forest Plan Direction

In addition to the SMS, the 1997 Forest Plan, as amended, contains forest-wide standards and guidelines which apply to resources across the ARP.[43] The 1997 Forest Plan contains one forest-wide standard and two guidelines for scenery management that are applicable to this project:[44]

[41] Ibid.
[42] Ibid.

Standards

- 154. Prohibit management activities that are inconsistent with the scenic integrity objective unless a decision is made to change the scenic integrity objective. A decision to change the scenic integrity objective will be documented in a project-level NEPA decision document.

Guidelines

- 157. Design and implement management activities to meet the adopted scenic integrity objective for the area as shown on the SIO map enclosed with [the Forest Plan].
- 158. Rehabilitate all existing facilities and areas that do not meet the scenic-condition objectives specified for each management area. Set priorities for rehabilitation considering the following: a) relative importance of the area and the amount of deviation from the scenic-condition objectives; "foreground" of high public-use areas has highest priority; b) length of time it will take natural processes to reduce the visual impacts so that they meet the scenic condition objective; c) length of time it will take rehabilitation measures to meet the scenic condition objectives; d) benefits to other resource-management objectives to accomplish rehabilitation.

One Management Area 8.22 guideline is applicable to this project and the scenery resource:

- Retain vegetation for screening around structures where vegetation recovery will be slow.

Desired Conditions

Furthermore, the following information on the desired condition for scenic values is contained in Management Area 8.22:[45]

> ***Physical/Biological***
>
> *Maintain or improve vegetation composition and structure to provide a pleasing appearance, maintain views from the site and provide for sustainable vegetation cover… Arrangement of vegetation and featured species complement the area's appearance, provide for user safety, and minimize maintenance costs.*
>
> *Manage scenic resources so that the character is one of forested areas interspersed with openings of varying widths and shapes…*
>
> ***Social***
>
> *Design new human modifications to vegetation to resemble natural patterns or patterns typical of the particular area. Other ecological changes may affect the appearance…*

[43] A *standard* is a course of action which must be followed; adherence is mandatory. A *guideline* is a preferred course of action designed to achieve a goal, respond to variable site conditions, or respond to an overall condition.
[44] USDA Forest Service, 1997a
[45] Ibid.

Recreational opportunities are primarily at the developed level. The base area is often an urban setting. Views and vistas outside the area, but visible from the within, may be featured. Wildlife-viewing opportunities may be available.

Evidence of past human activities or habitation due to mining, milling or grazing may be present. Blend existing improvement such as improved roads, primitive roads, trails, bridges, fences, shelters, signs or water diversions into the landscape where feasible or remove them if no longer needed. Design new improvements to be minimally intrusive into the landscape.

Administrative

Facilities provided on site vary from rustic to highly developed, depending on the individual site…

Improve areas to restore the desired appearance. Improvements are owned by permittee. Master plans for special-use permits ensure that facilities harmonize and blend with the natural setting. Travelways constructed and maintained under terms of the permit will meet Forest Service standards…

The Built Environment Image Guide

The Built Environment Image Guide (BEIG) was prepared by the Forest Service for the "thoughtful design and management" of the built environment contained within the National Forests.[46] The Forest Service defines the built environment as "the administrative and recreation buildings, landscape structures, site furnishings, structures on roads and trails, and signs installed or operated by the Forest Service, its cooperators, and permittees.[47] The BEIG divides the United States into eight provinces which combine common elements from the ecological and cultural contexts over large geographical areas; EMR and adjacent NFS lands are within the Rocky Mountain Province. Site development, sustainability, and architectural character should conform to BEIG guidelines described for this Province.

AFFECTED ENVIRONMENT

EMR is located partially on private land and partially on NFS lands, in Boulder and Gilpin Counties, Colorado. EMR offers views of the surrounding Colorado Continental Divide landscapes. The landscape surrounding EMR contains a mix of upper montane, subalpine, and alpine plant communities consisting of aspen, Douglas-fir, limber pine, lodgepole pine, Engelmann spruce, subalpine fir, krummholz, grass, tundra, and rock outcrops.[48] At EMR, and in the surrounding landscape, there is historic evidence of mining and logging activities. Beginning with the Gold Rush in the mid-1800s, active mining continued

[46] USDA Forest Service, 2001
[47] Ibid.
[48] USDA Forest Service, 1997a

well into the 1950s in a series of boom and bust cycles. In addition to human caused disturbance, evidence of previous wildfire was detected in all the stands inventoried during field reconnaissance.[49]

As indicated in the 1997 Forest Plan, EMR's SUP area is designated as *Low (the two areas shown within the SUP boundary as designated as High were determined to be mapping errors, and were corrected for this EIS process).* EMR's existing ski trails are the major contributing factor to the *Low* SIO (moderately altered) classification for the developed portions of the SUP area. EMR's existing chairlift and trail network, all related infrastructure, maintenance and guest operation buildings are currently consistent with the 1997 Forest Plan SIO designation (*Low*) for the SUP area, as well as forest-wide and Management Area 8.22 standards and guidelines for scenery management. As depicted on Figure 11, SIOs surrounding the existing SUP area where the SUP boundary adjustments are proposed include *High, Moderate and Low* to the south and *Low* and *Moderate* to the north.

Scenic Characteristics of the SUP Area

The ski area is one forest habitat type known as subalpine fir (*Abies bifolia*)-Engelmann spruce (*Picea engelmannii*)-grouse whortleberry (*Vaccinium scoparum*). Many stands are a mix of tree species including, mature lodgepole pine (*Pinus contorta* subsp. *Latifolia*); mature Engelmann spruce-subalpine fir (*Picea engelmanni-Abies bifolia*) with patches of aspen (*Populus tremuloides*) and limber pine (*Pinus flexilis*) and very incidental Douglas-fir (*Psuedotsuga menziesii*).

Lodgepole pine/spruce/fir mix is the most extensive vegetation type occurring at EMR, occupying approximately 371 acres. The spruce/fir forest community is the second most extensive forest type at the ski area occupying 135 acres. Understory are generally composed of grass, forb, and shrub species associated with these forest types, including species such as elk sedge (*Carex geyeri*), strawberry (*Fragaria virginiana*), common juniper (*Juniperus communis*), Oregon grape (*Mahonia repens*), kinnikinnick (*Arctostaphylos adenotricha*), heart-leaf arnica (*Arnica cordifolia*), russet buffalo berry (*Sheperdia canadensis*) and whortleberry (*Vaccinium* spp.). Other vegetation types at EMR include: widely scattered spruce/fir; spruce/fir/limber pine mix; limber pine; mixed pine; mixed species; and willow/wetlands. Non-forest vegetation is dominated by formally developed ski terrain. The maintenance of developed ski terrain basically retards forest and large shrub regeneration and is typically dominated by non-native grasses.

Colors within the EMR SUP area are predominantly mottled shades of dark green—created by the vegetation cover described above—along with lighter shades of green, tan and grey, creating a medium mottled texture on the landscape. This mottled texture is interspersed with smoother, less textured areas of light green where traditional ski trails have been cleared from the vegetation cover. Landforms include

[49] Eldora Mountain Resort, 2013

glacially scoured U-shaped valleys, rounded forested peaks, gullies, meltwater channels cut into the bedrock and numerous rock outcroppings.

Currently, trails, chairlifts and facilities are visible in the fore- and middleground throughout the SUP area. The chairlift terminals and towers are colored to maximize blending with the surrounding summer landscape. Existing gladed areas appear mostly natural. The Lookout facility is an older facility, and although it is well-sited and screened by trees, the architectural theme of the Indian Peaks Lodge is preferred. EMR's SUP area is visible to the general public from the Shelf Road (after arriving at Peterson Lake), from portions of Eldorado Avenue/CR 130 and from some locations in the dispersed recreation areas north of EMR. Limited background views of EMR are also seen from Colorado Highway 119 (Peak to Peak National Scenic Byway) at the switchback near the intersection with Peakview road. The SUP area is also visible from within EMR; however, guests at the resort expect to see ski area infrastructure. A portion of the EMR SUP area is visible from the Town of Eldora (Eldorado Avenue and 6th Street). The EMR SUP area is not visible from the Nederland High School or the core of the Town of Nederland. The SUP area has limited visibility from the south (i.e., Rollins Pass Road, NFS and private lands) as the SUP area and EMR trails, infrastructure and facilities primarily lie on the north side of the ridgeline.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No changes or modifications would be approved that would affect the scenic quality of the SUP area.

Compliance with Forest Plan Direction for Scenery Management

As discussed under Affected Environment, EMR's traditional, below treeline trails are the major contributing factor to the *Low* SIO (moderately altered) classification for the developed portions of the SUP area. EMR's existing chairlift and trail network, all related infrastructure, maintenance and guest operation buildings would continue to meet the 1997 Forest Plan SIO designation (*Low*) for the SUP area, as well as forest-wide and Management Area 8.22 standards and guidelines for scenery management. No changes or modifications would be approved that would change these existing conditions.

Critical Viewpoints

The existing condition as viewed from each of the critical viewpoints is portrayed in Figures 7, 8, 9 and 10. No changes or modifications would be approved that would change these existing conditions. These critical viewpoints are intended to serve as the baseline for which to compare the effects of implementation of Alternatives 2 and 3.

Critical Viewpoint #1 – Fourth of July Road (Figure 7)

Currently visible ski area development from this viewpoint, from east to west or left to right on the photo, include: the very bottom of *Lower Diamondback* trail on private lands, a very small segment of *Corona*

Road trail, *Muleshoe* trail, *Corona* trail, Corona chairlift, *Cascade* trail, and *West Ridge* trail. *Muleshoe* and *Corona* trails are the most distinctive ski area features from this viewpoint.

Critical Viewpoint #2 – Hessie/Fourth of July Fork (Figure 8)

Due to the lower elevation of this viewpoint, only Corona chairlift and trail and *West Ridge* trail are visible from this viewpoint. The top and bottom terminal of the Corona chairlift are not visible from this viewpoint.

Critical Viewpoint #3 – Eldorado Avenue/CR 130 (Figure 9)

Four components of the existing ski area are currently visible from this viewpoint: Indian Peaks chairlift, *Lower Ambush* trail, Corona chairlift and trail, and *West Ridge* trail.

Critical Viewpoint #4 – Proposed Bridge Location (Figure 10)

From this location along Eldorado Avenue/CR 130, the existing ski area is not visible. The existing roadway is visible, although with a view into a forested area.

Areas South of EMR's SUP Area

No changes or modifications would be approved that would change the existing conditions as viewed from the south of EMR's SUP area. No changes would be experienced from Rollins Pass Road, NFS or private lands.

Jenny Creek Trail Easement

The No Action Alternative does not specifically include a PDC to pursue an easement for the Jenny Creek Trail located on private lands. The scenic integrity of the Jenny Creek Trail would remain unchanged on private lands; however, private land owners do have the ability to clear vegetation in the future that could affect the existing condition of the Jenny Creek Trail.

Forest Plan Amendment

The 1997 Forest Plan would not be amended with implementation of Alternative 1. The SIO designations within and adjacent to the existing SUP area would be unchanged.

Alternative 2 – Proposed Action

Compliance with Forest Plan Direction for Scenery Management

As a component of Alternative 2, a Forest Plan amendment is proposed to change the Forest Plan management area allocations for areas of the SUP boundary adjustments. Through this process, the SIOs within the existing and adjusted SUP boundary would be amended to *Low* to correspond with Management Area 8.22 – Ski-Based Resorts (refer to Figure 11 for locations of the existing and proposed SUP boundary, Management Areas and SIOs).

EMR's existing and proposed ski trails would be the major contributing factor to the *Low* SIO (moderately altered) classification for the developed portions of the SUP area. With the Forest Plan amendment, EMR's existing and proposed chairlift and trail network, all related infrastructure, maintenance and guest operation buildings would meet the SIO designation of *Low* throughout the existing and proposed SUP area, as well as forest-wide and Management Area 8.22 standards and guidelines for scenery management. Specifically, the Proposed Action would be consistent with Standard 154 and Guideline 157. The existing and proposed condition meets Guideline 158. To the extent practicable, structures and vegetation surrounding structures will be designed to meet the Management Area 8.22 guideline, understanding that the structures accommodate skiing activities and defensible space.

In addition, all proposed infrastructure and facilities under the Proposed Action would comply with the BEIG and reflectivity guidelines (discussed above) and imitate landscape character with natural appearing materials and colors to minimize impacts to the scenery. Project components are analyzed below.

Ski area parking located on private lands would be expanded to accommodate additional visitation associated with the Proposed Action. The creation of this parking would require site disturbance and cut/fill banks along the existing North Lot. This project would add to the developed character of the base area and the entrance to the ski area.

Analysis of Chairlifts

Chairlift terminal locations were planned to minimize the amount of ground disturbance necessary for construction. This criteria minimizes the amount of impact and by utilizing existing topography, scenery impacts are also minimized. The chairlift terminals (six-person chairlifts) would be approximately 28 feet wide, 60 feet long and 20 to 24 feet tall. The proposed chairlift terminals and towers would be colored to maximize blending with the surrounding summer landscape. Construction of the chairlift would require a corridor of variable width (average 60 feet) to be created through the forest canopy. To provide a variable width, additional tree removal would occur, although, balancing the aesthetic impact with wildlife habitat is an important consideration. PDC for the lift-line would minimize the negative scenic effect of a straight corridor by creating larger openings in key locations, to better visually blend into the surrounding landscape as viewed in winter. Installation of the chairlift towers would require excavation for foundations.

Jolly Jug Chairlift

The proposed Jolly Jug chairlift would be a six-person chairlift and would not be visible from viewpoints to the north. The Jolly Jug chairlift and associated trails would drive the Forest Plan amendment and the associated SIO change (refer to Figure 11). The chairlift would be visible from certain viewpoints to the south; however, those viewpoints were not determined to be critical. The top terminal location would be near the existing top terminals of the Cannonball and Challenge chairlifts. The bottom terminal would be

near the Jenny Creek Trail on private lands, but it would be outside the Nordic Center trail network. A new road would need to be constructed to the bottom terminal location, creating isolated scenery impacts.

Placer Chairlift

The Placer chairlift and associated trails would drive the Forest Plan amendment and the associated SIO change (refer to Figure 11).The proposed Placer chairlift would necessitate the construction of a new road, using an existing bench, to the top terminal location. This would create an isolated visual impact visible only within the ski area. The remainder of the scenery impacts associated with this project are disclosed below under the Critical Viewpoints heading.

Corona Chairlift

The upgrade of the Corona chairlift to a six-person chairlift would have a minimal effect to the scenic resource. The chairlift would be replaced in the existing alignment. The terminals would increase in size and widening the existing lift-line would be minimal as it primarily is located within *Corona* trail. The top terminal, though located near the ridgeline, would not be visible from the south.

Challenge Chairlift

The top terminal of the proposed Challenge chairlift would be built with an enclosed structure that surrounds the terminal. This would protect the chairlift unload from the wind. The top terminal chairlift structure would be designed with an architectural theme that would be consistent with the BEIG. The re-aligned lift-line would necessitate the removal of overstory vegetation, primarily on private lands, but the change would be nearly indistinguishable from the EMR base area, given the existing condition. The bottom terminal would be located in the existing parking area and would not substantially change with current visual condition.

Analysis of On-Mountain Guest Service Facilities

Challenge Mountain Facility

The proposed Challenge Mountain Facility located between *Muleshoe* and *Wayback* trails would be two stories in height, approximately 16,000 to 20,000 square feet with a footprint of approximately 100 by 100 feet. The structure would have a similar architectural design as the Indian Peaks Lodge in the base area. The building would be built of natural materials to blend with the surrounding landscape. Final design of the facility would be reviewed and approved by the Forest Landscape Architect to ensure consistency with Forest Plan guidelines. Upon site review prior to project implementation, the restroom facility building would comply with BEIG guidelines and ADA and ABA regulations.

Lookout Facility

The existing Lookout facility would be renovated, increasing its size from approximately 3,000 square feet to between 7,700 and 9,700 square feet. The footprint would be approximately 70 by 120 feet. The structure would have a similar architectural design as the Indian Peaks Lodge in the base area. The building would be built of natural materials to blend with the surrounding landscape. Final design of the

facility would be reviewed and approved by the Forest Landscape Architect to ensure consistency with Forest Plan guidelines. Upon site review prior to project implementation, the restroom facility building would comply with BEIG guidelines and ADA and ABA regulations.

Analysis of Trail Development

The Proposed Action includes the construction of 15 new ski trails (totaling approximately 58 acres), the creation of approximately 57 acres of new tree and gladed skiing areas and modifications to 43 acres of existing tree and gladed skiing across five areas. All ski trails included in the Proposed Action would be considered a “clear-cut” with no regeneration efforts. A PDC that applies to tree and gladed terrain, includes: Minimize overstory vegetation removal during construction of tree and gladed skiing areas. Vegetation removal should not occur beyond analyzed ski trail widths. The majority of trails would not be graded, so revegetation/soil stabilization efforts would be expected to have a high success rate. Cleared areas would be revegetated with a native grass mix. Trail edges would be feathered or scalloped to provide a variable line, thereby minimizing linear cuts in overstory vegetation. Trails have been designed with consideration for the aesthetic resource. Larger inter-trail tree islands would be maintained to minimize the impact of cleared trails.

To help maintain snow coverage, winch cat anchors are proposed in designated locations. These winch cat anchors would not be visible to the casual observer from within and outside the ski area. During the snowmaking season, lights attached to snowmaking guns would be visible from beyond the ski area, but the lighting would only occur when snowmaking operations occur. Night-time grooming operations would also produce lighting that could be observed from viewpoints beyond the ski area. Lighting could be visible during night-time hours from CR 130 immediately adjacent to the proposed SUP boundary near Middle Boulder Creek.

Analysis of Road Construction

The development of the Proposed Action would necessitate construction of new roads and road segments to access chairlift terminals and the Challenge Mountain Facility. All roads would be dirt/gravel surfaced. Proposed roads would utilize natural benches to the greatest extent practicable, reducing the visual impact. The proposed bridge is discussed below.

Analysis of Utilities

Utility lines would be buried, reducing the long-term scenery impact. Lines would be buried in existing and proposed roads and ski trails. Proposed snowmaking lines would not be buried, but they would be above-ground similar to existing snowmaking lines.

Analysis of Vegetation Management Projects

As described in Chapter 2, management prescriptions have been developed for the ski area to maintain and/or improve forest health within the SUP area and adjacent private lands. The prescriptions primarily reflect ski area activities and in most instances propose implementation guidance for ski area projects. P6

and P7 include the removal of dead and dying trees. The amount of overstory vegetation removal for the vegetation management projects is anticipated to create an indistinguishable impact to scenery resources. Furthermore, the vegetation management projects would be consistent with the SIO designation of *Low*.

Critical Viewpoints

A series of summer photographs were simulated to provide comparative analysis of "before" and "after" photo representations. Refer to Figures 7, 8, 9, and 10 for a depiction of the Proposed Action's effects to the visual resources and photo simulations during the summer months. These representations show the use of two PDCs identified to minimize impacts to scenery from vegetation removal and ground disturbance:

- Avoid straight edges where removing trees. Where the vegetation is removed use a variable density cutting (feathering) technique applied to create a more natural edge that blends into the existing vegetation; and
- All disturbed areas shall be revegetated after the site has been satisfactorily prepared. Seeding would be repeated until satisfactory revegetation is accomplished. Reseed with a native seed mixture using a variety of native seed grasses, wildflowers and forbs.

Critical Viewpoint #1 – Fourth of July Road (Figure 7)

The expected visual change in the middleground distance zone from Critical Viewpoint #1 is depicted in Figure 7. Currently visible ski area development from this viewpoint, from east to west or left to right on the photo, include: the very bottom of *Lower Diamondback* trail on private lands, a very small segment of *Corona Road* trail, *Muleshoe* trail, *Corona* trail, Corona chairlift, *Cascade* trail, and *West Ridge* trail. *Muleshoe* and *Corona* trails are the most distinctive ski area features from this viewpoint. Proposed projects that would vary in levels of visibility, from east to west or left to right on the photo simulation, include:

- Skier's right trail widening on *Lower Diamondback* (indiscernible);
- Placer chairlift top terminal and towers (slightly discernible at a distance of approximately 3,800 to 4,500 feet);
- Trails P-4 and P-3 (new trail clearing would be visible but would blend with the surroundings due to adjacent vegetation);
- Placer Glades (tree thinning would blend with the existing tree island);
- Placer Glades II (tree thinning would blend with the existing condition);
- Junction of trails C-3 and P-5 at Corona Road (would be slightly visible);
- P-6 (visible);
- Lower trail C-1 (indiscernible);

- Upper trail C-3 blends with Placer Glades (indiscernible);
- Upper portion of trail C-2 (visible as a new trail);
- Trail widening on skier's left near the confluence of Muleshoe and Corona trails (indiscernible); and
- Bryan Glades II and Salto Glades (indiscernible as the tree thinning should blend with the existing tree islands).

Trail P-6 would be most apparent from this viewpoint as it is directly in-line with the viewer at a distance of approximately 1,500 to 1,800 feet. Placer Glades II would be visible, as would trails P-3, P-4 and P-5; although trails P-3, P-4 and P-5 are facing more northeasterly. Therefore, trails P-3, P-4 and P-5 would better blend with the existing condition from this viewpoint. With the proposed Forest Plan amendment for the lower section of this terrain and implementation of project PDCs, the area would be consistent with the SIO of *Low*.

Critical Viewpoint #2 – Hessie/Fourth of July Fork (Figure 8)

The expected visual change in the middleground distance zone from Critical Viewpoint #2 is depicted in Figure 8. Due to the lower elevation of this viewpoint, only Corona chairlift and trail and *West Ridge* trail are visible from this viewpoint. The top and bottom terminal of the Corona chairlift are not visible from this viewpoint. Proposed projects that would vary in levels of visibility, from east to west or left to right on the photo simulation, include:

- Placer chairlift top terminal and several lift towers along the upper portion of the lift-line (slightly visible at a distance of approximately 3,400 feet);
- Trail C-2 (skiers left side of the new trail would be visible in the location where it is adjacent to Bryan Glades II);
- Lower portion of trail P-6 (distinguishable through the existing vegetation as the trail begins to parallel Middle Boulder Creek);
- Placer Glades (tree thinning would blend with the existing tree island); and[50]
- Corona chairlift (visible from this viewpoint, but the upgrade from a four-person chairlift to a six-person chairlift would not be distinguishable).

Existing ski trails and minimal glading are currently visible from this location, so an incremental visual change would be experienced from this critical viewpoint. With the proposed Forest Plan amendment for

[50] The maximum amount of tree thinning (i.e., groomable glades) is simulated in Figure 8 to depict the maximum amount of change that may be perceived.

the lower section of this terrain and implementation of project PDCs, the area would be consistent with the SIO of *Low*.

Critical Viewpoint #3 – Eldorado Avenue/CR 130 (Figure 9)

The expected visual change in the middleground distance zone from Critical Viewpoint #3 is depicted in Figure 9. Four components of the existing ski area are currently visible from this viewpoint: Indian Peaks chairlift, *Lower Ambush* trail, Corona chairlift and trail, and *West Ridge* trail. Proposed projects that would vary in levels of visibility, from east to west or left to right on the photo simulation, include:

- Placer chairlift top terminal, as well as several of the lift towers (top terminal visible at a distance of approximately 3,600 feet and a lift tower visible at a distance of approximately 1,500 feet);
- Upper segment of trail P-3 and a segment of P-3 below Around the Horn and Corona Road trail (visible);
- Trail P-4 (partially visible near the confluence with the proposed Placer lift-line).
- Placer Glades (tree thinning would blend with the existing tree island);
- Trail C-3 (visible as a new trail);
- Trail P-5 (visible above the existing SUP boundary);
- Corona chairlift (visible from this viewpoint, but the upgrade from a four-person chairlift to a six-person chairlift would not be distinguishable); and
- Salto Glades (tree thinning would blend with the existing tree island).

Combined with the existing condition, an incremental visual change would be experienced from this critical viewpoint. With the proposed Forest Plan amendment for the lower section of this terrain and implementation of project PDCs, the area would be consistent with the SIO of *Low*.

Critical Viewpoint #4 – Proposed Bridge Location (Figure 10)

From this location along Eldorado Avenue/CR 130, the existing ski area is not visible. The expected visual change at the proposed bridge and bottom terminal location would occur in the immediate foreground and has therefore been simulated using perspective renderings to most accurately demonstrate the changes that would occur in this area.[51] The proposed bridge, as well as the road spur leading to the bridge from Eldorado Avenue/CR 130, would be visible in the immediate foreground from this location. Tree clearing for ski trails and the bottom terminal of the proposed Placer chairlift and some lift towers/lines of the proposed Placer chairlift would be visible from this location. As these proposed project

[51] The perspective taken from ground level at Critical Viewpoint #4 looks approximately southwest from the middle of Eldorado Avenue towards the site of the proposed bridge and road spur. The Ground View perspective is taken from a location approximately on the edge of Eldorado Avenue at the far right of the existing condition photo, at the fork between Eldorado Avenue and the proposed road spur.

elements would be visible in the foreground/immediate foreground distance zone where there is currently little visual disruption, visual change in this area is expected to be substantial. However, the duration of view experienced by dispersed recreationalists and others traveling along Eldorado Avenue/CR 130 at this location is expected to be relatively short (i.e., most forest users are expected to travel through, rather than linger, in this area). Furthermore, with the exception of the access road clearing, the existing overstory and understory vegetative screen would remain on the north and south side of Middle Boulder Creek. The access road would be gravel/crushed rock surface with the anticipation that a two-track access would establish overtime. With implementation of project PDCs, the area would remain in compliance with the SIO of *Low*. The north side of the proposed bridge and access road to the Placer chairlift would be located beyond the proposed SUP boundary, where the SIO is not officially designated. Due to the limited nature of disturbance (short road spur and bridge that meets BEIG) the deviation due to the project would be noticeable for a short duration while traveling on CR 130, and the deviation would be visually subordinate to the overall landscape character.

Areas South of EMR's SUP

Although no critical viewpoint was identified in this area, the proposed Jolly Jug chairlift and trails would extend south of the current developed trail network under the Proposed Action and increase the visibility of the SUP area from areas south of the ski area (Rollins Pass Road, NFS and private lands).[52] Portions of the Jolly Jug chairlift and trails are expected to be visible from limited areas of Rollins Pass Road, NFS and private lands; however, visual change in this area is not expected to be substantial. With implementation of project PDC, the area would remain in compliance with the SIO of *Low*.

Jolly Jug trail development in the Proposed Action would change the visual character of the Jenny Creek Trail as it crosses through the proposed project area. All impacts to Jenny Creek Trail would occur on private lands. The Jenny Creek Trail would cross and parallel the chairlift construction access road, cross four proposed ski trails (JJ-1, JJ-2, JJ-3 and JJ-4), and would cross the Jolly Jug chairlift line and clearing. The impact to the scenic resource would be brief as hikers and/or winter users would cross these trails in a matter of minutes before exiting the operational boundary into relatively undisturbed segments of the trail.

Jenny Creek Trail Easement

The pursuit of an easement for Jenny Creek Trail within the current trail location would not affect scenery resource on private lands and the easement likely would not include a SIO direction.

[52] Based on the context of viewers, the duration of view, the degree of discernible detail, seasonal variations, and the number of viewers, no critical viewpoint was identified for use in this analysis south of the existing EMR SUP.

Forest Plan Amendment

The proposed Forest Plan amendment would change the land management allocations within the proposed SUP boundary area to Management Area 8.22. In conjunction with the management area change, the SIO designation would also be changed to a SIO designation of *Low*. With the Proposed Action Forest Plan amendment, on the ARP:

- 11 acres would be removed from the *High* SIO designation;
- 10 acres would be removed from the *Moderate* SIO designation;
- 32 acres of lands that are not officially designated in the Forest Plan would be added to the *Low* SIO designation (within and outside of the existing SUP boundary, refer to Figure 11), and
- Total, 53 acres would be added to the *Low* SIO designation.

The Forest Plan amendment would allow for a greater level of scenery impact to occur compared to the existing condition, both due to the Proposed Action and to reasonably foreseeable future actions (refer to Cumulative Effects below). The majority of the SIO change would occur in the area of the Placer chairlift and trails project from designating lands as 8.22 that are currently not officially designated in the Forest Plan. The Forest Plan amendment to accommodate the Management Area change for the Jolly Jug chairlift and trails project would result in 11 acres changing from a SIO designation of *High* to *Low*. Forest Plan standards and guidelines would apply to Management Area 8.22 within the SUP boundary adjustment areas.

Alternative 3

Compliance with Forest Plan Direction for Scenery Management

As a component of Alternative 3, a Forest Plan amendment is proposed to assign and change the Forest Plan management area allocations for areas of the proposed SUP boundary adjustment in the Jolly Jug area. In addition, areas within the existing SUP area that are currently undesignated would be assigned Management Area 8.22 – Ski-Based Resorts. Through this process the SIO within the adjusted SUP boundary would be amended to *Low* to correspond with Management Area 8.22 – Ski-Based Resorts (refer to Figure 11 for locations of the existing and proposed SUP boundary, Management Areas and SIOs).

EMR's existing and proposed ski trails would be the major contributing factor to the *Low* SIO (moderately altered) classification for the developed portions of the SUP area. With the Forest Plan amendment, EMR's existing and proposed chairlift and trail network, all related infrastructure, maintenance and guest operation buildings would meet the SIO designation of *Low* throughout the existing and proposed SUP area, as well as forest-wide and Management Area 8.22 standards and guidelines for scenery management. Specifically, the Alternative 3 would be consistent with Standard 154 and Guideline 157. The existing and proposed condition meets Guideline 158. To the extent practicable,

structures and vegetation surrounding structures will be designed to meet the Management Area 8.22 guideline, understanding that the structures accommodate skiing activities and defensible space.

In addition, all proposed infrastructure and facilities under Alternative 3 would comply with the BEIG and reflectivity guidelines (discussed above) and imitate landscape character with natural appearing materials and colors to minimize impacts to the scenery. Project components are analyzed below.

Ski area parking located on private lands would be expanded to accommodate additional visitation associated with Alternative 3. The creation of this parking would require site disturbance and cut/fill banks along the existing North Lot. This project would add to the developed character of the base area and the entrance to the ski area.

Analysis of Chairlifts

Chairlift terminal locations were planned to minimize the amount of ground disturbance necessary for construction. This criteria minimizes the amount of impact and by utilizing existing topography, scenery impacts are also minimized. The chairlift terminals (six-person chairlifts) would be approximately 28 feet wide, 60 feet long and 20 to 24 feet tall. The proposed chairlift terminals and towers would be colored to maximize blending with the surrounding summer landscape. Construction of the chairlift would require a corridor of variable width (average 60 feet) to be created through the forest canopy. To provide a variable width, additional tree removal would occur, although, balancing the aesthetic impact with wildlife habitat is an important consideration. PDC for the lift-line would minimize the negative scenic effect of a straight corridor by creating larger openings in key locations, to better visually blend into the surrounding landscape as viewed in winter. Installation of the lift towers would require excavation for foundations.

Jolly Jug Chairlift

The Alternative 3 Jolly Jug chairlift would be a six-person chairlift and would not be visible from viewpoints to the north. The chairlift would be visible from certain viewpoints to the south; however, those viewpoints were not determined to be critical. The top terminal location would be near the existing top terminals of the Cannonball and Challenge chairlifts. The bottom terminal would be near Jenny Creek on private lands. The bottom terminal would utilize an existing road for construction and maintenance access, avoiding additional scenery impacts.

Corona Chairlift

Alternative 3 impacts due to the Corona chairlift upgrade would be identical the impacts described in Alternative 2.

Challenge Chairlift

Alternative 3 impacts due to the Challenge chairlift replacement and upgrade would be identical the impacts described in Alternative 2.

Analysis of On-Mountain Guest Service Facilities

Challenge Mountain Facility

Alternative 3 impacts due to the construction of the Challenge Mountain Facility would be identical the impacts described in Alternative 2.

Lookout Facility

Alternative 3 impacts due to renovation of the Lookout facility would be identical the impacts described in Alternative 2.

Analysis of Trail Development

Alternative 3 includes the construction of ten new ski trails (totaling approximately 52 acres), the creation of approximately 63 acres of new tree and gladed skiing areas and modifications to 135 acres of existing tree and gladed skiing across six areas. All ski trails included in Alternative 3 would be considered a "clear-cut" with no regeneration efforts. A PDC that applies to tree and gladed terrain, includes: Minimize overstory vegetation removal during construction of tree and gladed skiing areas. Vegetation removal should not occur beyond analyzed ski trail widths. The majority of trails would not be graded, so revegetation/soil stabilization efforts would be expected to have a high success rate. Cleared areas would be revegetated with a native grass mix. Trail edges would be feathered or scalloped to provide a variable line, thereby minimizing linear cuts in overstory vegetation. Alternative 3 trails have been designed in response to issues raised during scoping and would utilize the existing ski area boundary where appropriate. Alternative 3 would create a more developed appearance on the upper half of the back-side of the ski area.

During the snowmaking season, lights attached to snowmaking guns would be visible from beyond the ski area, but the lighting would only occur when snowmaking operations occur. Night-time grooming operations would also produce lighting that could be observed from viewpoints beyond the ski area.

Analysis of Road Construction

The development of Alternative 3 would necessitate construction of new roads and road segments to access chairlift terminals and the Challenge Mountain Facility. All roads would be dirt/gravel surfaced. Proposed roads would utilize natural benches to the greatest extent practicable, reducing the visual impact. New roads would not be visible from beyond the SUP boundary.

Analysis of Utilities

Utility lines would be buried, reducing the long-term scenery impact. Lines would be buried in existing and proposed roads and ski trails. Proposed snowmaking lines would not be buried, but they would be above-ground similar to existing snowmaking lines.

Analysis of Vegetation Management Projects

As described in Chapter 2, management prescriptions have been developed for the ski area to maintain and/or improve forest health within the SUP area and adjacent private lands. The prescriptions primarily reflect ski area activities and in most instances propose implementation guidance for ski area projects. P6 and P7 include the removal of dead and dying trees. The amount of overstory vegetation removal for the vegetation management projects is anticipated to create an indistinguishable impact to scenery resources. Furthermore, the vegetation management projects would be consistent with the SIO designation of *Low*.

Critical Viewpoints

A series of summer photographs were simulated to provide comparative analysis of "before" and "after" photo representations. Refer to Figures 7, 8, 9, and 10 for a depiction of Alternative 3's effects to the visual resources and photo simulations during the summer months. These representations show the use of two PDCs identified to minimize impacts to scenery from vegetation removal and ground disturbance:

- Avoid straight edges where removing trees. Where the vegetation is removed use a variable density cutting (feathering) technique applied to create a more natural edge that blends into the existing vegetation; and
- All disturbed areas shall be revegetated after the site has been satisfactorily prepared. Seeding would be repeated until satisfactory revegetation is accomplished. Reseed with a native seed mixture using a variety of native seed grasses, wildflowers and forbs.

Critical Viewpoint #1 – Fourth of July Road (Figure 7)

The expected visual change in the middleground distance zone from Critical Viewpoint #1 is depicted in Figure 7. Currently visible ski area development from this viewpoint, from east to west or left to right on the photo, include: the very bottom of *Lower Diamondback* trail on private lands, a very small segment of *Corona Road* trail, *Muleshoe* trail, *Corona* trail, Corona chairlift, *Cascade* trail, and *West Ridge* trail. *Muleshoe* and *Corona* trails are the most distinctive ski area features from this viewpoint. Alternative 3 projects that would vary in levels of visibility, from east to west or left to right on the photo simulation, include:

- Trail IP-1 (lower segment is partially visible);
- Skier's right trail widening on *Lower Diamondback* (indiscernible);
- Placer Glades (tree thinning would blend with the existing tree island);
- Junction of trails C-3 at Corona Road (would be slightly visible);
- Lower trail C-1 (indiscernible);
- Upper trail C-3 blends with Placer Glades (indiscernible);
- Upper portion of trail C-2 (visible as a new trail);

- Upper portion of trail C-1 (visible as a new trail);
- Trail widening on skier's left near the confluence of Muleshoe and Corona trails (indiscernible); and
- Bryan Glades II, Salto Glades and Moose Glades (indiscernible as the tree thinning should blend with the existing tree islands).

Ski trails and minimal glading are currently visible from this location, so an incremental visual change would be experienced from this critical viewpoint. With implementation of project PDCs, the area would remain in compliance with the SIO of *Low*.

Critical Viewpoint #2 – Hessie/Fourth of July Fork (Figure 8)

The expected visual change in the middleground distance zone from Critical Viewpoint #2 is depicted in Figure 8. Due to the lower elevation of this viewpoint, only Corona chairlift and trail and *West Ridge* trail are visible from this viewpoint. The top and bottom terminal of the Corona chairlift are not visible from this viewpoint. Proposed projects that would vary in levels of visibility, from east to west or left to right on the photo simulation, include:

- Trail C-2 (skiers left side of the new trail would be visible in the location where it is adjacent to Bryan Glades II);
- Placer Glades (tree thinning would blend with the existing tree island);[53]
- Trail C-4 (lower portion of this new trail would be visible);
- Corona chairlift (visible from this viewpoint, but the upgrade from a four-person chairlift to a six-person chairlift would not be distinguishable); and
- Bryan Glades II, Salto Glades and upper Moose Glades (indiscernible as the tree thinning should blend with the existing tree islands).

Existing ski trails and minimal glading are currently visible from this location, so an incremental visual change would be experienced from this critical viewpoint. With implementation of project PDCs, the area would be consistent with the SIO of *Low*.

Critical Viewpoint #3 – Eldorado Avenue/CR 130 (Figure 9)

The expected visual change in the middleground distance zone from Critical Viewpoint #3 is depicted in Figure 9. Four components of the existing ski area are currently visible from this viewpoint: Indian Peaks chairlift, *Lower Ambush* trail, Corona chairlift and trail, and *West Ridge* trail. Alternative 3 projects that would vary in levels of visibility, from east to west or left to right on the photo simulation, include:

[53] The maximum amount of tree thinning (i.e., groomable glades) is simulated in Figure 8 to depict the maximum amount of change that may be perceived.

- Placer Glades (tree thinning would blend with the existing tree island);
- Trail C-3 (visible as a new trail);
- Corona chairlift (visible from this viewpoint, but the upgrade from a four-person chairlift to a six-person chairlift would not be distinguishable); and
- Salto Glades (tree thinning would blend with the existing tree island).

Combined with the existing condition, an incremental visual change would be experienced from this critical viewpoint. With the proposed Forest Plan amendment for the lower section of this terrain and implementation of project PDCs, the area would be consistent with the SIO of *Low*.

The expected visual change in the middleground distance zone from Critical Viewpoint #3 is depicted in Figure 9. A very limited amount of new trail construction and some glading may be evident (dependent upon the amount of tree thinning that is completed).[54] Traditional, below treeline trails, minimal glading, and portions of the existing Indian Peaks chairlift are currently visible from this location, so an incremental visual change would be experienced from this critical viewpoint. With implementation of project BMPs, the area would remain in compliance with the SIO of *Low*.

Critical Viewpoint #4 – Proposed Bridge Location (Figure 10)

As no bridge, chairlift or trails is proposed under Alternative 3 in this area, no visual change is expected from this viewpoint and no perspective renderings have been completed.

Areas South of EMR's SUP

Although no critical viewpoint was identified in this area, the proposed Jolly Jug chairlift and trails would extend south of the current developed trail network under Alternative 3 and increase the visibility of the ski area from areas south of the current SUP area (Rollins Pass Road, NFS and private lands).[55] Portions of the Jolly Jug chairlift and trails are expected to be visible from limited areas of Rollins Pass Road, NFS and private lands. The extent of trail development south of the existing SUP area is still not expected to be substantial. With implementation of project PDCs, the area would remain in compliance with the SIO of *Low*.

Alternative 3 trail development would change the visual character of the Jenny Creek Trail as it crosses through the proposed project area. On private lands the Jenny Creek Trail would cross three proposed ski trails (JJ-1, JJ-2 and JJ-3). On NFS lands the Jenny Creek Trail would cross one trail (JJ-4) and the Jolly Jug chairlift line and clearing. The impact to the scenic resource would be brief as hikers and/or winter

[54] See previous footnote.
[55] Based on the context of viewers, the duration of view, the degree of discernible detail, seasonal variations, and the number of viewers, no critical viewpoint was identified for use in this analysis south of the existing EMR SUP.

users would cross these trails in a matter of minutes (primarily on private lands) before exiting the operational boundary into relatively undisturbed segments of the trail.

Jenny Creek Trail Easement

The pursuit of an easement for Jenny Creek Trail within the current trail location would not affect scenery resource on private lands and the easement likely would not include a SIO direction.

Forest Plan Amendment

The proposed Forest Plan amendment would change the land management allocations within the proposed SUP boundary area to Management Area 8.22. In conjunction with the management area change, the SIO designation would also be changed to a SIO designation of *Low*. With Alternative 3 the Forest Plan amendment would change:

- 10 acres would be removed from the *High* SIO designation;
- 0.5 acre would be removed from the *Moderate* SIO designation;
- 11 acres of lands that are not officially designated in the Forest Plan would be added to the *Low* SIO designation (within the existing SUP boundary, refer to Figure 11);
- Total, approximately 21.5 acres would be added to the *Low* SIO designation.

The Forest Plan amendment would allow for a greater level of scenery impact to occur compared to the existing condition, both due to projects included in Alternative 3 and to reasonably foreseeable future actions (refer to Cumulative Effects below). The majority of the SIO change would occur with the existing SUP boundary (from designating lands as 8.22 that are currently not officially designated in the Forest Plan). The Forest Plan amendment would also accommodate the Management Area change for the Jolly Jug chairlift and trails project would result in 10 acres changing from a SIO designation of *High* to *Low*. Forest Plan standards and guidelines would apply to Management Area 8.22 within the SUP boundary adjustment areas.

CUMULATIVE EFFECTS

Scope of the Analysis

For a detailed description of past, present, and reasonably foreseeable future projects within the cumulative effects analysis area, the reader is referred to Appendix A in this document.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for scenery resources extends from EMR's inception as a ski area in 1961, through the foreseeable future in which EMR can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis is the same as the direct and indirect effects analysis and is focused on EMR's existing and proposed SUP area as visible from identified critical viewpoints.

Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable actions that affect visual resources within the study area are related to development of NFS and private lands dating back to the 1960s. These past, present, and reasonably foreseeable actions include:

- 2011 Master Plan
- Annual EMR Operating Plans
- Past Ski Area Projects
- Communications Tower

Alternative 1 – No Action

2011 Master Plan

EMR did not propose all projects in the 2011 Master Plan for site specific environmental review in the EIS. Therefore, the projects in the Master Plan that are not part of the Proposed Action and/or Alternative 3 are considered reasonably foreseeable future actions.

Key projects that have received Forest Service acceptance through the 2011 Master Plan process include the Moose Glade Express chairlift and terrain and the Four O'Clock chairlift and trails. The details of each of these projects are presented in Appendix A. This analysis assumes these projects are reasonably foreseeable future developments; however, these projects would require future site specific approval via the NEPA process.

The development of the Moose Glade Express chairlift and terrain would impact visual resources within the study area. The chairlift, ski trails, and tree and gladed skiing areas would likely lead to visual changes in the foreground and middleground distance as observed from some of the critical viewpoints identified in this analysis. While this would impact the visual resources of the study area, there are already ski trails, chairlifts, and tree and gladed skiing areas in this vicinity, so the change would be visible and impactful. Under the No Action Alternative, Moose Glades Express chairlift and trails would require a Forest Plan amendment to accommodate the SUP boundary adjustment. With the amendment and the application of PDCs, the Moose Glades chairlift and trails, combined with the No Action Alternative would be consistent with a SIO designation of *Low*.

The development of the Four O'Clock chairlift would lead to minimal changes to visual resources as viewed from the front-side of EMR. Two short trails would be constructed in conjunction with this chairlift project, both on private lands. This project would not be visible from identified critical viewpoints.

Cumulatively, when considered with the past, present and reasonably foreseeable future projects, EMR 2011 Master Plan projects would continue to be consistent with the SIO of *Low* within the SUP boundary.

Annual EMR Operating Plans

EMR's annual winter and summer operating plans within the SUP boundary contain various tree removal, minor construction, and maintenance projects that have cumulatively impacted visual resources at EMR. These projects do not result in notable changes to visual resources but rather maintain the visual characteristics within the SUP boundary as a ski area. Cumulatively, these annual operation plans would continue to be consistent with the SIO of *Low* within the SUP boundary.

Past Ski Area Projects

Since EMR opened for its first winter in 1961, visual resources in the analysis area have been gradually altered and now resemble a developed ski area. The development of the first chairlifts and ski trails led to visual changes and transformed the landscape from natural to one with signs of human activity. Once the landscape was changed from its natural state, all subsequent alterations are incremental. Once disturbed, further developments have direct impacts on scenery resources, but do not change the overall characterization of the landscape. Thus, cumulatively, past ski area projects have led to substantial changes to scenery resources; however, the area has maintained compliance with Forest Plan direction.

Communications Tower

The installation of a communications tower near the Lookout could impact scenic resources in the study area. While this tower could be visible from locations within the study area, because of the scale of the project it would not be visible from identified critical viewpoints on adjacent NFS lands. The project would incrementally add to the built environment and would be a new type of structure that currently does not exist at EMR. The communication tower site-specific analysis identified that it would be consistent with the SIO of *Low*.

Alternative 2 – Proposed Action

2011 Master Plan

Under Alternative 2, proposed chairlifts, ski trails, and tree and gladed skiing areas could impact visual resources, as discussed in the Direct and Indirect Environmental Consequences section above. Additionally, as discussed above under Alternative 1 of this section, the Moose Glades project and Four O'Clock chairlift and trails project could lead to visual changes in the analysis area. Specific to identified critical viewpoints for this analysis, under the Proposed Action, Moose Glades Express chairlift and

terrain would be combined with the Placer chairlift and terrain project. This would further add to the developed character of the ski area and would be more proximate to identified viewpoints at Hessie Road/Fourth of July Road fork and the Fourth of July Road. From these viewpoints, the bottom terminal of the Moose Glades Express chairlift, as planned in the 2011 Master Plan, would be located at a distance of approximately 1,000 feet. This would be located within the Foreground viewshed.

Cumulatively, when considered with the past, present and reasonably foreseeable future projects, EMR 2011 Master Plan projects would continue to be consistent with the SIO of *Low* for the SUP boundary.

Annual EMR Operating Plans

EMR's annual winter and summer operating plans within the SUP boundary contain various tree removal, minor construction, and maintenance projects that have cumulatively impacted visual resources at EMR. These projects do not result in notable changes to visual resources but rather maintain the visual characteristics within the SUP boundary as a ski area. When combined with the activities proposed in Alternative 2, these operating plans would not have a noticeable impact on visual resources in the project area. Cumulatively, these annual operation plans would continue to be consistent with the SIO of *Low* within the SUP boundary.

Past Ski Area Projects

As mentioned in the discussion of Alternative 1 of this section, past ski area projects have changed the characterization of the landscape. Once transformed from a natural to a modified landscape, the incremental changes resulting from the implementation of Alternative 2 would be consistent with a modified landscape. Thus, cumulatively, past ski area projects have led to substantial changes to visual resources; however, the area has maintained compliance with Forest Plan direction.

Communications Tower

The cumulative impact of the communications tower under Alternative 2 would be identical to that discussed under Alternative 1, please see the above discussion. Combined with Proposed Action projects, the communications tower would incrementally add to the developed character of the area, but the projects would continue to meet Forest Plan direction.

Alternative 3

2011 Master Plan

The cumulative effects of Alternative 3 when considered together with Master Plan projects would be similar to those discussed above under Alternative 1. Cumulatively, 2011 Master Plan projects would continue to be consistent with the SIO *Low* for the SUP boundary.

Annual EMR Operating Plans

EMR's annual winter and summer operating plans within the SUP boundary contain various tree removal, minor construction, and maintenance projects that have cumulatively impacted visual resources at EMR. These projects do not result in notable changes to visual resources but rather maintain the visual characteristics within the SUP boundary as a ski area. When combined with the activities proposed in Alternative 3, these operating plans would not have a noticeable impact on visual resources in the project area. Cumulatively, these annual operation plans would continue to be consistent with the SIO of *Low* within the SUP boundary.

Past Ski Area Projects

As discussed above in the discussion of Alternative 2, past ski area projects created a visual landscape characterized by human modification. Thus, projects proposed in Alternative 3 would continue to lead to incremental changes in visual resources but would continue to be consistent with the SIO of *Low*.

Communications Tower

The cumulative impact of the communications tower under Alternative 3 would be identical to that discussed under Alternative 1, please see the above discussion. Combined with Alternative 3 projects, the communications tower would incrementally add to the developed character of the area, but the projects would continue to meet Forest Plan direction.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Additional developed terrain and infrastructure in previously undisturbed portions of the SUP area would represent irretrievable effects to scenery resources; however, this commitment of the scenery resource is not considered irreversible because facilities and chairlifts could be removed and, in time, the area could be reclaimed and revegetated, restoring its natural appearance.

D. CULTURAL RESOURCES

SCOPE OF THE ANALYSIS

This cultural resource assessment is mandated by the National Historic Preservation Act of 1966 (NHPA). Section 106 of the NHPA requires that federal agencies take into account the effects of a federal undertaking on any cultural resource that is included in or eligible for inclusion in the National Register of Historic Places (NRHP). Cultural resources may refer to sites, areas, buildings, structures, districts, and objects which possess scientific, historic, and/or social values of a cultural group or groups as specified by 36 CFR 296.3.

This assessment is based on the built environment, as well as archaeological sources, that indicate the historic and prehistoric utilization of lands, such as hunting, gathering, grazing, timber harvesting, and natural resource transport, within and adjacent to EMR's SUP boundary, known as the area of potential effect (APE). NRHP eligibility is evaluated in terms of the integrity of the resource; its association with significant persons, events, or patterns in history or prehistory; its engineering, artistic, or architectural values; or its information potentially relative to important research questions in history or prehistory.[56] The significance of NRHP eligibility of cultural resources is determined by the Agency Official, in this case, the Forest Supervisor, in consultation with the State Historic Preservation Officer (SHPO).

AFFECTED ENVIRONMENT

The project area lies within the Southern Rocky Mountain Physiographic Province.[57] It is located on the Colorado Front Range just east of the Continental Divide in the mountains of north central Colorado. Geographically, the area is characterized by high mountains with deep, glacially-carved valleys and medium-sized streams. Elevations in the survey area range from approximately 8,940 to 10,160 feet (2,725 to 3,095 meters). A number of valuable metals, including gold, silver, and tungsten have been historically mined in the surrounding areas.[58] The project area is just east of the convergence of North Fork and South Fork creeks into Middle Boulder Creek, which forms the northern boundary of the survey area. Current land use in the area is largely associated with recreational activity (skiing, hiking, fishing, and hunting).

Historically, the survey area was used by the Arapaho, Ute, and other tribes, as well as fur trappers and miners. Mining was particularly important in the area, with miners primarily prospecting for gold and silver, although there was a short-lived tungsten mining boom in Boulder County from 1910 to 1920. Gold was first discovered in Boulder County in 1858 and was mined into the 1870s. Eldora itself prospered through the 1890s, even though there was minimal mining occurring, since it also functioned as

[56] 36 CFR Section 60.4
[57] Thornbury, 1965
[58] Smith, 2009

a supply center and railroad shipping center for outlying camps. The three most important camps around Eldora included Hessie (the largest and 2 miles west of Eldora), Grand Island (3 miles beyond Hessie on the North Fork of the Boulder Creek), and Lost Lake Camp (southwest and across Boulder Creek from Hessie).[59] Boulder County continued to be a gold and silver producer into the 1920s, but only minimally so.[60]

Files searches of the Colorado Office of Archaeology and Historic Preservation's (OAHP) online Compass database were conducted in August 2009 and August of 2012, both prior to beginning any fieldwork. The search indicated that one previously recorded historic burial (5GL22) was located in the survey area and that no previous surveys had occurred there. A number of archaeological surveys had been conducted in the general area, including one adjacent to the study area.[61] Known sites in areas surrounding the project are numerous and almost entirely historic. They include historic districts, towns, mining camps, mills, mines, cabins, and railroads. A number of these sites are recommended as eligible for, or are included on the NRHP, including the Eldora Historic District (5BL758) and the Switzerland Railway (5BL358.1). Of particular note is the Bailey Mill and Dam Site (5BL537), located in the extreme northeastern corner of the project area, which is not recommended for inclusion on the NRHP. Additionally, local historical maps, online records, a literature review, and in-house records searches were used to identify potential cultural resources.

Cultural Resource Sites and Isolated Finds Inventory

The APE encompasses approximately 175.3 acres, which was intensively surveyed via pedestrian transects spaced at no more than 20 meters apart. A second inventory was conducted to detail the 3.4-acre APE around the proposed parking lot expansion. The Visual and Auditory Impacts APE consists of the existing historic buildings along Hessie road, including the Crowley Load Cabin and the Lucky G's Cabin. All artifacts were analyzed in the field; none were collected. An isolated find was defined as five or fewer artifacts, many pieces of a single artifact, an isolated adit or claim marker, or five or fewer prospector pits with no associated structures or features. Sites included structures and clusters of features and artifacts including adits, trails, claim markers, prospector pits, and associated mining artifacts in a discrete location believed to represent the locus of patterned human activity.

Eighteen isolated finds, eight sites (5BL11081, 5BL11082, 5BL11083, 5BL11938, 5GL22), and one historic cultural landscape (5BL485) were recorded during the initial inventory. The second inventory, which was entirely on private land, identified four cultural resources: two segments of a newly recorded historic road (5BL12041.1 and 5BL12041.2) and three historic isolated finds (5BL12040, 5BL12042, and

[59] Eberhart, 1969, pp. 71–73
[60] Smith, 2009, p. 205
[61] Barclay, 1993

12043) for a total of 21 isolated finds. All cultural resources date to the historic period and are associated with mining operations, with the exception of 5GL22 which has an unknown association.

Table 3D-1:
Isolated Finds

Smithsonian Number	Description
5BL11084	Prospector pit
5BL11086	Claim marker
5BL11087	Prospector pit
5BL11088	Scrap metal
5BL11089	Adit
5BL11090	Prospector pit
5BL11091	Prospector pit
5BL11092	Prospector pit
5BL11093	Prospector pit
5BL11094	Prospector pit, bucket
5BL11095	Prospector pit
5BL11096	Claim marker
5BL11097	Prospector pit
5BL11098	Prospector pit
5BL11168	Prospector pit/modern dug out
5BL11169	Claim marker
5BL11941	Prospector pits
5GL2090	Historic fire/cooking pit
5BL12040	Prospector Pit
5BL12042	Prospector Pit
5BL12043	Collection of historic glass fragments and bottle parts from a single dumping episode

The mining site, 5BL11938, although individually not eligible for inclusion on the National Register is recommended as contributing to the overall eligibility of the Lost Lake Mining District (5BL485) and thus avoidance is recommended. The Fremont's Men Burial (5GL22) was recommended as not eligible to the NRHP; however, avoidance is required until additional data can be gathered (this location is on private land). The one historic cultural landscape identified in the survey, the Lost Lake Historic Mining District (5BL485), which largely falls outside of the APE includes a scattering of cabins around Lost Lake and along the steep gulch that runs down Bryan Mountain to the road to Hessie. The historic Lost Lake Mining District is recommended to be eligible for the NRHP. The district is recommended for inclusion under Criteria A, as the sites and features that constitute the landscape are the reflective of the events that took place in the final days of the gold and silver rush in the area.[62] Although only two

[62] Metcalf, 2013

segments of 5BL12041 were recorded during the most recent inventory, the resource in its entirety is recommended as eligible for inclusion on the NRHP under Criterion A for its contribution to the local development and use of the area for mining and recreation during the late 1800s and early 1900s. Segment 5BL12041.1 lies fully within the APE for the proposed parking lot and due to its compromised integrity is recommended as not supporting the integrity of the larger linear resource. Conversely, segment 5BL12041.2 lies just outside the APE for the proposed parking lot, retains many of its aspects of integrity, and is recommended as supporting the integrity of the larger resource.

All 21 isolated finds are recommended as not eligible for the NRHP. Assuming avoidance of site 5BL11938 (a contributing component of 5BL485) and avoidance and protection of 5GL22, no historic properties would be affected within the physical APE for the project, and no further work is recommended.

SHPO consultation on visual and auditory impacts consisted of the existing historic buildings along Hessie road, including the Crowley Load Cabin and the Lucky G's Cabin. Concurrence was received for the determination of "no adverse effect" for the potential visual and auditory impacts for these areas. The Town of Eldora was not included within this consultation as it was determined to be outside of the visual APE. Per the noise analysis (Chapter 3 Section F), it was determined that auditory impacts to the Town of Eldora would be negligible and did not warrant consultation with SHPO.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

New development projects would not occur. The ski area would continue to operate under its current configuration and capacity under this alternative. Because no ground disturbance is proposed under the No Action Alternative, there is no potential to affect the historic sites within the APE.

Alternatives 2 and 3

The 21 isolated historic sites found within the APE were recorded and found to be not eligible for inclusion on the NRHP. The other nine sites and one historic cultural landscape that fall within the APE will not be affected, with implementation of PDC such as marking the limits of disturbance and avoiding known significant sites. Therefore, the action alternatives would have "no adverse effect" on any known NRHP listed or eligible historic properties with the exception of 5GL22. SHPO and Gilpin County have not concurred with the determination of effect or eligibility for this site. Prior to implementation of either action alternative, additional consultation would be required in order to resolve the potential adverse effects to the site.

Expectations for the discovery of additional prehistoric or cultural materials are low considering the topography and geography of the area. As stated in the PDC (Table 2-3), if previously-unknown cultural

resources or artifacts are discovered during implementation of any approved projects, all ground disturbing activities will cease, and SHPO consultation will commence.

CUMULATIVE EFFECTS

Scope of Analysis

The effects analyzed in the cumulative effects section apply to all alternatives, including the No Action Alternative. For a detailed description of past, present, and reasonably foreseeable future projects within the cumulative effects analysis area, the reader is referred to Appendix A in this document.

Temporal Bounds

The temporal bounds for this cumulative effects analysis of cultural resources extend from 1961 when EMR first opened as a ski area through the foreseeable future in which EMR can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis of cultural resources are limited to public and private lands in the vicinity of the EMR SUP area.

Past, Present, and Reasonably Foreseeable Future Actions

From a cumulative perspective, since implementation of projects contained in the action alternatives were mostly determined to have “no adverse effect” on known NRHP listed or eligible historic properties, by definition, no cumulative impacts to cultural resources are identified specifically related to the EMR projects in regards to all identified sites with the exception of 5GL22. The determination of eligibility and effect has not received concurrence from SHPO and Gilpin County. Further consultation regarding mitigation of adverse effects or avoidance by means of PDC would need to be completed prior to the implementation of either action alternative in order to avoid cumulative impacts.

All projects listed in Appendix A would require the completion of requisite cultural surveys and to satisfy State and Federal requirements. As stated above, this project has been determined to have no adverse effect either independently or cumulatively to cultural resources.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The determination of irreversible and/or irretrievable commitments of cultural resources is dependent on the outcome of additional consultation with SHPO and Gilpin County. Should acceptable PDC to protect site 5GL22 receive concurrence prior to the implementation of an action alternative, there would be no irreversible and/or irretrievable commitments of cultural resources.

E. SOCIAL AND ECONOMIC RESOURCES

SCOPE OF THE ANALYSIS

Social and economic resources are those features of the human environment that form the social and economic fabric of a county, community or region. Population, economy, employment, personal income, visitor spending, and environmental justice are considered in this socioeconomic analysis, as these are the most relevant social and economic resources to the proposed projects. The study area for social and economic resources includes all of the two counties (Boulder and Gilpin).

Economic Impact Theory

A significant body of prior research regarding ski operations makes it clear that by drawing visitation to an area, ski facilities can generate economic activity in the form of employment and dollar flows. Further, these benefits accrue to both the ski area and to local businesses that benefit from spending by visitors. Perhaps just as importantly, the direct dollars spent at ski areas and local businesses have a secondary (multiplier) impact, creating additional dollar flows/jobs within the local and regional economy.

Economic Impacts

Terms used in this section are defined in Chapter 7 – Glossary: "Economic Impacts."

The direct and secondary impacts of the alternatives were projected using a computer-based model—IMPLAN3.[63] IMPLAN3 is a broadly accepted model used by the Forest Service for making projections regarding employment and economic impacts and is often used by the Forest Service in the preparation of Environmental Impact Statements as part of the NEPA process.

In this analysis, existing and prospective new jobs are defined in terms of "Full-Time-Equivalents" (FTEs)—one FTE provides sufficient work to keep one person employed full-time for one year. In seasonal industries—such as ski areas—one FTE may represent several employment positions.

Environmental Justice

Environmental justice speaks to concerns that federal decisions could disproportionately impact people of a particular ethnic or cultural heritage group, or people with low incomes. Environmental Justice is an executive order (EO 12898) that requires, in brief, that each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately

[63] IMPLAN3 software guides users though the task of creating an impact study that tracks the effects of a modeled event (such as each Alternative) against 440 unique sectors in the United States. The result is a detailed summary of economic impacts including: changes in jobs, household incomes, tax impacts, and gross regional product that can be used to show the effect of firms moving into an area, special events, introduction of new technologies, recreation and tourism, military base closures, changes in government spending and many more events. Additional information regarding IMPLAN3 software and data used for the economic analysis is contained in the Social and Economics technical report in the project file.

high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

The CEQ provides the following definitions in order to provide guidance for compliance with environmental justice requirements in NEPA:

- "Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis."[64]
- "Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect."[65]

AFFECTED ENVIRONMENT

Population

The population of Boulder and Gilpin counties has been steadily growing over the past thirty years—with 55 percent growth in Boulder County and 123 percent growth in Gilpin County. In addition, the Colorado State population has also grown considerably during this time, increasing by 74 percent between 1980 and 2010. The Colorado State Demography Office has projected a strong growth trend for the next thirty years, but not as substantial as has been observed since 1980. Population growth in the 2010–2040 period is expected to be stronger in Gilpin County (56 percent) and weaker in Boulder County (32 percent).[66] The population totals and projections for each county are presented in Table 3E-1.[67]

[64] Council on Environmental Quality, 1997
[65] Ibid.
[66] Colorado State Demography Office, 2013
[67] Note: Prior to 2002, Boulder County included part of the area today known as Broomfield County.

Table 3E-1:
Study Area Population Totals and Projections 1980–2040

Geographic Location	1980	1990	2000	2010	2020	2030	2040	% Change 1980–2010	% Change 2010–2040
Boulder	189,625	225,339	291,288	294,567	333,399	366,519	390,228	55	32
Gilpin	2,441	3,070	4,757	5,441	6,384	7,437	8,501	123	56
Colorado	2,889,733	3,294,394	4,301,261	5,029,196	5,915,922	6,888,181	7,749,477	74	54

Source: Colorado State Demography Office, 2013

Race

Racial diversity is somewhat limited in the study area—about 87 percent of the study area's population is white, Hispanic or Latino. Another 4.4 percent of the population in the study area identified themselves as "Some Other Race," which are most often persons of Hispanic or Latino origins.[68] Asian persons made up approximately 4 percent of the study area population, while other groups, each contributing approximately 1 percent or less of the population in the study area, included: Black or African American, American Indian or Alaskan Native and Hawaiian and Pacific Islander. People of two or more races made up approximately 2.7 percent of the study area population.[69]

Economy

Travel and tourism is an economic component of both Boulder and Gilpin Counties. In this context, travel and tourism consists of sectors that provide goods and services to visitors to the local economy, as well as to the local population.[70] For the purposes of this analysis these sectors include: retail trade, passenger transportation, arts, entertainment and recreation, and accommodation and food services. Travel and tourism account for about 15 percent of total employment nationally and about 16 percent in the State of Colorado. The proportion of the Boulder County economy attributed to travel and tourism is nearly identical to that of the national average, at about 15 percent. Gilpin County, however, is much more heavily dependent on tourism with approximately 95 percent of the total employment in the county attributed to travel and tourism sectors.[71]

[68] In 2000, 97 percent of the people who reported as "Some Other Race" were Hispanic or Latino.
[69] U.S. Census Bureau, 2010
[70] Without additional research such as surveys, it is not known what exact proportion of the jobs in these sectors is attributable to expenditures by visitors, including business and pleasure travelers, versus by local residents. Some researchers refer to these sectors as "tourism-sensitive." They could also be called "travel and tourism-potential sectors" because they have the potential of being influenced by expenditures by non-locals. In this report, they are referred to as "travel and tourism."
[71] U.S. Department of Commerce, 2013. Note: the large proportion of the Gilpin County economy attributable to travel and tourism sectors is due to the high concentration of casinos and hotels within Blackhawk and Central City.

Employment

Employment status in the study area has been fluctuating since 2000, commensurate with changes in the economy at the state and national level. In general, the unemployment rate in Boulder and Gilpin Counties is typically lower than what is observed in for the State of Colorado as a whole. In 2012, the unemployment rate was 6.1 percent in Boulder County, 6.5 percent in Gilpin County and 8 percent statewide.

The Colorado Department of Local Affairs (DOLA) provides employment status projections for Colorado regions, and some counties, through 2040. Both Boulder and Gilpin Counties are in DOLA's Colorado Planning and Management Region 3; however, for the counties in Region 3 only Gilpin and Clear Creek are listed separately. The rest are combined for a Metro Denver total. Through 2040, the unemployment rate is expected to decrease slightly to the 5.4 to 5.7 percent range in the Denver Metro area, with more substantial decreases in Gilpin County (to the 4.2 to 4.6 percent range) and the State of Colorado as a whole (to the 5.3 to 6.1 percent range).

Personal Income

Household income and the proportion of the population below the poverty level are important measures of individual prosperity within the local economy (i.e., the ability of households and individuals to achieve economic security). In 2010, Boulder and Gilpin Counties had higher median household incomes ($64,839 and $58,036, respectively) than the State of Colorado ($56,456). Boulder County had a slightly higher value for the proportion of the population below the poverty level (12.80 percent) than the State of Colorado (12.20 percent), while Gilpin County had a lower value than the state (11 percent). It is important to note that these figures are based on total personal income, from both labor (e.g., wages) and non-labor (e.g., investment income) sources.

Eldora Mountain Resort

EMR is a generator of visitor activity in Boulder County, attracting primarily local and regional visitors. EMR visitors—by virtue of their expenditures on goods and services—support employment and dollar flows both inside and outside the resort, both on direct and secondary bases.[72] EMR visitors tend to fall into one of two broad categories:

- **Day Visitors** – visitors who travel to and from EMR for a day of skiing activity. No overnight lodging is involved. Overall, EMR reports that Day Skiers account for approximately 85 percent their visitor base. It should be also noted that Day Skier parties include a small segment of non-skiers, assumed to boost total day visitation by approximately 5 percent.

[72] The *direct* dollars spent at ski areas and local businesses have a *secondary* (multiplier) impact, creating more dollar flows/jobs in the local and regional economy.

- **Destination Visitors** – visitors whose trip to EMR includes one or more nights spent away from their place of residence. Overall, EMR reports that Destination Skiers account for approximately 15 percent their visitor base. It should be also noted that Destination Skier parties include a segment of non-skiers, assumed to boost total destination visitation by approximately 20 percent.

While resort-based employment is focused in Boulder County, secondary impacts can extend well beyond the local region. Refer to Chapter 7 – Glossary: "Economic Impacts" for a definition of terms specific to economic impacts at EMR.

Because EMR visitors' expenditures drive employment and dollar impacts, variations in visitation are significant to the area economy. Resort visitation for three recent seasons—along with averages for the three-year period—are summarized in Table 3E-2. Figures are shown for: Skier Visits (Destination and Day Skiers), Overnight Non-Skiers, and Day Non-Skiers.[73] Among skiers alone, EMR reports that the current distribution is: approximately 85 Percent Day Skiers and approximately 15 Percent Destination Skiers. The level of visitation shown in the table is regarded as 'baseline' conditions for EMR.

It is important to consider non-skier visitors as a significant economic component of resort visitation—particularly among destination groups. Destination groups commonly include persons who do not ski, but who take advantage of other EMR or Boulder and Gilpin County offerings. For instance, a family group might include a parent or very young child who does not ski. In some instances, North American mountain resorts have reported that non-skiers account for as much as 50 percent of winter visitors. However, in this instance, it has been assumed that 20 percent of EMR's winter destination visitors are non-skiers. Thus, for every four destination skiers, one additional non-skier is included in visitation totals. For example, a family of five would likely have one non-skier. Among day skiers, the segment accounted for by non-skiers is significantly smaller. In this instance, it has been assumed that approximately 5 percent of persons in day skier parties are non-skiers. Thus, while the distribution of *skiers* is 15 percent Destination Visitors/85 percent Day Visitors, resort visitor *totals* are closer to 17 percent Destination Visitors/83 percent Day Visitors.

[73] Assumes 85/15 breakdown between Day and Destination skiers. Assumes one non-skier for every five destination skiers. Assumes one non-skier for every 20 day skiers.

Table 3E-2:
Recent & Average/Rounded Eldora Mountain Resort "Baseline" Visitation

	2010/11	2011/12	2012/13	Three-Year Average	Round
Skier Visits	182,603	207,979	197,363	195,982	196,000
Destination/Overnight	27,390	31,197	29,604	29,397	29,400
Day Visitor	155,213	176,782	167,759	166,584	166,600
Overnight Non-Skiers	5,478	6,239	5,921	5,879	5,900
Day Non-Skiers	7,761	8,839	8,388	8,329	8,300
Total: Destination Visitor	32,869	37,436	35,525	35,277	35,300
Total: Day Visitor	162,973	185,621	176,146	174,914	174,900
Total Visitation	**195,842**	**223,057**	**211,672**	**210,190**	**210,200**

Source: Doug Kennedy Associates, 2013

Over the past three years, for which data is available, EMR averaged approximately 210,200 visitors—approximately 83+/- percent of which were day visitors. This is a critical distinction, as destination visitors' per diem expenditures are higher than day visitors' per diem expenditures. Destination skiers incur costs for lodging, food, travel, etc., resulting in significantly higher expenditures than day visitors.

Table 3E-3 summarizes the current and historic levels of total employment positions at EMR. Employment positions are the number of persons employed by EMR. In many instances, these positions are both seasonal and part-time. As such, an employment position can be less than a full-time/year-round job.

Table 3E-3:
EMR Employment *Positions* 2010–2013

Year	Full-time/ Year-round	Full-time/ Seasonal (Winter)	Full-time/ Seasonal (Summer)	Part-time/ Year-round	Part-time/ Seasonal	Total Employment Positions
2012/13	23	204	15	0	295	537
2011/12	24	242	18	0	294	578
2010/11	23	226	16	0	298	563

Over a twelve-month period, EMR currently generates over 560+/- employment positions. Again, many of these positions are less than full-time employment. Table 3E-4 summarizes the conversion of EMR-based employment positions to FTEs.[74]

[74] Conversions as follows: full-time/year-round = 1.0 (works full-time for twelve months); full-time/seasonal = 0.4 (works full-time for four to five months); part-time/seasonal = 0.17 (works part-time for four months).

Table 3E-4:
Conversion of Employment Positions to FTEs

	2010/11	2011/12	2012/13	Three Year Average
Full-time/Year-round	23	24	23	23.3
Full-time/Seasonal (Winter)	90	97	82	89.6
Full-time/Seasonal (Summer)	6	7	6	6.5
Part-time/Seasonal	51	50	50	50.3
Total FTEs	**170**	**178**	**161**	**170**

The 560+/- resort-based employment positions converts to 170 FTEs.

EMR's ongoing operations have a considerable impact on Boulder and Gilpin Counties' economies. Direct employment is created both at EMR (refer to Table 3E-3) and outside the resort, as visitors make expenditures both at EMR and at other area businesses, such as hotels, restaurants, retail stores, etc. Secondary employment is dispersed over a broader geographic area, including suppliers, service contractors, etc, who work with EMR and other local businesses. Ongoing operation of EMR (expressed in terms of visitor expenditures) effectively generates employment in three ways:

- **Resort-based employment** – direct impact of visitor expenditures within the ski resort (Table 3E-3).
- **Employment outside the resort** – direct impact of visitor expenditures at area businesses—hotels, restaurant, retail stores, etc.
- **Employment in the region** – secondary (multiplier) impact of increased economic activity generated by visitor/resort expenditures—resort suppliers, service contractors, etc.

Estimation of these impacts is directly related to skier visits and overall visitation—as expenditures by visitors generate dollar flows and support employment. As noted above, EMR currently attracts 210,200 overall visitors on an annual basis. Over the years, a number of studies and data sources have been utilized to estimate average, detailed per diem expenditures, by category of visitor (day skiers, overnight skiers, etc.).[75] These studies are based on direct research, which includes visitor surveys that gather data on actual visitor expenditures.

Table 3E-5 shows estimated, daily expenditures by Colorado skiers.[76]

[75] Sources include: Colorado Ski Country, Colorado State University, Utah Bureau of Economic & Business Research, Vermont Tourism Data Center, Alberta Economic Development
The greatest weight was applied to estimates of Colorado skier activity. Per capita expenditure figures have been factored up to account for Consumer Price Index (CPI) increases since the dates of publication.
[76] Lodging figures have been adjusted to account for assumed expenditures inside and outside EMR.

Table 3E-5:
Daily, Per Capita Expenditures – Colorado Skiers

	Per Diem Expenditures			
	Day Skiers	**Destination Skiers**	**Day Non-Skiers**	**Destination Non-Skiers**
Lodging	$0.00	$66.30	$0.00	$66.30
Food & Beverage	$18.06	$42.57	$18.06	$42.57
Retail	$4.70	$26.34	$4.70	$27.88
Recreation	$37.31	$43.42	$6.65	$8.95
Groceries	$5.15	$9.26	$5.15	$9.26
Entertainment	$3.76	$6.41	$3.76	$6.41
Transportation/Gas	$5.82	$14.12	$5.82	$13.55
Total Daily Expenditure	**$78.80**	**$208.43**	**$48.14**	**$163.03**

The daily, per capita expenditure estimates were then multiplied by current EMR visitation (by type of visitor) to develop current estimates of total visitor expenditures—by industry category—both inside and outside the resort. The results of these calculations are shown in the Table 3E-6.

Table 3E-6:
Estimated Annual Expenditures by EMR Visitors: Current Level
($Millions)

	Destination Visitors	**Day Visitors**	**All Visitors**
Inside Resort	$2.17	$9.78	$11.95
Outside Resort	$4.92	$3.74	$8.66
Totals	**$7.09**	**$13.53**	**$20.62**

Current level direct expenditures by EMR visitors are estimated in excess of $20.6 million annually. These expenditures were input to the IMPLAN3 model in order to estimate the net impact of EMR on local/regional dollar flows and employment. The IMPLAN3 model converts the direct expenditure figures (above) into employment and dollars generated on both direct and secondary (Indirect and Induced) bases. A summary of these findings is shown in the Table 3E-7.

Table 3E-7:
Total Current FTE Employment and Dollar Flow Impact
(Eldora Mountain Resort)

	Total Impact (Inside and Outside Resort)
EMPLOYMENT (FTES)	
Direct Impact	259
Secondary Impact	71
Total	**330**
DOLLAR OUTPUT ($ MILLIONS)	
Direct Impact	$16.7
Secondary Impact	$8.8
Total	**$25.5**

The model indicates that EMR's current annual level of total economic impact is: 330 FTE jobs and $25.5 million in dollar output. In summary, EMR is currently a substantial economic factor in the study area—both in terms of employment and income.

Visitor Spending and Tax Revenues

Public revenue from visitor spending are sources of funding for governments that allow them to operate and provide public services to their constituency. Public revenue in the study area are generated primarily through property taxes, although sales taxes, federal and state payments, and other local sources of revenue are also important for the operation of the county governments. In each county, property and sales taxes are the largest sources of public revenues, ranging from approximately 63 percent of total general revenue in Boulder County to approximately 81 percent in Gilpin County.[77] The breakdown of total general revenue by source for each county is presented in Table 3E-8. The economic census profiles U.S. national and local economies every five years, including total general revenue for U.S. counties. The latest economic census figures available are from 2007, as the 2013 economic census has yet to be tallied and reported by the U.S. Census Bureau.

[77] Headwaters Economics, 2013

Table 3E-8:
Breakdown of Total General Revenue by Source in FY 2007

	Boulder County	Gilpin County	Study Area
TOTAL GENERAL REVENUE	266,267	17,609	283,876
Taxes	166,475	14,261	180,737
Intergovernmental Revenue	55,641	2,280	57,922
Total Charges	25,117	420	25,536
All Other (Miscellaneous)	19,034	648	19,681
Federal Land Payments (FY 2006)	287	90	377
PERCENT OF TOTAL			
Taxes	62.52%	80.99%	63.67%
Intergovernmental Revenue	20.90%	12.95%	20.40%
Total Charges	9.43%	2.39%	9.00%
All Other (Miscellaneous)	7.15%	3.68%	6.93%
Federal Land Payments (FY 2006)	0.11%	0.51%	0.13%

Note: Figures in thousands of dollars (adjusted for 2012 dollars)
Source: Headwaters Economics, 2013

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Population

Colorado State Demography Office population growth projections expect strong growth for Boulder and Gilpin Counties' resident population between 2010 and 2040. In 2010 the resident population of the two counties was 340,836 people. Over the thirty-year period from 2010 to 2040 an additional 58,184 residents would likely be added, representing a 17 percent increase over current population levels. Alternative 1 is not anticipated to measurably affect (positively or negatively) this overall population trend.

Race

Racial diversity is somewhat limited in the study area, with about 87 percent of the study area population identifying as white, Hispanic or Latino. Alternative 1 is not anticipated to measurably affect (positively or negatively) the racial breakdown of the study area.

Economy

Travel and tourism is an economic component of both Boulder and Gilpin Counties. The proportion of the Boulder County economy attributed to travel and tourism is nearly identical to that of the national

average, at about 15 percent. Gilpin County, however, is much more heavily dependent on tourism with approximately 95 percent of the total employment in the county attributed to travel and tourism sectors.[78]

Alternative 1 is not anticipated to measurably affect (positively or negatively) the economic makeup of the study area.

Employment

In general, the unemployment rate in Boulder and Gilpin Counties is typically lower than what is observed in for the State of Colorado as a whole. In 2012, the unemployment rate was 6.1 percent in Boulder County, 6.5 percent in Gilpin County and 8 percent statewide. DOLA has projected the unemployment rate to decrease slightly to the 5.4 to 5.7 percent range in the Denver Metro area (which includes Boulder County) through 2040. More substantial decreases are projected for Gilpin County through 2040—down to the 4.2 to 4.6 percent range.

Over the ten-year IMPLAN3 projection timeframe (through 2024), Alternative 1 would create no new jobs at EMR. However, incremental increases in visitation (refer to the Eldora Mountain Resort section below) would result in a total of three to four new, long-term FTEs being created—this employment would continue into the future. These three to four new FTEs are not anticipated to meaningfully affect employment status (or unemployment rates) in the study area.

Personal Income

In 2010, Boulder and Gilpin Counties had higher median household incomes ($64,839 and $58,036, respectively) than the State of Colorado ($56,456). Boulder County had a slightly higher value for the proportion of the population below the poverty level (12.80 percent) than the State of Colorado (12.20 percent), while Gilpin County had a lower value than the state (11 percent). It is important to note that these figures are based on total personal income, from both labor (e.g., wages) and non-labor (e.g., investment income) sources.

As discussed above, Alternative 1 would result in a total of three to four new, long-term FTEs being created. These new FTEs would provide $210,000 in labor income on an annual basis. This additional labor income is not anticipated to meaningfully affect personal income in the study area.

Eldora Mountain Resort

Alternative 1 would result in a relatively low annual level of visitation increase. As a true “no action alternative,” Alternative 1 does not include any projects that would address the Purpose and Need. Skier

[78] U.S. Department of Commerce, 2013. Note: the large proportion of the Gilpin County economy attributable to travel and tourism sectors is due to the high concentration of casinos and hotels within Blackhawk and Central City.

visits are projected to increase at an annual compounded rate of 0.45 percent over the first five years and at an overall annual compounded rate of 0.30 percent over ten years.[79]

Over the ten-year analytical timeframe, net annual visitation increases at EMR are expected to reach approximately 6,427 under Alternative 1 (including non-skiers). Visits would increase incrementally over the ten-year projection period.

Over the ten-year projection timeframe, Alternative 1 would create no new jobs at EMR. However, incremental increases in visitation would result in a total of three to four new, long-term FTEs being created—this employment would continue into the future. Labor income would increase by $210,000 on an annual basis. In addition, economic (dollar) activity would increase by approximately $600,000 on an annual basis. The projected FTE and dollar flow impact of Alternative 1 is provided in the project file.

Visitor Spending and Tax Revenues

As discussed above, incremental increases in visitation under Alternative 1 would result in an increase of economic (dollar) activity in the study area. This increased economic activity is projected to generate a cumulative total of $340,000 in state and local taxes within the study area.[80] This increased public revenue is not anticipated to meaningfully affect the breakdown of total general revenue by source or the day to day operations of Boulder or Gilpin Counties.

Environmental Justice

No changes or modifications would be approved that would directly or indirectly affect minority or low-income populations in the three-county area and the baseline conditions presented in the Affected Environment section above would be expected to continue into the future.

Alternative 2 – Proposed Action

Population

Due to the quantity of socio-economic impact, Alternative 2 is not anticipated to measurably affect (positively or negatively) this overall population trend.

Race

Racial diversity is somewhat limited in the study area, with about 87 percent of the study area population identifying as white, Hispanic or Latino. Alternative 2 is not anticipated to measurably affect (positively or negatively) the racial breakdown of the study area.

[79] RRC Associates, 2013
[80] State and Local Tax Collections as calculated by IMPLAN3 Model include: Taxes on Production & Exports (Sales, Property Tax, Motor Vehicle, Severance, Other), Social Ins Taxes, Corporate Profits Tax, Personal/Households Taxes (Income, Fines/Fees, Motor Vehicle License, Property, Other). This applies to each instance tax figures are provided within this document.

Economy

Alternative 2 is not anticipated to measurably affect (positively or negatively) the overall economic makeup of the study area.

Employment

The construction activity required to accomplish Alternative 2 would generate employment in the local/regional economy. However, these impacts would be short-term—only affecting the economy in the years in which construction activity occurs. The cumulative impact of Alternative 2 construction activity would be to generate 240+ FTEs. These impacts would occur over a five-year period (2015–2019), providing an annual average of 48 FTEs per year. At the completion of the ten-year projection, Alternative 2 would generate 27.8 FTEs within the resort. Increases in visitation would result in a cumulative total of 75+ new, long-term FTEs regionally—this employment would continue into the future (both construction and on-going operations impacts of Alternative 2 are discussed in more detail under the "Eldora Mountain Resort" section). Compared to the total employment positions currently provided in Boulder and Gilpin Counties (172,226 in 2012), these additional FTEs would represent approximately 0.07 percent increase over current employment levels.[81] Therefore, these new FTEs are not anticipated to meaningfully affect employment status (or unemployment rates) in the study area.

Personal Income

As discussed below in the "Eldora Mountain Resort" section, the cumulative impact of Alternative 2 construction activity would be to generate $12.1 million in labor income. In addition, labor income would increase by $2.7 million on an annual basis as result of ongoing operations of the Alternative 2 projects. This additional labor income is not anticipated to meaningfully affect personal income in the study area.

Eldora Mountain Resort

Construction Impacts

The construction activity required to accomplish Alternative 2 would generate employment, labor income and dollar flows in the local/regional economy. However, these impacts would be short-term—only affecting the economy in the years in which construction activity occurs. Alternative 2 has a total construction budget of $31.3 million.[82] The construction values were input to the IMPLAN3 model to provide estimates of direct and secondary employment, labor income, dollar flows and State and Local tax collections to be generated by the construction component of Alternative 2.

[81] 48 FTEs (construction annual average) + 75 FTEs (on-going operations) ÷ 172,226 (total employment in Boulder and Gilpin Counties in 2012) = ~0.07%
[82] Eldora Mountain Resort, 2013. The construction budget and timetable was provided by EMR and is contained in the project file.

The cumulative impact of Alternative 2 construction activity would be to generate 240+ FTEs, $12.1 million in labor income and $33.5 million in total dollar flows. These impacts would occur over a five-year period (2015–2019). In addition, Alternative 2 construction would generate a cumulative total of $1.03 million in state/local taxes. Additional information is available in the project file.

On-Going Operations Impacts

While Alternative 2 construction activity would have an impact over a five-year period, the ongoing operation of the expanded EMR facility would have a long-term impact on Boulder and Gilpin Counties. Specifically, ski area improvements can typically be expected to generate increases in visitation that, in turn, result in increases in visitor expenditures both inside and outside the ski area. Direct employment would be created both inside and outside the ski area, as new visitors make expenditures both within EMR and at other area businesses. Secondary employment would be dispersed over a broader geographic area. Effectively then, ongoing operation of EMR (expressed in terms of visitor expenditures) would generate employment and dollar flows in three ways:

- **EMR-based employment** – direct impact of visitor expenditures within the ski area. EMR-based employment positions have been projected as part of the analysis process. EMR projects that, at completion, Alternative 2 would support 78 new employment positions (including full-time/year-round, full-time/seasonal, and part-time/seasonal positions). Based on the ratio of Employment Positions to FTEs, this would result in 27.8 new, permanent FTEs. This net new resort-based employment would continue on into the future—beyond the ten-year projection period.
- **Employment outside the ski area** – direct impact of visitor expenditures at area businesses—hotels, restaurants, retail stores, etc.
- **Employment in the region** – secondary (multiplier) impact of increased economic activity generated by visitor/ski area expenditures.

The estimation of non-resort based impacts is directly related to visitation as expenditures by visitors would generate dollar flows and support new jobs. Alternative 2 includes projects that would meet the Purpose and Need and result in increased skier visits. Skier visits are projected to increase at an annual compounded rate of 4.39 percent over the first five years and at an overall annual compounded rate of 3.37 percent over ten years under Alternative 2.[83]

Over the ten-year analytical timeframe, net annual visitation increases at EMR are expected to reach approximately 83,046 under Alternative 2 (including non-skiers). Visits would increase incrementally over the ten-year projection period.

[83] RRC Associates, 2013

The daily per capita expenditure estimates summarized above (Table 3E-5) were applied to net annual projected increases in visitation (by visitor type) to develop annual estimates of net increases in visitor expenditures—by industry category—both inside and outside of EMR. The resultant total expenditures were then input to the IMPLAN3 model in order to estimate the net economic impact of Alternative 2 on regional dollar flows, labor income and employment. The results of the IMPLAN3 model are provided in more detail in the project file.

At the completion of the ten-year projection, Alternative 2 would generate 27.8 FTEs within the resort. Incremental increases in visitation would result in a cumulative total of 75+ new, long-term FTEs regionally—this employment would continue into the future. In addition, labor income would increase by $2.7 million and economic (dollar) activity would increase by $7.7 million on an annual basis. It is important to note that employment (FTE), labor income and dollar values are cumulative, with year 2024 values expected to continue into the future on an annual basis.

Total Impact

Overall, the impacts of increased EMR visitation under Alternative 2 would be substantial, with more than half of the impact taking place outside the resort. The *multiplier* impact of operations activity (the amount by which direct impacts are reinvested in the Boulder/Gilpin economy) is 1.43—for every dollar spent directly by EMR visitors, an additional $0.87 (over and above the initial dollar) is circulated through the Boulder/Gilpin County economy.[84]

Cumulatively (including construction and on-going operations), Alternative 2 would generate 795 FTEs and approximately $83 million in dollar flows over the ten-year projection period. In addition, Alternative 2 would generate a cumulative total of $3.94 million in state and local taxes. Table 3E-9 summarizes the total private sector impact of Alternative 2 projects, in terms of FTEs, state and local taxes and dollar flows. Combined construction and operations impacts are summarized over the ten-year projection timeframe. Note that the ‘Dollar Flows’ figures shown in the tables include Labor Income.

[84] Average of employment and dollar multipliers.

Table 3E-9:
Alternative 2 – Economic Impact During Projection Period – Private and Public Sectors

	Year										Cumulative
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
PRIVATE SECTOR IMPACTS											
Operations/Increased Visitation											
Jobs (FTEs)	19.4	31.4	38.1	52.8	59.3	63.5	67.6	70.6	73.7	76.7	553.1
Dollar Flows ($Millions)	$1.17	$2.21	$3.26	$4.31	$4.97	$5.62	$6.28	$6.75	$7.23	$7.70	$49.50
Construction Activity											
Jobs (FTEs)	75.1	55.2	29.5	59.5	22.6	0.0	0.0	0.0	0.0	0.0	241.9
Dollar Flows ($Millions)	$11.42	$8.17	$4.61	$6.73	$2.56	$0.00	$0.00	$0.00	$0.00	$0.00	$33.48
Combined											
Jobs (FTEs)	94.5	86.6	67.6	112.3	81.9	63.5	67.6	70.6	73.7	76.7	795.0
Dollar Flows ($Millions)	$12.6	$10.4	$7.9	$11.0	$7.5	$5.6	$6.3	$6.8	$7.2	$7.7	$83.0
PUBLIC SECTOR IMPACTS – STATE & LOCAL TAX COLLECTIONS ($MILLIONS)											
Tax Collections	$0.09	$0.18	$0.26	$0.34	$0.40	$0.45	$0.50	$0.54	$0.58	$0.61	$3.94

Visitor Spending and Tax Revenues

As discussed above, the combined on-going operations and construction activity of Alternative 2 would result in approximately $83 million in dollar flows over the ten-year projection period. This increased economic activity is projected to generate $3.94 million in state and local taxes within the study area. This increased public revenue is not anticipated to meaningfully affect the breakdown of total general revenue by source; however, these additional revenues would help to support the day to day operations of Boulder or Gilpin Counties.

Environmental Justice

Alternative 2 is not expected to directly or indirectly create disproportionately high and adverse human health or environmental effects on minority and low-income populations. No minority populations were identified in the study area where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. Likewise, no low-income populations were identified in the affected area.

Alternative 3

Population

Alternative 3 is not anticipated to measurably affect (positively or negatively) this overall population trend.

Race

Racial diversity is somewhat limited in the study area, with about 87 percent of the study area population identifying as white, Hispanic or Latino. Alternative 3 is not anticipated to measurably affect (positively or negatively) the racial breakdown of the study area.

Economy

Alternative 3 is not anticipated to measurably affect (positively or negatively) the economic makeup of the study area.

Employment

The construction activity required to accomplish Alternative 3 would generate employment in the local/regional economy. However, these impacts would be short-term—only affecting the economy in the years in which construction activity occurs. The cumulative impact of Alternative 3 construction activity would be to generate 225+/- FTEs. These impacts would occur over a five-year period (2015–2019), providing an annual average of 45 FTEs per year. At the completion of the ten-year projection, Alternative 3 would generate 23 FTEs within the resort. Increases in visitation would result in a cumulative total of 53+ new, long-term FTEs regionally—this employment would continue into the future (both construction and on-going operations impacts of Alternative 3 are discussed in more detail under the "Eldora Mountain Resort" section). Compared to the total employment positions currently provided in Boulder and Gilpin Counties (172,226 in 2012), these additional FTEs would represent approximately 0.06 percent increase over current employment levels.[85] Therefore, these new FTEs are not anticipated to meaningfully affect employment status (or unemployment rates) in the study area.

Personal Income

As discussed below under the "Eldora Mountain Resort" section, the cumulative impact of Alternative 3 construction activity would be to generate $11.5 million in labor income. In addition, labor income would increase by $1.6 million on an annual basis as result of ongoing operations of the Alternative 3 projects. This additional labor income is not anticipated to meaningfully affect personal income in the study area.

Eldora Mountain Resort

Construction Impacts

The construction activity required to accomplish Alternative 3 would generate employment, labor income and dollar flows in the local/regional economy. However, these impacts would be short-term—only affecting the economy in the years in which construction activity occurs. Alternative 3 has a total construction budget of $27.8 million.[86] The construction values were input to the IMPLAN3 model to

[85] 45 FTEs (construction annual average) + 53 FTEs (on-going operations) ÷ 172,226 (total employment in Boulder and Gilpin Counties in 2012) = ~0.06%
[86] Eldora Mountain Resort, 2013. The construction budget and timetable was provided by EMR and is contained in the project file.

provide estimates of direct and secondary employment, labor income and dollar flows to be generated by the construction component of Alternative 3.

The cumulative impact of Alternative 3 construction activity would be to generate approximately 225+/- FTEs, $11.5 million in labor income and $30.6 million in total dollar flows. These impacts would occur over a five-year period (2015–2019). In addition, Alternative 3 Construction would generate a cumulative total of $0.95 million in state/local taxes. Additional detail is available in the project file.

On-Going Operations Impacts

While Alternative 3 construction activity would have an impact over a five-year period, the ongoing operation of the expanded EMR facility would have a long-term impact on Boulder and Gilpin Counties. Specifically, ski area improvements can typically be expected to generate increases in visitation that, in turn, result in increases in visitor expenditures both inside and outside the ski area. Direct employment would be created both inside and outside the ski area, as new visitors make expenditures both within EMR and at other area businesses. Secondary employment would be dispersed over a broader geographic area. Effectively then, ongoing operation of EMR (expressed in terms of visitor expenditures) would generate employment and dollar flows in three ways:

- **EMR-based employment** – direct impact of visitor expenditures within the ski area. EMR-based employment positions have been projected as part of the project planning process. EMR projects that, at completion, Alternative 3 would support 63 new employment positions (including full-time/year-round, full-time/seasonal, and part-time/seasonal positions). Based on the ratio of Employment Positions to FTEs, this would result in 23.0 new, permanent FTEs. This net new resort-based employment would continue on into the future—beyond the ten-year projection period.
- **Employment outside the ski area** – direct impact of visitor expenditures at area businesses—hotels, restaurants, retail stores, etc.
- **Employment in the region** – secondary (multiplier) impact of increased economic activity generated by visitor/ski area expenditures.

The estimation of non-resort based impacts is directly related to visitation—as expenditures by visitors would generate dollar flows and support new jobs. Alternative 3 includes projects that would meet the Purpose and Need and result in increased skier visits. Skier visits are projected to increase at an annual compounded rate of 3.10 percent over the first five years and at an overall annual compounded rate of 2.19 percent over ten years under Alternative 3.[87]

[87] RRC Associates, 2013

Over the ten-year analytical timeframe, net annual visitation increases at EMR are expected to reach approximately 51,306 under Alternative 3 (including non-skiers). Visits would increase incrementally over the ten-year projection period.

The daily per capita expenditure estimates summarized above (Table 3E-5) were applied to net annual projected increases in visitation (by visitor type) to develop annual estimates of net increases in visitor expenditures—by industry category—both inside and outside of EMR. The resultant total expenditures were then input to the IMPLAN3 model in order to estimate the net economic impact of Alternative 3 on regional dollar flows, labor income and employment. The results of the IMPLAN3 model are provided in more detail in the project file.

At the completion of the ten-year projection, Alternative 3 would generate 23 FTEs within the resort. Incremental increases in visitation would result in a cumulative total of 53+ new, long-term FTEs regionally—this employment would continue into the future. In addition, labor income would increase by $1.6 million and economic (dollar) activity would increase by $4.8 million on an annual basis. It is important to note that employment (FTE), labor income and dollar values are cumulative, with year 2024 values expected to continue into the future on an annual basis.

Total Impact

Overall, the impacts of increased EMR visitation under Alternative 3 would be significant, with more than half of the impact taking place outside the resort. The *multiplier* impact of operations activity (the amount by which direct impacts are reinvested in the Boulder/Gilpin economy) is 1.43—for every dollar spent directly by EMR visitors, an additional $0.87 (over and above the initial dollar) is circulated through the Boulder/Gilpin County economy.[88]

Cumulatively (including construction and on-going operations), Alternative 3 would generate 395+ FTEs and approximately $63 million in dollar flows over the ten-year projection period. In addition, Alternative 3 would generate a cumulative total of $2.57 million in state and local taxes. Table 3E-10 summarizes the total private sector impact of Alternative 3 projects, in terms of FTEs, state and local taxes and dollar flows. Combined construction and operations impacts are summarized over the ten-year projection timeframe.

[88] Average of employment and dollar multipliers.

Table 3E-10:
Alternative 3 – Economic Impact During Projection Period

	Year										Cumulative
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
PRIVATE SECTOR IMPACTS											
Operations/Increased Visitation											
Jobs (FTEs)	13.1	22.3	26.9	39.4	44.2	46.6	48.9	50.4	51.8	53.2	396.9
Dollar Flows ($Millions)	$0.80	$1.52	$2.24	$2.96	$3.34	$3.71	$4.09	$4.31	$4.54	$4.76	$32.27
Construction Activity											
Jobs (FTEs)	55.9	57.2	29.5	59.5	22.6	0.0	0.0	0.0	0.0	0.0	224.7
Dollar Flows ($Millions)	$8.34	$8.40	$4.61	$6.73	$2.56	$0.00	$0.00	$0.00	$0.00	$0.00	$30.64
Combined											
Jobs (FTEs)	69.0	79.5	56.4	98.9	66.8	46.6	48.9	50.4	51.8	53.2	621.6
Dollar Flows ($Millions)	$9.1	$9.9	$6.8	$9.7	$5.9	$3.7	$4.1	$4.3	$4.5	$4.8	$62.9
PUBLIC SECTOR IMPACTS – STATE & LOCAL TAX COLLECTIONS ($MILLIONS)											
Tax Collections	$0.06	$0.12	$0.18	$0.24	$0.27	$0.30	$0.33	$0.34	$0.36	$0.38	$2.57

Visitor Spending and Tax Revenues

As discussed above, the combined on-going operations and construction activity of Alternative 3 would result in approximately $63 million in dollar flows over the ten-year projection period. This increased economic activity is projected to generate $2.57 million in state and local taxes within the study area. This increased public revenue is not anticipated to meaningfully affect the breakdown of total general revenue by source; however, these additional revenues would help to support the day to day operations of Boulder or Gilpin Counties.

Environmental Justice

Alternative 3 is not expected to directly or indirectly create disproportionately high and adverse human health or environmental effects on minority and low-income populations. No minority populations were identified in the study area where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. Likewise, no low-income populations were identified in the affected area.

CUMULATIVE EFFECTS

For a detailed description of past, present, and reasonably foreseeable future projects within the cumulative effects analysis area, the reader is referred to Appendix A in this document.

Scope of the Analysis

The effects analyzed in the cumulative effects section apply to all alternatives, including the No Action Alternative. For a detailed description of past, present, and reasonable foreseeable future projects, the reader is referred to Appendix A in this document. The following projects are expected to cumulatively have short- and long-term effects on Social and Economic Resources.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for social and economic resources extends from EMR's inception as a ski area in 1961 through the foreseeable future in which EMR can be expected to operate.

Spatial Bounds

It is expected that the social and economic impacts from operations at EMR would be primarily felt locally, within Boulder and Gilpin counties.

Past, Present, and Reasonably Foreseeable Future Actions

As noted above, the estimation of social and economic impacts is directly related to visitation—as expenditures by visitors generate dollar flows and support new jobs. EMR expects visitation to increase as a result of proposed projects. Other projects with potential to impact social and economic resources are:

- 2011 Master Plan
- EMR Annual Operating Plans
- Past Ski Area Projects
- Continued Nederland, and Town of Eldora Residential Build-out
- Mining Activities

Alternatives 1, 2, and 3

Population

Historical mining activity, regional residential growth, and past ski area projects have all impacted population growth in the analysis area. As mentioned above, population in Boulder and Gilpin counties has grown steadily over the past thirty years. None of the alternatives analyzed here are expected to have measurable impacts on regional population trends, thus would not contribute to cumulative effects on population.

Race

Current racial diversity in the study area is a function of a number of historical processes. None of the

alternatives analyzed in this document are expected to measurably affect the racial breakdown of the study area, and thus, by definition, these projects could not contribute to cumulative effects.

Economy

As discussed above, travel and tourism are important components of the Boulder and Gilpin County economies. None of the alternatives analyzed in this document are expected to measurably affect the economic makeup of the study area, and thus, by definition, these projects could not contribute to cumulative effects on the economy.

Employment

While operations at EMR do have the potential to create a limited number of jobs, as discussed above, there would not be a meaningful change to employment status in the study area resulting from any of the alternatives discussed above. Thus, by definition, these projects could not contribute to cumulative effects on employment.

Personal Income

As discussed above, the alternatives analyzed could result in increases in labor income. However, the scale of these changes would not likely contribute to cumulative effects on individual prosperity.

Eldora Mountain Resort

EMR did not propose all projects in the 2011 Master Plan for site specific environmental review in the EIS. Therefore, the projects in the Master Plan that are not part of the Proposed Action and/or Alternative 3 are considered reasonably foreseeable future actions.

Increased visitation at EMR would have substantial impacts at the resort and the surrounding communities, as discussed above. The dollar flows and jobs resulting from increased visitation combined with past ski area projects and future Master Plan projects could have a positive economic effect on EMR. Increased visitation due to future Master Plan projects could lead to more job creation and dollar flow, leading to a positive effect on regional economics.

Visitor Spending and Tax Revenues

Public revenue generated through activity and operations at EMR supports Boulder and Gilpin County management. This has historically been the case, and will continue if EMR continues to attract increasing numbers of visitors. However, the cumulative impact of ski area projects at EMR on the breakdown of total general revenue by source is not meaningful.

Environmental Justice

None of the alternatives analyzed in this document are expected to directly or indirectly create disproportionately high and adverse human health or environmental effects on minority and low-income populations. Thus, by definition, it could not contribute to cumulative effects on environmental justice.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

No irreversible and/or irretrievable commitment of social or economic resources has been identified in association with any of the alternatives analyzed in this document.

F. NOISE

SCOPE OF THE ANALYSIS

The scope of the noise analysis includes a review of the following project components that could potentially affect the acoustic environment:

- Operation of proposed snowmaking infrastructure;
- Proposed construction activities; and
- Proposed resort operations.

Changes to the acoustic environment are qualitatively discussed in relation to the type of equipment used, manufacture's specifications and the duration of noise generating activities. Topography and the distance between noise sources and areas of interest are also considered. The study area for noise includes the EMR SUP area, the Town of Eldora, the Hessie Townsite and dispersed recreation areas north of EMR.

Forest Plan Direction

The current ARP Forest Plan does not provide any pertinent noise standards or guidelines.

Boulder County Noise Ordinance

Boulder County Ordinance No. 92-28 pertains to the regulation of noise on public and private property within Boulder County. The ordinance prohibits excessive sound levels and states: "No person shall operate any type of vehicle, machine, or device, or carry on any activity, or promote or facilitate the carrying on of any activity which makes sound in excess of the levels specified in Sections 1.01.050 of this ordinance."[89]

The following sound levels, as specified in Sections 1.01.050 of the ordinance are relevant to this analysis:

- Sound from vehicles being operated on a public road or highway with a speed limit of 35 mph or less should not exceed 80 dBA.
- Sound from vehicles being operated on a public road or highway with a speed limit of more than 35 mph should not exceed 84 dBA.
- Sound from vehicles with a manufacturer's gross vehicle rating of 10,000 lbs. or more operated on a public road or highway with a speed limit of 35 mph or less should not exceed 86 dBA.
- Sound from vehicles with a manufacturer's gross vehicle rating of 10,000 lbs. or more operated on a public road or highway with a speed limit of more than 35 mph should not exceed 88 dBA.

[89] Boulder County, 2013

- Sound from any vehicle being operated on private property or public property which is not a road or highway should not exceed 78 dBA.
- Sound from a non-vehicular source located in a residential area should not exceed 55 dBA between 7 AM and 7 PM and 50 dBA between 7 PM and 7 AM.
- Construction projects in residential areas shall not exceed 80 dBA between 7 AM and 7 PM and 75 dBA between 7 PM and 7 AM.[90]

However, the use of property for the purpose of manufacturing, maintaining, or grooming machine-made snow is specifically exempted from the provisions of the ordinance.

AFFECTED ENVIRONMENT

Operation of Snowmaking Infrastructure

EMR's snowmaking system covers nearly the entire developed trail network (which does not include gladed areas). The only exception to this is that there is no snowmaking coverage on the *Pipeline* trail and the upper portion of the *West Ridge* trail (roughly half of that trail's area). The total area covered by snowmaking is approximately 170 acres. The snowmaking season typically lasts an average of 90 days, and is usually started on the 21st of October and is finished around the 15th of January. During the snowmaking season snow guns are generally operated for two 12-hour shifts per day, weather permitting. Over the past three seasons, snowmaking operations averaged approximately 1,231 operating hours per season. Table 3F-1, below, shows the number of days and total running hours of snowmaking operations at EMR.

Table 3F-1:
Snowmaking Operating Days and Hours

Season	Operating Days	Total Running Hours
2010/11	94	1,347
2011/12	95	1,322
2012/13	81	1,024
Three-Year Average	**90**	**1,231**

Source: EMR, n.d.

EMR currently employs 302 snow guns in their snowmaking system; however, on average only 32 snow guns are used at one time. During the 2012/13 season, the highest number of guns used at one time was 66 guns. EMR's snowmaking system currently includes 110 K-3000 snow guns, 110 HKD Impulse Towers, 35 York Borax Towers, 23 HKD Spectrum Towers, 18 HKD SV-10 Towers, two HKD Millennium Towers, two Ratniks, one Techno Alpin T-40 and one SMI Super PoleCat.

[90] Ibid.

Although the sound generation of each snowmaking gun varies with manufacturer and model, typical sound levels for snowmaking tower guns are approximately 85 dBA at 50 feet, 71dBA at 250 feet and 59 dBA at 1,000 feet.[91] It is important to note that the attenuation of sound (i.e., the amount of gradual sound loss) through air is based on a number of factors, including the frequency of the sound and the temperature, relative humidity and pressure of the air. Topography and physical objects (e.g., trees, homes, etc.) between noise generation sources and the listener can also reduce the intensity of sound heard. It is also important to note that sound generation from multiple sources is not an additive process. This means that two identical sources of sound do not produce twice the intensity of sound that one source produces. For example, two identical sources of sound each producing 80 dBA individually, would not produce 160 dBA when heard together; rather, they would produce 83 dBA (assuming no interference).[92]

The closest snowmaking infrastructure to the Town of Eldora is located approximately 3,300 feet from the Town. This measurement is calculated from the base of the Indian Peaks chairlift to the west end of town near the intersection of Klondike and Eldorado Avenues.[93] A relatively steep ridgeline blocks views and dampens sound from the bottom of the Indian Peaks chairlift to the Town of Eldora. Snowmaking in this area (the lower portion of the Indian Peak Pod) is relatively short in duration, typically lasting for only a few days. The closest terrain at the base area of EMR is approximately 4,300 feet from the Town of Eldora. This measurement is calculated from the base of the Challenge and Cannonball chairlifts to Eldorado Avenue. The topography between the Town of Eldora and the front-side terrain (including terrain serviced by the EZ, Caribou, Sundance and Race chairlifts) slopes up from the town and Middle Boulder Creek, flattens out and then slopes back down slightly to the base area. As more snowmaking at longer durations occurs in this area than does on the lower portion of the Indian Peak Pod, much of the snowmaking noise currently experienced in the Town of Eldora is a result of snowmaking on the front-side of EMR.

The closest snowmaking infrastructure to the Hessie Townsite is approximately 1,900 feet from the edge of the townsite. This measurement is calculated from the base of the Corona chairlift to Hessie Road approximately 1,700 road-feet from the fork in Eldorado Avenue at Hessie and Fourth of July Roads. Although the upper portions of the trails in the Corona pod (Muleshoe, Corona, West Ridge) are visible from this location, a ridgeline separates the base of the Corona chairlift and the lower portions of these trails from the townsite.

[91] dBA is a measurement of sound level expressed in decibels, filtered or weighted at various frequencies to approximate the response of the human ear. A decibel (dB) is a unit for measuring the intensity of sound. The human hearing range is from 0 dB (the theoretical threshold of audibility) to 130 dB (the average pain threshold). dBA means sound levels in decibels measured on the "A" scale of a standard sound level meter having characteristics defined by the American national standards institute, publication S1. 4 – 1971.
[92] Stanford University, 1999
[93] Although there are some outlying private properties south of Middle Boulder Creek associated with the Town of Eldora, the western edge of Eldorado Avenue, near the intersection with Klondike Avenue, is the closest part of the "town core" which is considered representative for noise heard throughout the town.

The closest snowmaking infrastructure to dispersed recreation areas north of EMR is approximately 1,500 feet from the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads.[94] This measurement is calculated from the base of the Corona chairlift to the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads. Although the upper portions of the *Corona* and *West Ridge* trails are visible from this location, a ridgeline separates the base of the Corona chairlift and the lower portions of these trails from the parking area.

The ARP received noise monitoring data recorded on 12 days between 10/18/1994 and 1/5/1995 from Mr. David Hallock and the Middle Boulder Creek Coalition. Sound levels were recorded by a Realistic Digital Sound Level Meter in the dBA scale. Although affected by specific atmospheric conditions (wind, temperature, etc.) and location of snowmaking on any given day, noise levels in the Town of Eldora were generally less than 50 dBA (too low to be recorded by this specific meter), with the highest recorded noise level being 58 dBA. Noise levels at the Hessie Townsite were generally higher than those within the Town of Eldora. Although noise levels were not recorded in the Hessie Townsite each day, the average of the recorded noise levels was 58 dBA, with the highest noise recorded noise level being 68 dBA. The highest noise level recorded in the dispersed recreation area between the Town of Eldora and the Hessie Townsite was 58 dBA. These noise levels are generally considered moderate. For comparison purposes, a normal conversation at 3 feet is typically between 55 and 60 dBA. An electric shaver at 1.5 feet is typically +/- 68 dBA. It is important to note these measurements were recorded prior to the installation of the Indian Peaks chairlift and terrain.

Construction Activities

No construction activities are currently taking place at EMR. Recent construction projects at EMR were carried out in the late 1990s and early 2000s, including the Indian Peaks expansion project in 1997, construction of the upper parking lot in 1997, replacement of the old Corona chairlift in 1998, the EZ beginner chairlift in 2000 and the Indian Peaks Lodge in 2001. Since that time, the only other major construction project was a 45-acre foot snowmaking reservoir in 2007. Construction activities typically involve the use of heavy equipment such as backhoes, excavators and bulldozers; however, the specific equipment used is dependent upon what is being constructed. Construction of new ski trails typically requires equipment such as chain saws, log skidders, wood chippers, bulldozers, etc.

Resort Operations

EMR is a developed recreational facility. As such, the resort uses a variety of motorized and mechanized equipment which generate noise to carry out resort operations. The equipment used varies between the winter operating season and the summer maintenance season.

[94] The parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads was selected for analysis because it is expected to contain the highest concentration of dispersed recreation users before they are further dispersed on trails or Hessie and Fourth of July Roads.

Winter Operations

In the winter season, EMR uses snowmobiles, passenger vehicles, grooming vehicles and other motorized equipment to carry out resort operations. The majority of this motorized equipment usage occurs during the operating hours of the resort, 9 AM to 4 PM. However, EMR presently operates two or three grooming vehicles nightly to groom approximately 80 to 115 acres of terrain. This acreage includes all of the beginner and intermediate terrain as well as some upper level trails, as needed. Winter operations are carried out while EMR is open for public skiing, typically from mid-November to mid-April (note: snowmaking is usually begun in mid-October, weather permitting). Sound levels associated with common ski area operations at various distances are shown in Table 3F-2.

Table 3F-2:
Typical Sound Levels from Ski Area Sources

	50 Feet	250 Feet	1,000 Feet
Snowmaking Tower Gun (1)	85 dBA	71 dBA	59 dBA
Snowmobile (1)	85 dBA	71 dBA	59 dBA
Passenger vehicle (1)	67–71dBA	53–57dBA	41–45dBA

Source: Acoustical Consulting Services, 2003

Summer Operations

Summer operations at EMR are focused on maintenance and upkeep of the resort; EMR does not provide any services to the public over the summer. Although specific activities vary from year to year, summer operations typically include maintenance of the snowmaking, chairlift, trail, electrical and road systems. Tree work and mountain pine beetle mitigation is also usually completed in the summer. Some motorized and mechanized noise generating equipment, such as chain saws and pick-up trucks, is used. Summer operations are carried out between April and November and generally take place from 9 AM to 4 PM.

Ambient Sound levels

For comparison purposes, the following table portrays the dBA level associated with commonly encountered noise sources in the environment.

Table 3F-3:
Noise Levels (dBA) for Common Noise Sources

Common Noise Source	Sound Level (dBA)	Subjective Evaluation
Human breathing at 3 feet	8–10	Just Audible
Quiet rural area or a bedroom at nighttime	25–30	Very Quiet
Wind in trees at 10 mph or soft stereo music in a residence	40–45	Quiet
Birds at 10 feet or normal conversation at 3 feet	55–60	Moderate
Electric shaver at 1.5 feet	+/- 68	
Vacuum cleaner at 10 feet or a large dog barking at 50 feet	70–75	Loud
Alarm clock ringing at 5 feet	+/- 80	
Lawn mower at 5 feet, food blender or garbage disposal at 3 feet	85–90	Very Loud
Train pulling hard at 100 feet	+/- 94	
Train siren at 50, motorcycle at 25 feet, car horn at 10 or a chain saw at 2 feet	100–110	Extremely Loud
Thunder nearby	+/- 115	
Hard rock band at 16 feet or a jet aircraft at 300 feet during takeoff	120–130	Painful
Jet aircraft at 75 feet or a long range gun at 0 feet	140	Deafening

Source: Acoustic Consulting Services, 2003

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

The No Action Alternative is a true no action alternative and reflects a continuation of existing operations and management practices at EMR without changes. Alternative 1 would have no direct or indirect impacts on noise within the study area.

Alternative 2 – Proposed Action

Operation of Snowmaking Infrastructure

Snowmaking coverage is proposed for all new ski trails, excluding tree and gladed skiing areas. This would result in approximately 58 acres of additional snowmaking coverage. Although the specific number of additional snow guns needed for this terrain is unknown at this time, on average the number of snow guns that are used at one time at EMR is not expected to change; remaining in the 30 to 35 range. The highest number of guns used at one time is also expected to remain within the range of plus or minus 66 guns.[95] The duration of the snowmaking season is expected to remain relatively constant, at approximately 90 days, usually starting in mid-October and ending mid-January. During the snowmaking season snow guns would continue to be operated for two 12-hour shifts per day, weather permitting. EMR intends to install HKD SV-10201 Towers in fixed locations along the proposed terrain. The

[95] Note: Snowmaking operations at EMR are limited by the capacity/throughput of the snowmaking system and the available water; neither of which would change under the Proposed Action.

manufacturer's specifications for this snow gun estimate the sound pressure level to be approximately 85 dBA at a distance of 50 feet from the snow gun.[96]

The closest snowmaking infrastructure to the Town of Eldora would be located approximately 2,600 feet from the Town. This measurement is calculated from the base of the proposed Placer chairlift to the west end of town near the intersection of Klondike and Eldorado Avenues. The same relatively steep ridgeline that dampens sound from the bottom of the Indian Peaks chairlift to the Town of Eldora would also block the proposed snowmaking in this area. Proposed snowmaking on the trails served by the Placer chairlift would be relatively short in duration, lasting for only a few days of the total snowmaking season. Much of the snowmaking noise experienced in the Town of Eldora is expected to continue to be a result of snowmaking on the front-side of EMR, as more snowmaking, at longer durations, would continue on the front-side terrain (including terrain serviced by the EZ, Caribou, Sundance and Race chairlifts).

The closest snowmaking infrastructure to the Hessie Townsite would be located approximately 1,500 feet from the edge of the townsite. This measurement is calculated from the closest western portion of proposed trail P-6 to Hessie Road approximately 1,700 road-feet from the fork in Eldorado Avenue at Hessie and Fourth of July Roads. Although some sound would be dampened by the same ridgeline that blocks sound from the lower Corona pod, sound generated by snowmaking on proposed terrain near Middle Boulder Creek would have little landform interference before reaching the townsite. Proposed snowmaking on the trails served by the Placer chairlift, particularly those areas near Middle Boulder Creek, would be relatively short in duration, lasting for only a few days of the total snowmaking season.

The closest snowmaking infrastructure to dispersed recreation areas north of EMR would be located approximately 300 feet from the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads. This measurement is calculated from the closest northern portion of proposed trail P-6 (near Middle Boulder Creek) to the parking area. Although sound generated by snowmaking on the upper portion of the proposed trails would be blocked by the lower ridgeline, the trail segments that extend beyond the existing Corona Road trail (i.e., those nearest to Middle Boulder Creek) would have little to no landform interference. Proposed snowmaking on the trails served by the Placer chairlift, particularly those areas near Middle Boulder Creek, would be relatively short in duration, lasting for only a few days of the total snowmaking season. It is important to note that Eldorado Avenue is not plowed in the winter and most users in this area are traveling along Eldorado Avenue on foot, snowshoe or cross country skis. Therefore, it is likely that users would be traveling through this area and would not remain at one location along Eldorado Avenue for long durations of time.

Proposed snowmaking in the Jolly Jug pod is not expected to increase the sound level experienced in the Town of Eldora, the Hessie Townsite or dispersed recreation areas north of EMR. The closest proposed

[96] HKD Snowmakers, 2013

snowmaking in the Jolly Jug pod would be over 7,000 feet from each of these three locations and would be separated by numerous ridgelines.

Noise impacts from snowmaking operations are expected in each location, with a minimal change in the sound heard in the Town of Eldora, moderate change in the sound heard in the Hessie Townsite and considerable change in sound heard at the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Road. Noise impacts to other dispersed recreation areas north of EMR will vary depending on the proximity and the landforms between the specific area and the proposed snowmaking. All of these impacts are expected to be short in duration, likely less than one week out of the snowmaking season.

Construction Activities

Construction of the project components is expected to occur over a period of five years. The Jolly Jug chairlift and trails as well as the Placer chairlift and trails are expected to be constructed in the first year of construction. Snowmaking system improvements are also expected to be installed in the first year of construction. The Corona chairlift replacement and parking improvements are expected to be completed in the second year of construction. The Challenge chairlift replacement is expected to be completed in the third of construction. The Challenge Mountain Facility is expected to be constructed in the fourth year and the Lookout Facility is expected to be constructed in the fifth year of construction. Vegetation management projects are expected to be completed in the first and second years of construction.[97]

Construction of the project components is expected to involve sound-generating motorized equipment, including backhoes, excavators, bulldozers, chain saws, log skidders and wood chippers, among others; however, the specific equipment used is dependent upon what is being constructed. Under the Alternative 2, most project components are expected to be of sufficient distance, and separated by considerable landforms, from the Town of Eldora, the Hessie Townsite and dispersed recreation areas north of EMR, which would cause construction noise heard in these areas to be minimal and negligible. However, noise generated by the construction of the Placer chairlift and trails (P-1–P-6) would be heard in the dispersed recreation areas north of EMR, particularly along Eldorado Avenue and at the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads. To a lesser extent, noise generated by the construction of the Placer chairlift and trails may also be heard in the Hessie Townsite. Due to the distance and landforms between the project site and the Town of Eldora construction noise heard in the town is expected to be minimal. Noise heard in these areas would be limited to the first year of construction and would likely be carried out between May and October on weekdays between 9 AM to 4 PM. It is important to note construction is not expected to occur on the weekends, when these areas would receive the highest amount of use. Although construction would not occur in residential areas, noise heard in residential areas (i.e., the Town of Eldora) is not expected to be anywhere near the 80 dBA threshold established by the Boulder County Noise Ordinance for construction projects.

[97] This construction timetable was provided by EMR as a part of a conceptual construction plan; the actual timing of the construction of project components may vary.

Most construction project areas are expected to be accessed through the base area of EMR; however, construction of some of the Placer trails (P-1–P-6), Placer Glades II and the Placer chairlift would be accessed by traveling along the shelf road, on Eldorado Avenue through the Town of Eldora and up to the base of the proposed Placer chairlift. It is assumed EMR will transport employees from the base area of the resort to construction sites in two high-occupancy vehicles (van or large SUV). The Town of Eldora is expected to experience these vehicles traveling through the town twice a day (one trip each way) in the first year of construction. Noise from these vehicles is not expected to reach or exceed the 80 dBA threshold established by the Boulder County Noise Ordinance for vehicles being operated on a public road or highway with a speed limit of 35 mph or less. Construction of the other project components is expected to be accessed through the base area of EMR and would not impact the Town of Eldora.

It is assumed EMR will transport heavy equipment necessary for construction (back-hoes, skidders, etc.) from the base area of the resort to construction sites once and then store the equipment at the construction site for the rest of the construction season. It is assumed five heavy equipment vehicles would be needed. The Town of Eldora is expected to experience these vehicles traveling through the town twice in the first year of construction for the Placer chairlift and trails. Noise from these vehicles is not expected to reach or exceed the 80 dBA threshold established by the Boulder County Noise Ordinance for vehicles being operated on a public road or highway with a speed limit of 35 mph or less or the 88 dBA threshold established by the Boulder County Noise Ordinance for vehicles with a manufacturer's gross vehicle rating of 10,000 lbs. or more. Construction of the other project components is expected to be accessed through the base area of EMR and would not impact the Town of Eldora.

It is assumed that 53 long logger truck loads would be necessary to remove the timber from tree clearing associated with the Placer chairlift and trails.[98] These trucks would travel along Eldorado Avenue through the Town of Eldora approximately 106 times in the first year of construction (53 trucks with one trip on the way in and one trip on the way out). Noise from these vehicles is not expected to reach or exceed the 88 dBA threshold established by the Boulder County Noise Ordinance for vehicles with a manufacturer's gross vehicle rating of 10,000 lbs. or more. Tree removal trips for the other project components are expected to be accessed through the base area of EMR and would not impact the Town of Eldora.

EMR would conduct limited rock blasting through the use of dynamite within the Placer chairlift and terrain pod. The acoustic levels of airblast, or air pressure, is measured in dB. The maximum airblast limits range from 129 dB to 134 dB. Blasting would occur over an approximate 15-minute period over several days during construction. To reduce noise impacts, blasting could occur in the springtime when snow is still present.

[98] Refer to the construction trips assumptions document contained in the project file.

Resort Operations

Upon completion of the project components of Alternative 2, EMR would likely employ a variety of noise-generating motorized and mechanized equipment to carry out resort operations. The equipment used varies between the winter operating season and the summer maintenance season.

Winter Operations

In the winter, snowmobiles, grooming vehicles and the operation of the Placer chairlift may be able to be heard in dispersed recreation areas north of EMR, particularly along Eldorado Avenue and at the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads. The majority of this motorized equipment usage would occur during the operating hours of the resort, 9 AM to 4 PM. However, EMR may operate grooming vehicles during the night. Hence, a moderate amount of sound may be heard in dispersed recreation areas north of EMR during the day and a minimal amount of sound may be heard in these areas at night. Note: Snow grooming vehicles are specifically exempted from the provisions of the Boulder County Noise Ordinance. The sound heard in the Town of Eldora and the Hessie Townsite resulting from winter operations is expected to be minimal and negligible.

Summer Operations

Summer operations at EMR would continue to be focused on maintenance and upkeep of the resort; EMR would not provide any services to the public over the summer. Although specific activities would vary from year to year, summer operations would likely include maintenance of the snowmaking, chairlift, trail, electrical and road systems. Tree work and mountain pine beetle mitigation would also be completed in the summer. Some motorized and mechanized noise generating equipment, such as chain saws and pick-up trucks, would be used. Noise resulting from maintenance of EMR systems and tree work/mountain pine beetle mitigation in the Placer area may be heard in dispersed recreation areas north of EMR, particularly along Eldorado Avenue and at the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads. This noise is expected to be limited in duration—a few hours to a few days—and would not occur every summer. The sound heard in the Town of Eldora and the Hessie Townsite resulting from summer operations is expected to be minimal and negligible.

Alternative 3

Operation of Snowmaking Infrastructure

Snowmaking coverage is proposed for all new ski trails, excluding tree and gladed skiing areas. This would result in approximately 52 acres of additional snowmaking coverage. Although the specific number of additional snow guns needed for this terrain is unknown at this time, on average the number of snow guns that are used at one time at EMR is not expected to change; remaining in the 30 to 35 range. The highest number of guns used at one time is also expected to remain within the range of plus or minus

66 guns.[99] The duration of the snowmaking season is expected to remain relatively constant, at approximately 90 days, usually starting in mid-October and ending mid-January. During the snowmaking season snow guns would continue to be operated for two 12-hour shifts per day, weather permitting. EMR intends to install HKD SV-10201 Towers in fixed locations along the proposed terrain. The manufacturer's specifications for this snow gun estimate the sound pressure level to be approximately 85 dBA at a distance of 50 feet from the snow gun.[100]

The closest snowmaking infrastructure to the Town of Eldora would be located approximately 3,185 feet from the town. This measurement is calculated from the northeastern portion of the proposed IP-1 trail to the west end of town near the intersection of Klondike and Eldorado Avenues. The proposed IP-1 trail is in a similar alignment to the existing Lower Diamond Back trail, but is approximately 300 feet further to the east (at its farthest distance). The same relatively steep ridgeline that dampens sound from the bottom of the Indian Peaks chairlift to the Town of Eldora would also block the proposed snowmaking in this area. There would be no snowmaking north (toward Middle Boulder Creek) of the existing EMR trails (i.e., Corona Road). Proposed snowmaking on IP-1 would be very short in duration, lasting for only a few hours to one day of the total snowmaking season. Much of the snowmaking noise experienced in the Town of Eldora is expected to continue to be a result of snowmaking on the front-side of EMR, as more snowmaking, at longer durations, would continue on the front-side terrain (including terrain serviced by the EZ, Caribou, Sundance and Race chairlifts). The change in snowmaking noise heard in the Town of Eldora is expected to be minimal and negligible under Alternative 3.

The distance from the closest snowmaking infrastructure to the Hessie Townsite would not change and would remain approximately 1,900 feet from the edge of the townsite. This measurement is calculated from the base of the Corona chairlift to Hessie Road approximately 1,700 road-feet from the fork in Eldorado Avenue at Hessie and Fourth of July Roads. New tails would be constructed in the Corona area (C-1 through C-4). The upper portions of these trails would be visible from this location, but a ridgeline would block the lower (and closer) portions of these trails from the townsite. Snowmaking on these proposed Corona trails would be relatively short in duration, lasting for only a few days of the total snowmaking season. The change in snowmaking noise heard in the Hessie Townsite is expected to be minimal and negligible under Alternative 3.

The distance from the closest snowmaking infrastructure to dispersed recreation areas north of EMR would not change and would remain approximately 1,500 feet from the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Roads. This measurement is calculated from the base of the Corona chairlift to the parking area near the fork in Eldorado Avenue at Hessie and Fourth of July Road. New tails would be constructed in the Corona area (C-1 through C-4). The upper portions of these

[99] Note: Snowmaking operations at EMR are limited by the capacity/throughput of the snowmaking system and the available water; neither of which would change under Alternative 3.
[100] HKD Snowmakers, 2013

trails would be visible from this location, but a ridgeline would block the lower (and closer) portions of these trails from the parking area. Snowmaking on these proposed Corona trails would be relatively short in duration, lasting for only a few days of the total snowmaking season. The change in snowmaking noise heard in the dispersed recreation areas north of EMR is expected to be minimal and negligible under Alternative 3.

Although the Jolly Jug trails would extend further to the southeast under Alternative 3, proposed snowmaking in the Jolly Jug pod is not expected to increase the sound level experienced in the Town of Eldora, the Hessie Townsite or dispersed recreation areas north of EMR. The closest proposed snowmaking in the Jolly Jug pod would be over 7,000 feet from each of these three locations and would be separated by numerous ridgelines.

Construction Activities

Construction of the project components is expected to occur over a period of five years. The Jolly Jug chairlift and trails as well as the proposed Indian Peaks and Corona trails are expected to be constructed in the first year of construction. Snowmaking system improvements are also expected to be installed in the first year of construction. The Corona chairlift replacement and parking improvements are expected to be completed in the second year of construction. The Challenge chairlift replacement is expected to be completed in the third of construction. The Challenge Mountain Facility is expected to be constructed in the fourth year and the Lookout Facility is expected to be constructed in the fifth year of construction. Vegetation management projects are expected to be completed in the first and second years of construction.[101]

Construction of the project components is expected to involve sound-generating motorized equipment, including backhoes, excavators, bulldozers, chain saws, log skidders and wood chippers, among others; however, the specific equipment used is dependent upon what is being constructed. Under Alternative 3, all project components are expected to be of sufficient distance, and separated by considerable landforms, from the Town of Eldora, the Hessie Townsite and dispersed recreation areas north of EMR, which would cause construction noise heard in these areas to be minimal and negligible. Any of the minimal noise that may be heard in these areas would be limited to between May and October on weekdays between 9 AM to 4 PM. It is important to note construction is not expected to occur on the weekends. Although construction would not occur in residential areas, noise heard in residential areas (i.e., the Town of Eldora) is not expected to be anywhere near the 80 dBA threshold established by the Boulder County Noise Ordinance for construction projects.

All construction project areas are expected to be accessed through the base area of EMR; no project sites would be accessed through the Town of Eldora. It is assumed EMR will transport employees from the

[101] This construction timetable was provided by EMR as a part of a conceptual construction plan; the actual timing of the construction of project components may vary.

base area of the resort to construction sites in two high-occupancy vehicles (van or large SUV). Noise from these vehicles is not expected to reach or exceed the 80 dBA threshold established by the Boulder County Noise Ordinance for vehicles being operated on a public road or highway with a speed limit of 35 mph or less. It is assumed EMR will transport heavy equipment necessary for construction (back-hoes, skidders, etc.) from the base area of the resort to construction sites once and then store the equipment at the construction site for the rest of the construction season. Noise from these vehicles is not expected to reach or exceed the 80 dBA threshold established by the Boulder County Noise Ordinance for vehicles being operated on a public road or highway with a speed limit of 35 mph or less or the 88 dBA threshold established by the Boulder County Noise Ordinance for vehicles with a manufacturer's gross vehicle rating of 10,000 lbs. or more. No truck trips for removing timber from tree clearing are expected to travel through the Town of Eldora under Alternative 3—all trucks would travel from project sites through the EMR base area and down the Shelf Road. Noise from these vehicles is not expected to reach or exceed the 88 dBA threshold established by the Boulder County Noise Ordinance for vehicles with a manufacturer's gross vehicle rating of 10,000 lbs. or more.

Resort Operations

Upon completion of the project components of Alternative 3, EMR would likely employ a variety of noise-generating motorized and mechanized equipment to carry out resort operations. However, the physical distance and landforms present between the proposed projects of Alternative 3 and the Town of Eldora, the Hessie Townsite and dispersed recreation areas north of EMR would make the change from existing noise conditions in these areas minimal and negligible. This would be true for both winter and summer operations.

CUMULATIVE EFFECTS

Scope of the Analysis

For a detailed description of past, present, and reasonably foreseeable future projects within the cumulative effects analysis area, the reader is referred to Appendix A in this document.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for scenery resources extends from EMR's inception as a ski area in 1961, through the foreseeable future in which EMR can be expected to operate (EMR's current 30-year SUP expires December 31, 2021; however, this analysis assumes the SUP would be reissued).

Spatial Bounds

The spatial bounds for this cumulative effects analysis is the same as the direct and indirect effects analysis and is focused on EMR's existing and proposed SUP area, the Town of Eldora, the Hessie Townsite and dispersed recreation areas north of EMR.

Past, Present, and Reasonably Foreseeable Future Projects

Past, present, and reasonably foreseeable future projects with potential to cumulatively contribute to noise impacts to the analysis include the following:

- 2011 Master Plan
- EMR Annual Operating Plans
- Past Ski Area Projects
- Corona Trail Grading EA
- Continued Nederland and Eldora Residential Build-Out

Alternatives 1, 2, and 3

EMR did not propose all projects in the 2011 Master Plan for site specific environmental review in the EIS. Therefore, the projects in the Master Plan that are not part of the Proposed Action and/or Alternative 3 are considered reasonably foreseeable future actions.

Cumulatively, the various projects that have occurred or are anticipated to take place at EMR and near the Town of Eldora and Hessie Townsite have the potential to influence noise levels. It is important to recognize that when sound levels are summed together it is the stronger noise source that dominates the influence. Therefore it is the existing snowmaking between mid-October and late December that is of the most important in a cumulative context. Future projects including additional snowmaking infrastructure could thus have cumulative impacts on noise in the area. These projects would be similar to the impacts associated with the action alternatives and the related noise impacts.

Other past, present, and reasonably foreseeable future projects that would result in cumulative acoustic impacts would include short-term construction related to the Corona Trail Grading EA and ski area infrastructure including ski trails and chairlifts. Additionally, residential construction in the Town of Eldora could also lead to short-term noise impacts.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

No irreversible and irretrievable commitments of resources as expected with respect to noise.

G. FOREST HEALTH

SCOPE OF THE ANALYSIS

The study area consists of EMR's 524-acre SUP area, designated as Management Area 8.22, adjacent NFS lands to be incorporated into EMR through the proposed SUP boundary adjustments, and adjacent private land currently managed by EMR for downhill skiing opportunities. The scope of this analysis includes forested vegetation along the north and east slopes of Bryan Mountain. The components of the action alternatives would meet the Forest Plan definition of vegetation management—"any activities undertaken to modify the existing condition of the vegetation."[102] Although some components of the action alternatives are not specifically designed as vegetation management projects, this analysis incorporates and analyzes plan components from the EMR Vegetation Management Plan (VMP) as it relates to the alternatives.[103]

FOREST SERVICE DIRECTION

Activities permitted and conducted on NFS lands must comply with the long-term management directions included in the Forest Plan. The desired future conditions within Management Area 8.22 include the following vegetation management direction:

> *"Maintain or improve vegetation composition and structure to provide a pleasing appearance, maintain scenic views from the site and provide for sustainable vegetation cover. A variety of tree and associated plant species are present. Arrangement of vegetation and featured species complement the area's appearance, provide for user safety, and minimize maintenance costs.*
>
> *"Manage scenic resources so that the character is one of forested areas interspersed with openings of varying widths and shapes. Manage tree stands and islands to provide a variety of species and size classes, stability, longevity, esthetics, and wind firmness to sustain forest cover and complement recreational values." (384)*

Additionally, the Forest Plan contains a forest-wide Guideline relating to forest health:

> *"Manage vegetation in high-use recreational areas to provide for public safety and to improve forest health, as needed to maintain or improve the desired recreational settings(s)."(34)*

AFFECTED ENVIRONMENT

The ARP has experienced heavy mortality of mature lodgepole pine due to an epidemic population of mountain pine beetle (*Dendroctonus ponderosae*). A mountain pine beetle (MPB) outbreak was initially

[102] USDA Forest Service, 1997a
[103] Eldora Mountain Resort, 2013

detected in the Rocky Mountain Region (Region 2) of the U.S. Forest Service in 1996.[104] Conditions across Region 2 resulted in unhealthy forest stands susceptible to insect infestation.[105] MPB easily spread throughout the region, to approximately 3.6 million acres.[106] In the last three years the MPB infestation has slowed; however, dead and dying trees still remain in areas impacted by MPB.[107]

The study area consists of a single forest habitat type known as the plant association subalpine fir-Englemann spruce-grouse whortleberry. Mature lodgepole pine and Englemann spruce-subalpine fir dominate the study area with patches of aspen and limber pine and isolated Douglas-fir.

A forest inventory was conducted across 751 acres of EMR's SUP area and on adjacent private lands owned or leased by EMR in September and October of 2011. The inventory was conducted using the USFS Common Stand Exam protocols, is archived in the USFS R2 FSVeg database, and is further detailed in the EMR VMP, contained in the project file.

Existing Vegetation Communities within the Study Area

Four dominant vegetation communities were identified within the ski resort including lodgepole pine-spruce-fir mixed forest, grasslands (ski trails), spruce-fir forest, and mixed species forest. Each of these dominant types could have small inclusions of wetlands, willows, water, mountain shrub, and aspen habitats that may be either too small to map or not the dominant species.

Current conditions within the study area support the following vegetation types: lodgepole pine (*Pinus contorta*) spruce-fir mixed forest (39 percent), ski trails (19 percent), spruce-fir (*Picea engelmannii-Abies bifolia*) forest (14 percent), mixed species (spruce-fir, lodgepole pine, aspen and Douglas-fir) (14 percent), lodgepole pine (*Pinus contorta*) (6 percent), limber pine (3 percent), willow wetlands (2 percent), mixed pine (LP/LI) forest (2 percent), spruce-fir limber pine mixed forest (1 percent), widely scattered spruce-fir (<1 percent).

Below is a brief description of the most extensive forest communities within the study area. A more detailed description of these forest communities is contained in the EMR VMP in the project file.[108]

Lodgepole Pine/Spruce/Fir Mix

This is the most extensive cover type occurring at EMR, containing a mosaic of lodgepole pine, Englemann spruce and subalpine fir. While lodgepole pine is the dominant cover type, spruce and fir on average make up 35 percent of the total trees per acre greater than 5 inches in diameter on these sites; and often times occur as co-dominants. These stands originated between 1802 and 1906. There exist old-age lodgepole stands (that do not meet the definition of "old-growth" due to lack of downed woody debris)

[104] USDA Forest Service, 2011c
[105] Ibid.
[106] Eldora Mountain Resort, 2013
[107] USDA Forest Service, 2014
[108] Eldora Mountain Resort, 2013

that are stunted and exhibit altered morphology or size due to the harsh growing conditions at EMR's upper subalpine environments. Such stands are noteworthy biologically and also contribute to aesthetic qualities.

MPB mortality in the lodgepole pine varied considerably across these sites, and recent attacks were observed in some stands. The relative small diameter of the lodgepole pine as well as the species diversity prevented heavy MPB infestation.

This forest community is structurally diverse, a blend of two-story, multiple story and mosaic patterns in the overstory. Regeneration is present and strong throughout this cover type, with all species successfully reproducing. Seedlings and saplings were generally of good form and relatively well distributed.

Spruce-Fir Forest Community

The spruce-fir forest community is the third most extensive vegetation type at the ski area. This cover type is characterized by the dominance of Englemann spruce and subalpine fir. Subtle differences in slope and aspect result in varying spruce-fir structural conditions (tree sizes and ground cover).

Tree ring data shows the spruce-fir dominant stands within the ski area mostly originated between the late-1730s through the 1910s as a result of historic fire. The lack of standing dead remnant following insect mortality suggests fire has been the dominant change agent. Within-stand tree ages vary to a high degree due to the shade-tolerant, uneven-aged ecology of the spruce-fir forest type. Stand structure is multi-storied with diameter classes of 6 to 14 inches well represented. Recent unsuccessful spruce beetle attacks were observed in some stands. Other damaging agents detected across these sites included broom rust and root disease. Spruce-fir vigor is highly variable primarily limited by the low water holding capacity of many of these soils. Lodgepole pine is a minor component of these stands, occurring as widely scattered individuals, in very small patches, as recent MPB mortality or remnants.

Spruce and fir regeneration, although plentiful, is unevenly distributed across these sites favoring northerly aspects, moderate to high canopy closure, drainages or other mesic sites. Generally regeneration is of good form and vigor.

Mixed Species

This uneven aged dynamic blend of spruce-fir, lodgepole pine, limber pine, aspen and Douglas-fir is the fourth most extensive forest community at EMR. Rich in species and structural diversity, these multi-storied stands are fairly uniformly stocked with diameter classes of 6 to 14 inches well represented. Generally spruce, fir and lodgepole pine occur as co-dominants with scattered inclusions of limber pine, aspen and Douglas fir. On average, limber pine accounts for 11 percent of the total trees per acre greater than 5 inches in diameter, while aspen accounts for 12 percent. Douglas-fir is a minor component, contributing 3 percent of the total trees per acre and occurring incidentally elsewhere. With the exception

of a few rock outcrops and small boulder fields, site and soil conditions are generally good, resulting in good vigor throughout.

Lodgepole pine trees infected with western gall rust and dwarf mistletoe were common across these sites as well as some scattered patches of MPB mortality. Recent mountain pine beetle activity was detected in some stands. One recent unsuccessful spruce beetle bole attack (pitchout) was also observed. Other damaging agents affecting spruce and fir across these sites included widely scattered broom rust and root disease.

Regeneration, although abundant, was unevenly distributed, exceeding 1,250 trees per acre in all sites. Generally, regeneration was of good health and form with all species successfully reproducing with the exception of limber pine.

Old Growth

Old growth, or late-successional, forests are defined as forested areas exhibiting particular characteristics including large diameter trees, high accumulations of dead standing and fallen trees, multiple canopy layers, etc.[109]

Old growth is defined as:[110]

- Large trees for species and site;
- Wide variation in tree sizes and spacing between trees;
- Relative to earlier stages, high accumulation of large, dead standing and fallen trees;
- Decay in the form of broken and deformed boles and root rots;
- Multiple canopy layers; and
- Canopy gaps and understory patchiness.

Late-successional forest is ecological “old growth” emphasizing climax species (late stage) forest condition within a specific forest habitat type such as plant association subalpine fir (*Abies bifolia*)-Engelmann spruce (*Picea engelmannii*)-grouse whortleberry (*Vaccinium scoparum*).[111] There are existing and potential non-climax species “old growth” that are relatively limited in Colorado including lodgepole pine, Douglas-fir, ponderosa pine and aspen. The combination of old growth components (above) provides cover, food and “housing” for many species of wildlife, thus, is very desirable. Critical is the component that provides housing—large tree decadence or “soft” snags.

[109] Buell Environmental LLC, 2013
[110] Kaufmann et al., 1992
[111] USDA Forest Service, 1987

The most natural potential for late-successional forest at EMR occurs on northerly aspects, moderate elevation and or along wet drainages where water and snow are available for large tree growth and mesic conditions for stem decay (fungi).[112] The overall sources of tree mortality across EMR occur from bark beetles, rusts, dwarf mistletoe and root disease. Thus, forest conditions include predominately hard snags. Soft snags occur to lesser amounts and mostly in the larger lodgepole pine and large limber pine without spruce-fir. Although several stands have potential live late successional character, the lack of adequate large standing dead and decay does not meet goals and guidelines described by Mehl or desired in the Forest Plan for old growth.[113]

Insects, Diseases and Damage

Mountain pine beetle, Dwarf mistletoe (*Arceuthobium americanum*), Western Gall Rust (*Endocronartium harknessii*), Spruce beetle (*Dendroctonus rufipennis*) spruce broom rust (*Chrysomyxa arctostaphyli*) and fir broom rust (*Mellampsorella caryophyllacearum*), Armillaria Root Disease (*Armillaria ostoyae*) have all been observed at EMR. These insects, funguses and diseases cause damage to trees and can ultimately kill trees and stands within EMR.

Dwarf mistletoe is a parasitic plant that is the most widespread and damaging disease agent in lodgepole pine throughout its range. Heavy mistletoe infections adversely impact tree and stand vigor by reducing rates of height and diameter growth and seed and cone production. Low to moderate levels of dwarf mistletoe infections are common in the lodgepole pine dominated stands where 10 to 40 percent of the lodgepole are affected. Witches brooms often form on infected branches. Stem cankers or swellings sometimes result from stem infections. Dwarf mistletoe plants form shoots on branches or stems of host trees. These shoots are 1 to 4 inches in length and usually yellow or green. This pathogen, although rarely fatal, spreads easily to adjacent lodgepole pine trees. Infected trees are more susceptible to other damaging agents. Bark beetles often attack trees weakened by dwarf mistletoe infections.

White pine blister rust (WPBR) (*Cronartium ribicola*) was detected in Rocky Mountain bristlecone and limber pines in 2003, the Wet Mountains and the Sangre de Cristo Range in 2004 and more recently, localized infections have been found in Rocky Mountain National Park, near the community of Ward, and on the north slope of Pikes Peak. A new area of white pine blister rust infection was detected in May 2012 in the Left Hand Canyon area of Boulder County. Field surveys conducted in September and October of 2011 did not detect any white pine blister rust infections at EMR and because most of the landscape is not “low lying” and moisture regimes are highly variable where limber pine are growing (e.g., exposed ridges, scree fields, rock outcrops), the area is likely at low risk for white pine blister rust. However,

[112] Mehl, 1992
[113] Mehl, 1992; USDA Forest Service, 1997a

because WPBR is thought to be an imminent threat to limber pine in Colorado; it is currently known to occur near the Town of Ward, it could potentially be present in low concentrations in the EMR area.[114]

Cores taken from limber pines near the Lookout Restaurant, at the top of the Corona Ski Trail, show that some of the larger trees near, around 24 inches at dbh, are over 400 years old.[115] Limber pine ecosystems serve a variety of important ecological roles such as occupying and stabilizing dry habitats, colonizing sites after wildfire, facilitating the establishment of late successional species, and providing food and habitat for animals.[116] However, limber pine forests, as well as other five-needle pine forests in western North America, are declining because of a combined threat of white pine blister rust (WPBR) and the MPB. In the Colorado Front Range, WPBR is not as pervasive as in other areas of the western U.S., however limber pines are being heavily affected by the current MPB epidemic. Both the WPBR and MPB stressors are further exacerbated by continued polices of fire exclusion and emerging changes in climate.[117] As limber and other five-needle pines continue to decline, the diversity of wildlife and plant species that depend on them for food and cover will also decline. Furthermore, limber pine mortality on harsh, steep, dry sites may transition these forested sites to treeless areas affecting slope stability, snow retention and watershed hydrology. MPB occur at EMR and the ski area has been spraying preventative insecticides to protect approximately 4,200 high-value pine trees since 2008. Limber pine is an important tree species threatened by several factors and, within the project area, the Forest Service desires that these trees, where healthy and free of MPB and WPBR, be conserved wherever practicable. Such trees and stands are increasingly biologically important in serving as genetic reserves of limber pine as more stands exhibit die-off from MPB infestation or WPBR infection along the Colorado Front Range and across the Forest.

Mountain Pine Beetle

MPB is an insect native to the forests of western North America that typically infests ponderosa pine (*Pinus ponderosa*), lodgepole and limber pines (*Pinus flexilis*). Periodic outbreaks can result in widespread pine tree mortality. During the early stages of an outbreak attacks are focused on less healthy trees due to old age, stress from injury or disease, poor growing conditions and overcrowding. As beetle populations increase in the later stages of outbreaks or epidemics, most trees with diameters over 4 to 5 inches are susceptible to attack.

The recent extensive warm winters, early spring snowmelt, droughty summers, and continuous stands of dense mature lodgepole pine created the ideal environment for the current MPB epidemic which has resulted in approximately 3.6 million acres of lodgepole pine mortality across the Rocky Mountain region.

[114] Burns, 2013
[115] Huckaby, 2012
[116] Schoettle, 2004
[117] Keane et al., 2011

All the stands inventoried at EMR have some degree of infestation from the recent MPB epidemic. MPB mortality rates within the EMR study area ranged from 15 to 80 percent. Mortality depends on species composition, diameter classes, individual site conditions and the concentration of lodgepole pine. Currently, approximately 750 acres of lodgepole and mixed pine forests exhibit effects from MPB. Trees that are affected will eventually fall, resulting in openings in the forest canopy and an increased risk for blow down on standing trees.

In an attempt to maintain key lodgepole pine stands at the resort, EMR has been applying carbaryl to approximately 4,200 trees within their operational boundary (approximately 1,300 on NFS lands and 2,900 on private lands owned or leased by the resort), annually since 2008. Carbaryl kills or deters attacking beetles on individual trees.[118] Spraying throughout the SUP area was approved by the District Ranger in a 2007 Decision Memo for Direct Control Efforts for the Mountain Pine Beetle at Eldora Mountain Resort. The Decision Memo approved treatment areas on the front-side of the mountain, along the ridgeline to the west and in critical areas that serve as screens or windbreaks particularly those surrounding the top terminals of chairlifts. Specifically, stands surrounding the top of Challenge and Cannonball chairlifts, the patrol headquarters (PHQ), and the top terminal of Indian Peaks chairlift have been sprayed. Spraying has been approximately 95 percent effective in these stands.

The application of carbaryl occurs by spraying healthy trees in early summer, after snowmelt. In addition to carbaryl spraying, a test stand was baited with verbenone packs, which secrete pheromones that discourage MPB from infesting bait trees. EMR found that the packs were less successful when used for protecting at a broad scale and therefore, no additional verbenone packs were used at EMR.

Wildfire Fuels

As discussed above, the MPB epidemic has resulted in patches of dead and dying lodgepole pine across EMR. Experience in similar MPB outbreaks in other areas has shown that the dead trees will begin to fall within five to seven years and 90 to 100 percent will be down within twenty years. Falling trees are hazardous to skiers and summer recreationists and can create heavy fuel loads across the landscape.

Ski terrain management at EMR over the past fifty years has resulted in reduced fuels or an area of separation between fuels in and near conventional trails and smaller tree islands. Larger tree islands (interior portions) and tree skiing terrain have different varying fuel loads with more ladder fuel scenarios. Non-skied areas have the greatest potential for natural fuel loading which could be high or low depending upon particular site characteristics. The accelerated MPB mortality will dramatically change existing fuel character in the next few years.

[118] Leatherman et al., 2011

Structures and improvements are not at risk from wildfires due to the presence of defensible space and less flammable vegetation in proximity to improvements. However, the threat of catastrophic wildfire is intensifying due to the increasing amount of dead and dying lodgepole pine in and around EMR.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

EMR would not construct any new facilities, ski trails or chairlifts and would not engage in additional vegetation management activities as described in the VMP. EMR would continue to apply carbaryl for MPB control.

MPB would continue to pose a risk to forest health. As mentioned above, all stands inventoried have some level of MPB infestation. Trees killed by MPB would begin to deteriorate and eventually fall to the ground. This change in the fuel profile would increase the fuel hazard rating due to a combination of natural fuel build-up from pine beetle activity and subsequent regeneration with the opening of the canopy, creating ladder fuels. As the fuel profiles change over time, so would the fuel hazard. In the study area the result would be an increased continuity between the ground fuels and the next generation of aerial fuels. Although all stands containing lodgepole pine may be affected to some extent by the MPB epidemic, the degree each stand could be affected is directly related to the species composition (e.g., presence of other tree species).

Impacts to regeneration from current ski operations would continue to occur from incidental contact between skiers and grooming equipment; however, these impacts are not expected to be measurable. MPB and/or other insect mortality in existing tree islands and gladed skiing terrain would continue to occur, thereby affecting the recreational experience of ski area guests as dead trees fall and new tree regeneration and shrubs start to grow up through the dead-fall (refer to Chapter 3 Section A – Recreation, Mountain Operations and Guest Services).

Alternative 2 – Proposed Action

There would be approximately 168 acres of direct impacts to vegetation communities related to grading, vegetation clearing, or glading for the construction of the proposed new ski trails, tree and gladed skiing areas, roads, guest service facilities, and utilities. Approximately 98 acres of these impacts would be due to thinning for tree and gladed skiing areas, requiring the removal of approximately 30 to 50 percent of existing trees. Approximately 65 acres of clearing/grading would occur in stands susceptible to MPB infestation. Additionally, approximately 170 acres of glading and vegetation management treatments would occur in stands affected by MPB. These activities would focus on removing infested trees and minimizing future infestation risk. However, tree removal would create openings in the forest canopy and increase the risk of blow downs. Additional openings in the canopy due to MPB mortality, vegetation management, and glading would contribute to this risk.

All of the activities at EMR have been identified in EMR's VMP and fall into one of the identified "Management Prescriptions." Prescriptions (P1 through P8) describe management options for proposed ski area projects and vegetation management. Below is a discussion of each vegetation management prescription and anticipated effects to forest health at EMR (refer to Figure 3 for Vegetation Management Prescriptions within EMR). PDCs are presented to minimize adverse effects and are listed in Table 2-3.

P1 – New Ski Trail Construction

This prescription would guide the construction of formal ski trails and lift alignments, totaling approximately 59 acres. This prescription includes clearing vegetation to allow for the development of ski area infrastructure. By creating new cleared areas in the forest cover this prescription would reduce the amount of forested area within the EMR study area. Therefore, P1 would have minimal forest health value. However, this prescription could lead to the removal of MPB infested trees, thereby reducing standing hazard trees, fuels and potential for wildfire throughout EMR.

P2 – Existing Ski Trail Maintenance

This prescription would apply to approximately 184 acres of existing ski trails and lift alignments. Proposed new trails would be considered existing trails directly after potential construction of the trail is completed (and would be added to the 184 acres of current existing ski trails and lift alignments). The only vegetation removal included in this prescription is the removal of hazard trees. The removal of dead or dying trees along the edge of ski trails would protect recreationalists from falling trees. Additionally, trees targeted for removal would likely be MPB infested individuals, or other diseased trees. The removal of these trees would improve forest health by allowing for healthy regeneration and reduce standing hazard trees, fuels and potential for wildfire throughout EMR.

P3 – Defensible Space

This prescription ensures that the maintenance of vegetation provides defensible space and hazard tree reduction around existing and proposed ski area facilities. This prescription would apply to approximately 9 acres surrounding the Lookout, proposed Challenge Mountain Facility, and existing base area facilities. This prescription includes the removal of vegetation which poses a risk to EMR infrastructure. Primarily this will involve the removal of dead trees from areas adjacent to guest service facilities. As with P2, these hazardous trees are likely infested with MPB, or other disease, and their removal would allow for healthy regeneration and reduce standing hazard trees, fuels and potential for wildfire throughout EMR.

P4 – New Tree and Gladed Skiing Area Construction

This prescription applies to new tree and gladed skiing areas and modification to existing tree and gladed skiing areas as identified in the Proposed Action, totaling approximately 100 acres. This prescription would include selective tree removal to create adequate tree density for safe skiing and retention of forest components for other resources. A high priority would be placed on removing hazard trees. As discussed above, these trees would likely be dead as a result to MPB. The removal of these dead and infested trees

would reduce standing hazard trees, fuels and potential for wildfire throughout EMR, however skiing within these areas would reduce regeneration within these stands which are not currently skied.

P5 – Existing Tree and Gladed Skiing Areas Maintenance

This prescription would remove dead, dying or diseased trees that have the potential to create a hazard to ski area guests in existing tree and gladed skiing areas. This would apply to all existing tree and gladed skiing areas at EMR, totaling approximately 100 acres. This prescription would include the removal of dead, dying or diseased trees that have the potential to create a hazard to skiers in existing tree and gladed skiing areas. The removal of dead and infested trees would reduce standing hazard trees, fuels and potential for wildfire throughout EMR. However, this prescription would also inhibit regeneration within existing tree and gladed skiing areas.

P6 – Sanitation/Salvage with Removal in Lodgepole Pine Stands

This prescription is not related to construction or maintenance of ski area infrastructure. It would remove all dead, dying or infested lodgepole pine 4 inches diameter at breast height (dbh) and larger in selected stands. Healthy trees would be retained within the P6 areas. This treatment would reduce fuel loading, accelerate regeneration of other species, and create a stand with two age classes. This prescription would apply to approximately 63 acres of lodgepole pine stands.

P7 – Sanitation/Salvage with Removal in Spruce/Fir Stands

This prescription is also not related to construction or maintenance of ski area infrastructure. It would remove all dead, dying and infested Englemann spruce and subalpine fir primarily located outside the ski trail network that have been affected by insect activity, disease or mechanical damage. This prescription would apply to approximately 14 acres of spruce-fir stands. This prescription would harvest all dead or beetle infested trees as individuals or in groups up to 2 acres in size or trees that are in danger of structural failure. By removing dead and infested trees, this prescription would reduce the fuel load and improve the viability of healthy regeneration and mature trees.

P8 – Continued Forest Monitoring

This prescription provides for the long-term assessment of forest health at EMR. Healthy stands could develop insect, disease, or damage issues in the future. While this prescription does not directly impact forest health at EMR, it would provide guidance for future management should concerns arise. This prescription would apply to approximately 199 acres.

Summary

Vegetation management projects would improve forest health across EMR. In addition, the application of carbaryl would continue to occur under this alternative according to Forest Service application specifications as directed in the 2007 Decision Memo. Management of the MPB epidemic serves to protect the diversity of stand composition at EMR. Vegetation management projects would address

dangerous fuel loads by removing dead trees where practicable. By removing dead, dying and diseased trees, healthy trees would be able to thrive. These activities would also allow for improved regeneration which would add diversity to the forest.

Construction of ski area projects would require some vegetation clearing and thus an overall decrease in forested acreage at EMR. However, vegetation management prescriptions focusing on the removal of dead, dying, and infested trees would improve the health of existing trees and support new regeneration.

Table 3G-1 summarizes disturbance acreages associated with the Proposed Action.

Table 3G-1:
Disturbance Impacts – Alternative 2

Vegetation Type	Disturbance Type[a]		
	Ski Trails (acre)	Glading (acre)	Veg. Mgmt. (acre)
Grassland/Forb	5.3	0.0	8.0
Lodgepole Pine	37.1	50.1	80.5
Limber Pine	0.0	0.9	12.1
Spruce-Fir	27.6	46.9	79.1
Total	**347.6**		

[a] As described above, Ski Trails correspond to P1, Glading corresponds to P4, and Veg. Mgmt. here includes P3, P5, P6, and P7. There is no disturbance related to P2 or P8 in Alternative 2.

Regeneration would be affected under Alternative 2 as approximately 30 acres of vegetation clearing would occur in forest stands which are currently experiencing "good" natural regeneration. In stands with "good" regeneration, regenerating seedlings or saplings are well represented. "Good" regeneration is a "stocked" stand containing >150 seedlings per acre, and "poor" regeneration is a stand containing <150 seedlings per acre.[119] Only one stand (112) was found to have insufficient stocking levels. Currently at EMR, natural regeneration is occurring across all other sites at adequate levels. All projects in the Proposed Action would occur in stands experiencing adequate regeneration except for approximately 1 acre for the Jolly Jug trails and 3 acres for Jolly Jug Glades, which would occur in stand 112 experiencing poor regeneration.

While the construction and maintenance of ski trails and tree and gladed skiing areas limits the regeneration potential of an area, vegetation management prescriptions are designed to facilitate regeneration in forested stands. Thus, while there could be some direct impacts to regeneration in project areas, regeneration across EMR's forested stands would generally be improved by vegetation management.

[119] Eldora Mountain Resort, 2013

As stated in the Affected Environment section, the study area does not include old growth forest; therefore, the Proposed Action would not have impacts to old growth.

Alternative 3

There would be approximately 261 acres of direct impacts to vegetation communities related to grading, vegetation clearing, or glading for the construction of the proposed new ski trails, tree and gladed skiing areas, roads, guest service facilities, and utilities. Approximately 198 acres of these impacts would be due to thinning for tree and gladed skiing areas, requiring the removal of approximately 30 to 50 percent of existing trees. Approximately 60 acres of clearing/grading would occur in stands susceptible to MPB infestation. Additionally, approximately 285 acres of glading and vegetation management treatments would occur in stands affected by MPB. These activities would focus on removing infested trees and minimizing future infestation risk. However, tree removal would create openings in the forest canopy and increase the risk of blow downs. Additional openings in the canopy due to MPB mortality, vegetation management, and glading would contribute to this risk

All projects with impacts to vegetation are discussed in the VMP and PDCs are presented to minimize adverse effects. The Vegetation Management prescriptions would have the same effects to forest health as discussed in Alternative 2 but with different acreages. Refer to the above discussion for details.

P1 – New Ski Trail Construction

P1 would apply to approximately 53 acres of proposed ski trails and lift alignments.

P2 – Existing Ski Trail Maintenance

P2 would apply to approximately 184 acres of existing and future ski trails.

P3 – Defensible Space

P3 would apply to approximately 9 acres surrounding the Lookout Facility, proposed Challenge Mountain Facility, and existing base area facilities.

P4 – New Tree and Gladed Skiing Area Construction

P4 would apply to approximately 198 acres of proposed tree and gladed skiing terrain.

P5 – Existing Tree and Gladed Skiing Areas Maintenance

P5 would apply to approximately 5 acres of existing tree and gladed skiing areas.

P6 – Sanitation/Salvage with Removal in Lodgepole Pine Stands

P6 would apply to approximately 85 acres of lodgepole pine stands.

P7 – Sanitation/Salvage with Removal in Spruce/Fir Stands

P7 would apply to approximately 14 acres of spruce-fir stands.

P8 – Continued Forest Monitoring

P8 would apply to approximately 161 acres.

Summary

The vegetation management projects included in Alternative 3 would improve forest health across EMR. In addition, the application of carbaryl would continue to occur under this alternative according to Forest Service application specifications. Management of the MPB epidemic serves to protect the diversity of stand composition at EMR. Vegetation management projects would address dangerous fuel loads by removing dead trees where practicable. By removing dead, dying and diseased trees, healthy trees would be able to thrive. These activities would also allow for improved regeneration which would add diversity to the forest.

Under Alternative 3, construction of ski area projects would require some vegetation clearing and thus an overall decrease in forested acreage at EMR. However, vegetation management prescriptions focusing on the removal of dead, dying, and infested trees would improve the health of existing trees and support new regeneration. Refer to Table 3G-2 for disturbance acreages for Alternative 3.

Table 3G-2:
Disturbance Impacts – Alternative 3

Vegetation Type	Disturbance Type[a]		
	Ski Trails (acre)	Glading (acre)	Veg. Mgmt. (acre)
Grassland/Forb	8.3	0.0	5.6
Lodgepole Pine	34.3	105.7	62.4
Limber Pine	0.0	13.1	0.0
Spruce-Fir	24.5	74.6	37.6
Total	**366.1**		

[a] As described above, Ski Trails correspond to P1, Glading corresponds to P4, and Veg. Mgmt. here includes P3, P5, P6, and P7. There is no disturbance related to P2 or P8 in Alternative 3.

All projects in Alternative 3 would occur in stands experiencing adequate regeneration except for approximately 2 acres for the Jolly Jug trails and 2 acres for Jolly Jug Glades, which would occur in stand 112 experiencing poor regeneration.

As stated in the Affected Environment section, the study area does not include old growth forest; therefore, Alternative 3 would not have impacts to old growth.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the cumulative effects section apply to all alternatives, including the No Action Alternative. For a detailed description of past, present, and reasonable foreseeable future projects, the reader is referred to Appendix A in this document.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for forest health extend from EMR's inception as a ski resort in 1961 through the foreseeable future in which EMR can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis are limited to public and private lands in the vicinity of the EMR SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

Past, present, and reasonably foreseeable actions that affect forest health within the analysis area include:

- EMR Annual Operating Plans
- Direct Control Efforts for Mountain Pine Beetle at Eldora Mountain Resort
- Forest Legacy Conservation Easement
- Lump Gulch Fuels Treatment Project
- Forsythe Fuels Reduction Project
- Nederland Water Treatment Plant Fuels Reduction Project
- Moffat Collection System EIS
- Jenny Creek Restoration and Reroute of Motorized Trail

Alternatives 1, 2, and 3

While this EIS contains an analysis of a 2013 VMP for EMR, the resort has been implementing some vegetation management since 2007, with the approval of a plan for Direct Control Efforts for Mountain Pine Beetle at Eldora Mountain Resort. Their primary activity has been carbaryl application to control the spread of the MPB epidemic. Proposed vegetation management prescriptions would serve to further protect forested stands from MPB and improve overall forest health.

The Forest Legacy Conservation Easement is a future action which could potentially lead to improvements to forest health on adjacent private lands. The proposed conservation easement on Toll property adjacent to EMR would include a Forest Stewardship Plan containing management suggestions

for improved resource health. Combined with the VMP at EMR, this could improve forest health on a larger, regional scale.

The Lump Gulch Fuels Treatment Project, Forsythe Fuels Reduction Project, and Nederland Water Plant Fuels Reduction will reduce fuel loads and remove dead trees on NFS land within the ARP. The removal of fuels and dead trees would improve regional forest health by returning it to a more natural state.

The Moffat Collection System EIS is a future action which could reduce fuel loads near the Gross Reservoir. The expansion of the reservoir would inundate additional acreage of forest, thereby reducing the fuel load in the immediate vicinity.

The restoration and relocation of the motorized trail in Jenny Creek would involve some hazard tree removal and vegetation clearing, thus potentially resulting in a localized reduction of the fuel load.

All of the past, present and reasonably foreseeable projects discussed above will benefit forest health in the area surrounding EMR. EMR's VMP was developed to improve forest health within the SUP, understanding the ski area is primarily located in Management Area 8.22. Management projects detailed in the VMP were designed to address EMR operational needs that are inextricably related to forest health within the SUP area.

Cumulatively, the projects above will manage and alter vegetation types and patterns. The action alternatives would incrementally add to the current trend of landscape alteration within EMR but are not anticipated to detrimentally affect forest health within the permit area and adjacent private lands.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Tree removal related to the proposed projects would represent an irretrievable effect to some late-successional forest components (not old growth) within the SUP area. However, these projects have detailed prescriptions designed to minimize effects to vegetation overall and are relatively small in scope and scale in relation to the 15,365-acre Boulder Creeks Geographic Management Area with 6,884 acres of it in relatively "forest retention" management prescriptions.[120] This is not considered an irreversible commitment because overstory, understory and herbaceous vegetation is being retained and is a renewable resource.

[120] USDA Forest Service, 1997a

H. FISH AND WILDLIFE

SCOPE OF THE ANALYSIS

This section evaluates potential project effects on federally proposed, Threatened or Endangered and/or Forest Service Rocky Mountain Region sensitive (PTES) fish and wildlife species, Management Indicator Species (MIS), migratory birds, animal species of local concern (ASOLC), and other habitat considerations. The reader is referred to the Biological Assessment (BA) and Biological Evaluation (BE), MIS and wildlife specialist's report in the project file for additional information.

This section is tiered to the ARP Forest Plan and incorporates by reference other recent EMR technical and NEPA documents contained in the project file.[121] Recent EMR technical and NEPA documents were supplemented with information on species status, distribution, and ecology derived from Colorado Natural Heritage Program (CNHP) data base maps and reports, Colorado Parks and Wildlife (CPW) Wildlife Resource Information System, Natural Diversity Information System (NDIS) mapping, and CPW biologists, Forest Service data, personal knowledge from Forest Service wildlife biologists, applicable scientific studies, and field surveys and information provided by public comment. Field surveys were conducted specifically for this project between June 5, 2009 and October 24, 2012. Collectively, the animal data used for the present analysis represents the best scientific information currently available.

ANALYSIS AREAS

For the purposes of this document, ecological analyses are considered at several scales biologically appropriate for individual species. These analysis areas are described below.

Eldora Mountain Resort Project Area

For the purposes of this analysis, the Eldora Mountain Resort (EMR) project area is a 1,376-acre area that includes approximately 1,160 acres of the existing ski area and the ski area as it would occur under Alternatives 2 (1,246 acres; +86 acres) and 3 (1,178 acres; +18 acres). This includes the 524-acre existing SUP area on NFS lands and the SUP areas as they would occur under Alternatives 2 (610 acres) and 3 (542 acres). Most (55.7 percent) of the project area is on private lands (compared to 44.3 percent on NFS lands). Elevations of these SUP areas range from approximately 8,925 (at the proposed bridge on Middle Boulder Creek (under Alternative 2) to 10,600 feet atop Bryan Mountain (under all alternatives).

[121] USDA Forest Service, 1997a

Boulder Lynx Analysis Unit

The Canada Lynx Conservation Assessment and Strategy (LCAS) indicated that project planning should evaluate the effects to lynx habitat within designated Lynx Analysis Units (LAU) exceeding 25,000 acres in the southern Rocky Mountain Geographic Area.[122] LAUs are intended to provide the smallest scale at which the effects of management actions on lynx habitat are quantitatively evaluated. LAUs do not represent actual lynx home ranges, but their scale should approximate the size of an area used by an individual lynx. The EMR project area is located within the Boulder LAU—one of eleven LAUs located on the ARP. The Boulder LAU is located on the Boulder and Clear Creek Ranger Districts and is 77,120 acres.

Lynx Linkages

Six lynx linkage areas have been identified on the ARP due to their importance contributing to lynx connectivity with other Forests and other large blocks of habitat.[123] The goal of linkage areas is to ensure population viability through population connectivity.[124] Linkage areas are areas of movement opportunities between habitat blocks that may be separated by intervening areas of "non-habitat" such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks.[125] They exist on the landscape and can be maintained, degraded, or severed by management activities and human infrastructure, such as high-use highways, subdivisions, or other developments.[126] The Forest Service does not consider lynx linkages to be "corridors" (which imply only travel routes), but broad areas of habitat where animals can find food, shelter, and security that also provide connectivity between larger habitat blocks.[127] Such linkages would be expected to support greater use by transient or nomadic individuals.[128] Linkages are also important for maintaining genetic diversity throughout the Southern Rockies lynx population.[129]

The six ARP lynx linkages include, from southwest to north, (1) Loveland Pass, (2) Guanella Pass, (3) Herman Gulch, (4) Berthoud Pass, (5) Fraser Valley, and (6) Bull Mountain. None of these lynx linkages are located within or are closely associated with the Boulder LAU and none is bisected by a high speed highway that supports traffic associated with EMR.

[122] Ruediger et al., 2000
[123] USDA Forest Service, 2008a
[124] Ibid.
[125] USDA Forest Service, 2008a; Ruediger et al., 2000 [Oct. 2001 rev. definition]
[126] Ruediger et al., 2000 [Oct. 2001 rev. definition]
[127] USDA Forest Service, 2008a
[128] Thompson, 1998b
[129] US Fish and Wildlife Service, 2006b

Action Areas for Threatened and Endangered Species

The "action area" includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."[130] Action areas defined individually for the threatened and endangered species carried forward and considered in detail herein are described below.

South Platte River Species

For the purposes of this analysis, the South Platte River species (pallid sturgeon [*Scaphirhynchus albus*], whooping crane [*Grus americana*], piping plover [*Charadrius melodus*], and least tern [*Sterna antillarum*]) action area is the South Platte River basin, extending from the project area downstream to the most distal points on the river occupied by the individual species.[131]

Greenback Cutthroat Trout

For the purposes of this analysis, the greenback cutthroat trout (GBCT, *Oncorhynchus clarkia stomias*) action area is occupied reaches of the upper South Platte River drainages.

Mexican Spotted Owl

For the purposes of this document, the Mexican spotted owl (MSO, *Strix occidentalis*) action area includes the EMR project area and the furthest extent of any potential overlapping home range. Based on the maximum documented home range size, the MSO action area could extend approximately 3 miles beyond the project area.[132]

Preble's Meadow Jumping Mouse

For the purposes of this document, the Preble's Meadow Jumping Mouse (PMJM, *Zapus hudsonius* subsp. *Preblei*) action area includes the EMR project area and extends down Middle Boulder Creek to Barker Meadow Reservoir (east of Nederland) and down South Boulder Creek to Gross Reservoir (approximately 13.2 miles. downstream of EMR's snowmaking water diversion point on Jenny Creek), the furthest extent of potential water effects.

North American Wolverine

For the purposes of this analysis, the North American wolverine (*Gulo gulo Lucius*) analysis area for this project extends outward from the EMR project area to the furthest extent of any wolverine home range that could overlap the proposed Alternative 2 and 3 disturbance areas. Because wolverine home ranges can be hundreds of square miles, the wolverine analysis area for this project includes the Front Range of

[130] US Fish and Wildlife Service and National Marine Fisheries Service, 1998; 50 CFR § 402.02
[131] US Fish and Wildlife Service, 2006a
[132] US Fish and Wildlife Service, 1995

Boulder and Grand Counties and isolated portions of contiguous counties connected by mountain ranges, especially those along the Continental Divide.[133]

Canada Lynx

For the purposes of this analysis, the Canada lynx action area includes the Boulder LAU, described above, and those portions of highways serving EMR, including Highways 119 (Boulder Canyon, from Boulder to the east and Blackhawk/I-70 to the south), 72 (Coal Creek Canyon from Highway 93 to the east), 7 (South St. Vrain Canyon to the northeast from Lyons), 6 (Clear Creek Canyon from Golden to the southeast), and I-70 (from the east to the Blackhawk exit, east of Idaho Springs). This area is sufficiently inclusive to capture the most far-reaching potential direct, indirect, and reasonably certain effects associated with the action alternatives.

Planning Area

The Planning Area is the ARP, including 1,227,225 acres of federally managed land.[134]

FOREST SERVICE DIRECTION

Forest Plan standards and guidelines specific to each of the following wildlife and aquatic species are in the BA or BE contained in the project file. In addition, a Forest Plan Consistency Analysis for each of the standards and guidelines prescribed in the Forest Plan was conducted for Alternatives 1 through 3 and is contained in the project file.

AFFECTED ENVIRONMENT

Table 3H-1 describes the habitat types present in the project area.

Table 3H-1:
Existing Habitat Types and Structural Stages within the Project Area

Habitat Type and Structural Stage	NFS Lands (acres)	Private Lands (acres)	All Lands (acres) (%)
Forblands (FOR, 1M)	3.19	39.96	**43.15 (3.1)**
Grasslands (GRA, 1M)	106.80	87.47	**194.27 (14.1)**
Barren/Disturbed (NBA)		26.26	**26.26 (1.9)**
Willows (SWI, 2S)		9.82	**9.82 (0.7)**
Aspen Forest (TAA)			**45.31 (3.3)**
3A		0.06	0.06 **(0.0)**
3B	1.47		1.47 **(0.1)**
3C	43.77		43.77 **(3.2)**

[133] Krott, 1960; Halfpenny, 1981; Nead et al., 1985; Hornocker and Hash, 1981; Copeland, 1996
[134] USDA Forest Service, 1997a

Table 3H-1:
Existing Habitat Types and Structural Stages within the Project Area

Habitat Type and Structural Stage	NFS Lands (acres)	Private Lands (acres)	All Lands (acres) (%)
Lodgepole Pine Forest (TLP)			**563.76 (40.9)**
3A	19.96	263.78	283.73 **(20.6)**
3C	38.23	186.59	224.82 **(16.3)**
4B	42.96	12.25	55.21 **(4.0)**
Spruce-fir Forest (TSF)			**479.54 (34.8)**
3A	22.55		22.55 **(1.6)**
3C		8.40	8.4 **(0.6)**
4A		6.31	6.31 **(0.5)**
4B	325.72	91.26	416.99 **(30.3)**
4C	9.16	16.13	25.29 **(1.8)**
Water		16.52	**16.52 (1.2)**
Total Acres	**613.81**	**764.81**	**1,378.62 (100)**

Note: The sum of all habitat types within the project area (**1,378.62 acres) exceeds the acreage of the project area (1,376 acres) because of the slight overlap of some habitat polygons in the ARP database.**
Note: The existing habitat types and structural stages were field-validated for this wildlife analysis.
Source: ARP, SE Group, and Western Ecosystems, Inc.

For a detailed discussion of each habitat type, please refer to the BA or BE.

Threatened and Endangered Species

Federally listed and proposed species that were initially considered in the BA included those identified by the US Fish and Wildlife Service (USFWS) and part of the South Platte Water Related Activities Program (SPWRAP) Colorado BA template that were subsequently verified by USFWS personnel.[135] The North American wolverine (*Gulo gulo luscus*) was added for consideration as a proposed species after its proposed listing under the ESA on February 4, 2013.[136] The American burying beetle (*Nicrophorus americanus*), the South Platte River species mentioned in the Platte River Recovery Implementation Program (PRRIP), GBCT (*Oncorhynchus clarki* subsp. *stomias*), MSO (*Strix occidentalis*), PMJM (*Zapus hudsonius* subsp. *preblei*), and Canada lynx (*Lynx canadensis*) are identified in Table 3H-2.

The ARP has determined that the Project is not likely to adversely affect the American burying beetle and will have no effect on the Eskimo curlew and they will not be considered further in this document (per the SPWRAP Colorado BA template).[137] Those species—pallid sturgeon, whooping crane, piping plover, interior least tern, GBCT, MSO, PMJM, North American wolverine, and Canada lynx—that may be affected by the Federal action are addressed in this analysis. Other federally-listed and proposed species known to occur elsewhere in and beyond Colorado were not included in this analysis.

[135] US Fish and Wildlife Service, 2007 and 2014
[136] US Fish and Wildlife Service, 2013c
[137] US Fish and Wildlife Service, 2007

Table 3H-2:
Federally Listed and Proposed Animal Species[a]
Known to Occur in the Action Areas or with Potential to be Affected

Common name, *Scientific Name*	Status	Species Excluded	Reason for Exclusion (if excluded)
American burying beetle *Nicrophorus americanus*	E	Yes	NLAA determination made per SPWRAP CO BA Template direction
Pallid sturgeon *Scaphirhynchus albus*	E	No	
Greenback cutthroat trout (*Oncorhynchus clarki* subsp. *stomias)*	T	No	
Whooping crane *Grus americana*	E	No	
Piping plover *Charadrius melodus*	T	No	
Eskimo curlew *Numenius borealis*	E	Yes	NE determination made per SPWRAP CO BA Template direction
Least tern *Sterna antillarum*	E	No	
Mexican spotted owl *Strix occidentalis*	T	No	
Preble's meadow jumping mouse *Zapus hudsonius* subsp. *Preblei*	T	No	
North American wolverine *Gulo gulo Lucius*	P	No	
Canada lynx *Lynx canadensis*	T	No	

[a] Other Federally listed and proposed species are not listed in this table because the project area is outside of the species' range, their habitats do not occur in the project area, they have no affinities to project area habitats, and the management decisions associated with the action alternatives would have no potential to affect the species, their habitats, or designated critical habitat. Species are listed phylogenetically. Federal status, listed after species, is as follows: E = Endangered, T = Threatened, P = Proposed. Candidate species are addressed in the BE.
Source: USFWS IPaC (accessed Dec. 20, 2012 and January 13, 2014) and SPWRAP (Colorado BA template, verified by USFWS, Jan. 14, 2014) and Western Ecosystems, Inc.

Pallid Sturgeon

The historic abundance of pallid sturgeon is poorly known, but available information suggests that the species was always rare.[138] In the early 1900s, pallid sturgeon reportedly comprised only 1 in 500 of river sturgeon captured in the Mississippi River at Grafton, Illinois. Since development of the Missouri River dams and reservoirs, the species has declined even further. There are now only remnant, small populations of pallid sturgeon remaining in each of the reservoir complexes in North and South Dakota. Also, the remaining riverine habitat between the dams apparently does not meet the requirements of the species because successful reproduction has not been documented. It is also likely that the forage base once used by pallid sturgeon has been greatly altered, thus affecting both growth and reproduction.

[138] US Fish and Wildlife Service, 2001b

The PRRIP, established in 2006, is implementing actions designed to assist in the conservation and recovery of the target species and their associated habitats along the central and lower Platte River in Nebraska through a basin-wide cooperative approach agreed to by the States of Colorado, Nebraska, and Wyoming and the U.S. Department of the Interior (Program, I.A.1). The Program addresses the adverse impacts of existing and certain new water related activities on the Platte target species and associated habitats, and provides ESA compliance for effects to the target species and whooping crane critical habitat from such activities including avoidance of any prohibited take of such species. The State of Colorado is in compliance with its obligations under the Program.

For Federal actions and projects participating in the Program, the Platte River Recovery Implementation Program Final Environmental Impact Statement and the June 16, 2006 programmatic biological opinion (PBO) serve as the description of the environmental baseline and environmental consequences for the effects of the Federal actions on the listed target species, whooping crane critical habitat, and other listed species in the central and lower Platte River addressed in the PBO.[139] The Forest Service requires, as a condition of any approval, that Applicants fulfill the responsibilities required of PRRIP participants in Colorado, which includes participation in the South Platte Water Related Activities Program, Inc. (SPWRAP). These documents are hereby incorporated into this analysis by this reference.

Greenback Cutthroat Trout

GBCT have recently been detected in Middle Boulder Creek, a reach of which is adjacent to Alternative 2's proposed Placer chairlift and terrain.[140] The genetic purity and source of those trout are unknown; however, it is most likely that these fish originated from native cutthroat trout stocked into the headwater lakes (e.g., Bob, Betty, Woodland, Skyscraper, and others) located in the Middle Boulder watershed portion of the Indian Peaks Wilderness.[141] Based on recent CPW manuscripts (Metcalf) and other research (Rogers et al.), the existing population of cutthroat in the Middle Boulder Creek drainage are not representative of historically pure cutthroat trout genetics.[142] The closest known conservation population is from a stream approximately 6 miles to the north. It is unlikely that fish from that source could have gone downstream, then up Boulder Creek because they would have had to negotiate Barker Dam. The GBCT in Middle Boulder Creek are not part of a conservation population. Rather, they are considered part of the recreationally stocked population from headwater lakes. Therefore, genetically pure GBCT that warrant consideration as a federally threatened species are not present in that portion of the action area that would be affected by the action alternatives, and this species is dropped from further consideration as a federally threatened species herein.

[139] US Fish and Wildlife Service, 2006a
[140] Ellwood, 2010; Aquatics Associates, 2012
[141] Swigle, 2012
[142] Ibid.

Whooping Crane

Critical habitat for the endangered whooping crane has been established far downstream from the project area in the central Platte Valley of Nebraska.[143] Whooping cranes are one of the target species included in the PRRIP, and thus considered similarly to pallid sturgeon.

Piping Plover

Breeding habitat for the threatened northern Great Plains population of the piping plover occurs far downstream from the project area along the Platte River in Nebraska.[144] Piping plovers are one of the target species included in the PRRIP.

Least Tern

Breeding habitat for the endangered interior least tern occurs far downstream from the project area along the Platte River in Nebraska.

Mexican Spotted Owl

In 2004 the USFWS issued a Final Rule designating 8.6 million acres of critical habitat in Arizona, Colorado, New Mexico, and Utah, on Federal lands for the MSO.[145] Although 263,026 acres of critical habitat were designated on NFS lands in Colorado, none of the critical habitat occurs on the ARP. The critical habitat designation did not include some areas that are known to have widely scattered owl sites, low population densities, and/or unknown or marginal habitat quality (including some areas of Boulder Mountain Parks), which are not considered to be essential to this species' conservation.[146]

The nearest occupied MSO nest sites to the EMR MSO action area are located on the Pike-San Isabel National Forest west of Colorado Springs. The MSO action area lies at the very northeast edge of the estimated potential range for MSOs. Compared to habitat characteristics and physiographic variables at documented owl nesting sites in Colorado and elsewhere, potential habitat on the ARP appears to be marginal in quality and quite limited in distribution and patch size.[147] No suitable nesting or foraging habitat was detected or suspected in the EMR MSO action area. Furthermore, the Douglas-fir, ponderosa pine, and montane mixed conifer habitat that this species is associated with further south along the Front Range is not present on or near the EMR MSO action area.[148] Potential MSO habitat is not considered to be present in the EMR action area, and this species is dropped from further consideration herein.

[143] US Fish and Wildlife Service, 2006a
[144] US Fish and Wildlife Service, 2006
[145] US Fish and Wildlife Service, 2004
[146] Ibid.
[147] Hughes and Petterson, 1994
[148] Ellwood, 2013

Preble's Meadow Jumping Mouse

The Final Rule to list PMJM as a threatened species was published in the Federal Register on May 13, 1998. The Final Rule defined Preble's habitat as extending outward 300 feet from the 100-year floodplain of streams.[149] Critical habitat for the mouse was designated effective on July 23, 2003, and then revised in December 2010.[150] Preble's populations are known to occur within all of the major stream systems in these critical habitat units. No designated critical habitat occurs within the EMR PMJM action area. The closest designated critical habitat (Unit 5) encompasses approximately 798 acres along 8 miles of streams within the South Boulder Creek watershed. It includes South Boulder Creek from Baseline Road upstream to Eldorado Springs (approximately 5,800 feet). No occupied habitat is known within the South Boulder Creek drainage above this elevation, although this species is known to occupy higher elevations.[151] The USFWS concluded that populations of PMJM are not likely present in the vicinity of Gross Reservoir or in the reservoir's three tributaries (Forsythe Gulch, Winiger Gulch, and South Boulder Creek), below the EMR project area.[152] The distal reach of designated critical habitat along South Boulder Creek (i.e., on City of Boulder Open Space, south of Baseline Road and north of Highway 36) contains the Howard Ditch headgate associated with EMR's water system. From April through October, EMR diverts a portion of the very senior Howard Ditch water right that has been permanently moved from the Howard Ditch headgate to EMR's Jenny Creek Pipeline. Therefore, there is no net change to the streamflow in South Boulder Creek below the Howard Ditch headgate, or in Boulder Creek, the Saint Vrain River, or the South Platte River.[153] EMR's Howard Ditch water right diversions at the Jenny Creek Pipeline represent 0.16 percent of the average April through October streamflow at the South Boulder Creek gauging station near Eldorado Springs. Potential PMJM habitat is not considered to be present in the EMR action area, and this species is dropped from further consideration herein.

North American Wolverine

There are numerous historical records of North American wolverines from the Colorado Rocky Mountains; however, the species is believed to have been extirpated from the Southern Rocky Mountains in Colorado, New Mexico, and Wyoming by the early 1900s.[154] Some isolated mountainous areas within this portion of its range are considered to be potential, but unoccupied habitat, with the exception of the single male (M56) that dispersed from the Northern Rockies and is currently moving within the mountains of Colorado, but no wolverine population currently exists.[155]

The account of M56's dispersal from the Greater Yellowstone Ecosystem is in Inman et al. (2009). Wolverine (M56), now in Colorado for over three years, traveled through portions of the Boulder Ranger

[149] US Fish and Wildlife Service, 1998
[150] US Fish and Wildlife Service, 2003 and 2010
[151] US Fish and Wildlife Service, 2003
[152] US Fish and Wildlife Service, 2006c
[153] Bishop-Brogden Associates, Inc., 2013
[154] Seidel et al., 1998; Aubrey et al., 2007 cited in US Fish and Wildlife Service, 2013c
[155] Inman et al., 2009

District (BRD) in 2010, but exact locations are not available.[156] A hiker reported a possible encounter with a wolverine in 2010 in the Mount Audubon area, which is about 10.4 miles north of the project area. M56 subsequently dispersed to other mountainous areas of Colorado and likely followed the spine of the Continental Divide to move out of Boulder County. Monitoring by CPW suggests that he moves up and down the Continental Divide regularly. Given the species' avoidance of highways, it is likely that he crossed the landbridge along the Continental Divide over I-70 above the Johnson/Eisenhower Tunnels. He has been tracked as far south as Leadville. He was sighted on Mt. Bierstadt in April, 2012 and has been detected near the Saints John Mine in Montezuma.[157]

The EMR project area occurs along a spur ridge off the Continental Divide, which could increase the likelihood of a wolverine encountering the project area. The EMR project area contains potential foraging habitat, which could be used as a small part of a wolverine home range or opportunistically during dispersal. Based on the large home range size of wolverines and low numbers in Colorado, wolverine use of the project area, if it occurs, would be incidental and transitory. No evidence of wolverine was detected during 2010–2013 winter tracking surveys associated with the action alternatives and summer construction projects.

The CPW is currently considering reintroducing wolverines to Colorado.[158] The CPW Commission would have to approve any reintroduction plan, there currently is no reintroduction plan, and it has yet to be determined if adequate suitable habitat is present; therefore, this potential reintroduction does not currently meet reasonably foreseeable criteria warranting further consideration.

Canada Lynx

Canada Lynx Status and Critical Habitat

Canada lynx in the contiguous United States was listed as threatened effective April 24, 2000.[159] The USFWS identified one distinct lynx population segment in the lower 48 States composed of four distinct regions separated from each other by ecological barriers consisting of unsuitable lynx habitat.[160] With the exception of the Southern Rocky Mountain Region, lynx regions in the United States are geographically connected to the much larger lynx population in Canada. On November 9, 2006, the USFWS published a final rule designating critical habitat for lynx.[161] No habitats within Colorado were designated critical habitat for lynx. The Canada lynx has been classified by the State of Colorado as a State endangered

[156] Baker, 2011
[157] Nettles, 2013
[158] Remington, 2010
[159] US Fish and Wildlife Service, 2000
[160] Ibid.
[161] US Fish and Wildlife Service, 2006b

species since 1976. On September 17, 2010, the CPW announced that the lynx reintroduction project had successfully accomplished its goal of establishing a breeding population in the Southern Rockies.[162]

Southern Rockies Ecosystem Lynx Population

The majority of historic lynx occurrence records in the Southern Rockies are associated with the "Rocky Mountain Conifer Forest" type. The occurrences in the Southern Rockies were generally at higher elevations (8,000 to 12,000 feet) than were all other occurrences in the West.[163] Canada lynx occur primarily in spruce-fir and lodgepole pine forests, at elevations between 8,000 and 12,000 feet (2,450 to over 3,650 meters).[164] On a landscape scale, Canada lynx habitat includes a mosaic of early seral stages that support snowshoe hare populations and late seral stages of dense old-growth forest that provide high quality denning and security habitat.

The Southern Rockies Ecosystem represents the extreme southern edge of the range of lynx in North America.[165] The southern boreal forest of Colorado and southeastern Wyoming is isolated from boreal forest in Utah and northwestern Wyoming by the Green River Valley and the Wyoming basin.[166] These areas likely reduce opportunities for immigration from the Northern Rocky Mountains/Cascades Region and Canada.[167] Although habitats in the Southern Rockies are far from source populations and more isolated, it is still possible that dispersers could arrive in the Southern Rocky Mountains during extreme highs in the population cycle.

As of May 25, 2009 (the last lynx update following the discontinuation of the lynx monitoring program), the CPW was tracking 42 of the 103 reintroduced lynx still possibly alive in the Southern Rockies Ecosystem.[168] Additional animals are present in the landscape, but it has become nearly impossible to determine the extent of the lynx population in Colorado due to reproduction, failed collars, terminated radio tracking, and/or lynx outside of the research area.[169] There are 115 known mortalities and 62 missing animals.[170] CPW biologists estimate the number of lynx in Colorado is holding steady at about 150, with most in the southern mountains.[171] Reproduction has been documented in 2003–2006, and 2009 scattered throughout the Southern Rockies Ecosystem.[172] Between 2003 and 2010, a total of at least 141 kittens were born, including a Colorado born female that produced kittens in 2006.[173] In 2010, the CPW

[162] Colorado Division of Wildlife, 2010a,b
[163] Ruediger et al., 2000
[164] Ruggiero et al., 1999
[165] Ruediger et al., 2000; Findley and Anderson, 1956
[166] Ibid.
[167] Halfpenny et al., 1982; Koehler and Aubry, 1994
[168] Colorado Division of Wildlife, 2009b
[169] Shenk, 2006
[170] Colorado Division of Wildlife, 2009b
[171] Broderdorp, 2007; Colorado Division of Wildlife, 2006
[172] Shenk, 2006, 2009; Andree, n.d.
[173] Colorado Division of Wildlife, 2006, 2010b

announced that the lynx reintroduction project had successfully accomplished its goal of establishing a breeding population in the Southern Rockies.[174]

Based on the results from reintroduction and monitoring efforts to date, Colorado's lynx reintroduction has successfully achieved the program's original goals and all benchmarks for successful lynx reintroduction.[175]

Landscape Connectivity and Lynx Movements

Wildlife movement corridors have been defined as linear habitats whose salient function is to connect ≥ two significant habitat areas.[176] Although corridors may also support intrinsic habitat values, particularly where they represent linear patches, their principal value is that they connect substantive habitat blocks.[177] In a broader, landscape-level context, some wildlife corridors with extensive, continuous habitat connectivity may go beyond the function of allowing daily and seasonal movements between home range segments. Such corridors in a fragmented habitat matrix may provide key connectivity between subpopulations in large habitat patches, functioning as landscape linkages and dispersal corridors. The importance of such linkages to the landscape ecology of rare forest carnivores include (1) facilitating daily and seasonal intra- and inter-home range movements, (2) facilitating mating and genetic interchange, (3) allowing dispersal from population centers and colonization of otherwise suitable, vacant habitat, and (4) allowing populations to respond to natural and human-caused environmental changes and catastrophes.[178]

Because of the patchy, discontinuous distribution of lynx habitat in the Southern Rockies Ecosystem, maintaining landscape-level habitat connectivity may be paramount to maintaining a viable population. Landscape linkages must be available to allow lynx movements between adjacent mountain ranges. Colorado lynx habitats are not only constrained by broad alpine zones and non-forested valleys, but also by towns, reservoirs, highways, and other human developments that fragment and isolate montane and subalpine lynx habitats. This does not mean that lynx will not cross broad alpine zones, broad open valley bottoms, highways, or other landscape features, because they do. However, movements through such open habitats are not preferred because it predisposes animals to increased risk factors (e.g., predation, poaching, highway mortality) in habitats that do not support their primary suite of prey species.[179] Any continuously forested corridor between mountain ranges supporting lynx habitat that is relatively free of

[174] Colorado Division of Wildlife, 2010b
[175] Colorado Division of Wildlife, 2010a
[176] Forman and Godron, 1986; Harris and Gallagher, 1989
[177] Rosenberg et al., 1997; Beier and Loe, 1992
[178] Noss, 1983; Harris and Gallagher, 1989; Bennett, 1990; Bleich et al., 1990; Henein and Merriam, 1990; Beier and Loe, 1992; Taylor et al., 1993; Wiens, 1997
[179] Ruediger et al., 2000

human development has the potential to be an important landscape linkage. Large tracts of continuous forest are the most effective for lynx travel and dispersal.[180]

Characteristics of lynx movements that are relevant to the present analysis include movement type, movement frequency, landscape familiarity, movement efficiency, dispersal distances, and daily travel distances that are further influenced by season and sexual differences. Lynx movements may be of four types: those associated with an established home range, those of transient or nomadic lynx that do not maintain home ranges, those of dispersing individuals, and those associated with extensive exploratory movements. The frequency that lynx may use a landscape linkage would theoretically decline from an area occasionally used as part of a resident's home range, to infrequent use within a nomadic range, to one-time use by dispersing and exploring individuals.

Long distance lynx movements (i.e., > 62.5 miles), once reported as anomalies, are now considered characteristic of the species, involving nearly one-half of some populations during periods of low prey availability.[181] The most extreme example of a dispersing movement is that of lynx BC03M02, who was captured in a neck snare near Nordegg, Alberta on January 28, 2010, approximately 1,800 kilometers north of its home range in the Silverton, Colorado area. Other radio-collared lynx in Colorado have displayed similar long distance movements, which have been related to dispersal and mating.

Non-dispersing daily travel distances (DTD), the distance that resident animals move in a 24-hour period, are also relevant to the present analysis with respect to the ability of a lynx to cross through fragmented habitats between adjacent diurnal security areas. DTDs are equivalent to the following terms reported in the literature: night's hunt distance, distance between consecutive daytime beds, daily cruising distances, straight-line daily travel distance, and minimum daily travel distances.[182] All distances reported are straight-line distances between two successive points and, therefore, underestimate the actual meandering course that an animal travels in a heterogeneous landscape. DTDs reported during dispersal are generally within the same range as those reported for resident animals. Therefore, these two groups of DTDs were not separated. As a summation of DTD studies, Project planning should consider mean DTDs of up to 3 to 6 miles for resident females.[183]

Recent data from radio-collared Colorado lynx suggests that lynx within home ranges may be relatively sedentary during winter (September into April), concentrating activity within a higher quality portion of their home range.[184] Furthermore, based on preliminary data from a limited number (n=4) of radio-collared Colorado lynx in Eagle and Summit Counties monitored from February through April, 2010

[180] Tanimoto, 1998
[181] Nellis and Wetmore, 1969; Mech, 1997
[182] Nellis and Keith, 1968; Brand et al., 1976; Parker et al., 1983; Ward and Krebs, 1985; Slough and Mowat, 1996
[183] Saunders, 1963; Nellis and Keith, 1968; Brand et al., 1976; Parker et al., 1983; Slough and Mowat, 1996; Poole, 1997; Apps, 1999; Ruediger et al., 2000
[184] Shenk, 2008; Roberts, 2011

(similar 2011 data are not yet available), lynx, when in their home range, may only move 0.5 to 1 mile a day in the winter, with females generally travelling shorter distances than males.[185] Such shorter daily movements primarily reflect hunting movements within higher quality habitat (i.e., where prey densities are likely greater) versus more extended travel movements that animals would also be capable of at any time of year.

Project Area Lynx Habitat

Project Area Vegetation Communities

The ski area is all one plant association known as the subalpine fir (*Abies bifolia*)-Engelmann spruce (*Picea engelmannii*)-grouse whortleberry (*Vaccinium scoparum*, ABLA-PIEN-VASC) association.[186] Many forest stands are a mix of all potential tree species. Local cover type dominance occurs based upon the existing seed sources, various soil types, slope, water availability, aspect, and elevation unique to each portion of the ski area. Major forest types within the EMR project area are dominated by mature lodgepole pine (*Pinus contorta* subsp. *latifolia*) and mature Engelmann spruce-subalpine fir (*Picea engelmanni-Abies bifolia*), with patches, scatterings, and/or interspersion of aspen (*Populus tremuloides*), limber pine (*Pinus flexilis*), and very incidental Douglas-fir (*Psuedotsuga menziesii*). Former forest now supports ski trails (grass-forb and wetland communities) and disturbed areas (the base area, roads, and other infrastructure).

Project Area Lynx Habitat Classification

Table 3H-3 lists the acreage and percentage of field-verified lynx habitat types within the project area. They do not consider land use, habitat effectiveness, and other factors. While a moderate amount of the project area supports structurally suitable denning habitat, for the reasons described above, that habitat is not likely effective for lynx denning. A relatively small proportion of the ski area is “currently unsuitable.” That proportion may increase with progression of the MPB epidemic in lodgepole pine habitat.

[185] Roberts, 2011
[186] USDA Forest Service, 1987

Table 3H-3:
Lynx Habitat Types – Existing Conditions[a]

Lynx Habitat Type	NFS Lands (%)	Private Lands (%)	All Lands (%)
Winter Foraging	79.6 (13.0)	299.0 (38.8)	378.6 (27.4)
Denning[b]	338.9 (55.3)	100.7 (13.1)	439.6 (31.8)
Other	70.0 (11.4)	173.7 (22.5)	243.7 (17.6)
Currently Unsuitable	0.8 (0.1)	0 (0)	0.8 (0.1)
Total Lynx Habitat[c]	489.3 (79.7)	573.4 (74.4)	1,062.7 (79.9)
Non-habitat	123.3 (20.1)	197.0 (25.6)	320.3 (23.2)
NFS Lands	612.6 (100)	0 (0)	612.6 (44.3)
Private	0 (0)	770.4 (100)	770.4 (55.7)
Total	**612.6 (100)**	**770.4 (100)**	**1,383.0[d] (100)**

[a] These habitat types were field verified within the 1,376-acre EMR project area. The field verified data only consider the forest types, structural stages, relative down coarse woody debris density, and relative live horizontal conifer density within the winter foraging range of snowshoe hares of the lynx habitats present. They do not consider land use, habitat effectiveness, and other factors.
[b] All denning habitat supports winter foraging values.
[c] On NFS and private lands = ∑ WFH + denning + other + currently unsuitable.
[d] Note: The sum of all lynx habitat types within the project area (**1,383 acres) exceeds the acreage of the project area (1,376 acres) because of the slight overlap of some lynx habitat polygons in the ARP database.**
Source: Forest Service, SE Group, and Western Ecosystems, Inc.

Boulder LAU Lynx Habitat Statistics

The project area is located entirely within the Boulder LAU. The 9,000 foot elevation level is used as a determinant of the break between mesic subalpine fir types (constituting lynx habitat) and other xeric conifer types (constituting non-lynx habitat).[187] A finger of lynx non-habitat that occurs below the 9,000 extends into the Boulder LAU up the bottom of the Middle Boulder Creek drainage into the proposed EMR SUP boundary under Alternative 2. This local lynx habitat delineation is consistent with potential lynx habitat as defined by the CPW.[188]

For further consideration, and based on the field validation of habitat and lynx habitat for this project, a comparison of the Boulder LAU habitat types and lynx habitat types figures suggests that lynx winter foraging habitat may be less widespread than mapped in the Boulder LAU (i.e., above the 9,000 feet contour). Conversely, denning habitat may be more widespread in the LAU than what is mapped in the lynx habitat type figure associated with the BA, particularly on north-facing slopes at moderate and higher elevations.

Table 3H-4 provides environmental baseline lynx habitat statistics for the Boulder LAU based on current Forest Service habitat mapping and classification criteria.[189]

[187] Lowry, 2002
[188] Lynx Activities in project file at BRD.
[189] Lowry, 2002

Table 3H-4:
Lynx Habitat Statistics for the Boulder Lynx Analysis Unit – Environmental Baseline

Lynx Habitat Description	Acres of Lynx Habitat in LAU	% of all Lynx Habitat in LAU
Winter Foraging (NFS, not incl. denning)	26,204	34
Denning (NFS)	8,875	12
Other (NFS)	5,871	8
Unsuitable (NFS)	3,120	4
Total Lynx Habitat[a] (NFS)	44,070	58[b]
Non-habitat (NFS)	8,211	11[c]
NFS Acres in LAU	52,281	67.8
Unsuitable (private)	192[d]	0
Private Acres in LAU	24,839	32.2
Total Acres in LAU	**77,120**	**100**

[a] Total lynx habitat = WFH + Denning + Other + Unsuitable.
[b] The sum of lynx habitat is 58%, which is 100% of the lynx habitat in the LAU. Lynx habitat does not include non-habitat (11%) or the 32% of the LAU in private acres (sum = 100% of the LAU acres) where the ARP data did not specify lynx habitat type.
[c] Non-habitat is a lynx habitat type, but it is not included in lynx habitat.
[d] This acreage is included in the 24,839 private acres, below (i.e., 24,839 private acres = 52,281 NFS acres = 77,120 total acres in the LAU).
Source: Forest Service (provided by B. Baker, Forest Service, July 31, 2013; these data were not field validated) and Western Ecosystems, Inc.

Note that the LAU statistics do not reflect the effects of the MPB epidemic, which has converted some "other" and "winter foraging" habitats into currently "unsuitable" habitat. Although the Forest Service has not remapped lynx habitat in the Boulder LAU to account for MPB effects, lodgepole pine stands have experienced much less mortality compared to nearby LAUs, such as Clear Creek.[190] Dead trees are typically in small pockets of less than ten trees and the effect of MPB on lynx habitat at the Boulder LAU scale is currently discountable.[191]

Traffic on Regional Highways in the Lynx Action Area

This section addresses traffic effects on lynx highway mortality and habitat permeability, environmental baseline traffic volumes on highways serving EMR, and future traffic projections unrelated to the action alternatives.

Conflicts between Lynx and Highways

High-speed, high-volume highways can result in lynx road-kills, fragment and restrict lynx habitat use, impair home range effectiveness, and inhibit local and dispersing movements that may lead to reduced habitat connectivity and the decline of some wildlife populations and species over time due to genetic isolation.[192] Highway mortality levels can increase appreciably with relatively small increases in traffic

[190] McCormick, 2013
[191] Ibid.
[192] Forman and Alexander, 1998; Apps, 1998; Ruediger, 2000; US Fish and Wildlife Service, 2000; Alexander, 1998; Alexander et al., 2004, 2005; Clevenger et al., 2002; Forman et. al., 2003

volumes and speeds.[193] Fourteen of the 218 lynx released to date in Colorado have been killed attempting to cross highways. As a summary of highway traffic volume and carnivore road-kill probabilities, annual average two-way daily traffic (AADT) volumes within or above the 2,000 to 5,000 vehicles per day (VPD) range have been documented to impair lynx movements.[194]

Current and Future Baseline Traffic Volumes and Effects

Pertinent environmental baseline traffic volumes presented in this section are based on Year 2012 and Year 2022/23 (at full build-out) traffic volumes from the Colorado Department of Transportation (CDOT) website and represent the most current available data.[195]

Baseline traffic sources and patterns used in this analysis consider the points of origin of the vast majority of guests and employees associated with EMR. Based on statistics used for other resources on this project, 8 percent of EMR guests are from out of state, 2 percent are from south of Denver, and the remaining 90 percent are from Boulder County, Gilpin County, Larimer County, Jefferson County, Adams County, and Weld County. Virtually all current employees live in Boulder. For this traffic analysis, all guests and employees are assumed to access the resort via Highway 36/CO 119/Eldora Road/ Shelf Road. While a small percentage of EMR traffic accesses the resort via other highways (including Highways 119 [from Blackhawk/I-70 to the south], 72 [Coal Creek Canyon from Highway 93 to the east], 7 [South St. Vrain Canyon to the northeast from Lyons], 6 [Clear Creek Canyon from Golden to the southeast], and I-70 [from the east to the Blackhawk exit, east of Idaho Springs]), none of these highways cross through designated lynx linkages and only short sections of Highways 72 and 119 cross into lynx habitat above the 9,000 foot elevational contour. These traffic patterns are assumed to be similar between the environmental baseline (Year 2012) and full build out Alternatives 2 and 3 (ten years, Year 2022/23). Calculation of future traffic volumes under the No Action Alternative are required to properly understand total future traffic levels. The existing traffic related impacts to lynx habitat is discountable.

Lynx Use of the Boulder LAU

To date, verified lynx use of the east slope of the Front Range and the Boulder LAU has been limited.[196] TA study analyzed 12,796 locations of 118 individual lynx (♀=64; ♂=54) released into Colorado between 1999 and 2006.[197] In the 12 years including 1999 to 2010, there were a total of six lynx relocations in Boulder County (3 in 1999, 1 in 2004, 1 in 2006, and 1 in 2009).[198] Two relocations appeared to be in the Boulder LAU. To date, there has been no evidence of lynx denning in Boulder County, all relocations occurred in the spruce-fir zone, and, lynx use appears to be by transients.[199]

[193] Ruediger et al., 2000
[194] Stevens et al., 1996; Ruediger, 2000; Clevenger et al., 2002; Alexander et al., 2004, 2005
[195] Colorado Department of Transportation, 2013
[196] Theobald and Shenk, 2011
[197] Ibid.
[198] Ibid.
[199] Ibid.

The spruce-fir zone in Boulder County, ranging from approximately 4 to 8 miles wide, generally contained relatively moderate to high probabilities of detecting lynx at the stated frequency.[200] Summer probabilities were slightly higher than winter values. In the four cells overlapping the EMR project area, winter habitat values were 0.62 to 0.65 out of one (i.e., moderate) and summer values were 0.63 to 0.65 to 0.65 to 0.79 out of one (i.e., moderately high to high).[201] Two additional results of the analysis were apparent. First, while potential lynx habitat values in western Boulder County were seasonally moderate to high, they were relatively low compared to other habitat blocks around the state. Second, western Boulder County lynx habitat is relatively small and linear.

While documented lynx use of the Boulder LAU has been limited to transients, based on a comparison of lynx habitat (including, but not limited to types, distribution, block sizes, seasonal core area potential, human land use and recreational activity, transportation corridors, etc.) present in the Boulder LAU with known dens areas around Colorado, it is possible that portions of the Boulder LAU could support one or more lynx home ranges and effective denning habitat.[202]

Other Factors Affecting Lynx in the Action Area

Other relevant and meaningful activities that are influencing lynx in the action area, that are part of the environmental baseline, and that have been identified by the ARP for consideration herein are presented below.

Mountain Pine Beetle Effects on Lynx Habitat

Mountain pine beetle (MPB, *Dendroctonus ponderosae*) is a native insect that affects many different pine species. In Colorado, MPB can cause significant mortality of lodgepole pine (*Pinus contorta* subsp. *latifolia*), ponderosa pine (*Pinus ponderosa*), and limber pine (*Pinus flexilis*). Since 1996, the MPB has affected 3.4 million acres of pine forest in Colorado.[203] Although the epidemic has slowed down in many areas as large pine trees have been killed in core outbreak areas, in 2012 MBP activity expanded by 31,000 acres in Colorado for total active MPB activity in 264,000 acres of forest. These areas primarily occur in the northern Front Range, such as Larimer County. Although the Forest Service has not remapped lynx habitat in the Boulder LAU to account for MPB effects, lodgepole pine stands have experienced much less mortality compared to nearby LAUs, such as Clear Creek.[204] Dead trees are typically in small pockets of less than ten trees and the effect of MPB on lynx habitat at the Boulder LAU scale is currently discountable.[205] At EMR, MPB activity varies considerably across the project area, ranging from 15 to 80 percent; dependent upon forest tree species composition, diameter classes, individual site conditions, and the concentration of lodgepole pine. Small stands or individuals or large

[200] Ivan et al., 2012
[201] Ibid.
[202] Personal Communications with various CPW, USFS, and USFWS personnel
[203] USDA Forest Service, 2012
[204] McCormick, 2013
[205] Ibid.

diameter limber pine were also observed to have been killed by MPB.[206] For this analysis, MPB effects are considered an ongoing part of the environmental baseline.

In and beyond the Boulder LAU, MPB activity has impaired lynx foraging values in lodgepole pine forests. Within forests dominated by lodgepole pine, MPB-induced lodgepole pine mortality can alter lynx prey species abundance and lynx habitat use.

MPB effects in mixed conifer (spruce-fir dominated with a subdominant lodgepole pine component) stands could cause minor to moderate long-term increases in the primary lynx prey base, while year-round habitat connectivity through affected areas would not be meaningfully affected. Forty-one percent (Table 3H-1) of the EMR project area supports lodgepole pine forests that have been, or will be, affected by MPB to some extent. EMR management currently includes the targeted application of Carbaryl to control MPB and the removal and barking of active MPB infected trees.

Climate Change

While research continues to provide updated information on climate change, studies are indicating a variety of scenarios that may occur and could negatively affect wildlife species. According to some studies, climate change is reducing the snow pack in western North American mountains and is shifting the distribution of boreal forest northward and up mountain slopes.[207] As a result, climate change is altering the geographic location and distribution of potential lynx habitat, threatening the long-term viability of lynx in the contiguous United States.[208] Based on three climate change scenarios, potential lynx habitat in the lower 48 United States could decrease by 47 to 69 percent by Year 2100.[209] Climate change could also result in increased intra-year periods of a more consolidated snowpack, which could reduce the competitive advantage that lynx have over competitors and predators in the backcountry. Furthermore, climate change could result in more frequent, larger, and more destructive wildfires that could affect lynx habitat and their prey base. In addition, climate change could result in altered, future forest composition that could benefit or adversely affect snowshoe hare and lynx habitat use.[210] Full implementation of Alternative 2 or 3 would be completed by years 2022/2023, possibly before any predicted, measureable climate change effects predicted by that could be discerned from normal background variation would be realized in those montane and subalpine habitats within the lynx action area.[211]

[206] Orthner, 2013
[207] Knowles et al., 2006; IPCC, 2007; Sturm et al., 2001; Danby and Hik, 2007; IPCC, 2007
[208] Gonzales et al., 2007
[209] Ibid.
[210] Hoback, 2013
[211] Gonzales et al., 2007

Region 2 Sensitive Animal Species

Forest Service Region 2 (R2) has designated "sensitive species," representing species declining in number or occurrence or whose habitat is declining, either of which could lead to federal listing if action is not taken to reverse the trend, and species whose habitat or population is stable but limited. From the current R2 list, a subset of sensitive species, including 1 mollusk, 3 insects, 5 fish, 3 amphibians, 25 birds, and 11 mammals, was determined to be present or potentially present on the ARP (Table 3H-5). These species are considered in Table 3H-5 and discussed individually in the text where warranted. With the exception of species noted in the table as not excluded, none of the R2 sensitive species that are present or potentially present on the ARP occur within the project area, they have no affinities to project area habitats, the project area is outside of the species' range, and they would not be potentially affected by management decisions associated with the alternatives. Therefore, Alternatives 1 through 3 would have no impact on the species noted as excluded in Table 3H-5 and they will not be discussed further in this document. Wolverine (*Gulo gulo luscus*) was proposed for listing under the ESA on February 4, 2013.[212] As a result, it is discussed in the threatened and endangered species section.

Table 3H-5:
Region 2 ARP Forest Service Sensitive Animal Species

Common Name[a]	Scientific Name	MIS/Indicator Community	Species Excluded	Reason for Exclusion
MOLLUSCS				
Rocky Mountain capshell snail	*Acroloxus coloradensis*	Yes	No	
INSECTS				
Arapahoe snowfly	*Capnia arapahoe*	No	Yes	Outside species range – Cache La Poudre, Big Thompson, and St. Vrain tributaries only
Hudsonian emerald	*Somatochlora hudsonica*	No	No	
Ψ Regal fritillary butterfly	*Speyenia idalia*	No	Yes	No species or habitat in project area
FISH				
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	No	Yes	Potential habitat not present or affected
Ψ Flannelmouth sucker	*Catostomus latipinnis*	No	Yes	Not found in analysis area
Ψ Lake chub	*Couesius plumbeus*	No	Yes	Potential habitat not present or affected
Mountain sucker	*Catostomus platyrhynchus*	No	Yes	Potential habitat not present or affected
Northern redbelly dace	*Phoxinus eos*	No	Yes	No suitable habitat in project area

[212] US Fish and Wildlife Service, 2013c

Table 3H-5:
Region 2 ARP Forest Service Sensitive Animal Species

Common Name[a]	Scientific Name	MIS/Indicator Community	Species Excluded	Reason for Exclusion
AMPHIBIANS				
Boreal toad**	*Anaxyrus boreas boreas*	Yes/Montane riparian & wetlands	No	
Northern leopard frog	*Lithobates pipiens*	No	No	
Wood frog	*Lithobates sylvatica*	No	Yes	Potential habitat not present or affected
BIRDS				
☼ American bittern	*Botaurus lentiginosus*	No	Yes	Potential habitat not present or affected
American peregrine falcon	*Falco peregrinus*	No		
Bald eagle	*Haliaeetus leucocephalus*	No	No	
Black swift	*Cypseloides niger*	No	Yes	No habitat (Waterfalls, cliffs)
Black tern	*Chlidonias niger*	No	Yes	Project outside species habitat range
Boreal owl	*Aegolius funereus*	No	No	
Brewer's sparrow	*Spizella breweri*	No	No	
Burrowing owl	*Athene cunicularia*	Yes/Prairie dog towns	Yes	Grassland/prairie species habitat not present
Cassin's sparrow	*Aimophila cassini*	No	Yes	Grassland/prairie species, habitat not present
Chestnut-collared longspur	*Calcarius ornatus*	No	Yes	Grassland/prairie species, habitat not present
Ferruginous hawk	*Buteo regalis*	Yes/Shortgrass & midgrass prairie	Yes	Grassland/prairie species, habitat not present
Flammulated owl	*Otus flammeolus*	No	No	
Grasshopper sparrow	*Ammodramus savannarum*	No	Yes	Grassland/prairie species, habitat not present
▼ Greater sagegrouse	*Centrocercus urophasianus*	No	Yes	Sagebrush steppe species, habitat not present
☼ Lewis' woodpecker	*Melanerpes lewis*	No	Yes	No habitat (Ponderosa pine and cottonwoods)
Loggerhead shrike	*Lanius ludovicianus*	No	Yes	Grassland/agriculture species, habitat not present
Long-billed curlew	*Numenius americanus*	No	Yes	Grassland species; habitat not present
McCown's longspur	*Calcarius mccownii*	No	Yes	Grassland species; habitat not present
Mountain plover	*Charadrius montanus*	Yes/Shortgrass Prairie	Yes	Short-grass prairie species; habitat not present

Table 3H-5:
Region 2 ARP Forest Service Sensitive Animal Species

Common Name[a]	Scientific Name	MIS/Indicator Community	Species Excluded	Reason for Exclusion
Northern goshawk	*Accipiter gentilis*	No	No	
Northern harrier	*Circus cyaneus*	No	Yes	Project outside species habitat range
Olive-sided flycatcher	*Contopus borealis*	No	No	
Purple martin	*Progne subis*	No	Yes	Project outside species range
White-tailed ptarmigan	*Lagopus leucurus*	No	No	
▼ Yellow-billed cuckoo	*Coccyzus americanus occidentalis*	No	Yes	Project outside species habitat range
MAMMALS				
American marten	*Martes americana*	No	No	
Black-tailed prairie dog	*Cynomys ludovicianus*	Yes/Prairie dog towns	Yes	Grassland/prairie species Habitat not present
☼ **Fringed myotis**	*Myotis thysanodes*	No	No	
Ψ Hoary bat	*Lasuirus cinereus*	No	No	
Pygmy shrew	*Sorex hoyi montanus*	No	No	
River otter	*Lontra canadensis*	No	No	
Rocky mountain bighorn sheep	*Ovis canadensis*	Yes/Openings	Yes	Project outside of known population's range
Swift fox	*Vulpes velox*	No	Yes	Grassland/prairie species Habitat not present
Townsend's Big-eared bat	*Corynorhinus townsendii*	No	No	
Ψ White-tailed prairie dog	*Cynomys leucurus*	No	Yes	Grassland/prairie species Habitat not present
Ψ North American wolverine	*Gulo gulo luscus*	No	Yes	Species analyzed in the threatened and endangered species section

Notes:
Species are listed phylogenetically by taxonomic Class and alphabetically within Classes.
Species in **bold** are potentially present and/or are discussed in the text.
Alternatives 1 through 3 would not impact the species noted as excluded in this table
Ψ Species analyzed in the threatened and endangered section.
▼These species not known or suspected to occur on NFS lands, however it may occur in the planning area vicinity.
☼ Species suspected to occur, but unconfirmed on the Pawnee National Grassland.
** Species also analyzed as MIS.

Molluscs

Rocky Mountain Capshell Snail

The environmental baseline for the capshell snail associated with the action alternatives focuses on the population in Peterson Lake. The Lost Lake capshell population is isolated from effects associated with EMR.

Peterson Lake is located on private land in Boulder County, bordered on the north by EMR's paved, two-lane access road and approximately 521 feet from the ski area's gravel, North Parking Lot, located on the opposite side of the access road from the lake. The lake is fed by Peterson Creek, a tributary of Middle Boulder Creek located below the ski area.[213] Originally the lake was much smaller than it is presently. In 1882, it was dammed on its east side, which substantially increased its surface area and storage capacity.[214] Subsequent improvements to the lake in 1977 raised the lake level by an additional 3 feet. A standpipe with a controllable gate was included in these improvements to allow a drawdown to the lake's original 1977 pre-improvement level, if necessary, to protect downstream water rights.[215] Currently the lake has a full pool surface area of approximately 18.2 acres with a maximum depth of 39 feet, an average depth of 13.7 feet, and a storage capacity of 250.2 acre feet.[216]

Presently, the primary use of Peterson Lake is the provision of water for snowmaking at EMR. This occurs primarily from mid-November through mid-January, during which time the lake level drops substantially. However, the hydrology associated with EMR's snowmaking system is more complicated.[217] While all snowmaking water at EMR is pumped out of Peterson Lake, other water impoundments are also involved. When snowmaking starts, water that is pumped out of Peterson Lake is replaced by water pumped out of Lake Eldora, keeping the level of Peterson Lake relatively stable. Once Lake Eldora is drawn down to the extent possible, water from Peterson Lake is then replaced with water out of the lined, man-made, snowmaking reservoir (aka the "Kettle Pond"), again keeping the level of Peterson Lake relatively stable. Once all water is pumped out of the Kettle Pond into Peterson Lake, subsequent withdrawals from Peterson Lake cause the water level, by now generally iced over, to drop by up to 8 feet. Over winter and in spring, Peterson Lake and Lake Eldora begin to fill slowly through ground water recharge, then more rapidly with snowmelt runoff, then all three reservoirs are filled through water pumped out of Jenny Creek until all impoundments are full in May to June.

The first description of the Rocky Mountain capshell was from a specimen taken from Peterson Lake in the 1920s.[218] In 1967, up to 72 specimens per square meter were found in a favorable location near the

[213] Wright Water Engineers, Inc., 1990
[214] Pioneer Environmental Services, 1996
[215] Pioneer Environmental Services, 1992
[216] Wright Water Engineers, Inc., 1992
[217] Hunter, 2012
[218] Bryce, 1970

southwest shore of the lake.[219] In 1992, however, only three specimens were observed during 1.25 days of sampling by a diver and several waders.[220] The low sampling success of the survey raised concerns that development around the lake, combined with water withdrawals from the lake by EMR, was impacting capshell populations. This concern was heightened by the then current belief that the only locations where the capshell existed in the United States were at Peterson Lake in Boulder County, Colorado and at Lost Lake in Glacier Park, Montana.[221] Unfortunately, it is not apparent whether Clark sampled in the same location as Bryce (Clark's specimens were found near the inlet from Lake Theo). Additionally, the apparent drop in catch-per-effort between Bryce's and Clark's surveys was a qualitative observation and not quantitatively rigorous. Bryce's field notes indicate that Bryce sampled several days without finding any capshells at all.[222]

In addition to the differences in sampling rigor between the surveys, the different results may also be attributed to the capshell snail occurring in small localized populations in Peterson Lake.[223] This makes lakewide population estimation very difficult unless extensive quantitative sampling is done. Monitoring of each small localized population may be the only way to assess yearly population fluctuations.

In 1993 and 1994, Pioneer found that capshells overwintering in shallow water appear to survive 5-foot winter water level fluctuations which leave them periodically above waterline, although how they do this is unclear.[224] On December 22, 1994, after the USFWS determined that listing of the capshell was not warranted, the capshell's status changed to Category 3 [Federal Register, 59:132, 7/12/94], and the Category 3 status abolished, it was decided that EMR would be allowed to draw Peterson Lake down 8 feet for snowmaking for the 1994/95 season.

In 1995, during a quantitative survey of Peterson Lake, a total of ten snails were found at depths ranging from 0.5 to 3.0 meters.[225] Results showed no significant difference in snail densities among depth increments and that it was likely that the snail population in Peterson Lake exhibited a clumped distribution. Based on the survey, Pioneer calculated a population estimate of 2.34 ± 2.27 individuals/square meter (95 percent confidence interval).[226]

Concern remains about the possibility of large water level fluctuations affecting capshell distributions and populations in Peterson Lake.[227] In 1994 and 1995, pumping from Peterson Lake for snowmaking resulted in water levels dropping a total of 8 feet. In spite of these fluctuations, snails were still being

[219] Ibid.
[220] Clark, 1993
[221] Ibid.
[222] Wu, 1993
[223] Pioneer Environmental Services, 1995
[224] Ibid.
[225] Ibid.
[226] Ibid.
[227] Pioneer Environmental Services, 1996

found above and below the drawdown level. Although captive capshells remain immobile a large part of the time, field evidence indicates they may move from rock to rock. This is based on the results of the 1996 training survey in which rocks that were previously known to be inhabited by capshells were no longer inhabited. It is possible that the snails had not moved, but had completed their life-cycle on that rock. The presence of capshells both above and below the winter drawdown level in the results of the annual Peterson Lake surveys indicated that winter draw downs probably have not impacted capshell snail populations, although that was refuted by Clarke before the results of Pioneer's surveys were available.[228] Further evidence of the capshell's ability to deal with water fluctuations is provided by the presence of a healthy population at Upper Big Creek Lake, which experiences a 5- to 7-foot water fluctuation. However, it should be noted that the irrigation-induced water fluctuations at Upper Big Creek Lake occur in the summer and may not be as rapid as the winter water drawdown at Peterson Lake.

Unfortunately, it is difficult to pinpoint potential reasons for capshell declines, or even if the capshell snail population has declined in Peterson Lake.[229] Normal population fluctuations and shifts in the locations of localized populations as well as differences in sampling methodology and efficiency could account for differences in the success of various sampling efforts. Nevertheless, it would be advisable to preserve the water and habitat quality of the lake. During the 1996 survey, it was noted that the lake was experiencing a substantial algae bloom.[230] Visibility was limited to less than 0.2 meter because of the turbidity of the water. It appeared that the lake was approaching eutrophic conditions. Because of this, it would be important to monitor wastewater entering the lake to insure that phosphorus, nitrogen, and chlorine limits are not exceeded. Additionally, the effects of sanding and salting of the road on the north shore of the lake could be assessed to determine that extent of chemical and/or sediment contamination to the lake.

Divers working on the 1996 survey noticed a large amount of disturbed rocks in the general area west of Lake Theo.[231] This was an indicator of the high level of sampling effort that has been concentrated in this area in the past four years. This, combined with the encountering of only one capshell in a day's (albeit inefficient) sampling, raises questions about the impacts of heavy sampling on this small, localized population. In the interest of being conservative as far as protecting the resident capshell populations, it would be advisable to not sample in vicinity of the Lake Theo inlet for a period of two to three years.

Water quality concerns in Peterson Lake have also been associated with runoff from the county access road on the northern edge of the lake, EMR's parking lot (located a short distance up the Peterson Creek drainage), and wastewater discharges into Peterson Creek. In 1973, the wastewater treatment facility utilized by EMR was expanded and in 1978 the facility was upgraded to meet current effluent standards

[228] Ibid.
[229] Ibid.
[230] Ibid.
[231] Ibid.

for chlorine. As a result, contamination associated with wastewater has decreased under resort management.[232]

Insects

Hudsonian Emerald

Some of the aquatic and wetland habitats surveyed (all on private land; including the kettle pond within the developed interior of the ski area where a single Hudsonian emerald female may have been recorded in 1914) for boreal toads also represent potential habitat for the Hudsonian emerald dragonfly. No Hudsonian emeralds were located during any of those surveys. A few individual emeralds (identified as mountain emeralds [*S. semicircularis*], a more common and widespread emerald in R2) were observed through binoculars, but none could be captured with a butterfly net that was carried during all toad surveys conducted for the action alternatives. The emeralds observed did not have white rings between abdominal segments characteristic of the Hudsonian emerald.[233] Some of the more persistent kettle ponds within the developed interior of the ski area represent potential, but apparently unoccupied habitat. In 2013 (June 7 and July 12 and 15), additional surveys were conducted around Peterson Lake, Lake Eldora, Lake Theo, and other associated ponds, as well as the small ponds and wetlands in Buckeye Basin, to further search for evidence of Hudsonian emeralds and assess habitat potential. This species was not detected during those surveys.

Fish

None of the five species of R2 sensitive fish that occur or may occur on the ARP occur within the hydrologic influences of the project area and none have been carried forward for detailed analysis.

Amphibians/Reptiles

Boreal Western Toad

In Colorado, evidence of boreal toad declines has been thoroughly documented.[234] Boreal toads historically occurred in many locations on the BRD. CPW and CNHP surveys throughout the 1990s and ongoing have been unable to detect historic occurrences in many areas of the BRD.[235] Boreal toads have historically occurred at Lost Lake and “Middle Boulder Creek,” but specific locations have not been identified.[236] There was a reintroduction at Lost Lake in the mid-1990s, although it wasn’t successful and no toads were observed during a June 24, 2010 survey for the action alternatives.[237] The water bodies, surrounding ponds, and wetlands associated with the EMR snowmaking system are considered to

[232] Pioneer Environmental Services, 1993a
[233] Dunkle, 2000
[234] Loeffler, 2001
[235] Loeffler, 2001; Lambert et al., 2000
[236] Pioneer Environmental Services, 1993a,b; Baker, 2010
[237] Baker, 2011

represent potential, but unoccupied breeding habitat.[238] There are no known, local, extant, boreal toad populations within the dispersal distance of the EMR project area.

Northern Leopard Frog

Because there are no known current or historic populations of northern leopard frog on the ARP, occurrence in and around the project area is unlikely. No leopard frogs were detected during any of the amphibian surveys (refer to boreal toads section, above). Potential, but unoccupied breeding habitat occurs in the project area along Jenny Creek, in some kettle ponds within the SUP area, at and around some of the lakes and ponds associated with snowmaking system, and along some portions of Middle Boulder Creek.

Birds

Northern Goshawk

Goshawks are likely present in the vicinity of the SUP utilizing portions of the ski area as part of a large hunting territory. Information provided in Pioneer (1993a) indicated that an historic nest was located southwest of Peterson Lake, that their calling surveys throughout the ski area did not detect goshawk nests or individuals, but that local ecologists (D. Hallock and M. Figgs) had observed goshawks regularly using the ski area and adjacent NFS lands over the prior 14 years.[239] The majority of observations occurred within the Nordic trail system during early spring through late fall, including post-fledging families suggesting a nest site. Past surveys from a gas pipeline replacement did not detect nesting goshawks within the SUP boundary.[240] A May 4, 2000 calling survey of marginal nesting habitat in upper Corona Bowl did not locate any evidence of goshawks.[241] In July, 2010, a foraging adult goshawk was observed within 2 miles southwest of the project area (D. Williams, Forest Service wildlife biologist).

For the action alternatives, goshawk surveys were conducted in forest stands containing action alternative project component areas that were large enough and structurally suitable to support a potential goshawk nest site. Thirty-nine calling stations, located in and around proposed tree clearing and thinning areas, were surveyed on June 18 and 30, 2009. Goshawk survey routes and waypoints of calling stations are contained in the project file. In 2013, 21 additional calling stations were conducted in the proposed Jolly Jug pod, which was expanded after the 2012 breeding season. No goshawks or goshawk nests were detected during those surveys or during other wildlife fieldwork.

While forest stands within the project area have been fragmented by ski trail development, negatively affecting potential nesting and foraging habitat, those forest stands with open and relatively open understories remain effective goshawk foraging habitat. Goshawks have been detected hunting developed

[238] Pioneer Environmental Services, 1993a,b
[239] Pioneer Environmental Services, 1993a
[240] Baker, 2011
[241] Cirrus, 2000

portions of Breckenridge, Vail, Ski Cooper, and Powderhorn Ski Areas.[242] Most spruce-fir and some mixed conifer stands in the project area do not have open understories, which would make it difficult for goshawks to hunt below the canopy, however, that does not mean that goshawks could not hunt the area. Existing glading of spruce-fir and mixed conifer stands may have benefitted goshawks by facilitating more effective foraging of those otherwise closed understories. Primary prey species abundance within the project area and the immediate surrounding landscape is representative of the proportion of lodgepole pine and spruce-fir habitats present (re: small and medium-sized birds and red squirrels) to low (re: snowshoe hares and blue grouse) compared to other Colorado ski areas where goshawks have been detected hunting. Given the history of goshawks in the EMR area and the large blocks of suitable foraging habitat on and surrounding EMR, it is likely that goshawks utilize portions of EMR as part of a local pair's large range.

While no evidence of goshawk nesting was detected, and while most forest blocks within the interior of the ski area are too small or do not support open understories and other physiographic characteristics suitable as nesting habitat, suitable nesting habitat is present, generally associated with lodgepole stands surrounding the existing ski area, particularly in the Jolly Jug pod.

American Peregrine Falcon

The peregrine falcon analysis area for this project extends approximately 30 miles from the EMR SUP area, the maximum hunting distance away from the nest site that would overlap the entire potential action alternative disturbance areas. Several active peregrine falcon eyries are present within 30 miles of the EMR SUP area such that the action alternative project component areas could be considered to be within a hunting territory. Birds from the eyries are thought hunt primarily in the vicinity of Boulder. The EMR project area is located 10 miles beyond the active peregrine eyries. There are no habitats within the EMR project area that concentrate prey or that expose the moderate prey base to peregrine attack any more so than other habitats common in the surrounding area.

Bald Eagle

There are no known nests, roosts, or mapped summer or winter activity areas in the vicinity of the project area that would be affected by the action alternatives.[243] A bald eagle sighting was reported from the Los Lagos Reservoirs (approximately 3 miles ESE of the project area), but the identification was not confirmed and other circumstantial evidence suggests that the bird may have been an osprey (*Pandion haliaetus*).[244] The only potential foraging habitat associated with the project area is the salmonids associated with Peterson Lake. The closest big game winter range is the elk habitat on Arapaho Ranch, several miles northeast of the project area. No evidence of such potential bald eagle presence and habitat use has been detected.

[242] Thompson, 2011b, 1994a, 1999, 2001
[243] Baker, 2013; NDIS mapping, accessed Sep. 9, 2013
[244] Baker, 2013

White-tailed Ptarmigan

Ptarmigan have not been detected during summer or winter field surveys in and around the project area. There is no alpine habitat that this species would use for breeding in summer or for male wintering habitat. Potential alpine winter range occurs along the ridgeline west of the SUP area, but skier use does not extend into that area. There is no potential female wintering habitat that would be affected by the action alternatives, although potential (but apparently unoccupied) wintering habitat may occur nearby in Jenny Creek. While alpine and Nordic skiing occasionally and temporarily displaces individuals and groups of wintering males from alpine wintering areas (e.g., at Ski Cooper, Breckenridge, and Copper Mountain Ski Areas), ptarmigan continue to use such activity areas.[245]

Flammulated Owl

Flammulated owls have not been detected during field surveys (some of which overlapped crepuscular hours) in and around the project area. No specific taped calling surveys have been conducted at EMR because the project area supports higher elevation, mature, spruce-fir and xeric lodgepole pine forests, not the ponderosa pine/Douglas-fir habitat association representing primary habitat that this species is associated with. However, a Forest Service crew heard a flammulated owl in the Brainard Lake area a few years ago, which supports habitat similar to the spruce-fir and mixed conifer stands on north-facing slopes in the EMR project area.[246] Therefore, it is possible, that flammulated owls could use EMR habitats during migration and individuals could even nest in the secondary habitat present.

Boreal Owl

As of 2007, there were no documented surveys or sightings in the project area in BRD records.[247] Past EMR wildlife surveys have not detected boreal owls; however, none of those surveys used taped calls.[248] A boreal owl was heard vocalizing on Bryan Mountain, along Middle Boulder Creek within or near the EMR project area, and there have been other reports of vocalizing boreal owls from the general vicinity of the Hessie townsite.[249] Some habitats in this general area are suitable for this species. Heavy, year-round recreational use along Highway 130 and the Fourth of July and Lost Lake Trails probably has no negative effect on boreal owl habitat effectiveness.

A boreal owl survey was conducted on February 16, 2010 in and around proposed project component areas that could have represented potential nesting habitat. On March 7, 2013, additional boreal owl surveys were conducted around the proposed parking lot expansion (2 calling stations) and in the proposed Jolly Jug pod (8 calling stations), which was expanded after the 2012 breeding season. No boreal were detected during the 2010 and 2013 surveys or during other wildlife fieldwork.

[245] Thompson, 1999, 2012, 2003
[246] Baker, 2013
[247] Baker, 2007
[248] Pioneer Environmental Services, 1993a; Cirrus, 2007c
[249] Jones, 2003; Hallock, 2010; Baker, 2012

Despite the negative survey results, large portions of the EMR project area (much of Corona Bowl, mid- and lower portions of the Indian Peak pod, and areas north, down to and along Middle Boulder Creek, and, possibly, upper portions of the Jolly Jug pod) represent suitable nesting and/or foraging habitat. High quality boreal owl habitat occurs in those spruce-fir stands with understory wetlands, including the bottom of Moose Glades, below the Corona base terminal down to Middle Boulder Creek, some areas along the Middle Boulder Creek floodplain, and on NFS and private lands east of the Indian Peaks pod. Boreal owls have been detected in suitably large habitat blocks within the developed interior of Vail Ski Area and adjacent to developed portions of Telluride Ski Area and Durango Mountain Resort.[250]

Olive-sided Flycatcher

During summer field surveys when this species would have been present, olive-sided flycatchers were detected in a few, larger, mixed conifer intertrail tree islands within the developed ski area. Based on habitat distributions and structural conditions present, about 40 percent of EMR's spruce-fir and mixed conifer stands (i.e., those larger intertrail islands with snags extending through the forest canopy) represent potential nesting and foraging habitat. Heavily fragmented forest, the interior of large intertrail islands and closed forest blocks, and islands without prominent snags were not occupied. Olive-sided flycatcher habitat values in the existing SUP area should improve with ski trail succession, as trails succeed towards native meadows supporting higher density insect populations and as existing spruce-fir stands develop higher snag densities. Beetle effects to these flycatchers will vary by forest type. The MPB epidemic will increase snag densities, but may also likely decrease foraging and nesting opportunities. With further progression of the MPB epidemic to levels occurring in the surrounding area, olive-sided flycatchers now associated with lodgepole stands may be completely displaced over the long term until lodgepole stands succeed back to mature communities with openings and suitable snag densities. Flycatchers associated with suitable mixed conifer stands may be affected by reduced foraging opportunities, but birds should persist, perhaps at lower densities. Flycatchers associated with suitable spruce-fir stands may be unaffected by MPB effects.

Brewer's Sparrow

There is no primary habitat (sagebrush) that Brewer's sparrows are typically associated with in the vicinity of the project area. With the possible exception of a talus field supporting krummholz-like structure at the top of Salto Glades (west of the top of Corona chairlift at the top of Bryan Mountain), there is no habitat structure present on or within the area of influence of project component areas that approaches the open montane to open subalpine, secondary habitat that Brewer's sparrows have been associated with near treeline in Boulder County during drought years.[251] The top of Salto Glades is a young, sparse to dense, second-growth stand of mixed conifers (lodgepole and limber pine, spruce and fir) ranging from seedlings to 10-foot-tall trees on coarse talus and xeric gravelly soils with a low to high density of down CWD and low snag density. Understory shrubs are sparse and largely limited to wax

[250] Thompson, 1994a, 1998a, 2008
[251] Hallock, 2013

current and ground juniper. This community is bisected by an existing access trail to Salto and Moose Glades and that portion of the krummholz-like habitat below the trail is currently skied. No Brewer's sparrows were detected in this community during a June 30, 2009 survey when this species could have been present and this habitat patch is considered to be unoccupied, potential secondary habitat that this species may inhabit during drought years.

Mammals

Pygmy Shrew

Large areas of potential pygmy shrew habitat persist along the east slope of the Front Range, including developed and undeveloped ski terrain within the EMR SUP area. Pygmy shrew habitat in the project area has largely recovered from historic mining and logging activities. More recent Alpine and Nordic ski areas developments that created permanent grasslands and linear openings out of closed canopy forest (including some formerly forested wetlands), altered prey populations and degraded pygmy shrew potential habitat.

No suitable trapping surveys have been conducted within the project area or across the ARP specifically to detect pygmy shrews. Evidence to date indicates that this species is rare in the landscape, suggesting that it is unlikely to be present within EMR analysis area. However, based on the species' broad habitat affinities, forested and mesic habitats associated with some Alternatives 2 and 3 project areas fall within the broad habitat continuum known to be occupied by this species. The project component areas that would be most suitable for this species are those spruce-fir stands with understory wetlands, including the bottom of Moose Glades, below the Corona base terminal down to Middle Boulder Creek, some areas along the Middle Boulder Creek floodplain, and on NFS and private lands east of the Indian Peaks pod.

Fringed Myotis

Fringed myotis day roosts, hibernacula, and maternity sites will be considered to be potentially present within the project area.

The fringed myotis analysis area for this project extends outward from the EMR project area to the furthest extent of any nocturnal foraging range that bats using habitats in the project area might use. Based on nightly foraging ranges of other similar bats, the fringed myotis analysis area could extend several miles beyond the proposed EMR disturbance areas.

Hoary Bat

The CPW was asked to review their database for records of this species in Boulder County. That search did not identify any records of hoary bats in the vicinity of the project area. However, because this species has been detected within some of the habitat types present in the project area and because the project area is within the species' known elevational and general distribution, the species and its habitat will be considered to be potentially present in the analysis area.

Townsend's Big-eared Bat

The CPW was asked to review their database for records of this species in Boulder County. That search identified 72 records from the southeast portion of Boulder County, including 12 from three historic mine adits on Caribou Ranch, approximately 4.5 miles northeast of the project area, at elevations of 8,706 to 8,840 feet.[252] In addition, three historic mine adits were located within (n=2) and west (n=1) of the EMR project area during field surveys associated with the project. Two of the adits were thoroughly surveyed and found to support no evidence of bat roosting. No caves, deeper abandoned mines, or intact abandoned buildings (which could provide maternity and hibernacula habitat) are known within the analysis area. However, given the mining history of the area, such structures are likely present within the nocturnal foraging range of bats that might use habitats in the project area. In part because of the adits on Caribou Ranch, potential Townsend's big-eared bat day roosts, hibernacula, and maternity sites will be considered to be present within the EMR project area.

American Marten

Past and present actions that resulted in habitat conversion, fragmentation, loss, and incomplete successional recovery that were largely associated with historic mining and logging, those associated with former trapping, and more recent ski area development in the EMR project area, may have negatively affected potential habitat and local populations of this species, mostly negatively. Forest fragmentation associated with ski area development in late-successional forests is thought to negatively affect local marten use of the landscape via a reduced prey base (at least on ski runs), reduced cover (potentially for resting, denning, traveling, predator evasion, and thermal refugia), and reduced effectiveness of remaining forest habitat (from disturbances associated with recreation and management activities). However, marten continue to use developed ski terrain where suitable habitat is present in intertrail islands. Large areas of occupied marten habitat persist in the surrounding landscape, including developed and undeveloped ski terrain within the EMR SUP area. The value of lodgepole and lodgepole-dominated mixed conifer stands to the marten prey base may decline in the short- to moderate term as the MPB epidemic progresses through the EMR project area and forests beyond.

Five winter tracking surveys, most (n=4) specifically scheduled to coincide with favorable tracking conditions, were conducted between January 29, 2010 and October 17, 2012.[253] At EMR, marten occurred within developed and undeveloped ski terrain and were most common in mature spruce-fir stands.

River Otter

Until the March 7, 2013 sighting of a single otter in Boulder Creek east of Boulder, there were no historic or recent records of river otters from the Boulder Creek drainage.[254] Habitat in the entire Middle and South Boulder Creek drainages largely represent potential summer habitat. As demonstrated by the recent

[252] Ibid.
[253] Halfpenny et al., 1995
[254] Brennan, 2013

Boulder Creek otter, more individual otters may disperse into these drainages as the population recovers and expands. It is discountable that a dispersing otter would find its way into either of these drainages in the vicinity of the EMR project area during summer; however, this species will not be excluded from detailed analysis to investigate the project's potential hydrologic effects on downstream habitat effectiveness.

Management Indicator Species

The ARP identified MIS to provide a means to monitor selected issues on the Forest as required by regulation.[255] MIS are those whose response to management activities can be used to predict the likely response of a larger group of species with similar habitat requirements. In addition, selected MIS should be those whose change in population would be directly attributable to the management action. Management Indicator Species are meant to be a forest-wide issue and MIS trends are to be evaluated at the forest-wide scale. Project-level activities are evaluated in relation to how they affect forest-wide population and habitat trends.

The complete list of MIS for the ARP is listed in Appendix G of the Forest Plan.[256] That list was amended by a Forest Supervisor decision (May 3, 2005) and the amended list of species for the Arapaho/Roosevelt National Forest only, not including Pawnee National Grassland species, appears below in Table 3H-6. From the amended list of Arapaho/Roosevelt National Forest MIS (Table 3H-6), GBCT (*Oncorhynchus clarki stomias*), brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), boreal toad (*Anaxyrus boreas boreas*), golden-crowned kinglet (*Regulus satrapa*), Wilson's warbler (*Wilsonia pusilla*), hairy woodpecker (*Picoides villosus*), pygmy nuthatch (*Sitta pygmaea*), warbling vireo (*Vireo gilvus*), mountain bluebird (*Sialia currucoides*), elk (*Cervus elaphus*), and mule deer (*Odocoileus hemionus*) were identified as project MIS, based on the presence or potential occurrence of these animals and/or their habitats on NFS lands within, adjacent to, or affected by, management actions associated with the action alternatives. These project MIS are discussed below. There would be no viability concerns with the project MIS, as determined below, because no changes to populations locally or on the Planning Area are expected from the action alternatives. Habitat types and structural stages that would be affected by the action alternatives are described above. Other MIS were not selected as project MIS because they do not occur on NFS lands in the project area and they and their associated habitats on NFS lands would not be affected by the action alternatives. Species not carried forward for detailed analysis (i.e., excluded), including Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*) and Rocky mountain bighorn sheep (*Ovis canadensis*), will not be discussed further in this document, for the reasons stated in Table 3H-6.

[255] 36 CFR 219.19, 1982; USDA Forest Service, 2005a
[256] USDA Forest Service, 1997a

Table 3H-6:
Management Indicator Species Evaluation – Existing Conditions

MIS[a]	MIS Community	Habitat Occupied by Species. Species and Habitat Present in the Analysis Area?	Will the Proposed Action affect (Direct, Indirect, or Cumulative) the Species or its Habitat?	Will Proposed Action affect Forest-wide Population or Habitat Trends?	Species Excluded from Detailed Analysis?
Greenback cutthroat trout, *Oncorhynchus clarkii stomias*	Montane Aquatic Environments	Isolated, headwater streams and lakes. Species Presence: Yes, downstream Habitat Presence: Yes, downstream	Species (hybrids) - Possibly Habitat - Possibly	Population Trends: No Habitat Trends: No	No
Colorado River cutthroat trout, *Oncorhynchus clarkii pleuriticus*	Montane Aquatic Environments	Isolated, headwater streams and lakes. Species Presence: No Habitat Presence: No	Species - No Habitat - No	Population Trends: No Habitat Trends: No	Yes
Brook trout, *Salvelinus fontinalis*	Montane Aquatic Environments	Montane Aquatic Environments Species Presence: Yes, downstream Habitat Presence: Yes, downstream	Species - Possibly Habitat - Possibly	Population Trends: No Habitat Trends: No	No
Brown trout, *Salmo trutta*	Montane Aquatic Environments	Montane Aquatic Environments Species Presence: Yes, downstream Habitat Presence: Yes, downstream	Species - Possibly Habitat - Possibly	Population Trends: No Habitat Trends: No	No
Boreal toad, *Anaxyrus boreas boreas*	Montane Riparian Areas and Wetlands	Montane & subalpine ponds with willows Species Presence: No Habitat Presence: Yes	Species - No Habitat - Yes	Population Trends: No Habitat Trends: No	No
Hairy woodpecker, *Picoides villosus*	Young to Mature Forest Structural Stage	Young-decadent conifer forests Species Presence: Yes Habitat Presence: Yes	Species - Yes Habitat - Yes	Population Trends: No Habitat Trends: No	No
Pygmy nuthatch, *Sitta pygmaea*	Existing and Potential Old Growth Forest	Ponderosa pine forests Species Presence: Possibly Primary Habitat Present: No	Species - Possibly Habitat - Possibly	Population Trends: No Habitat Trends: No	No
Mountain bluebird, *Sialia currucoides*	Openings within and adjacent to Forest	Montane – Alpine areas in and adjacent to forests Species Presence: Yes Habitat Presence: Yes	Species - Possibly Habitat - Yes	Population Trends: No Habitat Trends: No	No

Table 3H-6:
Management Indicator Species Evaluation – Existing Conditions

MIS[a]	MIS Community	Habitat Occupied by Species. Species and Habitat Present in the Analysis Area?	Will the Proposed Action affect (Direct, Indirect, or Cumulative) the Species or its Habitat?	Will Proposed Action affect Forest-wide Population or Habitat Trends?	Species Excluded from Detailed Analysis?
Golden-crowned kinglet, *Regulus satrapa*	Interior Forest	Interior spruce-fir forests Species Presence: No Habitat Presence: Yes	Species - No Habitat - Yes	Population Trends: No Habitat Trends: No	No
Warbling vireo, *Vireo gilvus*	Aspen Forest	Aspen forest Species Presence: No Habitat Presence: Yes	Species - No Habitat - Yes	Population Trends: No Habitat Trends: No	No
Wilson's warbler, *Wilsonia pusilla*	Montane Riparian Areas and Wetlands	Montane to Alpine riparian and wetlands Species Presence: No Habitat Presence: Yes	Species - No Habitat - Yes	Population Trends: No Habitat Trends: No	No
Elk, *Cervus elaphus*	Young to Mature Forest Structural Stage, Openings within and adjacent to Forest	Wide variety of montane through Alpine habitats Species Presence: Yes Habitat Presence: Yes	Species - Yes Habitat - Yes	Population Trends: No Habitat Trends: No	No
Mule deer, *Odocoileus hemionus*	Young to Mature Forest Structural Stage, Openings within and adjacent to Forest	Wide variety of montane through Alpine habitats Species Presence: Yes Habitat Presence: Yes	Species - Yes Habitat - Yes	Population Trends: No Habitat Trends: No	No
Rocky Mountain bighorn sheep, *Ovis canadensis*	Openings within and adjacent to Forest	Montane through Alpine habitats Species Presence: No Habitat Presence: No	Species - No Habitat - No	Population Trends: No Habitat Trends: No	Yes

[a] Species in **bold** are discussed in the text.

Greenback Cutthroat, Brook, and Brown Trout

Greenback cutthroat trout (*Oncorhynchus clarki* subsp. *stomias*, including hybrids), brook trout (*Salvelinus fontinalis*), and brown trout (*Salmo trutta*) are discussed together because of generally similar habitat requirements, local distribution, and similar response to project effects. These species are indicators of montane aquatic conditions. Rainbow trout (*Oncorhynchus mykiss*) were removed from the ARP MIS list due to the significant impact whirling disease has had on the species, which can over-shadow or mask population trends relative to Forest Service management actions.[257] Recreationally stocked GBCT hybrids and the other two trout species are present in some of the streams associated with the project area. Genetically pure GBCT are a federally threatened species and are analyzed in the threatened and endangered species section of this analysis.

Aquatics Associates, in coordination with the Forest Service, sampled fish populations in three stream reaches (including Middle Boulder Creek, Jenny Creek, and the outflow of Peterson Lake) and their tributaries (n=9 sites) associated with the project area in September 2012.[258] Detailed sampling results are contained in the project file.

Middle Boulder Creek

Brook trout and cutthroat trout (recreationally stocked greenback trout hybrids) were collected at the three Middle Boulder Creek sites with one rainbow trout also collected at the lower site MBC3. Brook trout were dominant and represented 96.8 percent of the population at the upper site MBC1 and about 80 percent of the population at sites MBC2 and MBC3.

Brook trout density and biomass estimates were highest at the upper site and were substantially lower and similar at the middle and lower sites, whereas density and biomass estimates for cutthroat trout were low and similar at all three sites. The total trout density estimate was high at site MBC1 at 2,389 fish/ha largely due to the high numbers of young brook trout collected. Total density estimates were comparatively lower at downstream sites MBC2 and MBC3 where less shallow riffle (nursery) habitat is available for younger fish, although density was still moderately high at 415 and 568 fish/ha, respectively. Total trout biomass estimates were moderately low at the three sites at 50, 27, and 34 kg/ha (low < 20 kg/ha) at sites MBC1, MBC2, and MBC3, respectively. The lower biomass at the middle and lower sites may in part be due to the heavy angling pressure that occurs in these reaches which are situated close to the road and easily accessible. Density and biomass estimates at the MBC sites were within the normal ranges for headwater montane streams in Colorado.

[257] Fairchild, 2012
[258] Aquatics Associates, Inc., 2013

Jenny Creek

Brook trout were the only fish species collected at the two sites on Jenny Creek. Density estimates were very high at both sites with 5,005 and 3,705 fish/ha at sites JC1 and JC2, respectively. Biomass estimates were 105 and 98 kg/ha, which is moderately high for a headwater montane stream.

Trout appeared healthy and in good condition based on visual observations during sampling. The lower condition factors at the Jenny Creek sites as well, as the MBC middle and lower sites, are typical of other montane streams in Colorado because such fast-riffle habitats require fish to expend more energy to maintain their weight and condition.

Boreal Toad

Boreal toads are analyzed as a R2 sensitive species. Please refer to the above discussion.

Hairy Woodpecker

Hairy woodpeckers are present within the EMR SUP area based on results of 2009–2013 field surveys. Mature and decadent project area trees represent potential foraging and nesting habitat for this species.

Pygmy Nuthatch

The pygmy nuthatch is an ARP MIS for existing and potential old-growth forest. While there is no existing old-growth forest or primary habitat for this species in the EMR project area, the pygmy nuthatch is being analyzed in detail for this project because secondary habitat is present.[259]

Pygmy nuthatches were not detected in or around the EMR project area during any 2009 to 2013 field survey. There is no existing old-growth forest or primary habitat for this species in the EMR project area.[260] However, secondary habitat representing potential foraging and nesting habitat is present in the project area that may be affected by the action alternatives.[261]

Warbling Vireo

In the EMR project area, warbling vireos were detected in mature, closed canopy aspen on the south side of Middle Boulder Creek during summer field surveys. It is possible that they also occur in the heterogeneous polygon above Middle Boulder Creek listed as a 3C aspen stand in the ARP database. This polygon contains some small (± 1 acre) 4B aspen stands, but it is primarily 3A-C aspen interspersed amongst stages 2 to 4 conifers that occur as mixed conifers (including spruce, fir, lodgepole pine, and limber pine) and small clumps of single species or two species patches. Otherwise, there is no suitable, primary, warbling vireo habitat in the EMR project area in the vicinity of any proposed disturbance areas.

[259] Buell, 2013
[260] Ibid.
[261] Aspen, lodgepole, and spruce-fir.

Mountain Bluebird

Mountain bluebirds occur in portions of the EMR SUP area and pairs nest (1) along ski trail edges in some of the forested project component areas, (2) in ski area infrastructure (e.g., lift towers and buildings), and (3) in snags in sparsely forested areas. The effects of the current MPB epidemic would not likely benefit this species. While beetle-induced lodgepole mortality would create additional snags and nesting opportunities, those snags that might be used along ski trail edges (bluebirds are not forest interior species) would likely be prophylactically removed by EMR for safety reasons, as they are now. Furthermore, it is unknown if nest cavity availability is currently limiting local bluebird numbers.

Golden-crowned Kinglet

Golden-crowned kinglets are residents of higher mountain forests. Where suitable habitat occurs they are fairly common in summer and rare in winter. During migration, they occur in most wooded habitats, including those at lower elevations in the mountains. These birds breed from approximately 8,000 feet to treeline in the interiors of mature, dense, spruce-fir forests and are an obligate indicator species for that habitat.[262] Golden-crowned kinglets have been detected in the closed interiors of some larger spruce-fir islands within the EMR SUP area and they may occur in other areas.

Wilson's Warbler

Wilson's warbler's were detected within the EMR project area during 2009–2012 field surveys in wetlands associated with the recently approved Corona Trail re-grading area, at another wetland on a ski trail, and associated with one of the small kettle ponds.[263] They also likely occur in wetlands associated with Jenny Creek.

Elk and Mule Deer

Elk and mule deer are discussed jointly because of similar habitat use, seasonal presence in and around the project area, and similar project effects.

Rocky Mountain elk inhabit the central and northern Rocky Mountains, including western Canada, south through eastern Oregon and Washington, Idaho, western Montana, Wyoming, Colorado, Utah, Nevada, New Mexico and Arizona. Colorado supports the largest elk population of any state or province where they range over much of the western two-thirds of the state.

The State of Colorado has responsibility for the management of wildlife populations. CPW manages elk and deer to provide healthy populations capable of supporting both significant harvests and opportunities for non-consumptive uses.[264] Elk and deer license sales account for a large percentage of all license revenue, indicating the importance of herd management and population viability in the state. CPW has

[262] Andrews and Righter, 1992; Thompson, 1994a
[263] Thompson, 2011a
[264] Freddy et al., 1993; Colorado Division of Wildlife, 2002

specific elk management goals and objectives that have been developed in cooperation with landowners, the public and federal land management agencies. These plans help guide the State's direction in the management of both species. Periodically these plans are updated to cover land management changes, new social perspectives, and changes in elk populations.

The project area is considered elk "overall," "summer," and "summer complexes" range for the species (NDIS mapping). There is an "elk production area" outside of the SUP boundary to the west on Bryan Mountain, but not in the project area. No designated elk winter range overlaps the project area. A polygon of "elk winter concentration area" (i.e., that part of the winter range of a species where densities are at least 200 percent greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten") occurs to the southeast in Buckeye Basin and Buckeye Mountain and to the northeast on Arapaho Ranch.[265] A polygon of "elk severe winter range" extends east from the western edges of the winter concentration area polygon to north of Gross Reservoir. "Elk severe winter range" is defined as "that part of the winter range of a species where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten.[266] The winter of 1983/84 is a good example of a "severe winter," along with the winters of 1996/97 and 2008. Another elk severe winter range polygon extends north of Highway 119 from Highway 72, most of the way to Boulder. There are no elk or mule deer "highway crossings" designated along Highway 119. The project area is considered mule deer "overall" and "summer" range for the species (NDIS mapping). There is no mule deer winter range anywhere in the vicinity of the project area. A band of deer winter range extends along the foothills just west of Boulder that is bisected by Highway 119. Both species are occasionally present on the ski area from spring (June) through fall (early November).

Three ungulates, mule deer, elk, and moose, have seasonal distributions overlapping the EMR project area. Based on the close proximity of the elk production area shown in the NDIS database, surveys were conducted during the peak (per se, June 5), mid-point (June 18), and last day (June 30) of the 2009 elk calving season to assess snowpack conditions, evidence of ungulates in the vicinity of EMR (including in the NDIS production area polygon), and use of the area for parturition and rearing. Survey coverage during this parturition period is provided in the project file. Only two relatively recent elk tracks were detected during the entire June 5, 2009 survey. No evidence of elk calving on the project area was detected during any June survey; however, it is possible that a low level of calving could occur. The best potential elk calving habitat within the project area occurs in two areas. The shallow gradient terrain around the base of the Corona chairlift is isolated from human activity and provides good nearby forage and water. Similar characteristics occur in the Jenny Creek area, including up an into the proposed Jolly Jug pod. The terrain below the base of the Corona and Indian Peaks base terminals is too steep and snow covered to provide suitable calving habitat and the terrace along Middle Boulder Creek is too close to the

[265] Colorado Division of Wildlife, 1993
[266] Ibid.

heavy traffic and dogs and human disturbances associated with the Fourth of July Trailhead. The Bryan Mountain calving polygon was surveyed on June 18, 2009. While it is possible that elk would calve there, considerably more suitable calving habitat is abundant in and around the project area.

Mule deer fawn in mid-June. As a result, more of the ski area is snowfree (i.e., than when elk calve) and suitable for fawning. Indeed, fawns in their hiding phase were located within developed ski terrain that was well above the continuous snowline a week or two earlier. Low numbers of deer fawn throughout most of the ski area.

Elk use of the ski area is more transitory as animals migrate through the ski area in spring and fall, between lower elevation winter ranges and upper elevation summer ranges. Some deer persist on the ski area during spring to fall.

Other Habitats

Old Growth and Late Successional Forest

Old growth inventories on the ARP were conducted from 1990–1992.[267] Updates continue as losses occur and as new sites are found. The surveys were for old growth forests of greatest concern, most affected in the past, or likely to be affected by future management activities. Old growth dominated by other forest species, such as aspen, limber pine, bristlecone pine, and Rocky Mountain juniper, were not defined or inventoried.

Old growth definitions are based on structural characteristics that include indices for old trees. Structural requirements are described, but exacting, ridged definitions were avoided.[268] Key old growth characteristics were primary considerations and, as a minimum rule, large, live trees, some of which were old and declining, either snags or fallen trees, and greater than 20 percent overhead canopy closure were all prerequisites for a site to be called old growth. Common old growth characteristics were not determinants of whether old growth existed, but were qualifiers in assessing old growth condition, in additional to key characters. Additional old growth criteria are listed in.[269]

The ARP Forest Plan divided old growth into three distinct categories; “old growth retention,” “old growth development,” and “existing old growth.” Old growth retention areas were identified within the timber suitability analysis in the Forest Plan. Old growth development areas are primarily low elevation areas to be managed for developing and perpetuating old growth, primarily ponderosa pine and Douglas-fir and also including some higher elevation areas of lodgepole pine and spruce/fir. Existing old growth areas are those that have been inventoried and meet the definition used in the Forest Plan. Developing old

[267] USDA Forest Service, 2007a
[268] Ibid.
[269] Ibid.

growth areas have been inventoried and are estimated to become old growth stands within the next century in the absence of catastrophic change.

All NFS lands within the existing SUP area were designated as "high elevation old growth development area." Polygons west of the Corona chairlift, east of the Indian Peaks chairlift, and many south-facing lodgepole pine stands (overlapping part of the proposed Jolly Jug terrain [Alternatives 2 and 3]), were designated as "inventoried old growth." No "old growth retention" areas occur in the project area. Old growth delineations did not include private lands. Old growth delineations extended beyond the existing SUP boundary to the south and in the central and western portions of the proposed SUP adjustment area along Middle Boulder Creek.

The project wildlife biologist conducted year-round surveys (2009–2013) throughout the project area in part opportunistically searching for, and evaluating, old growth characteristics. The intent was that if any communities were located that approached meeting old growth criteria, stand measurements would have been implemented. While many stands throughout the project area contained legacy trees, and while some stands supported old growth characteristics, no stands approached classification of old growth. Common stand exam plots sampled throughout the EMR project area and used the ARP's 1992 scorecard to assess old growth presence.

Effective Habitat

Effective habitat is considered by the ARP to be mostly undisturbed habitat, which is buffered from regularly used roads and trails, including both motorized and non-motorized travel. Buffer distances and habitat block sizes associated with effective habitat vary based on vegetation cover and topography.

Based on ARP mapping, approximately 20 percent of the EMR project area is considered to be effective wildlife habitat, following the above ARP definitions. Larger blocks of designated effective habitat are located in the large intertrail island east of the Corona chairlift (including the existing Bryan Glades terrain proposed for further glading under Alternatives 2 and 3) and portions of Salto and Moose Glades (both proposed for further glading under Alternatives 2 and 3). Virtually none of the proposed Jolly Jug pod expansion would affect designated effective habitat. Approximately 60 percent of the proposed SUP expansion between the existing SUP boundary and Middle Boulder Creek is designated effective habitat.

Interior Forest

Interior forests are considered by the ARP to be contiguous areas of relatively dense and large trees that are buffered from the temperature, light, and humidity differences of sizeable openings in the forest, and from human disturbance along regularly used roads and trails.[270] Interior forest areas occur entirely within effective habitat and are also influenced by openings in vegetation. Like effective habitat, buffer distances and habitat block sizes associated with interior forests vary based on the scale and species under

[270] USDA Forest Service, 1997a

consideration. Based on ARP mapping, one block of designated wildlife interior forest overlaps the EMR project area (overlapping and west of Moose Glades) and less than 5 percent of the EMR project area is designated wildlife interior forest.

Forest interior species (e.g., golden-crowned kinglet, hermit thrush, brown creeper, etc.) are present within some of the larger intertrail islands within developed ski terrain.

Aspen

There are 45.3 acres of aspen stands within the project area, all on NFS lands. All but 1.5 acres (a stunted 3B stand at the top of Salto Glades) is in the proposed Placer chairlift and terrain, to the south of Middle Boulder Creek. That polygon above Middle Boulder Creek is listed as a 3C aspen stand in the ARP database. It is quite heterogeneous and does not neatly fit into any standard vegetative category. It was retained as a 3C aspen because of the higher value of aspen to the overall wildlife community and because only one other small aspen polygon is identified in the project area. This polygon contains some small (± 1 acre) 4B aspen stands, but it is primarily 3A-C aspen interspersed amongst stages 2 to 4 conifers that occur as mixed conifers (including spruce, fir, lodgepole pine, and limber pine) and small clumps of single species or two species patches. Large boulder outcrops are common in the steep portions of this polygon that serve to open the canopy. Viewpoints from the Fourth of July Trail suggest the polygon is co-dominated by mature aspen and conifers in summer and mature conifers in winter.

Riparian/Wetlands

Refer to Chapter 3 Section J – Watershed, Wetlands and Soils for a description of riparian and wetland habitats.

Corridors

Virtually all (± 90 percent) forest stands in the EMR project area (i.e., low density forest, such as at the top of Salto Glades, is excluded) and most surrounding NFS and private lands are designated wildlife forested corridors. Conventional ski trails, but not existing glades, are not considered to be wildlife forested corridors. Forested corridors are abundant across the ARP and BRD.[271] No open corridors (such as those that might be used by species such as pronghorn) occur in the project area.

Key Winter Range

Key winter range for elk and mule deer consists of severe winter range and winter concentration areas as defined and mapped by CPW. No key winter range occurs in the project area.

[271] Baker, 2014

Migratory Birds

In 2008, the Forest Service Chief signed a MOU (#08-MU-1113-2400-264) with the USFWS to promote the conservation of migratory birds. This MOU was pursuant to Executive Order 131866, Responsibilities of Federal Agencies to Protect Migratory Birds.[272] The Executive Order directs agencies to take certain actions to further comply with the migratory bird conventions, the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA) and other pertinent statutes. The purpose of the MOU is to strengthen migratory bird conservation by identifying strategies that promote conservation and avoid or minimize negative impacts on migratory birds.

The MOU outlined that the Forest Service shall evaluate the effects of agency actions on migratory birds within the NEPA process, with a focus on species of management concern along with their priority habitats and key risk factors. An evaluation of the effects of the action alternatives to bird species and habitats of management concern is included in the various sections herein. The project has been designed to the extent practicable to minimize incidental take through the implementation of PDC. Specifically, in the event that nests of the identified R2 bird species (flammulated and boreal owls and olive-sided flycatcher) known or suspected of occurring in project disturbance areas are detected within impact areas, direct mortality of eggs and/or nestlings could be avoided by conducting tree removal in potential nesting habitat outside of the identified nesting (with eggs/young in the nest) period(s).[273] Such a construction closure would also avoid or minimize incidental take for all migratory birds possibly nesting in and adjacent to project disturbance areas during that time interval. Additional PDC would further minimize potential effects to active raptor nests, trees with nest cavities, and mortality from hollow vertical pipes.

This section also considers migratory bird species that have been identified as candidates for conservation priority by at least one of the following five lists: (1) the Service Birds of Conservation Concern list for the Southern Rockies/Colorado Plateau Bird Conservation Region 16 (containing EMR), (2) Colorado Partners in Flight Bird Conservation Plan for the Southern Rocky Mountains Physiographic Area (Area 62; containing EMR), (3) the Colorado State Threatened and Endangered list, (4) species designated as Sensitive by the U.S. Forest Service Rocky Mountain Region, (5) species listed under the federal Endangered Species Act, and (6) species designated as MIS on the ARP. More detailed information on the habitat requirements, status, distribution, abundance, and key habitat components of most species is on file at the BRD.

[272] Federal Register, 2001
[273] Williams, 2003b

Table 3H-7:
Migratory Bird Species – Existing Conditions

Analysis Group	Species[a]
Riparian/wetlands	American Bittern, **American dipper**, bald eagle, black swift, **cordilleran flycatcher**, lazuli bunting, **MacGillivray's warbler**, **mallard**, **northern harrier**, short-eared owl, southwestern willow flycatcher, willet, Wilson's phalarope, **Wilson's warbler**, western yellow-billed cuckoo
Snag & Cavity Dependant	**American three-toed woodpecker**, **boreal owl**, flammulated owl**, hairy woodpecker**, Lewis's woodpecker, **mountain bluebird**, red-naped sapsucker, violet-green swallow, **Williamson's sapsucker**
Ponderosa Pine	**Band-tailed pigeon**, Grace's warbler, Merriam's turkey, **northern goshawk**
Pinyon-Juniper	Black-throated gray warbler, gray vireo, pinyon jay
Mixed-conifer	**Dusky grouse, Hammond's flycatcher,** MSO
Sagebrush	**Brewer's sparrow**, ferruginous hawk, Gunnison sage grouse, loggerhead shrike, sage sparrow
Mountain Shrub	**Broad-tailed hummingbird**, Columbian sharp-tailed grouse, green-tailed towhee, Virginia's warbler
Rock/cliff	**Golden eagle, peregrine falcon, prairie falcon**
Alpine Tundra	American pipit, brown-capped rosy finch, **white-tailed ptarmigan**
Aspen	Purple marten
Grasslands	Ferruginous hawk, Swainson's hawk, western burrowing owl

[a] Documented or potential occurrence on the EMR project area during at least some part of the year, including migratory stopovers, based on habitats present, species' habitat affinities and distributions, and field survey results.
Note: These species have been identified as candidates for conservation priority.

The USFWS developed a list of birds of conservation concern based on Bird Conservation Regions (BCR; Table 3H-8). There are 37 BCRs in North America with four of these occurring at least partially in Colorado. The EMR project area occurs within the Southern Rockies Colorado Plateau Bird Conservation Region 16, which encompasses portions of Colorado, New Mexico, Arizona, Utah, and Wyoming. Information from BCR 16 was synthesized for use in Colorado through the development of the Service's Birds of Conservation Concern list and the Colorado Land Bird Conservation Plan (BCP). These Plans have been or are being developed by every state in the nation based on the individual physiographic areas encompassed by the BCR's. Thus, at the finest scale of analysis, the ARP occurs within the Southern Rocky Mountains Physiographic Area (Area 62) of the Southern Rockies Colorado Plateau Bird Conservation Region.

Table 3H-8:
USFWS Birds of Conservation Concern for BCR – Existing Conditions

Species[a]	General Habitat	Occurrence in EMR Analysis Area
Northern Harrier	Grasslands	No
Swainson's Hawk	Grasslands	No
Ferruginous Hawk	Prairie	No
Golden Eagle	Cliffs/grasslands	Yes, project area could be part of a large hunting range; no local nests
Peregrine Falcon	Cliffs	Yes, project area may be part of large hunting range; eyrie non-local
Prairie Falcon	Cliffs	No
Gunnison sage-grouse	Sagebrush	No
Snowy Plover	Shorelines	No
Mountain Plover	Prairie	No
Solitary Sandpiper	Shorelines	No
Marbled Godwit	Wetlands	No
Wilson's Phalarope	Waterbodies/Shorelines	No
Yellow-billed Cuckoo	Deciduous Riparian	No
Flammulated Owl	Ponderosa pine/snags	No
Burrowing Owl	Plains/grasslands	No
Short-eared Owl	Parks/grasslands	No
Black Swift	Waterfalls/wet cliffs	No
Lewis's Woodpecker	Riparian Cottonwood	No
Williamson's Sapsucker	Montane forests/snags	Yes, nest with young obs. 6/30/09 on private land
Gray Vireo	Oak woodlands/scrub	No
Pinyon Jay	Pinyon/Juniper	No
Bendire's Thrasher	Rare spp of arid areas	No
Crissal Thrasher	No records in CO.	No
Sprague's pipit	No records in CO.	No
Virginia's warbler	Riparian scrub	No
Black-throated gray warbler	Oak scrub/riparian	No
Grace's warbler	Ponderosa pine	No
Sage sparrow	Sagebrush	No
Chestnut-collared longspur	Plains	No

[a] Species in bold may occur on the EMR project area. There is a documented or potential occurrence on EMR project area during at least some part of the year, including migratory stopovers, based on habitats present and species' habitat affinities and distributions.

Some of the species in the above list, and other migratory birds are considered individually in this projects technical analyses as listed species and as R2 sensitive species, MIS, and animal species of local concern.

CPW Endangered, Threatened and Species of Special Concern

The current lists of Colorado endangered and threatened species and Colorado species of state special concern were considered for species that may occur on and around the EMR project area. Those lists

included 2 mollusks, 23 fish, 7 amphibians, 10 reptiles, 19 birds, and 13 mammals. None of the state species contained in those lists occur or have potential habitat that would be influenced by the action alternatives, except the species which have been previously addressed elsewhere in this analysis as part of other species lists.

Animal Species of Local Concern

ASOLC are those identified from the public's response to the scoping notice, unless otherwise noted. A total of 34 animals were specifically identified by the public. Of those, 14 are considered and addressed as part of other lists associated with the technical documents. The remaining 20 species are addressed below, either individually or by group.

Beaver

Beavers are associated with riverine and riparian habitats in the project area, including active territories in Middle Boulder Creek, Jenny Creek, and Lake Eldora. They have occurred in some of the kettle ponds within the SUP area, but there were no active dams or lodges present in those kettle ponds during 2009–2013 field surveys. Beavers may use other local water bodies as their populations fluctuate.

Moose

Individual moose and cows with calves have been observed throughout the EMR project area, including along the Middle Boulder Creek floodplain, in Moose and Bryan Glades, in the Jolly Jug pod, in the base area, and in Peterson Lake. There is probably no portion of the EMR project area where moose would not be expected to occur. They are not common in the project area, but are widespread (i.e., to the extent that fresh tracks were recorded during winter tracking surveys) and conspicuous.

Other Mammals

Mammalian ASOLC considered for this project include black bear, mink, mountain lion, red fox, snowshoe hare, bobcat, and coyote. Evidence of all of these species, excluding mink, was detected within the EMR project area during field surveys. Mink have been observed along Middle Boulder Creek (Middle Boulder Creek Coalition scoping comment listed a sighting in 2010).[274] Snowshoe hares are discussed as prey for Canada lynx.

Other Birds

Avian ASOLC considered for this project include golden-crowned kinglet, hairy woodpecker, warbling vireo, northern pygmy owl, Williamson's sapsucker, Hammond's flycatcher, Cordilleran flycatcher, red-breasted nuthatch, brown creeper, hermit thrush, Swainson's thrush, MacGillivray's warbler, and dusky grouse, listed in the order of public identification. Excluding Hammond's flycatcher, Swainson's thrush, and MacGillivray's warbler, all of these species were detected within the EMR project area during field

[274] Baker, 2014

surveys. Hammond's flycatcher is a probable breeder in the latilong block overlapping the project area and it may be present in conifer forests with limited understory.[275] Swainson's thrush is a probable breeder in the latilong block overlapping the project area.[276] The alder/willow stands near the base of the Corona pod and riparian habitat along Middle Boulder Creek represent the types of potentially suitable habitat for this species in the project area. MacGillivray's warblers are possible breeders in the latilong block overlapping the project area.[277] Project area habitats identified for the MacGillivray's warbler are similar to those described for the Swainson's thrush.

With the exception of the peregrine falcon, northern goshawk, and golden eagle, there are no birds on the 2010 Boulder County Avian Species of Special Concern list that occur, or that may occur, within the EMR project area.[278] The two former species are addressed above as R2 sensitive species. The project area may be part of a large golden eagle territory.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1

The No Action Alternative reflects a continuation of existing operations and management practices at EMR without changes, additions or upgrades on NFS lands due to selection of this alternative. Therefore, Alternative 1 would have "no effect" on any PTES species, MIS, CPW Endangered, Threatened and Species of Special Concern, ASOLC, Migratory Bird species, or USFWS Birds of Conservation Concern in this analysis.

MPB effects and climate change would continue to impact fish and wildlife habitat with or without any project development.

Alternative 2 – Proposed Action

General Habitat Impacts

Table 3H-9 provides the affected acreages of habitat types and structural stages and whether the habitat values of those affected habitat types would be virtually lost or the majority retained.

[275] Kingery et al., 1998
[276] Ibid.
[277] Ibid.
[278] Hallock and Jones, 2011

Table 3H-9:
Habitat Values Lost or Retained – Alternative 2

Habitat Type and Structural Stage[a]	Habitat Values Lost[b]			Most Habitat Values Retained[c]			Total
	NFS Lands	Private Lands	All Lands	NFS Lands	Private Lands	All Lands	
Forblands (FOR, 1M)			**0**	1.3	0.2	**1.5**	**1.5**
Grasslands (GRA, 1M)			**0**	7. 6	4.3	**11.9**	**11.9**
Barren/Disturbed (NBA)			**0**		10.5	**10.5**	**10.5**
Aspen Forest (TAA)			**11.0**			**11.0**	**11.0**
3C	11.0	0	11.0	11.0	0	11.0	11.0
Lodgepole Pine Forest (TLP)			**26.1**			**87.7**	**113.8**
3B	1.3	7.3	8.7	0.1	18.6	18.7	27.3
3C	1.1	8.2	9.3	26.6	23.8	50.4	59.7
4B	7.1	1.0	8.1	17.1	1. 6	18.6	26.8
Spruce-fir Forest (TSF)			**27.7**			**171.0**	**198.6**
3A	0.1		0.1	13.1	0.0	13.1	13.1
4B	27.3	0.4	27.7	147.7	3.0	150.7	178.3
4C			0	4.6	3.0	7.2	7.2
Water			**0**		0.02	**0.02**	**0.02**
Total Acres	**47.8**	**16.9**	**64.8**	**228.9**	**64.6**	**293.5**	**358.3**

[a] See project file for RMRIS habitat type and structural stage definitions. Habitat types/structural stages that occur in the project area that are not listed in this table would not be affected by this alternative.
[b] Habitat values lost as a result of Alternative 2 projects involving vegetation clearing, with or without grading (e.g., for conventional ski trails, lift corridors, structures, etc.).
[c] Habitat values largely retained as a result of Alternative 2 projects involving vegetation management of forested stands, glading, and vegetation clearing, with or without grading, affecting non-forested habitats (i.e., existing conventional ski trails [grasslands, forblands] and disturbed/barren).
Source: SE Group and Western Ecosystems, Inc.

Threatened and Endangered Species

Alternative 2 would have "no effect" to GBCT, *Oncorhynchus clarkia stomias*, MSO, *Strix occidentalis*, and PMJM, *Zapus hudsonius* subsp. *preblei*. Alternative 2 is "not likely to jeopardize" North American wolverine, *Gulo gulo Lucius.* Alternative 2 would "likely adversely affect" pallid sturgeon, *Scaphirhynchus albus*, whooping crane, *Grus americana*, piping plover, *Charadrius melodus*, least tern, *Sterna antillarum*, and Canada lynx, *Lynx Canadensis.*

Table 3H-10 summarizes determinations for federally-listed animal species that may be affected by management decisions associated with the Federal Action. These determinations are based on the analysis contained in the following sections.

Table 3H-10:
Effects to Federally-Listed Animal Species – Alternatives 1 through 3

Common and Scientific Name	Determination by Alternative[a]		
	1	2	3
Pallid sturgeon, *Scaphirhynchus albus*	NE	LAA	LAA
Greenback cutthroat trout, *Oncorhynchus clarkia stomias*	NE	NE	NE
Whooping crane, *Grus americana*	NE	LAA	LAA
Piping plover, *Charadrius melodus*	NE	LAA	LAA
Least tern, *Sterna antillarum*	NE	LAA	LAA
Mexican spotted owl, *Strix occidentalis*	NE	NE	NE
Preble's meadow jumping mouse, *Zapus hudsonius* subsp. *preblei*	NE	NE	NE
North American wolverine, *Gulo gulo lucius*	NLJ	NLJ	NLJ
Canada lynx, *Lynx canadensis*	NE	LAA	LAA

[a] Determinations are NE = "No effect," NLAA = "May affect, not likely to adversely affect," NLJ = "Not likely to jeopardize," and LAA = "May affect, likely to adversely affect."
Note: Other federally-listed and proposed species are not listed in this table because the project area is outside of the species' range, their habitats do not occur in the project area, they have no affinities to project area habitats, and the management decisions associated with the alternatives would have "no effect" on the species, on their habitats, or on designated critical habitat. Species are listed phylogenetically.

South Platte River Species (Pallid Sturgeon, Whooping Crane, Piping Plover, and Least Tern)

From the CO BA template, the project qualifies as an existing water related activity because it reflects the effects of a surface water or hydrologically connected groundwater activity implemented on or before July 1, 1997, within the intent and coverage of the Program.[279] Implementation and operation of the project will result in some amount of continuing historic and new depletions to the South Platte River associated with the new Challenge Mountain food and beverage facility and the expanded Lookout facility. A total of 3 additional acre feet of water would be pumped out of Jenny Creek, via EMR's existing Jenny Creek pipeline, and delivered to both facilities over the course of the ski season. The water rights associated with these fully-usable consumptive use credits (which are very senior) have been permanently moved to EMR's Jenny Creek Pipeline from the Howard Ditch headgate, located on South Boulder Creek, north of Highway 36 and south of Baseline Road. Therefore, there would be no net change to the streamflow in South Boulder Creek below the Howard Ditch headgate, or in Boulder Creek, the Saint Vrain River, or the South Platte River.[280] As a result, there would be no project-related depletion effects extending downstream to potential and occupied South Platte River species habitats. However, because these additional diversions are above the "deminimus" of 0.1 acre feet/year, EMR is required to consult with the USFWS to provide ESA compliance for potential impacts to the target South Platte River species and whooping crane critical habitat.

[279] US Fish and Wildlife Service, 2007
[280] Bishop-Brogden Associates, Inc., 2013

EMR intends to rely on the provisions of the PRRIP and SPWRAP to provide required ESA compliance. The Forest Service intends to require, as a condition of any approval, that the Applicant fulfill the responsibilities required of Program participants in Colorado, which includes participation in the SPWRAP. The Forest Service also intends to retain discretionary Federal authority for the Project, consistent with applicable regulations and Program provisions, in case reinitiation of Section 7 Consultation is required. Therefore, no further separate analysis of indirect effects, reasonably certain project effects, or interrelated and interdependent actions are required for this project's Section 7 analysis.

The BA addresses consultation on all listed South Platte River species and designated whooping crane critical habitat. Potential impacts from construction and operation of the Project on other federally-listed threatened or endangered species and designated critical habitats are addressed below, and will be addressed by the USFWS within the applicable biological opinion prepared by the Service, in accordance with the ESA.

Greenback Cutthroat Trout

Genetically pure GBCT that warrant consideration as a federally threatened species are not present in that portion of the action area that would be affected by the Proposed Action. Therefore, there would be no direct effects of Alternative 2 on this species. Under Alternative 2, there would be no indirect effects that would be caused by, or result from, the Proposed Action that would extend to habitat occupied by this species. There are no summer recreation components associated with this project. Based on the lack of suitable GBCT habitat within the action area, including the project area, Alternative 2 would have "no effect" on GBCT or its habitat and the species is dropped from further consideration herein.

Mexican Spotted Owl

Based on the lack of suitable MSO habitat within the action area, including the project area, Alternative 2 would have "no effect" on the MSO or its habitat and the species is dropped from further consideration herein.

Preble's Meadow Jumping Mouse

Direct project effects would be confined to the SUP area and the spur road to Highway 130, as proposed. No suitable habitat or designated critical habitat for PMJM is present within the direct effects analysis area, the lowest elevation of which is 8,940 feet along Middle Boulder Creek, well above the species' upper elevational limit of 7,600 feet in Colorado.[281]

With respect to indirect effects, the few additional employees associated with the Proposed Action might live within the species' elevational range, but it would be discountable that such employees would build new residences or inhabit existing residences located within or adjacent to occupied Preble's habitat that would result in impacts to the species or designated critical habitat.[282] Such impacts would be precluded

[281] US Fish and Wildlife Service, 2003, 2010
[282] US Fish and Wildlife Service and National Marine Fisheries Service, 1998

by existing protective mechanisms (e.g., USFWS 1998, designated critical habitat, provisions of the Clean Water Act, county and town land use provisions, etc.).[283] Water depletion effects would not extend to, or meaningfully affect any potential, occupied, or designated critical PMJM habitat because of intervening water storage reservoirs (i.e., Gross and Barker Meadow), which have regulated outflows. Any altered hydrology above either reservoir would affect habitat above and outside of the species' known range.[284] Reservoir management would attenuate potential effects from extending downstream to potential and occupied habitat. The water rights associated with the 3 additional acre feet of fully-usable consumptive use credits have been permanently moved to EMR's Jenny Creek Pipeline from the Howard Ditch headgate, located in designated critical habitat on South Boulder Creek, north of Highway 36 and south of Baseline Road.[285] Therefore, there would be no net change to the streamflow in South Boulder Creek below the Howard Ditch headgate, or in Boulder Creek, the Saint Vrain River, or the South Platte River that could affect potential PMJM habitat.[286]

North American Wolverine

No known wolverine foraging, denning, travel, or security habitats would be affected by Alternative 2. Including the low level of ungulate (deer, elk, and moose) calving and rearing in and around the project area, depending on the year, there are no concentrated carrion or forage sources (such as deer and elk winter range) in the project area that might attract wolverines if they were moving through this landscape.[287] The project area is unsuitable for wolverine denning because of the absence of isolated alpine habitat.[288]

Alternative2 is not likely to jeopardize the continued existence of North American wolverine, as there is currently no wolverine population in the State of Colorado. The available scientific and commercial information does not indicate that other potential stressors, such as land management, recreation, infrastructure development, and transportation corridors pose a threat to the distinct population segment.[289] Section 7 (a) (4) of the ESA requires conferencing with USFWS when a proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. Because the Proposed Action is not likely to jeopardize the continued existence of North American wolverine, conferencing is not required.

[283] US Fish and Wildlife Service, 2003, 2010
[284] The USFWS (2006b) concluded that populations of PMJM are not likely present in the vicinity of Gross Reservoir or in the reservoir's three tributaries (Forsythe Gulch, Winiger Gulch, and South Boulder Creek), below the EMR project area.
[285] US Fish and Wildlife Service, 2003, 2010
[286] Bishop-Brogden Associates, Inc., 2013
[287] Thompson, 2013a
[288] Copeland, 1996, 1999
[289] US Fish and Wildlife Service, 2013c

Canada Lynx

With the exception of Objective HU O1 and Guideline HU G10, the direct and indirect effects of Alternative 2 would be consistent with applicable SRLA direction.[290] Guideline HU G10 concerns the location of projects within areas of consistent snow compaction. At EMR, the extent of existing snow compaction was mapped and reported to the USFWS in Year 2000. There has been no expansion of ski terrain since that time. Existing, mapped, EMR snow compaction on NFS lands totals 391.4 acres and is a subset of the SUP area corresponding to the actual area of consistent snow compaction resulting from skiing. Although this guideline explicitly "does not apply inside permitted ski area boundaries," because baseline snow compaction that is part of prior Section 7 Consultation did not extend to encompass the entire SUP area, calculation of the increased area of actual snow compaction resulting from Alternatives 2 and 3 was considered to be warranted. For the Alternatives 2 and 3 impact analyses, snow compaction mapping was extended to the outer boundary of existing and proposed ski terrain on NFS lands, including conventional trails, the proposed extent of glades, and all internal intertrail islands, to accurately quantify snow compaction. The Proposed Action would increase EMR's snow compaction by approximately 120.6 acres, mostly on the south side of Middle Boulder Creek, in Moose, Salto, and Jolly Jug Glades, and along the proposed Placer chairlift access road north of Middle Boulder Creek. While the three glades are currently skied and while there are a few skiers that duck the ropes defining the ski area's administrative boundary and illegally ski outside the above terrain, those areas are currently mapped and considered as "uncompacted" lynx habitat. Therefore, Alternative 2 would result in additional snow compaction that would not be consistent with this guideline. Alternative 2's collective effects on lynx foraging, sheltering, and breeding would exceed the definitions of insignificant and discountable.[291] Therefore, Alternative 2 warrants a "**may affect, likely to adversely affect**" determination for Canada lynx.

Project Area Lynx Habitat

Table 3H-11 shows the total acreage of various lynx habitat types (field verified) affected by VMP prescriptions P1 to P8 within the EMR project area. Alternative 2 would involve 363.2 acres of lynx habitat types, mostly (76.1 percent) on NFS lands; however, not all of this habitat would experience a change in lynx habitat type value.[292] Acreages in Table 3H-11 only associated with VMP prescriptions P2 and P5 through P8, where lynx habitat type values would change, include 116 acres on NFS lands, 22.2 acres on private lands, and 138.1 acres on all lands. Acreages in Table 3H-11 largely associated with VMP prescriptions P2 and P5 through P8, and including VMP prescriptions P3 and P4, where lynx habitat type values would not change, total 160.4 acres on NFS lands, 64.6 acres on private lands, and 225.0 acres on all lands.

[290] USDA Forest Service, 2008b
[291] US Fish and Wildlife Service and National Marine Fisheries Service, 1998
[292] Acreage differences between habitat types (e.g., total acreage involved on all lands, 358.3 acres) and lynx habitat types (e.g., total acreage involved on all lands, 363.2 acres) is the result of using two databases and the partial overlap of polygons within each data set.

Table 3H-11:
Lynx Habitat Affected by Alternative 2 and VMP Prescriptions P1 to P8

Lynx Habitat Type	NFS Lands	Private Lands	All Lands
Winter Foraging	15.0	19.2	34.2
Denning[a]	192.2	12.8	205.0
Other	57.1	40.0	97.1
Currently Unsuitable	0	0	0
Total Lynx Habitat[b]	264.3	72.0	336.3
Non-habitat	12.1	14.8	26.9
Total	**276.4**	**86.7**	**363.2**
Habitat Converted[c]	**116.0**	**22.2**	**138.1**
Habitat No Change[d]	**160.4**	**64.6**	**225.0**
Total	**276.4**	**86.7**	**363.2**

[a] **All denning habitat supports winter foraging values. While this habitat structurally meets denning criteria (Lowry 2002), it is not likely effective.**
[b] Lynx habitat = WFH + Denning + Other + Unsuitable.
[c] Habitat converted to Other or Non-habitat.
[d] Habitat value maintained.
Source: Forest Service, SE Group, and Western Ecosystems, Inc.

Table 3H-12 summarizes lynx habitat impacts within the EMR project area. More than half (59 percent, 215.1 acres on all lands) of affected habitats would be associated with VMP projects (designed to improve forest health over time) where the current lynx habitat values would be retained. Approximately 19 percent (68.5 acres on all lands) of affected habitat would be converted to "non-habitat" for conventional ski related projects. The remaining 22 percent (79.8 acres on all lands) of affected habitat would be degraded from winter foraging and denning habitats to "other" habitat as a result of forest glading. **Note that while denning habitat within the ski area structurally meets denning criteria, it is not likely effective.**[293]

Table 3H-12:
Summary Lynx Habitat Affected by Alternative 2 Project Components

Lynx Habitat Type Effect	NFS Lands	Private Lands	All Lands (%)
CONVERSION TO OTHER HABITAT[A]			
Winter Foraging to Other	12.1	0.0	12.1
Denning to Other[b]	67.7	0.0	67.7
Sum Conversion to Other Habitat	**79.8**	**0.0**	**79.8 (22)**
CONVERSION TO NON-HABITAT[C]			
Winter Foraging to Non-habitat	12.6	3.5	16.1
Denning to Non-habitat[b]	24.7	0.7	25.4
Other to Non-habitat	9.0	18.0	27.0
Sum Conversion to Non-habitat	**46.3**	**22.2**	**68.5 (19)**

[293] Lowry, 2002

Table 3H-12:
Summary Lynx Habitat Affected by Alternative 2 Project Components

Lynx Habitat Type Effect	NFS Lands	Private Lands	All Lands (%)
NO CHANGE TO EXISTING LYNX HABITAT TYPE[D]			
Winter Foraging No Change	8.3	15.7	24.0
Denning No Change[b]	99.8	12.1	111.9
Other No Change	30.3	22.0	52.3
Non-habitat No Change	12.1	14.8	26.9
Sum No Change	**160.4**	**64.6**	**215.1 (59)**
TOTAL	**276.4**	**86.7**	**363.2**

Note: These field verified data consider the forest types, structural stages, relative down coarse woody debris density, and relative live horizontal conifer density within the winter foraging range of snowshoe hares of the lynx habitats present. They do not consider land use, habitat effectiveness, and other factors. See text.
[a] Conversion to other habitat as a result of glading.
[b] All denning habitat supports winter foraging values.
[c] Conversion to non-habitat as a result of conventional ski trails, etc.
[d] No change to existing lynx habitat type due to implementation of VMP projects.
Source: Forest Service, SE Group, and Western Ecosystems, Inc.

Table 3H-13 summarizes impacts to the Boulder LAU.

Table 3H-13:
Changes to Boulder LAU statistics from Alternative 2

Lynx Habitat Type	NFS Lands	Private Lands	All Lands
Winter Foraging	-25	-4	-28
Denning	-92	-1	-93
Other	28	-36	-8
Currently Unsuitable	0	0	0
Net Lynx Habitat Affected	**-89**	**-40**	**-129**
Non-habitat	46	22	68
Total Net Lynx Habitat Types Affected	**136**	**62**	**198**

Source: Forest Service, SE Group, and Western Ecosystems, Inc.

Boulder LAU Habitat Parameters

Alternative 2 would have negligible effects on overall LAU statistics. The only change in the percent of any lynx habitat type in the LAU would be for denning habitat on NFS lands, which would change from 12 percent to 11 percent. Currently unsuitable habitat would remain at 4 percent. Table 3H-14 updates the Boulder LAU lynx habitat statistics as a result of Alternative 2.

Table 3H-14:
Boulder LAU Statistics from Implementation of Alternative 2

Habitat Description	Acres of Habitat in LAU	% of all Lynx habitat in LAU
Winter Foraging (NFS, not incl. denning)	26,179	34
Denning (NFS)	8,783	11
Other (NFS)	5,899	8
Unsuitable (NFS)	3,120	4
Total Lynx Habitat[a] (NFS)	43,981	57
Non-habitat (NFS)	8,257	11[b]
NFS Acres in LAU	52,281	67.8
Unsuitable (private)	192	0
Private Acres in LAU	24,839	32.2
Total Acres in LAU	**77,120**	**100**[b]

[a] Total lynx habitat = WFH + Denning + Other + Unsuitable.
[b] % of habitat in total LAU.
Source: Forest Service (data [lau_hab_acOct7th2002Version.xls] provided by B. Baker, Forest Service, July 31, 2013) and Western Ecosystems, Inc.

Construction Activity Effects

The ± ten years of construction activities associated with Alternative 2 should not result in lynx injury or mortality, but it could displace a lynx that might be moving through active construction areas and access corridors. Although lynx may be active at any time of day, their primary nocturnal and crepuscular activity period is largely exclusive with the diurnal construction period. Construction noise would alert any lynx that might be moving through the area, giving it ample opportunity to avoid the construction activities. The likelihood of a healthy lynx being killed by construction traffic off regional highways and roads (addressed below) is discountable because of only partly overlapping activity periods, the low number of lynx present in the landscape, and the slow speeds of vehicles (< 20mph) on mountain roads. A lynx encountering construction traffic might wait in forest cover to cross the road until the vehicle passed, increase its gait across the road before the vehicle arrived, or stand and watch the vehicle that would likely stop to observe the lynx, like what happened on Keystone Ski Area on October 3, 2000.[294] Another less likely option would be for the lynx to retrace its route. In any event, it is unlikely that any such encounter would occur, and if it occurred, it would not meaningfully affect lynx habitat use or survival probabilities.

Secondary Development

Virtually all current employees live in Boulder. The few additional employees associated with the action alternatives are also likely to live in Boulder, outside of lynx habitat. Therefore, there would be no impacts to lynx habitat resulting from additional employees associated with this alternative. Potential traffic effects are addressed below.

[294] Thompson, 2003a

Traffic Generation

Traffic generation on Highway 119 is presented in Chapter 3 Section B – Traffic, Parking and Air Quality. No section of the highway used to access EMR bisects Forest Service-designated lynx habitat or a designated lynx linkage.[295] Therefore, it is unlikely that lynx would attempt crossings of Highway 119 in mid- to upper Boulder Canyon where they would be vulnerable to increased highway mortality probabilities resulting from additional, Alternative 2-related guests and employees. There have been no known lynx home ranges in the action area and it is unlikely that there would be any overlapping Boulder Canyon such that additional Alternative 2-related traffic would reduce the efficacy of a lynx home range overlapping or occurring adjacent to the Highway 119 corridor. The resulting effects of additional Alternative 2-related traffic on regional highways should have no measurable or meaningful effect on lynx population growth within the Southern Rockies Lynx Population.

Dispersed Recreation Effects

Implementation of Alternative 2 project components are not expected to result in any increased skier use of undeveloped habitat blocks outside of what would become the dissected portion of the ski area that could have further adverse effects on the lynx prey base, lynx DSH, habitat connectivity, or lynx home range efficacy. Alternative 2 out-of-bounds terrain that might attract skiers seeking untracked snow is not attractive and it would be difficult and time consuming for skiers to return to resort facilities.[296] Potential dispersed recreation effects associated with additional (Alternative 2) EMR employees encountering lynx on the Forest would also be discountable.

Region 2 Sensitive Animal Species

Determinations to R2 sensitive species are presented in the BE in the project file; however, impacts are disclosed under individual species headings for those species with potential to occur.

Molluscs

Rocky Mountain Capshell Snail

Impact zones associated with Alternative 2 would not extend to occupied or potential habitat. Therefore, Alternative 2, including the implementation of PDC, would have no impact on the Rocky Mountain capshell snail and it is dropped from further consideration herein.

Insects

Hudsonian Emerald

There would be no ground disturbing or water use activities to the water bodies or peripheral wetland habitats as a result of Alternative 2 that could negatively affect this species or its habitat. Alternative 2,

[295] Ruediger et al., 2000; Alexander et al., 2005
[296] It involves short (several hundred feet) vertical relief, skiing (bashing) through tight trees, and the few open shots that appear attractive are boulder fields that are too dangerous to ski (i.e., until sufficient snow covers openings between boulders to depths that could support a skier) until mid-to late season.

including the implementation of PDC, would have no impact on the Hudsonian emerald and it is dropped from further consideration herein.

Amphibians/Reptiles

Boreal Western Toad

No known or potential breeding habitat occurs in project disturbance areas. A comprehensive list of PDC, including the maintenance of an existing vegetated buffer between the lowest Middle Boulder Creek collector trail and Placer chairlift bottom terminal site (Alternative 2), have been developed that would minimize and mitigate negative project-related water quality and hydrology effects (Table 2-3). With the effective implementation of those measures, Alternative 2 should have no negative effects to this species or its potential habitat. While the likelihood and levels of sediment that could potentially find their way to Middle Boulder Creek are considered low and the likelihood of boreal toad occurrence downstream is also low, it is possible that toad egg survival could be impaired if eggs were covered by sediment. In addition, forest cover facilitates post-breeding toad movements. Tree removal associated with Alternative 2 would incrementally reduce habitat connectivity for any toads attempting to move across a section of conventional ski trail (also in the event a local population was present, now or in the future). It is also possible, though unlikely (because there are no known, extant, toad populations within the dispersing distance of the EMR project area), that toads dispersing into Alternative 2 development area could be killed by construction (a direct effect) and maintenance vehicles (an indirect effect) and by construction activity (a direct effect). With the exception of the above potential effects, there are no effects associated with Alternative 2 that would affect this species. The Alternative 2 impact areas, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the Forest.

Under Alternative 2, there would be no change in the timing or the extent of water level fluctuations that now occur in the water bodies associated with EMR's snowmaking operations. The 3 acre feet of additional Jenny Creek diversions would occur overwinter when toads are hibernating and would not affect any potential, but unoccupied toad breeding habitats. With the potential exception of some beneficial, increased groundwater recharge out of a small portion of the Jolly Jug pod (i.e., into Jenny Creek meadows as a result of tree removal for conventional ski trail development and glading; greater under Alternative 3), the small, historic beaver ponds and kettle ponds within the ski area would be largely unaffected by Alternative 2.

Northern Leopard Frog

There are no known, extant breeding sites within the project area or close enough to potential disturbance areas such that leopard frogs dispersing from those sites could be affected by the Proposed Action. A comprehensive list of PDC have been developed that would minimize and mitigate negative project-related water quality and hydrology effects (Table 2-3). With the effective implementation of those measures, Alternative 2 should have no negative effects to this species or its potential habitat. The

Alternative 2 impact areas, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the Forest.

Birds

Northern Goshawk

Alternative 2 would affect goshawks by removing or thinning forest cover on NFS and private lands within the EMR project area that supports potential prey species (e.g., snowshoe hares, red squirrel, and birds). Based on goshawk habitat associations, Alternative 2 would affect 334.4 acres of potential goshawk habitat (on NFS and private lands).[297] Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 64.8 acres of potential goshawk habitat (on all lands). Alternative 2 would result in the fragmentation of, and habitat losses in, the Middle Boulder Creek pod (a relatively large, intact block of high quality foraging and potential nesting habitat). No goshawk nests or verified nesting habitat associated with a known nesting block would be affected under Alternative 2. Any goshawks present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. The Alternative 2 impact area, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the Forest.

American Peregrine Falcon

Under Alternative 2, the loss of forest cover associated with subalpine ski trail development should have no realized potentially beneficial effect because of how far the active eyries are to the project area and the superior hunting areas much closer to those eyries. However, because small areas of currently effective, potential foraging habitat would also be lost to the parking lot expansion, additional spur roads, chairlift terminals, new and expanded on-mountain facilities, overall potential effects would not be entirely beneficial. Peregrines are not particularly bothered by humans per se, so the limited amount of increased summer maintenance activity along the chairlift and access road corridors should have little negative effect on the availability of the local prey base.[298] Cables associated with new chairlifts would not represent a meaningful collision hazard. The implementation of PDC should have no effect on peregrine habitat use. Indirect effects associated with this project would have no impacts on peregrine falcons.

Bald Eagle

Based upon the lack of bald eagle use in the vicinity of the EMR project area, Alternative 2 should have no impact on the bald eagle.

[297] Rhea et al., 2006
[298] Craig, 2007

White-tailed Ptarmigan

Ptarmigan use of the project area and adjacent habitats for summer and breeding uses would be unaffected by Alternative 2. There would no physical loss of winter foraging habitat. Implementation of PDC should have no effect on ptarmigan. Indirect effects associated with this project would have no impacts on this species or potential habitat.

Flammulated Owl

Alternative 2 could result in the loss of forested habitat representing potential migratory habitat and secondary nesting habitat. Two PDC (Table 2-3) have been developed that would minimize snag removal and avoid or minimize construction season nest losses; however, impacts could occur to undetected nests.

Boreal Owl

Alternative 2 could affect boreal owls by removing or thinning linear forest strips, representing year-round foraging habitat and, to a lesser extent, potential, but presently unoccupied, nesting habitat, scattered throughout one or more potential owl home ranges. Alternative 2 would affect 212.3 acres of potential boreal owl habitat (NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 35.8 acres of potential boreal owl habitat (on all lands). Two PDC (Table 2-3) have been developed that would minimize snag removal and avoid or minimize construction season nest losses; however, impacts could occur to undetected nests. Boreal owls may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts should be limited to impacts to undetected nests and the loss of foraging habitat. These project effects to potential foraging and nesting habitat would occur within the relatively large (5.4 to 6.1 square miles), potential home range of a pair of boreal owls.[299] Loss or reduction of forest-interior prey result from habitat impacts may be partially offset during the snow free season by substantial increases in deer mice on newly created ski trails. Potential nesting habitat lost, largely associated with mature, closed canopy spruce-fir stands, would total up to 27.7 acres under Alternative 2. The Alternative 2 impact area, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the Forest.

Additional skiing activity, per se, should have no negative effects on owls. Tree thinning (i.e., for glading) should have less effect than conventional ski trails on foraging habitat (i.e., the majority of foraging values may be retained) if snow compaction does not become great enough that it limits subnivian small mammal (primary boreal owl prey) access to the surface. The abundance of some prey species (small mammals and birds) may decline in an area larger than the area of tree removal as a result of tree removal/thinning, snow compaction, forest fragmentation effects, and tree skiing. Tree thinning (i.e., for glading) should also have less effect than conventional ski trails on nesting habitat (i.e., the majority of suitable mature trees suitable for nest cavities would be retained). If nest trees associated with active

[299] Palmer, 1984

territories occur within impact areas during the construction season, direct mortality of eggs and/or nestlings should be avoided by conducting tree removal outside the May 21 to July 15 nesting period when eggs/young are present.[300] This and additional PDC have been developed to avoid or minimize nesting impacts to this species. Implementation of other PDC should have no effect on the boreal owl. Given this species' primarily nocturnal habitat use, cavity nesting habit, ability to use the types of intertrail islands that would remain within and outside the developed ski area, and tolerance to human disturbance, it is likely that the forested ski terrain would continue to support boreal owls, including possible future nesting. Indirect effects associated with this project and limited to increases in dispersed recreation extending into boreal owl habitat would have no impact on this species.

Olive-sided Flycatcher

Alternative 2 would affect olive-sided flycatchers by removing linear forest strips, portions of which represent summer nesting and foraging habitat, scattered throughout the home ranges of at least several pairs of birds. Based on potential olive-sided flycatcher habitat associations, Alternative 2 would affect 212.3 acres of potential olive-sided flycatcher habitat (on NFS and private lands).[301] Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 35.8 acres of potential olive-sided flycatcher habitat (on all lands). These project effects to potential foraging habitat would occur within the large (5.4 to 6.1 square miles), potential home range of several pairs of olive-sided flycatchers.[302] A PDC (Table 2-3) has been developed that would avoid or minimize construction season nest losses; however, direct effects could occur to undetected nests. Olive-sided flycatchers may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts should be limited to impacts to undetected nests and the loss of foraging habitat. The Alternative 2 impact area, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the Forest.

Slightly less habitat loss would occur under Alternative 3 compared to Alternative 2. Tree removal could be partly beneficial from a long-term, foraging habitat, perspective if forest openings could be revegetated or succeed to support a higher prey base than that currently present and available. That result does not always occur with conventional ski trail development. However, it is more likely to result with the type of flush cutting and tree removal being proposed. Conversely, existing, non-forested, foraging habitat (e.g., grasslands, meadows, and ski trails supporting the flying insect prey base of this species) adjacent to forest stands could also be negatively affected (over short- to moderate-terms) by ski trails, roads, and other impacts. If nest trees associated with active territories occur within impact areas during the construction season, direct mortality of current year recruitment should be avoided by conducting tree

[300] Kingery et al., 1998
[301] Including 4B lodgepole stands and 4A, 4B, and 4C spruce-fir stands.
[302] Palmer, 1984

removal outside the June 1 and July 15 nesting period when eggs/young are present.[303] Implementation of other PDC should have no effect on olive-sided flycatchers. While Alternative 2 would reduce the amount of foraging and nesting habitat within the existing and expanded SUP area, the ski area would continue to support these flycatchers (as influenced by the MPB epidemic). Habitat effectiveness may decline in an area larger than the area of tree removal as a result of forest fragmentation effects, snag removal, and subsequent ski trail forage effectiveness. Indirect effects associated with this project, limited to increases in dispersed recreation extending into olive-sided flycatcher habitat, would have no impacts on this species.

Brewer's Sparrow

Alternative 2 would not likely have any meaningful effect on Brewer's sparrows or their potential, apparently unoccupied, habitat associated with the krummholz-like community at the top of Salto Glades (the only secondary habitat present in the project area). Under Alternative 2, the only potential activity affecting that habitat patch is VMP P6 (Existing Skiing and Gladed Skiing Area Maintenance), which would not likely be implemented in this area because the terrain is already so open and skiable. However, in the event that one or more trees were cut (e.g., for a new "shot"), potential habitat could be negatively affected. Brewer's sparrows, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts could include the loss of potential, secondary foraging habitat and the potential loss of active nests during construction activities. The Alternative 2 impact areas, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the Forest.

Mammals

Pygmy Shrew

Alternative 2 could impact individual pygmy shrews through direct, construction-related mortality and/or loss or degradation of potential habitat. Alternative 2 would affect 358.3 acres, on all lands to some extent. Alternative 2 would result in the conversion of 64.8 acres, respectively, on all lands, though not necessarily the loss or degradation of habitat since this species inhabits such a wide range of habitats. Loss of forest-interior prey may be partially offset during the snowfree season by substantial increases in deer mice (potential prey) on newly created ski trails. The Alternative 2 impact area, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the Forest. The probability that this species would be present in those potentially suitable habitats proposed for disturbance, when it has not been detected (recognizing that the species is difficult to detect) on the ARP or in Boulder County, is unknown, but unlikely. Indirect effects associated with this project, limited to increases in dispersed recreation extending into potential pygmy shrew habitat, would

[303] Kingery et al., 1998

have no impact on this species.[304] A substantial acreage of potential habitat for this species would persist in this analysis area.

Fringed Myotis

While the project area is above the maximum elevational range of this species, outside of the local known range of this species, and does not support the primary habitat that this species is associated with, mature conifer stands in the project area are considered to represent potential habitat for this species.[305] Alternative 2 could affect fringed myotis by removing or thinning forest representing summer day roosts and maternity sites possibly involving dozens of individuals. No buildings or underground mines representing potential hibernacula would be affected. Alternative 2 would affect 212.3 acres of mature forest (NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. Foraging habitat may be improved by the increase in herbaceous and shrub vegetation that typically occurs after forest stands are opened up to more sunlight (i.e., as a result of MPB management and glading), which may increase prey abundance. Treatment might (i.e., depending upon the level of MPB effects and subsequent treatments) also maintain or restore more open forest conditions that are more conducive to fringed myotis foraging. Substantial numbers of large snags may be removed with high levels of beetle-induced lodgepole mortality, although the implementation of a snag-retaining PDC (Table 2-3) would reduce this negative effect. It is likely that adequate snag density would remain in the project area's lodgepole zone and would not limit potential fringed myotis use.

Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 35.8 acres of potential fringed myotis habitat (on all lands). These project effects to potential foraging and nesting habitat would occur within the relatively large potential home range of up to dozens of individuals. Fringed myotis, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts should be limited to the loss of foraging and roosting habitat. The Alternative 2 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the Forest. Indirect effects associated with this project and limited to increases in dispersed recreation extending into fringed myotis habitat would have no impact on this species. Fringed myotis, if present now, would persist in this analysis area.

Hoary Bat

Alternative 2 could affect hoary bats by removing or thinning forest representing summer habitat possibly involving dozens of individuals. Alternative 2 would affect 334.4 acres of forest (NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. Foraging habitat may be improved by the increase in herbaceous and shrub vegetation that typically occurs after forest stands are opened up to more sunlight (i.e., as a result of MPB management and

[304] Fitzgerald et al., 2011
[305] Including 4A-C lodgepole stands and 4A-C spruce-fir stands.

glading), which may increase prey abundance. Treatments might (i.e., depending upon the level of MPB effects and subsequent treatments) also maintain or restore more open forest conditions that are more conducive to fringed myotis foraging. Substantial numbers of large snags may be removed with high levels of beetle-induced lodgepole mortality, although the implementation of a snag-retaining PDC (Table 2-3) would reduce this negative effect. It is likely that adequate snag density would remain in the project area's lodgepole zone and would not limit potential hoary bat use.

Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 64.8 acres of potential hoary bat habitat (on all lands). These project effects to potential foraging and roosting habitat would occur within the relatively large potential home range of up to dozens of individuals. Hoary bats, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts should be limited to the loss of foraging and roosting habitat. The Alternative 2 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the Forest. Indirect effects associated with this project and limited to increases in dispersed recreation extending into hoary bat habitat would have no impact on this species. Hoary bats, if present now, would persist in this analysis area.

Townsend's Big-eared Bat

Alternative 2 could affect Townsend's big-eared bats by removing or thinning forest representing suboptimal (because of their distance from water), summer foraging habitat possibly involving dozens of individuals.[306] Alternative 2 would affect 334.4 acres of forest (NFS and private lands). Most of those affected acreages would be associated with the VMP prescriptions that could have a long-term positive effect on foraging habitat due to maintaining and restoring more open forest conditions. Foraging habitat may be improved by the increase in herbaceous and shrub vegetation that typically occurs after forest stands are opened up to more sunlight (i.e., as a result of MPB management and glading), which may increase prey abundance. Treatments might (i.e., depending upon the level of MPB effects and subsequent treatments) also maintain or restore more open forest conditions that are more conducive to fringed myotis foraging.

Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 64.8 acres of potential Townsend's big-eared bat habitat (on all lands). Conventional ski trails and glades could enhance foraging opportunities by creating openings and edge habitat in what currently is dense single-story forest stands, provided ski trail reclamation results in vegetative communities that support the relatively large prey of this species. Under Alternative 2, the relatively mesic growing conditions that would occur along the Placer chairlift and terrain bottom collector trail and its close proximity to Middle Boulder Creek could provide the best circumstances of any conventional trail to unintentionally enhance the available prey base for this species. These project effects to potential foraging habitat would occur

[306] Fitzgerald et al., 1994

within the relatively large potential home range of up to dozens of individuals. Townsend's big-eared bats, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts would be limited to the loss of foraging and roosting habitat. No known roost sites (structures) or hibernacula would be affected. The Alternative 2 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the Forest. Indirect effects associated with this project and limited to increases in dispersed recreation extending into hoary bat habitat would have no impact on this species. Townsend's big-eared bats, if present now, would persist in this analysis area.

American Marten

Alternative 2 would affect martens by removing and thinning linear forest strips representing foraging habitat and possible denning habitat, likely extending into portions of several individuals' home ranges. Alternative 2 would affect 212.3 acres of mature forest representing at least potential marten habitat (NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions.

Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 35.8 acres of potential marten habitat (on all lands). Marten may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Two PDC (Table 2-3) have been developed that would minimize snag removal and avoid or minimize construction season den losses. Direct impacts should be limited to impacts to undetected dens and the loss of foraging habitat. Indirect effects associated with this project and limited to increases in dispersed recreation extending into fringed myotis habitat would have no impact on this species. The Alternative 2 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the Forest.

No known marten dens are present within disturbance areas; however, marten dens are virtually impossible to locate without the use of radio-collared animals. Young-of-the-year would be vulnerable to den tree removal that occurred between approximately March 1 and June 15.[307] Because denning selection, if not denning per se, generally begins before the ski season has ended, marten may not select den sites within areas currently used for tree skiing, although such diurnal skiing when martens are asleep in arboreal and subnivian dens probably has little influence. Habitat conversion/treatment disturbances to active dens would be avoided or minimized with the implementation of PDC (Table 2-3). Implementation of other PDC should have no impact on martens.

Marten habitat effectiveness may decline in an area larger than the area of tree removal as a result of fragmentation effects and tree skiing. The effects of tree skiing intertrail islands on the local forest prey base are unclear, but are unlikely to be beneficial. Tree thinning (for glading) would have less impact on

[307] Ibid.

foraging habitat (i.e., the majority of foraging values may be retained) than total tree removal for conventional ski trail development. Loss of forest-interior prey would be partially offset during the snow-free season by substantial increases in deer mice on newly created ski trails. Within the existing SUP area, marten habitat would be further fragmented by additional ski trails, restricting (but not blocking) marten movements, and habitat effectiveness similar to that now experienced by martens on the existing ski area. However, marten would persist in this analysis area.

Indirect effects associated with this project (, generally limited to increases in dispersed recreation extending into marten habitat, would have no impact on this species. Individual marten that may be affected by the EMR project do not have home ranges that extend to the regional highways used to access the resort where increased, resort-related traffic volumes might increase road-kill probabilities.

River Otter

A comprehensive list of PDC have been developed that would minimize and mitigate negative project-related water quality and hydrology effects (Table 2-3). With the effective implementation of those measures, Alternative 2 should have no negative effects to this species or its potential habitat. With the implementation of standard BMPs incorporated into these alternatives as PDC, no sediments originating in temporary construction areas are likely to extend to Middle Boulder Creek, on NFS lands, or to Jenny Creek, on private lands. Such sedimentation could negatively affect trout recruitment and temporarily affect the forage availability of any transient otters that might be present. Under Alternative 2, there would be no change in the timing or the extent of water level fluctuations that now occur in the water bodies associated with EMR's snowmaking operations. The 3 acre feet of additional Jenny Creek diversions would occur overwinter when otters would not be present in such headwater streams. In addition to some beneficial increased groundwater recharge out of a small portion of the Jolly Jug pod (i.e., into Jenny Creek meadows) as a result of tree removal for conventional ski trail development and glading and snowmaking; greater under Alternative 3), the Jenny Creek diversions would be augmented by compensatory releases into South Boulder Creek, representing potential year-round habitat. The Alternative 2 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the Forest. Indirect effects associated with this project, limited to increases in dispersed recreation extending into potential, but unoccupied otter habitat, and discountable increased road-kill probabilities, would have no impact meaningful on this species.

Management Indicator Species

Alternative 2 is not expected to influence population trends locally or on the Planning Area for the MIS discussed below.

Greenback Cutthroat, Brook, and Brown Trout

For the reasons described above for genetically pure GBCT, Alternative 2 would have no effect on that threatened species. Potential Alternative 2 project effects on these three MIS trout species (including

greenback trout hybrids) could have minor, negative, short-term (from the start of construction until revegetation programs are deemed successful, about three years) effects as a result of sedimentation extending to occupied reaches of Middle Boulder Creek. The greatest risk of additional sediment reaching Middle Boulder Creek would be during development of the Placer chairlift and terrain, particularly with respect to activities involving grading near Middle Boulder Creek and its tributaries. Erosion and sedimentation affecting water quality could also result from tree removal in and above the Placer chairlift and terrain, the application of additional snowmaking water on watersheds draining the project area, channel destabilization, etc. Erosion and sedimentation could affect trout spawning (particularly fall spawning species) and aquatic habitat quality (e.g., aquatic macroinvertebrate communities) before revegetation treatments become effective. Removal of trees within the WIZ would occur for the most part more than 50 feet away from the stream bank (with the exception of the proposed bridge to the Placer chairlift's bottom terminal). Thus, the impact to functional riparian habitat and large woody debris recruitment should be minimal. However, these and other potential effects would be avoided or minimized with the effective implementation of PDC (Table 2-3). Such potential impacts would not be of a magnitude that would have a "negative influence" on the populations, habitats, or ability of these three MIS trout species to persist on the Forest. Alternative 2 could have greater negative effects on Middle Boulder Creek trout because of greater and closer forest clearing on slopes above and approaching Middle Boulder Creek. There are no indirect effects associated with Alternative 2 that would affect these species. Alternative 2 would be consistent with the Executive Orders 12962 and 13474 prohibiting Federal Actions from significantly affecting a recreational fishery.[308]

Boreal Toad

Boreal toads are analyzed above as a R2 sensitive species. Please refer to that discussion.

Hairy Woodpecker

Alternative 2 would affect hairy woodpeckers by removing or thinning forest cover on NFS and private lands within the EMR project area that supports occupied foraging and nesting habitat for an estimated ± 6 to 8 pairs of birds. Based on potential hairy woodpecker habitat associations, Alternative 2 would affect 334.4 acres of potential hairy woodpecker habitat (on NFS and private lands).[309] Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 64.8 acres of potential hairy woodpecker habitat (on all lands). Hairy woodpeckers may be temporarily displaced by construction season project activities, but are expected to return to suitable habitats once activities are complete. Direct impacts include the loss of potential, secondary foraging habitat and the potential loss of active nest trees during tree removal. A PDC (Table 2-3) has been developed that would minimize snag removal, representing potential foraging and nesting habitat. The Alternative 2 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range

[308] Federal Register, 1995 and 2008
[309] All affected aspen, lodgepole, and spruce-fir structural stages.

and habitat available to this species on the Forest. Alternative 2 would have local, negative (tree removal) and positive (implementation of forest health-related prescriptions), permanent effects on hairy woodpeckers, but these potential impacts would not be of a magnitude that would have a "negative influence" on their populations, habitats, or ability to persist on the Forest. There are no indirect effects associated with Alternative 2 that would affect this species.

Pygmy Nuthatch

Alternative 2 could affect pygmy nuthatches by removing or thinning forest cover on NFS and private lands within the EMR project area that supports potential, secondary, foraging and nesting habitat. Alternative 2 would affect 334.4 acres of potential, secondary, habitat (on NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 64.8 acres of potential, secondary, habitat (on all lands). Pygmy nuthatches, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts include the loss of potential, secondary foraging habitat and the potential loss of active nest trees during tree removal. A PDC (Table 2-3) has been developed that would minimize snag removal, representing potential foraging and nesting habitat. The Alternative 2 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the Forest. Alternative 2 would have local, negative (tree removal) and positive (implementation of forest health-related prescriptions), permanent effects on potential, secondary, pygmy nuthatch habitat, but these potential impacts would not be of a magnitude that would have a "negative influence" on their populations, habitats, or ability to persist on the Forest. There are no indirect effects associated with Alternative 2 that would affect this species.

Warbling Vireo

Alternative 2 would affect warbling vireos by removing or thinning forest cover on NFS lands within the EMR project area that supports occupied foraging and nesting habitat. Alternative 2 would affect 22 acres of aspen habitat on NFS lands to some extent. One-half of that affected acreage would be associated with the largely beneficial VMP prescriptions. However, Alternative 2 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 11 acres of aspen habitat for conventional ski trails and glades in the Placer chairlift and terrain pod above Middle Boulder Creek. Warbling vireos may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts include the loss of foraging habitat and the potential loss of active nest trees during tree removal. The Alternative 2 impact areas, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the Forest. Alternative 2 would have local, negative (tree removal) and positive (implementation of forest health-related prescriptions), permanent effects on occupied warbling vireo habitat, but these potential impacts would not be of a magnitude that would have a "negative influence" on their

populations, habitats, or ability to persist on the Forest. There are no indirect effects associated with Alternative 2 that would affect this species.

Mountain Bluebird

Alternative 2 would have positive and negative effects on mountain bluebirds. The development of new conventional ski trails would create additional foraging habitat whose quality would depend upon that of the ski trail vegetative communities (which would be facilitated by proposed trail construction techniques, specifically flush-cutting). New trails would also expose new flanking nesting habitat. While it is EMR's policy to remove snags along ski trails for safety issues, enough snags persist to provide some level of effective nesting habitat. Tree removal for tree skiing and glade skiing would not likely affect bluebirds because those areas would continue to provide forest interior habitat that this species does not use. Trail development might also negatively affect nesting habitat if there are any nest cavities (active or otherwise) or snags (potential nesting habitat) along ski trail edges where new ski trails would enter/exist forest stands. Mountain bluebirds, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts include the temporary loss and short-to long-term gain of foraging habitat (net positive) and the gain/loss of nesting habitat (net positive) due to conventional trail development. A PDC (Table 2-3) has been developed that would minimize snag removal, representing potential nesting habitat. The Alternative 2 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the Forest. Alternative 2 would have local, negative (tree removal) and positive (implementation of forest health-related prescriptions), permanent effects on potential, secondary, pygmy nuthatch habitat, but these potential impacts would not be of a magnitude that would have a "negative influence" on their populations, habitats, or ability to persist on the Forest. There are no indirect effects associated with Alternative 2 that would affect this species.

Golden-crowned Kinglet

Alternative 2 would result in the loss of habitat values in 27.7 acres of closed-canopy spruce fir forest mostly on the north-facing slopes in and beyond the current development area boundary, 27.3 acres and 0.4 acre on NFS and private lands, respectively. Alternative 2 could have minor to moderate, negative, permanent effects on golden-crowned kinglet foraging and nesting habitat. The Alternative 2 impact area represents an insignificant proportion of the total potential range and habitat available to this species on the Forest. These potential impacts would not be of a magnitude that would have a "negative influence" on golden-crowned kinglet populations, habitats, or ability to persist on the Forest. There are no indirect effects associated with Alternative 2 that would affect this species. No additional mitigation is recommended to minimize anticipated project effects on this species.

Wilson's Warbler

Alternative 2 could result in the loss of nesting and foraging values locally in project component areas. However, because no primary habitat that this species is associated with would be impacted (or was large

enough to delineate), this potential impact cannot be quantified. Alternative 2 could have small, permanent effects on Wilson's warbler foraging and nesting habitat, however the potential impact areas represent an insignificant proportion of the total potential range and habitat available to this species on the Forest. These potential impacts would not be of a magnitude that would have a "negative influence" on the species' populations, habitats, or ability to persist on the Forest. There are no indirect effects associated with Alternative 2 that would affect this species. No additional mitigation is recommended to minimize anticipated project effects on this species.

Elk and Mule Deer

Alternative 2 would result in the loss of elk and mule deer habitat values totaling 64.8 acres, 47.8 acres and 16.9 acres on NFS and private lands, respectively. Alternative 2 would have minor to moderate, negative, permanent effects on elk and mule deer spring through fall habitats. Habitat conversion to conventional ski trails and glades would affect moderately large, non-isolated, habitat blocks contiguous with existing developed ski terrain that are lightly to moderately influenced by human activities during spring through fall, when elk and mule deer are present using the area as transitional range (spring and fall), fawning (documented on the existing ski area), calving (not documented on the existing ski area, but possible), fawn/calf-rearing, and summer range. Habitat effectiveness of these seasonal ranges would also be reduced by habitat fragmentation and low levels of human activities (summer maintenance and dispersed recreation) in a larger area surrounding the habitat conversion. Construction activity displacement effects would persist for years (longer for elk than deer) and while full recovery cannot be assumed, it is possible that elk use could largely return to former levels after about seven years, as long as human use remains near current environmental baseline levels.[310] Otherwise, most current elk use would be lost during and after intervals of human activity. Elk and deer may benefit from increased forage availability on new conventional ski trails, as long as they are not displaced by human activity, although summer forage availability is not a limiting factor. Assuming full habitat occupancy at present, temporarily or permanently displaced elk would compete with their cohorts in local herds for the reduced effectiveness of spring through summer habitats. Alternative 2 effects would not affect elk or mule deer winter range availability and use or measurably increase road-kill on highways serving EMR.

Alternative 2 is not expected to generate any secondary development from additional residents or employees that would result in negative effects to elk or mule deer habitat or increased road-kill. Neither alternative proposes development that would increase the amount or extent of dispersed recreation effects on these two species.

While EMR's Alternative 2 traffic contributions to Highway 119 during the ski season would be additive to traffic volumes within the range of those documented to impair wildlife movements and pose more serious threats to mortality and habitat fragmentation, no section of Highway 119 used by the vast

[310] Morrison et al., 1995

majority of EMR guests bisects NDIS-designated highway crossings.[311] Nevertheless, Alternative 2 would theoretically increase elk and deer road-kill probabilities and impair habitat connectivity.

The Alternative 2 impact area represents an insignificant proportion of the total potential range and habitat available to these species on the Forest. These potential impacts would not be of a magnitude that would have a "negative influence" on their populations, habitats, or ability to persist on the Forest. The CPW will continue managing and monitoring the elk and mule deer populations across the ARP.

Other Habitats

Old Growth and Late Successional Forest

New conventional ski trail development would eliminate affected late successional stands that would otherwise progress toward old growth. Late successional stands thinned and perforated to facilitate tree skiing, would largely retain their late successional values and may progress toward old growth, though they may never achieve old growth communities, in part because of ski terrain development effects. Buffers of unaffected late successional stands contiguous with new ski trails and gladed areas would progress toward old growth, but may also not achieve old growth communities, in part because of ski terrain development effects, including increased tree skiing and spatial stand considerations.[312] Late successional stands affected by VMP prescriptions P6, P7, and P8 should largely retain their late successional values and progress toward old growth, particularly if prescription treatments are implemented timely after pathogens are identified that would otherwise affect larger areas of these stands.

Therefore, while portions of the EMR project area may have old growth characteristics warranting their classification as developing old growth areas, Alternative 2 would be consistent with all Forest Plan goals, objectives, standards, and guideline related to old-growth, with the exception of guideline 120.[313] Regarding GL 120, not accounting for the results of site specific surveys assessing old growth in the EMR project area and considering only ARP old growth mapping, Alternative 2 would not be consistent with this guideline, because new conventional ski trails would not maintain or increase habitat effectiveness within ARP-designated old growth development area (the entire EMR SUP area) or ARP-designated old growth inventory (refer to project file for mapping and inventory).[314] The acreage of affected, designated, old growth habitats would be similar between alternatives, with greater impacts under Alternative 2 to high-elevation old growth development habitat south of Middle Boulder Creek, and greater impacts under Alternative 3 to high-elevation old growth development habitat and old growth inventory in Salto, Moose, and Bryan Glades II.

[311] Stevens et al., 1996; Clevenger et al., 2002; Alexander et al., 2004, 2005; Ruediger et al., 2000
[312] Mehl (1992) requires that old growth stands not only contain certain characteristics, but also be ≥ 5 acres in size. Late successional stands affected by new ski terrain development may reduce eventual old growth stand below that size threshold.
[313] USDA Forest Service, 1997a
[314] 120. (GL) Maintain or increase habitat effectiveness within identified old growth areas and all old growth sites that are not planned for harvest. Thompson, unpublished data; Buell, 2013; Orthner, 2013

Effective Habitat

From an ARP mapping perspective, effective habitat would be reduced by the expansion of developed terrain footprints and by fragmentation of some of the larger remaining habitat blocks within existing developed terrain. However, expanding on ARP definitions of effective habitat, even disturbed areas can provide effective habitat and effective habitat depends on what species are considered. Based on habitat and wildlife surveys, much of the EMR project area, especially the larger intertrail islands within developed ski terrain, continues to support effective wildlife habitat for the majority of species seasonally present. Outside the ski season, little human activity is present when most wildlife are resident or moving through the ski area. Even elk persist within developed ski terrain as they drift through during spring movements to higher elevation summer ranges. For most of the wildlife species with relatively small home ranges, even moderately-sized intertrail islands provide adequate habitat blocks, either by themselves or via use of multiple contiguous blocks. While forest fragmentation from conventional ski trail development has adversely affected forest-interior species, it has benefitted edge (e.g., American robin) and grassland interior species (e.g., mountain bluebird; that were not previously present).[315]

Forest-interior species would experience temporary displacement (during construction activities) and permanent displacement from habitat converted to conventional ski trails, roads, structures, etc. Forest-interior species abundance would be retained to some extent in gladed areas (i.e., some obligate forest-interior species may disappear from more open glades while more facultative forest-interior species would persist, possibly at lower densities, where they are able to "connect" smaller forest patches into an effective territory).[316] Effective habitat for edge and grassland interior species would increase under Alternative 2. Individuals of other wildlife species may also be temporarily displaced to varying degrees during construction activities.

Following ARP effective habitat definitions, Alternative 2 would be consistent with all Forest Plan goals, objectives, standards, and guideline related to effective habitat, with the exception of guidelines 107 and 108. Regarding GL 107, Alternative 2 (Alternative 2 more so than Alternative 3) would fragment and impair effective habitat in the EMR project area with ski trails and lift corridors.[317] As a worst case scenario, these effects would meet the intent of "disconnecting" or "severing" intact areas of effective habitat that this guideline seeks to avoid. Note that the additional negative effects of ski area development on effective habitat under both alternatives would be less recognized outside the ski season when most wildlife are resident and most human activity is absent. Regarding GL 108, Alternative 2 would not be consistent with this guideline, because new conventional ski trails and glades would further reduce designated effective habitat of 20 to 250 acres in size (refer to project file).[318] While the effective habitat

[315] Thompson, 1994b
[316] Ibid.
[317] 107. (GL) Avoid disconnecting or severing with new open roads and trails. Favor seasonal use during non-critical times for wildlife when this cannot be avoided.
[318] 108**.** (GL**)** When developing new open roads and trails, do not reduce contiguous areas of effective habitat to less than 250 acres or further reduce effective habitat of 20 to 250 acres in size, except where access is required by law.

south of Middle Boulder Creek would be reduced under Alternative 2, that polygon, which extends to the west around the SUP area (refer to project file), would not be reduced below the 250 acres threshold specified in this guideline. Regarding GL 109, Alternative 2 would be consistent with this guideline because the percentage of effective habitat (52 percent) for the 8,291-acre Boulder Creeks Geographic Area would be reduced by far less than the 166 acres needed to reach the 50 percent threshold.[319]

Interior Forest

From a Forest Plan perspective, the designated wildlife interior forest polygon overlapping Moose Glades would be affected by further glading proposed under Alternative 2. Designated interior forest would be affected by further glading and, following ARP definitions, additional designated habitat buffering the gladed terrain would also be diminished in value. However, Alternative 2 impacts to wildlife interior forest in the Boulder Creeks Geographic Area would be consistent with Forest Plan direction.

Aspen

Under Alternative 2, 11.0 acres of aspen habitat values would be lost. Alternative 2 effects to this community would be consistent with Forest Plan direction.

Riparian/Wetlands

Alternative 2 would directly impact 0.07 acre of wetland for the construction of the proposed Corona chairlift bottom terminal. The Forest Service would require mitigation for this wetland impact, and the mitigation would likely include purchasing compensatory wetland acreage from a wetland mitigation bank. There would also be temporary impacts to 0.02 acre of wetlands for the installation of utility lines, which would be restored post-construction. Indirect impacts to wetlands through forest overstory removal are expected to impact 1.41 acres of wetlands including 0.11 acre of the Corona fen. Overall, there would be little change to wetland functions and values under Alternative 2.

Under Alternative 2, 0.02 acre of “water” would be affected on private lands, although the values of that habitat would be retained. PDC, incorporating buffers and protections around all riparian areas and wetlands, would minimize direct and indirect negative effects to these habitats. Consequently, riparian and wetlands habitat would be protected or minimally impacted by the proposed project activities.

Alternative 2 effects to this community would be consistent with Forest Plan direction.

Corridors

Forest cover would be fragmented by new conventional ski trails. Other proposed features (e.g., roads, structures, and glades) would not benefit continuously forested corridors, but they would not be at a discernible scale to map.

[319] 109. (GL) Additional open roads and trails should not reduce effective habitat below 50 percent by geographic area, or further reduce effective habitat in geographic areas that are already at or below 50 percent on NFS lands.

In a related issue, project scoping identified the public concern of potential Alternative 2 effects to wildlife movements along Middle Boulder Creek. Creeks, along with their flanking riparian vegetation and floodplain terrace geomorphology, are well known for their ability to conduct wildlife movements within and parallel to the creek's long-axis. Such is the case with Middle Boulder Creek in the vicinity of EMR's proposed SUP boundary adjustment. "Wildlife movements," as considered for this specific issue, may be categorized as aquatic/semi-aquatic (e.g., those of fish and mink in and along the creek per se), terrestrial (e.g., those of big game along the floodplain terrace), and arboreal (e.g., those of birds through the forest canopy). Wildlife move along the creek per se and along both sides of the creek. In the vicinity of the SUP area, habitat on the north side of the creek supports a narrow, continuous forest corridor, separated from a mountain shrub hillside by Highway 130 and the Fourth of July and Hessie Roads. Year-round human activity along those roads impairs wildlife use, particularly during daylight hours. Continuous, largely forested habitat on the south side of the creek is nearly 100 percent effective, mostly buffered from north-side human activities by the high creek flows and lack of bridges (i.e., restricting human access), by the forest cover, and by the noise of the creek. It is likely that most terrestrial and arboreal wildlife movements along Middle Boulder Creek occur on the south side of the creek (i.e., because the habitat is broader and more effective [especially for forest-interior and more reclusive species]).

A final consideration related to the effectiveness of this corridor is where it currently starts and ends. Approximately 0.47 mile down the creek from where the proposed SUP boundary adjustment would most closely approach the creek near the bottom of the proposed Placer chairlift terminal, residential development associated with the Town of Eldora begins. That development, on both sides of the creek, extends 1.32 miles along the creek through Town. At 0.7 mile below the proposed Placer chairlift terminal, the forest corridor narrows and becomes discontinuous. Aquatic and semi-aquatic wildlife movements may be little impaired through Town. Arboreal movements along the creek may be more impaired through town by narrower forested habitat and less continuous forest cover (especially east of the South 6th Street Bridge). Terrestrial wildlife movements along the Middle Boulder Creek corridor would be most negatively affected through Town. Therefore, terrestrial wildlife using the Middle Boulder Creek corridor in the vicinity of EMR's proposed SUP boundary adjustment most likely leave the corridor before entering Town development areas during eastward movements and do not enter the corridor during westward movements until they have cleared Town development areas.

Under Alternative 2, the Placer collector trail (± 70 feet wide, ± 1,800 feet long) would be constructed along the floodplain terrace south of Middle Boulder Creek, in the wildlife movement corridor. The lower ends of four ski trails (P-3 to P-6), the bottom of the Placer chairlift corridor and its base terminal would also be located in the corridor. A short access road and gated bridge across the creek would also be constructed. A band of existing riparian/upland forest would be maintained between the creek and the collector trail. Most forest cover on the south side of the collector trail in the corridor would also be retained.

Wildlife in the Middle Boulder Creek corridor during construction activities would be displaced for varying distances and for varying periods of time, depending on the species affected. Thereafter, most of the corridor function would resume, although it would be impaired from what is currently available by reduced forest cover providing less visual and noise attenuation from existing and ongoing human disturbances north of the creek. Habitat along the south side of the creek would remain physically isolated from the relatively heavy levels of dispersed recreational activity (e.g., vehicles, hiking, biking, skiing, snowshoeing, etc.), limited almost entirely to the north side of the creek. Authorized human use south of the creek during the spring through fall period when most wildlife movements occur in the area would be largely limited to base terminal maintenance activities. A PDC (Table 2-3) has been included in Alternative 2 that would exclude unauthorized human access from using the bridge to cross Middle Boulder Creek and access the otherwise relatively isolated wildlife habitat south of the creek. That PDC would minimize unauthorized access across the creek during the spring through summer period when high creek flow precludes access, although recreationists would still be able to cross the creek by hoping boulders in fall after high summer flows. Current human use of habitat south of the creek is very limited and local as it is much easier and faster to use existing trails to Lost Lake and other points west. In EMR's proposed SUP boundary adjustment, the affected portion of the Middle Boulder Creek corridor would remain more effective than any portion of the corridor associated with spring through fall residential habitation in the Town of Eldora.

Key Winter Range

No key winter range occurs in the project area.

Migratory Birds

A consistency analysis with Forest Plan goals, objectives, standards, and guidelines applicable to Alternative 2 was conducted. PDC (Table 2-3) that are required components of the Proposed Action would minimize negative project effects to the migratory birds considered herein. Alternative 2 would be consistent with all applicable Forest Plan direction related specifically to migratory birds and their habitats.

CPW Endangered, Threatened and Species of Special Concern

None of the CPW endangered, threatened, or species of special concern occur or have potential habitat that would be influenced by the Proposed Action, except the species which are addressed elsewhere in this analysis.

Animal Species of Local Concern

Beaver

Development of the Placer chairlift and terrain south of Middle Boulder Creek would involve tree clearing. There are aspen in areas to be cleared that could represent potential forage. Old stumps in that

area indicated that beavers have cut down aspens in the past, though there is no recent activity. This potential effect would be limited to a single beaver family. It is unlikely that forage is limiting in this territory.

Moose

Primary moose habitat (lakes, marshes, and phreatophytic shrub lands, including willows) would not be directly affected by Alternative 2. However, development would result in the direct loss of forest cover, representing cover and forage opportunities. Moose would be displaced from active construction areas and it may take some time for them to return to those areas and resume using developed ski area terrain as they do now. In addition to the current extent of moose displacement from active ski terrain during the ski season, there will be additional terrain and habitat adjacent to that terrain that moose would likely avoid. Most important would be the floodplain terrace along Middle Boulder Creek under Alternative 2. However, these areas represent a small portion of their overall home ranges. Effects of Alternative 2 would not block or restrict moose movements. There will likely be no discernible difference in moose use of EMR with or without Alternative 2.

Other Mammals

Animals would be temporarily displaced from active construction areas, but would continue using the upgraded ski area in the same ways that they do now, after adapting to the slightly modified distribution of habitats and seasonal recreational ski area activity.

Other Birds

Birds would be temporarily displaced from active construction areas, but would continue using the upgraded ski area in the same ways that they do now. Forest interior species would be negatively affected and may be locally displaced or less common, while edge species would benefit and may locally increase in abundance. All bird species now present within the project area should continue using the upgraded project area. Alternative 2 may have insignificant and discountable effects to potential golden eagle foraging habitat, but would not impact any active or potential golden eagle nesting habitat.

Alternative 3

General Habitat Impacts

Table 3H-15 provides the affected acreages of habitat types and structural stages and whether the habitat values of those affected habitat types would be virtually lost or the majority retained.

Table 3H-15:
Habitat Values Lost or Retained – Alternative 3

Habitat Type, Structural Stage[a]	Habitat Values Lost[b]			Habitat Values Retained[c]			Total
	NFS Lands	Private Lands	All Lands	NFS Lands	Private Lands	All Lands	
Forblands (FOR, 1M)				**1.3**	**0.2**	**1.5**	**1.5**
Grasslands (GRA, 1M)				**7.7**	**4.8**	**12.5**	**12.5**
Barren/Disturbed (NBA)					**10.5**	**10.5**	**10.5**
Aspen Forest (TAA)							**0.5**
3C				0.5		**0.5**	**0.5**
Lodgepole Pine Forest (TLP)			**33.7**			**125.5**	**159.3**
3B	2.1	8.4	**10.5**	0.8	22.0	**22.7**	**33.2**
3C	1.3	13.8	**15.1**	26.4	58.3	**84.7**	**99.8**
4B	7.4	0.7	**8.1**	16.3	1.9	**18.2**	**26.3**
Spruce-fir Forest (TSF)			**25.2**			**167.4**	**192.6**
3A	0.1		**0.1**	13.1		**13.1**	**13.1**
4B	21.2	3.9	**25.1**	144.2	3.0	**147.2**	**172.3**
4C		0.02	**0.02**	4.6	2.6	**7.2**	**7.2**
Water					**0.02**	**0.02**	**0.02**
Total Acres	**32.1**	**26.8**	**58.9**	**214.7**	**103.2**	**317.9**	**376.8**

[a] See project file for RMRIS habitat type and structural stage definitions. Habitat types/structural stages that occur in the project area that are not listed in this table would not be affected by this alternative.
[b] Habitat values lost as a result of Alternative 3 projects involving vegetation clearing, with or without grading (e.g., for conventional ski trails, lift corridors, structures, etc.).
[c] Habitat values largely retained as a result of Alternative 3 projects involving vegetation management of forested stands, glading, and vegetation clearing, with or without grading, affecting non-forested habitats (i.e., existing conventional ski trails [grasslands, forblands] and disturbed/barren).
Source: SE Group and Western Ecosystems, Inc.

Threatened and Endangered Species

Alternative 3 would have "no effect" to GBCT, *Oncorhynchus clarkia stomias*, MSO, *Strix occidentalis*, and PMJM, *Zapus hudsonius* subsp. *preblei*. Alternative 3 is "not likely to jeopardize" North American wolverine, *Gulo gulo Lucius.* Alternative 3 would "likely adversely affect" pallid sturgeon, *Scaphirhynchus albus*, whooping crane, *Grus americana*, piping plover, *Charadrius melodus*, least tern, *Sterna antillarum*, and Canada lynx, *Lynx Canadensis.* Please refer to Table 3H-10 in the discussion of Alternative 3 effects.

South Platte River Species (Pallid Sturgeon, Whooping Crane, Piping Plover, and Least Tern)

The impacts to these species under Alternative 3 would be identical to those under Alternative 2. Please refer to the discussion above.

Greenback Cutthroat Trout

The impacts to this species under Alternative 3 would be identical to those under Alternative 2. Please refer to the discussion above.

Mexican Spotted Owl

The impacts to this species under Alternative 3 would be identical to those under Alternative 2. Please refer to the discussion above.

Preble's Meadow Jumping Mouse

The impacts to this species under Alternative 3 would be identical to those under Alternative 2. Please refer to the discussion above.

North American Wolverine

The impacts to this species under Alternative 3 would be identical to those under Alternative 2. Please refer to the discussion above.

Canada Lynx

With the exception of Objective HU O1 and Guideline HU G10, the direct and indirect effects of Alternative 3 would be consistent with applicable SRLA direction.[320] Existing snow compaction at EMR is described above in Alternative 2. Alternative 3 would increase snow compaction on NFS lands at EMR by 65.6 acres in the Moose and Salto Glades and the Jolly Jug area. While the existing Moose, Salto, and Jolly Jug Glades are currently skied and while there are a few skiers that duck the ropes defining the ski area's administrative boundary and illegally ski outside that terrain, those areas are currently mapped and considered as "uncompacted" lynx habitat. Therefore, Alternative 3 would result in additional snow compaction and it would not be consistent with this guideline. Alternative 3's collective effects on lynx foraging, sheltering, and breeding would exceed the definitions of insignificant and discountable.[321] Therefore, Alternative 3 warrants a "**may affect, likely to adversely affect**" determination for Canada lynx.

Project Area Lynx Habitat

Table 3H-16 shows the acreage of various lynx habitat types (field verified) affected by VMP prescriptions P1 to P8 within the EMR project area.[322] Alternative 3 would involve 381.8 acres of lynx habitat types, mostly (64.7 percent) on NFS lands; however, not all of this habitat would experience a change in lynx habitat value.[323] Acreages in Table 3H-16 only associated with VMP prescriptions P2 and P5 to P8, where lynx habitat type values would not change, include 41.8 acres on NFS lands, 67.6 acres on private lands, and 109.4 acres on all lands. Acreages in Table 3H-16, largely associated with VMP prescriptions P2 and P5 to P8, and including VMP prescriptions P3 and P4, where lynx habitat type values would not change, total 75.8 acres on NFS lands, 96.6 acres on private lands, and 172.5 acres on all lands.

[320] USDA Forest Service, 2008b
[321] USFWS and NMFS, 1998
[322] EMR, 2013
[323] Acreage differences between habitat types (e.g., total acreage involved on all lands, 376.8 acres, Table 3H-21) and lynx habitat types (e.g., total acreage involved on all lands, 381.8 acres, Table 3H-23) is the result of using two databases and the partial overlap of polygons within each data set.

Table 3H-16:
Lynx Habitat Affected by Alternative 3 and VMP Prescriptions P1 to P8

Lynx Habitat Type	NFS Lands	Private Lands	All Lands
Winter Foraging	10.1	19.8	29.9
Denning[a]	185.7	15.7	201.4
Other	40.1	84.4	124.5
Currently Unsuitable	0	0	0
Total Lynx Habitat	235.9	119.9	355.8
Non-habitat	10.7	15.4	26.1
Total	**246.6**	**135.3**	**381.8**

[a] **All denning habitat supports winter foraging values. While this habitat structurally meets denning criteria (Lowry 2002), it is not likely effective**.
Source: Forest Service, SE Group, and Western Ecosystems, Inc.

Table 3H-17 summarizes lynx habitat impacts within the EMR project area. A large portion (45 percent versus 62 percent for Alternative 2; 172.5 acres on all lands) of affected habitats would be associated with VMP projects (designed to improve forest health over time) where the current lynx habitat values would be retained. Approximately 17 percent (63.4 acres on all lands) of affected lynx habitat (versus 19 percent for Alternative 2) would be converted to "non-habitat" for conventional ski related projects. The remaining 38 percent (145.9 acres on all lands; versus 19 percent for Alternative 2) of affected habitat would be degraded from winter foraging and denning habitats to "other" habitat as a result of forest glading. **Note that while denning habitat within the ski area structurally meets denning criteria, it is not likely effective.**[324]

Table 3H-17:
Summary Lynx Habitat Affected by Alternative 3 Project Components

Lynx Habitat Type Effect	NFS Lands	Private Lands	All Lands (%)
CONVERSION TO OTHER HABITAT[A]			
Winter Foraging to Other	3.7	0.0	3.7
Denning to Other[b]	135.5	6.7	142.2
Sum Conversion to Other Habitat	**139.2**	**6.7**	**145.9 (38)**
CONVERSION TO NON-HABITAT[C]			
Winter Foraging to Non-habitat	2.0	4.1	6.0
Denning to Non-habitat[b]	19.3	3.5	22.8
Other to Non-habitat	10.3	24.3	34.6
Sum Conversion to Non-habitat	**31.5**	**31.9**	**63.4 (17)**

[324] Lowry, 2002

Table 3H-17:
Summary Lynx Habitat Affected by Alternative 3 Project Components

Lynx Habitat Type Effect	NFS Lands	Private Lands	All Lands (%)
NO CHANGE TO EXISTING LYNX HABITAT TYPE[D]			
Winter Foraging No Change	4.4	15.7	20.1
Denning No Change[b]	30.9	5.4	36.4
Other No Change	29.8	60.1	89.9
Non-habitat No Change	10.7	15.4	26.1
Sum No Change	**75.8**	**96.6**	**172.5 (45)**
Total	**246.6**	**135.3**	**381.8**

Note: These field verified data consider the forest types, structural stages, relative down coarse woody debris density, and relative live horizontal conifer density within the winter foraging range of snowshoe hares of the lynx habitats present. They do not consider land use, habitat effectiveness, and other factors. See text.
[a] Conversion to other habitat as a result of glading.
[b] All denning habitat supports winter foraging values.
[c] Conversion to non-habitat as a result of conventional ski trails, etc.
[d] No change to existing lynx habitat type due to implementation of VMP projects.
Source: Forest Service, SE Group, and Western Ecosystems, Inc.

Table 3H-18 summarizes impacts to the Boulder LAU.

Table 3H-18:
Changes to Boulder LAU from Alternative 3

Lynx Habitat Type	NFS Lands	Private Lands	All Lands
Winter Foraging	-6	-4	-10
Denning	-155	-10	-165
Other	119	-42	77
Currently Unsuitable	0	0	0
Net Lynx Habitat Affected	**-42**	**-56**	**-98**
Non-habitat	42	32	74
Total Net Lynx Habitat Types Affected	**0**	**-24**	**-24**

Source: Forest Service, SE Group, and Western Ecosystems, Inc.

Boulder LAU Habitat Parameters

Alternative 3 would have negligible effects on overall LAU statistics. The only change in the percent of any lynx habitat type in the LAU would be for denning habitat on NFS lands, which would change from 12 percent to 11 percent. Currently unsuitable habitat would remain at 4 percent. Table 3H-19 updates the Boulder LAU lynx habitat statistics as a result of Alternative 3.

Table 3H-19:
Boulder LAU Statistics from Implementation of Alternative 3

Habitat Description	Acres of Habitat in LAU	% of all Lynx habitat in LAU
Winter Foraging (NFS, not incl. denning)	26,198	34
Denning (NFS)	8,720	11
Other (NFS)	5,990	8
Unsuitable (NFS)	3,120	4
Total Lynx Habitat[a] (NFS)	44,028	57
Non-habitat (NFS)	8,253	11[b]
NFS Acres in LAU	52,281	67.8
Unsuitable (private)	192[c]	0
Private Acres in LAU	24,839	32.2
Total Acres in LAU	**77,120**	**100**[d]

[a] Total lynx habitat = WFH + Denning + Other + Unsuitable.
[b] Non-habitat is a lynx habitat type, but it is not included in lynx habitat.
[c] This acreage is included in the 24,839 private acres, below (i.e., 24,839 private acres = 52,281 NFS acres = 77,120 total acres in the LAU).
[d] Non % of habitat in total LAU.
Source: Forest Service (data provided by B. Baker, Forest Service, July 31, 2013) and Western Ecosystems, Inc.

Construction Activity Effects

The ± ten years of construction activities associated with Alternative 3 would have the same negligible effects on lynx as those described above under Alternative 2.[325]

Secondary Development

Virtually all current employees live in Boulder. The few additional employees associated with the action alternatives are also likely to live in Boulder, outside of lynx habitat. Therefore, there would be no impacts to lynx habitat resulting from additional employees associated with this alternative.

Traffic Generation

Traffic generation on Highway 119 is presented in Chapter 3 Section B – Traffic, Parking and Air Quality. No section of the highway used to access EMR bisects Forest Service-designated lynx habitat or a designated lynx linkage.[326] Therefore, it is unlikely that lynx would attempt crossings of Highway 119 in mid- to upper Boulder Canyon where they would be vulnerable to increased highway mortality probabilities resulting from additional, Alternative 2-related guests and employees. There have been no known lynx home ranges in the action area and it is unlikely that there would be any overlapping Boulder Canyon such that additional Alternative 2-related traffic would reduce the efficacy of a lynx home range overlapping or occurring adjacent to the Highway 119 corridor. The resulting effects of additional Alternative 2-related traffic on regional highways should have no measurable or meaningful effect on lynx population growth within the Southern Rockies Lynx Population.

[325] US Fish and Wildlife Service and National Marine Fisheries Service, 1998
[326] Ruediger et al., 2000; Alexander et al., 2005

Dispersed Recreation Effects

Implementation of Alternative 3 project components is not expected to result in any increased skier use of undeveloped habitat blocks outside of what would become the dissected portion of the ski area that could have further adverse effects on the lynx prey base, lynx DSH, habitat connectivity, or lynx home range efficacy for the same reasons presented under Alternative 2.

Region 2 Sensitive Animal Species

Determinations to R2 sensitive species are presented in the BE in the project file, and impacts are disclosed under individual species headings for those species with potential to occur.

Molluscs

Rocky Mountain Capshell Snail

Impact zones associated with Alternative 3 would not extend to occupied or potential habitat. Therefore, Alternative 3, including the implementation of PDC, would have no impact on the Rocky Mountain capshell snail and it is dropped from further consideration herein.

Insects

Hudsonian Emerald

There would be no ground disturbing or water use activities to the water bodies or peripheral wetland habitats as a result of Alternative 3 that could negatively affect this species or its habitat. Alternative 3, including the implementation of PDC, would have no impact on the Hudsonian emerald and it is dropped from further consideration herein.

Amphibians/Reptiles

Boreal Western Toad

No known or potential breeding habitat occurs in project disturbance areas. A comprehensive list of PDC have been developed that would minimize and mitigate negative project-related water quality and hydrology effects (Table 2-3). With the effective implementation of those measures, Alternative 3 should have no negative effects to this species or its potential habitat. While the likelihood and levels of sediment that could potentially find their way to Middle Boulder Creek are considered low and the likelihood of boreal toad occurrence downstream is also low, it is possible that toad egg survival could be impaired if eggs were covered by sediment. In addition, forest cover facilitates post-breeding toad movements. Tree removal associated with Alternative 3 would incrementally reduce habitat connectivity for any toads attempting to move across a section of conventional ski trail (also in the event a local population was present, now or in the future). It is also possible, though unlikely (because there are no known, extant, toad populations within the dispersing distance of the EMR project area), that toads dispersing into Alternative 3 development area could be killed by construction (a direct effect) and maintenance vehicles (an indirect effect) and by construction activity (a direct effect). With the exception of the above potential effects, there are no effects associated with Alternative 3 that would affect this species. The Alternative 3

impact areas, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the ARP.

Under Alternative 3, there would be no change in the timing or the extent of water level fluctuations that now occur in the water bodies associated with EMR's snowmaking operations. The 3 acre feet of additional Jenny Creek diversions would occur overwinter when toads are hibernating and would not affect any potential, but unoccupied toad breeding habitats. With the potential exception of some beneficial, increased groundwater recharge out of a small portion of the Jolly Jug pod (i.e., into Jenny Creek meadows as a result of tree removal for conventional ski trail development and glading; greater under Alternative 3), the small, historic beaver ponds and kettle ponds within the ski area would be largely unaffected by Alternative 3.

Northern Leopard Frog

There are no known, extant breeding sites within the project area or close enough to potential disturbance areas such that leopard frogs dispersing from those sites could be affected by Alternative 3. A comprehensive list of PDC have been developed that would minimize and mitigate negative project-related water quality and hydrology effects (Table 2-3). With the effective implementation of those measures, Alternative 3 should have no negative effects to this species or its potential habitat. The Alternative 3 impact areas, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the ARP.

Birds

Northern Goshawk

Alternative 3 would affect goshawks by removing or thinning forest cover on NFS and private lands within the EMR project area that supports potential prey species (e.g., snowshoe hares, red squirrel, and birds). Based on goshawk habitat associations, Alternative 3 would affect 352.4 acres of potential goshawk habitat (on NFS and private lands).[327] Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 58.9 acres of potential goshawk habitat (on all lands). Alternative 3 would fragment and remove foraging and potential nesting habitat values outside the existing ski area development boundary (i.e., in the Jolly Jug pod, almost entirely on private lands) and result in more widespread glading within the existing SUP area boundary, largely on NFS lands. Tree thinning (i.e., for glading) would have less effect on foraging habitat (i.e., the majority of foraging values may be retained and hunting facilitated by a more open canopy) than total tree removal for conventional ski trail development. No goshawk nests or verified nesting habitat associated with a known nesting block would be affected under Alternative 3. Any goshawks present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities

[327] Rhea et al., 2006

are complete. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the APR.

American Peregrine Falcon

Under Alternative 3, the loss of forest cover associated with subalpine ski trail development should have no realized potentially beneficial effect because of how far the active eyries are to the project area and the superior hunting areas much closer to those eyries. However, because small areas of currently effective, potential foraging habitat would also be lost to the parking lot expansion, additional spur roads, ski chairlift terminals, new and expanded on-mountain facilities under Alternative 3, overall potential effects would not be entirely beneficial. Peregrines are not particularly bothered by humans per se, so the limited amount of increased summer maintenance activity along the chairlift and access road corridors should have little negative effect on the availability of the local prey base.[328] Cables associated with new chairlifts would not represent a meaningful collision hazard. The implementation of PDC should have no effect on peregrine habitat use. Indirect effects associated with this project would have no impacts on peregrine falcons.

Bald Eagle

Based upon the lack of bald eagle use in the vicinity of the EMR project area, Alternative 3 should have no impact on the bald eagle.

White-tailed Ptarmigan

Ptarmigan use of the project area and adjacent habitats for summer and breeding uses would be unaffected by Alternative 3. There would no physical loss of winter foraging habitat. Implementation of PDC should have no effect on ptarmigan. Indirect effects associated with this project would have no impacts on this species or potential habitat.

Flammulated Owl

Alternative 3 could result in the loss of forested habitat representing potential migratory habitat and secondary nesting habitat. Two PDC (Table 2-3) have been developed that would minimize snag removal and avoid or minimize construction season nest losses; however, impacts could occur to undetected nests.

Boreal Owl

Alternative 3 could affect boreal owls by removing or thinning linear forest strips, representing year-round foraging habitat and, to a lesser extent, potential, but presently unoccupied, nesting habitat, scattered throughout one or more potential owl home ranges. Alternative 3 would affect 205.8 acres of potential boreal owl habitat (NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 33.2 acres of potential boreal owl habitat (on

[328] Craig, 2007

all lands). Two PDC (Table 2-3) have been developed that would minimize snag removal and avoid or minimize construction season nest losses; however, impacts could occur to undetected nests. Boreal owls may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts should be limited to impacts to undetected nests and the loss of foraging habitat. These project effects to potential foraging and nesting habitat would occur within the relatively large (5.4 to 6.1 square miles), potential home range of a pair of boreal owls.[329] Loss or reduction of forest-interior prey result from habitat impacts may be partially offset during the snow free season by substantial increases in deer mice on newly created ski trails. Potential nesting habitat lost, largely associated with mature, closed canopy spruce-fir stands, would total up to 25.2 acres under Alternative 3. The Alternative 3 impact area, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the ARP.

While the acreage of total forest canopy lost (i.e., for conventional ski trails) would be lower under Alternative 3 versus Alternative 2, Alternative 3 would fragment a larger area of higher quality potential foraging and nesting habitat associated with additional glading of terrain within the existing ski area, most of which is currently skied. Additional skiing activity, per se, should have no negative effects on owls. Tree thinning (i.e., for glading) should have less effect than conventional ski trails on foraging habitat (i.e., the majority of foraging values may be retained) if snow compaction does not become great enough that it limits subnivian small mammal (primary boreal owl prey) access to the surface. The abundance of some prey species (small mammals and birds) may decline in an area larger than the area of tree removal as a result of tree removal/thinning, snow compaction, forest fragmentation effects, and tree skiing. Tree thinning (i.e., for glading) should also have less effect than conventional ski trails on nesting habitat (i.e., the majority of suitable mature trees suitable for nest cavities would be retained). If nest trees associated with active territories occur within impact areas during the construction season, direct mortality of eggs and/or nestlings should be avoided by conducting tree removal outside the May 21 to July 15 nesting period when eggs/young are present.[330] This and additional PDC have been developed to avoid or minimize nesting impacts to this species. Implementation of other PDC should have no effect on the boreal owl. Given this species' primarily nocturnal habitat use, cavity nesting habit, ability to use the types of intertrail islands that would remain within and outside the developed ski area, and tolerance to human disturbance, it is likely that the forested ski terrain would continue to support boreal owls, including possible future nesting. Indirect effects associated with this project and limited to increases in dispersed recreation extending into boreal owl habitat would have no impact on this species.

Olive-sided Flycatcher

Alternative 3 would affect olive-sided flycatchers by removing linear forest strips, portions of which represent summer nesting and foraging habitat, scattered throughout the home ranges of at least several pairs of birds. Based on potential olive-sided flycatcher habitat associations, Alternative 3 would affect

[329] Palmer, 1984
[330] Kingery et al., 1998

205.8 acres of potential olive-sided flycatcher habitat (on NFS and private lands).[331] Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 33.2 acres of potential olive-sided flycatcher habitat (on all lands). These project effects to potential foraging habitat would occur within the large (5.4 to 6.1 square miles), potential home range of several pairs of olive-sided flycatchers.[332] A PDC (Table 2-3) has been developed that would avoid or minimize construction season nest losses; however, direct effects could occur to undetected nests. Olive-sided flycatchers may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts should be limited to impacts to undetected nests and the loss of foraging habitat. The Alternative 3 impact area, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the ARP.

Slightly less habitat loss would occur under Alternative 3 compared to Alternative 2. Tree removal could be partly beneficial from a long-term, foraging habitat, perspective if forest openings could be revegetated or succeed to support a higher prey base than that currently present and available. That result does not always occur with conventional ski trail development. However, it is more likely to result with the type of flush cutting and tree removal being proposed. Conversely, existing, non-forested, foraging habitat (e.g., grasslands, meadows, and ski trails supporting the flying insect prey base of this species) adjacent to forest stands could also be negatively affected (over short- to moderate-terms) by ski trails, roads, and other impacts. If nest trees associated with active territories occur within impact areas during the construction season, direct mortality of current year recruitment should be avoided by conducting tree removal outside the June 1 and July 15 nesting period when eggs/young are present.[333] Implementation of other PDC should have no effect on olive-sided flycatchers. While Alternative 3 would reduce the amount of foraging and nesting habitat within the existing and expanded SUP area, the ski area would continue to support these flycatchers (as influenced by the MPB epidemic). Habitat effectiveness may decline in an area larger than the area of tree removal as a result of forest fragmentation effects, snag removal, and subsequent ski trail forage effectiveness. Indirect effects associated with this project, limited to increases in dispersed recreation extending into olive-sided flycatcher habitat, would have no impacts on this species.

Brewer's Sparrow

Alternative 3 would not likely have any meaningful effect on Brewer's sparrows or their potential, apparently unoccupied, habitat associated with the krummholz-like community at the top of Salto Glades (the only secondary habitat present in the project area). Under Alternative 3, that habitat patch could be affected by VMP P4 (New Tree and Gladed Skiing Area Construction), which would also not likely be

[331] Including 4B lodgepole stands and 4A, 4B, and 4C spruce-fir stands.
[332] Palmer, 1984
[333] Kingery et al., 1998

implemented in this area because the existing terrain is already so open and skiable. However, in the event that one or more trees were cut (e.g., for a new "shot"), potential habitat could be negatively affected. Brewer's sparrows, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts could include the loss of potential, secondary foraging habitat and the potential loss of active nests during construction activities. The Alternative 3 impact area, including areas affected by PDC, represent an insignificant proportion of the total potential range and habitat available to this species on the ARP.

Mammals

Pygmy Shrew

Alternative 3 could impact individual pygmy shrews through direct, construction-related mortality and/or loss or degradation of potential habitat. Alternative 3 would affect 376.8 acres, on all lands to some extent. Alternative 3 would result in the conversion of 58.9 acres, respectively, on all lands, though not necessarily the loss or degradation of habitat since this species inhabits such a wide range of habitats. Loss of forest-interior prey may be partially offset during the snowfree season by substantial increases in deer mice (potential prey) on newly created ski trails. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. The probability that this species would be present in those potentially suitable habitats proposed for disturbance, when it has not been detected (recognizing that the species is difficult to detect) on the ARP or in Boulder County, is unknown, but unlikely. Indirect effects associated with this project, limited to increases in dispersed recreation extending into potential pygmy shrew habitat, would have no impact on this species.[334] A substantial acreage of potential habitat for this species would persist in this analysis area.

Fringed Myotis

While the project area is above the maximum elevational range of this species, outside of the local known range of this species, and does not support the primary habitat that this species is associated with, mature conifer stands in the project area are considered to represent potential habitat for this species.[335] Alternative 3 could affect fringed myotis by removing or thinning forest representing summer day roosts and maternity sites possibly involving dozens of individuals. No buildings or underground mines representing potential hibernacula would be affected. Alternative 3 would affect 205.8 acres of mature forest (NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. Foraging habitat may be improved by the increase in herbaceous and shrub vegetation that typically occurs after forest stands are opened up to more sunlight (i.e., as a result of MPB management and glading), which may increase prey abundance. Treatment might (i.e., depending upon the level of MPB effects and subsequent treatments) also maintain or restore more open forest conditions that are more conducive to fringed myotis foraging. Substantial numbers of large snags may be removed

[334] Fitzgerald et al., 2011
[335] Including 4A-C lodgepole stands and 4A-C spruce-fir stands.

with high levels of beetle-induced lodgepole mortality, although the implementation of a snag-retaining PDC (Table 2-3) would reduce this negative effect. It is likely that adequate snag density would remain in the project area's lodgepole zone and would not limit potential fringed myotis use.

Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 33.2 acres of potential fringed myotis habitat (on all lands). These project effects to potential foraging and nesting habitat would occur within the relatively large potential home range of up to dozens of individuals. Fringed myotis, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts should be limited to the loss of foraging and roosting habitat. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. Indirect effects associated with this project and limited to increases in dispersed recreation extending into fringed myotis habitat would have no impact on this species. Fringed myotis, if present now, would persist in this analysis area.

Hoary Bat

Alternative 3 could affect hoary bats by removing or thinning forest representing summer habitat possibly involving dozens of individuals. Alternative 3 would affect 352.4 acres of forest (NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. Foraging habitat may be improved by the increase in herbaceous and shrub vegetation that typically occurs after forest stands are opened up to more sunlight (i.e., as a result of MPB management and glading), which may increase prey abundance. Treatments might (i.e., depending upon the level of MPB effects and subsequent treatments) also maintain or restore more open forest conditions that are more conducive to fringed myotis foraging. Substantial numbers of large snags may be removed with high levels of beetle-induced lodgepole mortality, although the implementation of a snag-retaining PDC (Table 2-3) would reduce this negative effect. It is likely that adequate snag density would remain in the project area's lodgepole zone and would not limit potential hoary bat use.

Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 58.9 acres of potential hoary bat habitat (on all lands). These project effects to potential foraging and roosting habitat would occur within the relatively large potential home range of up to dozens of individuals. Hoary bats, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts should be limited to the loss of foraging and roosting habitat. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. Indirect effects associated with this project and limited to increases in dispersed recreation extending into hoary bat habitat would have no impact on this species. Hoary bats, if present now, would persist in this analysis area.

Townsend's Big-eared Bat

Alternative 3 could affect Townsend's big-eared bats by removing or thinning forest representing suboptimal (because of their distance from water), summer foraging habitat possibly involving dozens of individuals.[336] Alternative 3 would affect 352.4 acres of forest (NFS and private lands). Most of those affected acreages would be associated with the VMP prescriptions that could have a long-term positive effect on foraging habitat due to maintaining and restoring more open forest conditions. Foraging habitat may be improved by the increase in herbaceous and shrub vegetation that typically occurs after forest stands are opened up to more sunlight (i.e., as a result of MPB management and glading), which may increase prey abundance. Treatments might (i.e., depending upon the level of MPB effects and subsequent treatments) also maintain or restore more open forest conditions that are more conducive to fringed myotis foraging.

Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 58.9 acres of potential Townsend's big-eared bat habitat (on all lands). Conventional ski trails and glades could enhance foraging opportunities by creating openings and edge habitat in what currently is dense single-story forest stands, provided ski trail reclamation results in vegetative communities that support the relatively large prey of this species. These project effects to potential foraging habitat would occur within the relatively large potential home range of up to dozens of individuals. Townsend's big-eared bats, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts would be limited to the loss of foraging and roosting habitat. No known roost sites (structures) or hibernacula would be affected. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. Indirect effects associated with this project and limited to increases in dispersed recreation extending into hoary bat habitat would have no impact on this species. Townsend's big-eared bats, if present now, would persist in this analysis area.

American Marten

Alternative 3 would affect martens by removing and thinning linear forest strips representing foraging habitat and possible denning habitat, likely extending into portions of several individuals' home ranges. Alternative 3 would affect 205.8 acres of mature forest representing at least potential marten habitat (NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions.

Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 33.2 acres of potential marten habitat (on all lands). Marten may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Two PDC (Table 2-3) have been developed that would minimize snag removal and avoid or minimize construction season den losses. Direct impacts should be limited to impacts to undetected dens and the

[336] Fitzgerald et al., 1994

loss of foraging habitat. Indirect effects associated with this project and limited to increases in dispersed recreation extending into fringed myotis habitat would have no impact on this species. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP.

While the acreage of forest canopy removal would be slightly lower under Alternative 2 versus Alternative 3, the Proposed Action would fragment a relatively large, intact block of high quality foraging and potential denning habitat (i.e., the Placer chairlift and terrain) versus the suboptimal lodgepole stands in the expanded Jolly Jug pod that would be affected under Alternative 3. However, Alternative 3 would fragment a larger area of higher quality potential foraging and denning habitat associated with additional glading of terrain within the existing ski area, most of which is currently skied. No known marten dens are present within disturbance areas; however marten dens are virtually impossible to locate without the use of radio-collared animals. Young-of-the-year would be vulnerable to den tree removal that occurred between approximately March 1 and June 15.[337] Because denning selection, if not denning per se, generally begins before the ski season has ended, marten may not select den sites within areas currently used for tree skiing, although such diurnal skiing when martens are asleep in arboreal and subnivian dens probably has little influence. Habitat conversion/treatment disturbances to active dens would be avoided or minimized with the implementation of PDC (Table 2-3). Implementation of other PDC should have no impact on martens.

Marten habitat effectiveness may decline in an area larger than the area of tree removal as a result of fragmentation effects and tree skiing. The effects of tree skiing intertrail islands on the local forest prey base are unclear, but are unlikely to be beneficial. Tree thinning (for glading) would have less impact on foraging habitat (i.e., the majority of foraging values may be retained) than total tree removal for conventional ski trail development. Loss of forest-interior prey would be partially offset during the snowfree season by substantial increases in deer mice on newly created ski trails. Within the existing SUP area, marten habitat would be further fragmented by additional ski trails, restricting (but not blocking) marten movements, and habitat effectiveness similar to that now experienced by martens on the existing ski area. However, marten would persist in this analysis area.

Indirect effects associated with this project are generally limited to increases in dispersed recreation extending into marten habitat and would have no impact on this species. Individual marten that may be affected by the EMR project do not have home ranges that extend to the regional highways used to access the resort where increased, resort-related traffic volumes might increase road-kill probabilities.

River Otter

A comprehensive list of PDC have been developed that would minimize and mitigate negative project-related water quality and hydrology effects (Table 2-3). With the effective implementation of those

[337] Ibid.

measures, Alternative 3 should have no negative effects to this species or its potential habitat. With the implementation of standard BMPs incorporated into these alternatives as PDC, no sediments originating in temporary construction areas are likely to extend to Middle Boulder Creek, on NFS lands, or to Jenny Creek, on private lands. Such sedimentation could negatively affect trout recruitment and temporarily affect the forage availability of any transient otters that might be present. Under Alternative 3, there would be no change in the timing or the extent of water level fluctuations that now occur in the water bodies associated with EMR's snowmaking operations. The 3 acre feet of additional Jenny Creek diversions would occur overwinter when otters would not be present in such headwater streams. In addition to some beneficial increased groundwater recharge out of a small portion of the Jolly Jug pod (i.e., into Jenny Creek meadows) as a result of tree removal for conventional ski trail development and glading and snowmaking; greater under Alternative 3), the Jenny Creek diversions would be augmented by compensatory releases into South Boulder Creek, representing potential year-round habitat. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. Indirect effects associated with this project, limited to increases in dispersed recreation extending into potential, but unoccupied otter habitat, and discountable increased road-kill probabilities, would have no impact meaningful on this species.

Management Indicator Species

Alternative 3 is not expected to influence population trends locally or on the Planning Area for the MIS discussed below.

Greenback Cutthroat, Brook, and Brown Trout

For the reasons described above for genetically pure GBCT, Alternative 3 would have no effect on that threatened species. Potential Alternative 3 project effects on these three MIS trout species (including greenback trout hybrids) could have minor, negative, short-term (from the start of construction until revegetation programs are deemed successful, about three years) effects as a result of sedimentation extending to occupied reaches of Middle Boulder Creek (more likely under Alternative 2). The greatest risk of additional sediment reaching Middle Boulder Creek would be during development of the Placer chairlift and terrain, particularly with respect to activities involving grading near Middle Boulder Creek and its tributaries. Erosion and sedimentation affecting water quality could also result from tree removal in and above the Placer chairlift and terrain, the application of additional snowmaking water on watersheds draining the project area, channel destabilization, etc. Erosion and sedimentation could affect trout spawning (particularly fall spawning species) and aquatic habitat quality (e.g., aquatic macroinvertebrate communities) before revegetation treatments become effective. Removal of trees within the WIZ would occur for the most part more than 50 feet away from the stream bank (with the exception of the proposed bridge to the Placer chairlift's bottom terminal). Thus, the impact to functional riparian habitat and large woody debris recruitment should be minimal. However, these and other potential effects would be avoided or minimized with the effective implementation of PDC (Table 2-3). Such potential impacts would not be of a magnitude that would have a "negative influence" on the

populations, habitats, or ability of these three MIS trout species to persist on the ARP. Alternative 2 could have greater negative effects on Middle Boulder Creek trout because of greater and closer forest clearing on slopes above and approaching Middle Boulder Creek. Alternative 3 could have greater negative effects on Jenny Creek trout because of greater and closer forest clearing to that creek. There are no indirect effects associated with Alternative 3 that would affect these species. Alternative 3 would be consistent with the Executive Orders 12962 and 13474 prohibiting Federal Actions from significantly affecting a recreational fishery.[338]

Boreal Toad

Boreal toads are analyzed above as a R2 sensitive species. Please refer to that discussion.

Hairy Woodpecker

Alternative 3 would affect hairy woodpeckers by removing or thinning forest cover on NFS and private lands within the EMR project area that supports occupied foraging and nesting habitat for an estimated ± 6 to 8 pairs of birds. Based on potential hairy woodpecker habitat associations, most of those affected acreages would be associated with the largely beneficial VMP prescriptions.[339] However, Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 58.9 acres of potential hairy woodpecker habitat (on all lands). Hairy woodpeckers may be temporarily displaced by construction season project activities, but are expected to return to suitable habitats once activities are complete. Direct impacts include the loss of potential, secondary foraging habitat and the potential loss of active nest trees during tree removal. A PDC (Table 2-3) has been developed that would minimize snag removal, representing potential foraging and nesting habitat. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. Alternative 3 would have local, negative (tree removal) and positive (implementation of forest health-related prescriptions), permanent effects on hairy woodpeckers, but these potential impacts would not be of a magnitude that would have a “negative influence” on their populations, habitats, or ability to persist on the ARP. There are no indirect effects associated with Alternative 3 that would affect this species.

Pygmy Nuthatch

Alternative 3 could affect pygmy nuthatches by removing or thinning forest cover on NFS and private lands within the EMR project area that supports potential, secondary, foraging and nesting habitat. Alternative 3 would affect 352.4 acres of potential, secondary, habitat (on NFS and private lands). Most of those affected acreages would be associated with the largely beneficial VMP prescriptions. However, Alternative 3 would result in the conversion (i.e., the permanent loss of most existing habitat values) of 58.9 acres of potential, secondary, habitat (on all lands). Pygmy nuthatches, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable

[338] Federal Register, 1995 and 2008
[339] All affected aspen, lodgepole, and spruce-fir structural stages.

habitat once activities are complete. Direct impacts include the loss of potential, secondary foraging habitat and the potential loss of active nest trees during tree removal. A PDC (Table 2-3) has been developed that would minimize snag removal, representing potential foraging and nesting habitat. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. Alternative 3 would have local, negative (tree removal) and positive (implementation of forest health-related prescriptions), permanent effects on potential, secondary, pygmy nuthatch habitat, but these potential impacts would not be of a magnitude that would have a "negative influence" on their populations, habitats, or ability to persist on the ARP. There are no indirect effects associated with Alternative 3 that would affect this species.

Warbling Vireo

Alternative 3 would have no influence on warbling vireos.

Mountain Bluebird

Alternative 3 would have positive and negative effects on mountain bluebirds. The development of new conventional ski trails would create additional foraging habitat whose quality would depend upon that of the ski trail vegetative communities (which would be facilitated by proposed trail construction techniques, specifically flush-cutting). New trails would also expose new flanking nesting habitat. While it is EMR's policy to remove snags along ski trails for safety issues, enough snags persist to provide some level of effective nesting habitat. Tree removal for tree skiing and glade skiing would not likely affect bluebirds because those areas would continue to provide forest interior habitat that this species does not use. Trail development might also negatively affect nesting habitat if there are any nest cavities (active or otherwise) or snags (potential nesting habitat) along ski trail edges where new ski trails would enter/exist forest stands. Mountain bluebirds, if present, may be temporarily displaced by construction season project activities, but would be expected to return to suitable habitat once activities are complete. Direct impacts include the temporary loss and short-to long-term gain of foraging habitat (net positive) and the gain/loss of nesting habitat (net positive) due to conventional trail development. A PDC (Table 2-3) has been developed that would minimize snag removal, representing potential nesting habitat. The Alternative 3 impact area, including areas affected by PDC, represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. Alternative 3 would have local, negative (tree removal) and positive (implementation of forest health-related prescriptions), permanent effects on potential, secondary, pygmy nuthatch habitat, but these potential impacts would not be of a magnitude that would have a "negative influence" on their populations, habitats, or ability to persist on the ARP. There are no indirect effects associated with Alternative 3 that would affect this species.

Golden-crowned Kinglet

Alternative 3 would result in the loss of habitat values in 25.1 acres of closed-canopy spruce fir forest, 21.2 and 3.9 acres on NFS and private lands, respectively. Alternative 3 could have minor to moderate, negative, permanent effects on golden-crowned kinglet foraging and nesting habitat. The Alternative 3

impact area represents an insignificant proportion of the total potential range and habitat available to this species on the ARP. These potential impacts would not be of a magnitude that would have a "negative influence" on golden-crowned kinglet populations, habitats, or ability to persist on the ARP. There are no indirect effects associated with Alternative 3 that would affect this species. No additional mitigation is recommended to minimize anticipated project effects on this species.

Wilson's Warbler

Alternative 3 could result in the loss of nesting and foraging values locally in project component areas. However, because no primary habitat that this species is associated with would be impacted (or was large enough to delineate), this potential impact cannot be quantified. Alternative 3 could have small, permanent effects on Wilson's warbler foraging and nesting habitat, however the potential impact areas represent an insignificant proportion of the total potential range and habitat available to this species on the ARP. These potential impacts would not be of a magnitude that would have a "negative influence" on the species' populations, habitats, or ability to persist on the ARP. There are no indirect effects associated with Alternative 3 that would affect this species. No additional mitigation is recommended to minimize anticipated project effects on this species.

Elk and Mule Deer

Alternative 3 would result in the loss of habitat values totaling 58.9 acres, 32.1 and 26.8 acres on NFS and private lands, respectively. Alternative 3 would have minor to moderate, negative, permanent effects on elk and mule deer spring through fall habitats. Habitat conversion to conventional ski trails and glades would affect moderately large, non-isolated, habitat blocks contiguous with existing developed ski terrain that are lightly to moderately influenced by human activities during spring through fall, when elk and mule deer are present using the area as transitional range (spring and fall), fawning (documented on the existing ski area), calving (not documented on the existing ski area, but possible), fawn/calf-rearing, and summer range. Habitat effectiveness of these seasonal ranges would also be reduced by habitat fragmentation and low levels of human activities (summer maintenance and dispersed recreation) in a larger area surrounding the habitat conversion. Construction activity displacement effects would persist for years (longer for elk than deer) and while full recovery cannot be assumed, it is possible that elk use could largely return to former levels after about seven years, as long as human use remains near current environmental baseline levels.[340] Otherwise, most current elk use would be lost during and after intervals of human activity. Elk and deer may benefit from increased forage availability on new conventional ski trails, as long as they are not displaced by human activity, although summer forage availability is not a limiting factor. Assuming full habitat occupancy at present, temporarily or permanently displaced elk would compete with their cohorts in local herds for the reduced effectiveness of spring through summer habitats. Alternative 3 effects would not affect elk or mule deer winter range availability and use or measurably increase road-kill on highways serving EMR.

[340] Morrison et al., 1995

Alternative 3 is not expected to generate any secondary development from additional residents or employees that would result in negative effects to elk or mule deer habitat or increased road-kill. Neither alternative proposes development that would increase the amount or extent of dispersed recreation effects on these two species.

While EMR's Alternative 3 traffic contributions to Highway 119 during the ski season would be additive to traffic volumes within the range of those documented to impair wildlife movements and pose more serious threats to mortality and habitat fragmentation, no section of Highway 119 used by the vast majority of EMR guests bisects NDIS-designated highway crossings.[341]

The Alternative 3 impact area represents an insignificant proportion of the total potential range and habitat available to these species on the ARP. These potential impacts would not be of a magnitude that would have a "negative influence" on their populations, habitats, or ability to persist on the ARP. The CPW will continue managing and monitoring the elk and mule deer populations across the ARP.

Other Habitats

Old Growth and Late Successional Forest

New conventional ski trail development would eliminate affected late successional stands that would otherwise progress toward old growth. Late successional stands thinned and perforated to facilitate tree skiing, would largely retain their late successional values and may progress toward old growth, though they may never achieve old growth communities, in part because of ski terrain development effects. Buffers of unaffected late successional stands contiguous with new ski trails and gladed areas would progress toward old growth, but may also not achieve old growth communities, in part because of ski terrain development effects, including increased tree skiing and spatial stand considerations.[342] Late successional stands affected by VMP prescriptions P6, P7, and P8 should largely retain their late successional values and progress toward old growth, particularly if prescription treatments are implemented timely after pathogens are identified that would otherwise affect larger areas of these stands.

Therefore, while portions of the EMR project area may have old growth characteristics warranting their classification as developing old growth areas, Alternative 3 would be consistent with all Forest Plan goals, objectives, standards, and guideline related to old-growth, with the exception of guideline 120.[343] Regarding GL 120, not accounting for the results of site specific surveys assessing old growth in the EMR project area and considering only ARP old growth mapping, Alternative 3 would not be consistent with this guideline, because new conventional ski trails would not maintain or increase habitat

[341] Stevens et al., 1996; Clevenger et al., 2002; Alexander et al., 2004, 2005; Ruediger et al., 2000
[342] Mehl (1992) requires that old growth stands not only contain certain characteristics, but also be ≥ 5 acres in size. Late successional stands affected by new ski terrain development may reduce eventual old growth stand below that size threshold.
[343] USDA Forest Service, 1997a

effectiveness within ARP-designated old growth development area (the entire EMR SUP area) or ARP-designated old growth inventory (refer to project file for mapping and inventory).[344] The acreage of affected, designated, old growth habitats would be similar between alternatives, with greater impacts under Alternative 2 to high-elevation old growth development habitat south of Middle Boulder Creek, and greater impacts under Alternative 3 to high-elevation old growth development habitat and old growth inventory in Salto, Moose, and Bryan Glades II.

Effective Habitat

From an ARP mapping perspective, effective habitat would be reduced by the expansion of developed terrain footprints and by fragmentation of some of the larger remaining habitat blocks within existing developed terrain. However, expanding on ARP definitions of effective habitat, even disturbed areas can provide effective habitat and effective habitat depends on what species are considered. Based on habitat and wildlife surveys, much of the EMR project area, especially the larger intertrail islands within developed ski terrain, continues to support effective wildlife habitat for the majority of species seasonally present. Outside the ski season, little human activity is present when most wildlife are resident or moving through the ski area. Even elk persist within developed ski terrain as they drift through during spring movements to higher elevation summer ranges. For most of the wildlife species with relatively small home ranges, even moderately-sized intertrail islands provide adequate habitat blocks, either by themselves or via use of multiple contiguous blocks. While forest fragmentation from conventional ski trail development has adversely affected forest-interior species, it has benefitted edge (e.g., American robin) and grassland interior species (e.g., mountain bluebird) that were not previously present.[345]

Forest-interior species would experience temporary displacement (during construction activities) and permanent displacement from habitat converted to conventional ski trails, roads, structures, etc. Forest-interior species abundance would be retained to some extent in gladed areas (i.e., some obligate forest-interior species may disappear from more open glades while more facultative forest-interior species would persist, possibly at lower densities, where they are able to “connect” smaller forest patches into an effective territory).[346] Effective habitat for edge and grassland interior species would increase under Alternative 3. Individuals of other wildlife species may also be temporarily displaced to varying degrees during construction activities.

Following ARP effective habitat definitions, Alternative 3 would be consistent with all Forest Plan goals, objectives, standards, and guideline related to effective habitat, with the exception of guidelines 107 and 108. Regarding GL 107, Alternative 3 (Alternative less so than Alternative 2) would fragment and impair

[344] 120**.** (GL) Maintain or increase habitat effectiveness within identified old growth areas and all old growth sites that are not planned for harvest. Thompson unpublished data; Buell, 2013; Orthner, 2013
[345] Thompson, 1994b
[346] Ibid.

effective habitat in the EMR project area with ski trails and lift corridors.[347] As a worst case scenario, these effects would meet the intent of "disconnecting" or "severing" intact areas of effective habitat that this guideline seeks to avoid. Note that the additional negative effects of ski area development on effective habitat under both alternatives would be less recognized outside the ski season when most wildlife are resident and most human activity is absent. Regarding GL 108, Alternative 3 would not be consistent with this guideline, because new conventional ski trails and glades would further reduce designated effective habitat of 20 to 250 acres in size (refer to the project file).[348] Regarding GL 109, Alternative 3 would be consistent with this guideline because the percentage of effective habitat (52 percent) for the 8,291-acre Boulder Creeks Geographic Area would be reduced by far less than the 166 acres needed to reach the 50 percent threshold.[349]

Interior Forest

From a Forest Plan perspective, the designated wildlife interior forest polygon overlapping Moose Glades would be affected by further glading proposed under Alternative 3. Designated interior forest would be affected by further glading and, following ARP definitions, additional designated habitat buffering the gladed terrain would also be diminished in value. However, Alternative 3 impacts to wildlife interior forest in the Boulder Creeks Geographic Area would be consistent with Forest Plan direction.

Aspen

Under Alternative 3, no acres of aspen habitat values would be lost. Alternative 3 effects to this community would be consistent with Forest Plan direction.

Riparian/Wetlands

Alternative 3 would directly impact 0.07 acre of wetlands for the construction of the proposed Corona chairlift bottom terminal. The Forest Service would require mitigation for this wetland impact and the mitigation would likely include purchasing compensatory wetland acreage from a wetland mitigation bank. There would also be temporary impacts to 0.05 acre of wetlands for the installation of utility lines, which would be restored post-construction. Indirect impacts to wetlands through forested overstory removal are expected to impact 0.51 acre of wetlands. Overall, there would be little change to wetland functions and values under Alternative 3.

Under Alternative 3, 0.02 acre of "water" would be affected on private lands, although the values of that habitat would be retained. PDC, incorporating buffers and protections around all riparian areas and wetlands, would minimize direct and indirect negative effects to these habitats. Consequently, riparian and wetlands habitat would be protected or minimally impacted by the proposed project activities.

[347] 107. (Guideline) Avoid disconnecting or severing with new open roads and trails. Favor seasonal use during non-critical times for wildlife when this cannot be avoided.
[348] 108. (GL) When developing new open roads and trails, do not reduce contiguous areas of effective habitat to less than 250 acres or further reduce effective habitat of 20 to 250 acres in size, except where access is required by law.
[349] 109. (GL) Additional open roads and trails should not reduce effective habitat below 50 percent by geographic area, or further reduce effective habitat in geographic areas that are already at or below 50 percent on NFS lands.

Alternative 3 effects to this community would be consistent with Forest Plan direction.

Corridors

Forest cover would be fragmented by new conventional ski trails. Other proposed features (e.g., roads, structures, and glades) would not benefit continuously forested corridors, but they would not be at a discernible scale to map. Implementation of Alternative 3 would incrementally reduce forest cover in the EMR project area and in the Boulder Creeks Geographic Area, but both areas would remain mostly forested wildlife corridors following ARP criteria.

Key Winter Range

No key winter range occurs in the project area.

Migratory Birds

A consistency analysis with Forest Plan goals, objectives, standards, and guidelines applicable to Alternative 3 was conducted. PDC (Table 2-3) that are required components of Alternative 3 would minimize negative project effects to the migratory birds considered herein. Alternative 3 would be consistent with all applicable Forest Plan direction related specifically to migratory birds and their habitats.

CPW Endangered, Threatened and Species of Special Concern

None of the CPW endangered, threatened, or species of special concern occur or have potential habitat that would be influenced by Alternative 3, except the species which are addressed elsewhere in this analysis.

Animal Species of Local Concern

Beaver

No impacts to beaver are anticipated under Alternative 3.

Moose

Primary moose habitat (lakes, marshes, and phreatophytic shrub lands, including willows) would not be directly affected by Alternative 3. However, development would result in the direct loss of forest cover, representing cover and forage opportunities. Moose would be displaced from active construction areas and it may take some time for them to return to those areas and resume using developed ski area terrain as they do now. In addition to the current extent of moose displacement from active ski terrain during the ski season, there will be additional terrain and habitat adjacent to that terrain that moose would likely avoid. Most important would be the Jenny Creek willows and riparian corridor under Alternative 3. However, these areas represent a small portion of their overall home ranges. Effects of Alternative 3 would not block or restrict moose movements. There will likely be no discernible difference in moose use of EMR with or without Alternative 3.

Other Mammals

Animals would be temporarily displaced from active construction areas, but would continue using the upgraded ski area in the same ways that they do now, after adapting to the slightly modified distribution of habitats and seasonal recreational ski area activity.

Other Birds

Birds would be temporarily displaced from active construction areas, but would continue using the upgraded ski area in the same ways that they do now. Forest interior species would be negatively affected and may be locally displaced or less common, while edge species would benefit and may locally increase in abundance. All bird species now present within the project area should continue using the upgraded project area. Alternative 3 may have insignificant and discountable effects to potential golden eagle foraging habitat, but would not impact any active or potential golden eagle nesting habitat.

CUMULATIVE EFFECTS

Scope of the Analysis

For a detailed description of past, present, and reasonable foreseeable future projects within the cumulative effects analysis area, the reader is referred to Appendix A in this document.

Temporal Bounds

The temporal extent of the analysis commences with conditions before the development of EMR, extending through the history of EMR to the present, and includes the lifespan of current proposed projects as well as those that are current reasonably foreseeable future actions, in general ten to twenty years into the future from the date of this document.

Spatial Bounds

The spatial bounds of this fish and wildlife cumulative effects analysis varies by species and is discussed above in the Affected Environment.

Past, Present, and Reasonably Foreseeable Future Projects

Past, present, and reasonably foreseeable actions that affect fish and wildlife within the analysis area include:

- 2011 Master Plan
- EMR Annual Operating Plans
- Direct Control Efforts for Mountain Pine Beetle at Eldora Mountain Resort
- Past Ski Area Projects
- Corona Trail Grading EA

- Continued Nederland and Town of Eldora Residential Build-out
- Forest Legacy Conservation Easement
- Peper Private Property Access
- Lump Gulch Fuels Treatment Project
- Forsythe Fuels Reduction Project
- Nederland Water Treatment Plant Fuels Reduction Project
- Moffat Collection System EIS
- Jenny Creek Restoration and Reroute of Motorized Trail
- Recreational Use Outside of the Ski Area
- Mining Activities
- Public and Private Road Infrastructure

Threatened and Endangered Species

South Platte River Species (Pallid Sturgeon, Whooping Crane, Piping Plover, Least Tern)

No further separate analysis of indirect effects, reasonably certain project effects, or interrelated and interdependent actions are required for this project's Section 7 analysis.

Greenback Cutthroat Trout

Those future actions that are reasonably foreseeable within the action area would have no effect on genetically pure GBCT or their habitat.

Preble's Meadow Jumping Mouse

Those future actions that are reasonably foreseeable within the action area would have no effect on PMJM or its habitat.

North American Wolverine

Those future actions that are reasonably foreseeable within the action area would have no effect on the wolverine or its habitat.

Canada Lynx

Further build-out of the towns of Nederland and Eldora could have minor negative impacts on lynx habitat connectivity if currently undeveloped parcels serve as movement corridors, which is unlikely. The Forest Legacy Conservation Easement could have positive (e.g., a Forest Stewardship Plan providing for the long-term management of natural resources on the property) and negative effects (e.g., further ski area developed) on lynx habitat. Road access to, and development of, the Peper property would result in

habitat loss and fragmentation adjacent to the SUP area with minor, permanent, localized, impacts to potential winter foraging, denning, and habitat connectivity values.

In addition to applicable reasonably certain projects described above, some areas of the Lump Gulch and Forsythe Fuels Treatment Projects may have short-term impacts and long-term benefits to lynx habitat effectiveness. The enlargement of Gross Reservoir is relatively far outside of mapped lynx habitat and would not result in a loss of lynx habitat.[350]

Region 2 Sensitive Animal Species

Molluscs

Rocky Mountain Capshell Snail

Impact zones associated with reasonably foreseeable projects considered in this analysis would not extend to occupied or potential habitat that could be affected by Alternatives 2 and 3.

Insects

Hudsonian Emerald

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement and Jenny Creek Restoration and Reroute of Motorized Trail) would have largely beneficial effects to potential, but currently unoccupied Hudsonian emerald habitat that could also be affected by Alternatives 2 and 3. Other reasonably foreseeable projects considered in this analysis would contribute no additional cumulative effects to this species because impact zones associated with those other projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2 and 3 on NFS lands.[351]

Amphibians/Reptiles

Boreal Western Toad

Under Alternative 1, MPB controls efforts (which are part of the environmental baseline), including the removal of infected trees, will continue, potentially reducing short- and moderate-term forest cover that could be needed by any toads dispersing to post-breeding terrestrial habitats.[352] Loss of forest cover to MPB-induced tree mortality and loss of overstory cover in untreated areas could have similar effects. However, at present there are no extant toad populations within the maximum, documented, post-breeding, female dispersal distance from a breeding site for any individual toads to be present and so affected within the EMR analysis area.[353] Such negative effects of the ongoing MPB epidemic in lodgepole pine and mixed conifer habitats overlapping the EMR toad analysis area would be a

[350] Baker, 2013
[351] CEQ, 1997a; US Environmental Protection Agency, 1999
[352] Cirrus, 2007b
[353] Loeffler, 1998

continuation of the ongoing MPB epidemic and would occur under Alternative 1, but would not be cause by any action under Alternative 1.

Past actions and present actions in the vicinity of the project area, including logging, mining, and road building, other habitat modifications (including ski area base area developments), water diversions, recreational trails and use, and the continuing chytrid fungus and MPB trends have negatively affected boreal toad habitat and may have negatively affected local historic toad populations. Present actions (ski area maintenance and summer construction projects, traffic on local roads, and dispersed recreation at elevations overlapping potential boreal toad habitat) have likely contributed minor, additional impacts to potential, but unoccupied boreal toad habitat. Impacts and potential impacts include forest clearing and fragmentation that could affect terrestrial toad movements, hibernacula, and the quality of aquatic breeding sites, traffic resulting in toad mortality during pre- and post-breeding toad movements, and dispersed recreation resulting in mortality risks and the inadvertent spread of chytrid fungus between breeding sites.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, Boulder County communications tower) would have beneficial and negative effects to potential, but currently unoccupied boreal toad habitat that could also be affected by Alternatives 2 and 3.

Northern Leopard Frog

As with the boreal toad, past actions may have negatively affected occupied and/or potential northern leopard frog habitat in the vicinity of the project area. Present actions have likely contributed minor, additional impacts to potential, but unoccupied leopard frog habitat. Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, Boulder County communications tower) would have beneficial and negative effects to potential, but currently unoccupied northern leopard frog habitat that could also be affected by Alternatives 2 and 3.

Birds

Northern Goshawk

Past and present actions, largely associated with historic mining and logging and more recent ski area and residential development in the goshawk project area, have negatively affected goshawk foraging and possible nesting habitat through habitat conversion, fragmentation, loss, and incomplete successional recovery. However, goshawks likely persist in the project area. Lodgepole pine stands in the vicinity of EMR have experienced much less mortality compared to nearby areas, and effects of the ongoing MPB epidemic are having minor, mixed (positive and negative) effects on goshawk prey species and habitat.[354] The ongoing MPB control efforts at EMR are having mixed theoretical effects on the goshawk prey base

[354] McCormick, 2013

and habitat.[355] Beetles killing conifers remove forage and habitat for squirrels, a major prey species of goshawks, but also help open the understory, possibly increasing hunting effectiveness. Beetle control treatments save many trees in stands that would otherwise be killed, reducing impacts on squirrel populations and the goshawk prey base. Conversely, beetle control through spraying kills the beetles themselves and, therefore, removes forage and potential future nesting habitat for woodpeckers and other birds that goshawks prey on.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, Boulder County Communications Tower; Continued Nederland and Town of Eldora residential build-out, Forsythe, Lump Gulch, and Nederland Water Treatment Plant Fuels Treatment Projects) would have beneficial and negative effects to potential goshawk foraging and nesting habitat that could also be affected by Alternatives 2 and 3.

American Peregrine Falcon

Past and present actions (largely associated with historic mining and logging and more recent Alpine and Nordic developments) that created grasslands out of closed canopy forest, have potentially benefitted peregrines by creating additional openings that prey species would have to fly across (thereby increasing the vulnerability of forest and "edge" birds to peregrine predation) and increased the quality of potential foraging habitat (by improving potential prey recovery habitat, for birds knocked down by peregrines above the former canopy). This potential benefit may be partly offset by the less abundant prey base associated with ski trails (even after decades of natural succession) versus the former forest bird community.[356] However, this potential, relatively insignificant benefit is likely unrealized given how far the active eyries are to the project area and the superior hunting areas much closer to those eyries.

Most unimplemented reasonably foreseeable projects considered in this analysis would have minor beneficial, negative, and neutral effects to potential peregrine foraging that could also be affected by Alternatives 2 and 3. These effects would not meaningfully influence the effectiveness of habitat within the large hunting territory or one or more pairs of birds.

Bald Eagle

Reasonably foreseeable projects considered in this analysis would contribute no additional cumulative effects to this species because impact zones associated with those projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2 and 3 on NFS land.

White-tailed Ptarmigan

Past actions in the project area had little effect on effective ptarmigan habitat, although impacts largely associated with historic mining and logging, EMR base area development, and the Eldora Gas Pipeline

[355] Cirrus, 2007b
[356] Thompson, 1994a,b

may have negatively affected seasonal habitats that may have been used by ptarmigan.[357] Hunting associated with those historic activities may also have locally reduced ptarmigan numbers. Present actions, including ski area management and use and dispersed recreation in some areas, have not likely contributed any additional impacts because suitable occupied habitat is either not present or potential, temporary displacement of wintering females (if any) in Jenny Creek would, at most, be temporary and benign.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement and Jenny Creek Restoration) would have beneficial effects to potential, but apparently unoccupied female ptarmigan wintering habitat along Jenny Creek, although that habitat would not be affected by Alternatives 2 and 3.

Flammulated Owl

Past actions in the project area (largely associated with historic mining and logging, EMR base area development, and the Eldora Gas Pipeline) had little if any effect on effective flammulated owl nesting habitat because the project area does not support primary habitat for this species.[358] Present actions, including ski area management and use and dispersed recreation in some areas, have also not likely contributed any additional impacts for similar reasons.

Reasonably foreseeable projects considered in this analysis would contribute no additional cumulative effects to this species because impact zones associated with those projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2 and 3 on NFS land.

Boreal Owl

Boreal owl habitat in the project area has largely recovered from historic mining and logging activities. More recent Alpine and Nordic ski areas developments) that created grasslands and linear openings out of closed canopy forest, altered prey populations, removed forest structure used for foraging and roosting, and probably eliminated trees suitable as nesting habitat. Glading and tree skiing may have had little effect on boreal owl nesting effectiveness, as long as trees with nest cavities and trees capable of supporting nest cavities were not removed. However, heavy levels of tree skiing or such skiing over prolonged periods of little snowfall, can so compact the snow that it reduces small mammal access above the snowpack, reducing owl prey species availability.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, Boulder County communications tower; Lump Gulch Fuels Treatment Project) that would affect spruce-fir, mixed conifer, and lodgepole habitats representing potential foraging and/or nesting habitat for this species would have

[357] Colfer, 2005
[358] Ibid.

beneficial and negative effects (net beneficial) to boreal owl habitat that could also be affected by Alternatives 2 and 3.

Olive-sided Flycatcher

Past and present actions, largely associated with historic mining and logging and more recent ski area development, have negatively affected suitable olive-sided flycatcher foraging and nesting habitat through habitat conversion, fragmentation, and loss. However, olive-sided flycatchers persist on and around EMR, including in developed ski terrain.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail) would have beneficial and negative effects to potential olive-sided flycatcher foraging and nesting habitat that could also be affected by Alternatives 2 and 3.

Brewer's Sparrow

Primary habitat for this species (sagebrush) was never present in the project area and it is unlikely that suitable secondary habitat (i.e., krummholz used as a result of climate change) for this species was affected by historic mining and logging activities. More recent ski area development did not likely affect occupied habitat, but may have affected (i.e., at the top of Salto Glades) what may now be potential habitat.

Reasonably foreseeable projects considered in this analysis would contribute no additional cumulative effects to this species because impact zones associated with those projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2 and 3 on NFS land.

Mammals

Pygmy Shrew

The effects of the current MPB epidemic on pygmy shrews, which will continue under the No Action Alternative, are uncertain because the species inhabits a wide range of habitats, including lodgepole forests, clearcuts, and selectively logged forests.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, and Boulder County communications tower) would have beneficial and negative effects to potential pygmy shrew habitat that could also be affected by Alternatives 2 and 3. Other reasonably foreseeable projects considered in this analysis would contribute no additional cumulative effects to this species because impact zones associated with those other projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2 and 3 on NFS land.

Fringed Myotis

Effects of the ongoing MPB epidemic would increase potential roost tree abundance outside of areas subject to EMR's MPB control treatments. Those treatments are theoretically having mixed effects on local, potential, fringed myotis habitat, by removing existing and future snags, while minimizing the alteration of the prey base by reducing MPB-induced tree mortality.[359]

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, and Boulder County communications tower) would have beneficial and negative effects to potential fringed myotis foraging and roosting habitat that could also be affected by Alternatives 2 and 3.

Hoary Bat

Past and present actions that resulted in habitat conversion, fragmentation, loss, and incomplete successional recovery that were largely associated with historic mining and logging and more recent ski area development in the EMR project area, may have affected potential habitat of this species, both positively and negatively. Large areas of potential hoary bat habitat persist in the surrounding landscape, including developed and undeveloped ski terrain within the EMR SUP area.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, Boulder County communications tower; Continued Nederland and Town of Eldora residential build-out, Forsythe, Lump Gulch, and Nederland Water Treatment Plant Fuels Treatment Project) would have beneficial and negative effects to potential hoary bat foraging and roosting habitat that could also be affected by Alternatives 2 and 3.

Townsend's Big-eared Bat

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, Boulder County communications tower; Continued Nederland and Town of Eldora residential build-out, Forsythe, Lump Gulch, and Nederland Water Treatment Plant Fuels Treatment Project) would have beneficial and negative effects to potential Townsend's big-eared bat foraging and roosting habitat that could also be affected by Alternatives 2 and 3.

American Marten

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, Boulder County communications tower; and Continued Nederland and Town of Eldora residential build-out) would have beneficial and negative effects to potential marten foraging and denning habitat that could also be affected

[359] Cirrus, 2007b

by Alternatives 2 and 3. Other reasonably foreseeable projects considered in this analysis would contribute no additional cumulative effects to this species because impact zones associated with those other projects would not extend to potential habitat for this species that could be directly and indirectly affected by Alternatives 2 and 3 on NFS land.

River Otter

Past and present actions, including historic mining and logging effects and contemporary EMR development and its support infrastructure, have probably had no negative effects on summer otter and travel habitat in the upper reaches of Middle and South Boulder Creeks. However, it is possible that transient otters could make their way into the vicinity of EMR, most likely via movements up Middle Boulder Creek.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Jenny Creek Restoration and Reroute of Motorized Trail, Continued Nederland and Town of Eldora residential build-out, High Peaks to Headwaters Watershed and Fisheries Restoration Project) would have beneficial and negative effects to potential, but unoccupied, summer otter habitat that could also be affected by Alternatives 2 and 3.

Management Indicator Species

Greenback Cutthroat, Brook, and Brown Trout

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Jenny Creek Restoration and Reroute of Motorized Trail, Peper Private Property Access, and Continued Nederland and Town of Eldora residential build-out) would have beneficial and negative effects to trout habitat that could also be affected by Alternatives 2 and 3. Specifically, the Jenny Creek project could have short-term impacts, but long-term benefits to that aquatic community and the Pepper access, which includes constructing a bridge over Middle Boulder Creek several hundred yards upstream of the proposed SUP boundary (Alternative 2), could have minor, short- to long-term negative effects to water quality and trout habitat downstream of the bridge.

Boreal Toad

Boreal toads are analyzed above as a R2 sensitive species. Please refer to the above discussion.

Hairy Woodpecker

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access) would have beneficial and negative effects to occupied and potential hairy woodpecker foraging and nesting habitat that could also be affected by Alternatives 2 and 3.

Pygmy Nuthatch

Past and present actions in the EMR project area that resulted in habitat conversion, fragmentation, loss, and incomplete successional recovery that were largely associated with historic mining and logging and

more recent ski area development, may have negatively affected potential, secondary habitat of this species. Extensive areas of potential, secondary, pygmy nuthatch habitat persist in the surrounding landscape.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Boulder County communications tower) would have beneficial and negative effects to potential, secondary pygmy nuthatch habitat that could also be affected by Alternatives 2 and 3.

Warbling Vireo

Past and present actions in the EMR project area that resulted in habitat conversion, fragmentation, loss, and incomplete successional recovery that were largely associated with historic mining and logging and more recent ski area development probably did not affect the aspen habitats that this species is associated with because those habitats are uncommon in the project area. Large areas of aspen habitat are present in the surrounding landscape.

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement;) could have beneficial and negative effects to potential warbling vireo habitat, although that would not be affected by Alternatives 2 or 3.

Mountain Bluebird

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement) could have beneficial and negative effects to potential mountain bluebird foraging and nesting habitat that could also be affected by Alternatives 2 and 3.

Golden-crowned Kinglet

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail) could have beneficial and negative effects to potential golden-crowned kinglet foraging and nesting habitat that could also be affected by Alternatives 2 and 3.

Wilson's Warbler

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Jenny Creek Restoration and Reroute of Motorized Trail, Continued Nederland and Town of Eldora residential build-out) would have beneficial and negative effects to potential Wilson's warbler foraging and nesting habitat that could also be affected by Alternatives 2 and 3.

Elk and Mule Deer

Some reasonably foreseeable projects considered in this analysis (Forest Legacy Conservation Easement, Peper Private Property Access, Jenny Creek Restoration and Reroute of Motorized Trail, Boulder County communications tower; Continued Nederland and Town of Eldora residential build-out, Forsythe, Lump

Gulch, and Nederland Water Treatment Plant Fuels Treatment Project; Lump Gulch Fuels Treatment Project, Recreational Use Outside of the Ski Area, Moffat Collection System EIS) would have beneficial and negative effects to seasonal elk and mule deer habitat that could also be affected by Alternatives 2 and 3.

A number of issues and continuing trends have the potential to affect local elk and mule deer herds slightly from the current environmental baseline (Year 2012) to full build-out (Year 2022/23) of Alternatives 2 and 3. The effects associated with these issues represent a continuation of the environmental baseline and are considered here so that additional EMR-related effects under Alternatives 2 and 3 can be accurately quantified.

Human Population Growth

Human population growth and land development will continue to be two of the largest influences on elk and mule deer management. Both of these factors could further limit winter range availability and effectiveness, a major limiting factor for elk and mule deer populations, as well as the effectiveness of other seasonal ranges.

Winter Severity

Winter severity and its effects on winter range forage availability is another major factor that can affect overwinter elk and mule deer survival, subsequent recruitment, and the size of elk herds.

Increased Dispersed Recreation

Dispersed recreation can negatively affect elk and mule deer habitat use.[360] Conflicts on winter range and calving areas are generally thought to be more significant. Existing levels and distributions of dispersed recreational activities are currently influencing elk habitat use in the vicinity of EMR. Major use areas include EMR's Nordic trail system and public trail and road corridors west of the towns of Eldora and Rollinsville. Based on the recent trend, dispersed recreational activities will continue to increase annually, imposing additional pressure on elk and mule deer habitat effectiveness.

Other Habitats

The other habitats discussed throughout the document would continue to be impacted by the projects and conditions mentioned above. As discussed above, impacts to these habitat types resulting from the action alternatives would be minimal. Thus, when considered cumulatively with the action alternatives, impacts to habitat would tend to be insignificant, and would not likely adversely impact the viability of any particular fish or wildlife species.

[360] e.g., Schultz and Bailey, 1978; MacArthur et al., 1982; Freddy et al., 1986; Knight and Cole, 1995; Phillips and Alldredge, 2000

Migratory Birds

Considered cumulatively, impacts on migratory birds resulting from the action alternatives would be insignificant. As discussed above, PDC would minimize impacts to these species and both action alternatives would be consistent with all applicable Forest Plan direction. Thus, cumulative impacts would be minimized.

CPW Endangered, Threatened and Species of Special Concern

Species on these lists that occur or have potential habitat that would be influenced by the action alternatives are addressed elsewhere in the section.

Animal Species of Local Concern

As discussed above, impacts to beaver, moose, and other mammal and bird species of local concern would be very limited. Thus, cumulative impacts resulting from the action alternatives on these species would be limited.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The amount of habitat modifications, as well as disturbances during the ski season, would irretrievably affect some individual members of various wildlife species, but are not considered irreversible.

I. PLANTS

SCOPE OF THE ANALYSIS

The analysis area for plants is located in Boulder and Gilpin Counties and encompasses the EMR project area and additional areas affected by water depletions. Elevations of the project area range from 9,200 feet elevation at the base of the ski area to 10,800 feet at the summit. This analysis of plant resources summarizes the more detailed Botanical Biological Report contained in the project file.[361] The Botanical Biological Report and this analysis disclose the existing condition and anticipated impacts to federally proposed, Threatened or Endangered and/or Forest Service Rocky Mountain Region sensitive (PTES) plant species, plant species of local concern (PSOLC) and significant natural plant communities (SNPC).

AFFECTED ENVIRONMENT

Vegetation types within the project area include mature Engelmann spruce-Subalpine fir forests (*Picea engelmannii-Abies bifolia*), mature lodgepole pine forests (*Pinus contorta* subsp. *latifolia*), with stands of limber pine (*Pinus flexilis*) and aspen (*Populus tremuloides*). In addition, there are graminoid-dominated meadows on ski trails and riparian/wetlands habitats. Each of the upland vegetation types are summarized in Chapter 3 Section G – Forest Health and riparian/wetland descriptions are described in Chapter 3 Section J – Watershed, Wetlands and Soils. There are no alpine vegetation communities present within the analysis area.

Pre-Field Review & Field Reconnaissance

A pre-field review was conducted for all PTES plant species, PSOLC and SNPC known or suspected to be present in the project area or which any action alternatives potentially affect. This preliminary review included meetings with the ARP Forest Botanist, a review of the Regional Forester's sensitive plant list, review of the Colorado Natural Heritage Program's Biological Database (CNHP) records, and review of the USFWS internet site.

Field surveys for PTES, PSOLC and SNPC were conducted in June, July, and August of 2012 by qualified botanists approved by the Forest Botanist. A list of field reconnaissance dates, as well as survey result maps, survey tracks for each day, and all Element Occurrence Record (EOR) forms are contained in the project file.

Surveys focused on areas with a potential for direct and indirect impacts from the proposed ski area improvement project disturbances, such as chairlift construction/replacement, new ski trails, new and/or improved ski glades, new on-mountain facilities, and the parking lot expansion. While 95 percent of the proposed ski terrain was surveyed for Alternative 2, only portions (approximately 60 percent) of the proposed ski terrain for Alternative 3 were surveyed. Most notably absent from the surveys for

[361] Western Ecological Resource, 2014

Alternative 2include small portions of the Bryan Glades and Salto Glades, which were expanded post survey. For Alternative 3, ski terrain not surveyed include the proposed tree removal for Moose Glades and portions of Bryan Glades II and Placer Glades. In addition, the proposed ski trails, *C-2* and *C-3*, for Bryan Glades II and proposed ski trail, *IP-1*, near *Lower Diamondback* trail were not surveyed for Alternative 3.

Finally, for both Alternatives 2 and 3, no surveys were conducted for several areas potentially impacted by forest health project activities associated with the Vegetation Management Plan (VMP). These areas mainly include prescriptions P2 for existing ski trail maintenance, P3 for defensible space management, P5 for existing tree island maintenance, P6 for sanitation/salvage with removal in lodgepole pine, P7 for sanitation/salvage in spruce/fir, and P8 for continued forest monitoring. However, approximately 95 percent of P1 (New Ski Trail Construction) and P4 (New Tree and Gladed Skiing Area Construction) were surveyed for Alternative 2, and approximately 60 percent of this area was surveyed for Alternative 3.

The lack of surveys for many of the vegetation management prescriptions is because the treatments and treatment areas are coarse at this time. It is more effective to conduct surveys once treatment prescriptions are fully defined, and specific treatment units narrowed and more accurately identified. PDC for these vegetation management projects would be implemented and are listed in Table 2-3. PDC ensure that surveys will occur and that appropriate conservation action be taken for rare plants or noteworthy communities.

No PTES plant species were documented within the analysis area as the result of the pre-field review or field reconnaissance. However, several PSOLC and SNPC were documented. The following sections describe rare plants known or suspected to occur within or near the analysis area. Collectively, this represents consideration of the best available science.

Threatened and Endangered Species

A USFWS species list for analysis was generated from the Service's on-line Information, Planning, and Conservation (IPaC) decision support system on March 26, 2013 and amended by the Forest Botanist. The complete list for the State of Colorado is contained in the project file. The IPaC system was queried for Boulder and Gilpin Counties, in which the proposed project is located. The USFWS species include the Ute ladies'-tresses orchid (*Spiranthes diluvialis*), the Colorado butterfly plant (*Gaura neomexicana* subsp. *coloradensis*) and the Western prairie fringed orchid (*Platanthera praeclara*). In addition, per request of the Forest Botanist, Penland's alpine fen mustard (*Eutrema penlandii*) was added for consideration in the analysis. Brief descriptions of each of these species is provided below as well as rationale for their exclusion from further analysis. Rationale is supported where appropriate by rare plant survey results.

Table 3I-1:
Federally Listed Plants Considered

Species	Habitat Description	Plants or Habitat Known or Suspected to be Present in/near Project Area or Affected by Project Activities	Species Excluded from Analysis	Rationale
Penland's alpine fen mustard *Eutrema penlandii*	Alpine constantly moist areas, often near snowbeds, 11,800–12,800' elevation	No	Yes	No habitat within federal Action Area
Colorado butterfly plant *Gaura* neomexicana subsp. *coloradensis*	Foothills and plains drainages on Colorado/Wyoming front range, up to 7,000' elevation	No	Yes	No habitat within federal Action Area, and no habitat affected by water depletion
Western prairie fringed orchid *Platanthera praeclara*	Prairie wet meadows; main stem of Platte River in Nebraska	No	Yes	Previously consulted upon; tiers to the Platte River Recovery programmatic EIS Biological Opinion
Ute ladies'-tresses orchid *Spiranthes diluvialis*	Riparian point bars and streamsides, meadows with subsurface hydrology, up to 8,000' elevation	No	Yes	No habitat within federal Action Area, and no habitat affected by water depletion.

Note: For purposes of this analysis, the federal Action Area for Penland's alpine fen mustard, Colorado butterfly plant, and Ute ladies'-tresses orchid is equal to the analysis area defined as the EMR's project area and additional areas affected by water depletion in which these plants could occur.

Penland's Alpine Fen Mustard

Penland's alpine fen mustard is a small, perennial herb in the mustard family (Brassicaceae) that inhabits alpine wetlands that are permanently saturated and meltwater areas with flowing water. It grows in mats of mosses on streambanks that remain wet year-round.[362] It is also found in alpine fens on the lee side of mountain crests where deep wind-deposited snow accumulates.[363] It is endemic to Colorado and only found in the Mosquito Range from Hoosier Pass to Mount Sherman in Park and Summit counties at elevations of 11,800 to 12,800 feet, and most known populations occur over the Leadville limestone and Manitou limestone. Penland's alpine fen mustard is excluded from further analysis due to lack of suitable habitat and elevational differences between known occurrences and the Action Area; no alpine areas or alpine fens are present in the study area, which is below 11,000 feet elevation.

[362] Spackman et al., 1997
[363] Roy et al., 1993

Colorado Butterfly Plant

The Colorado butterfly plant (*Gaura neomexicana* subsp. *coloradensis*) is a short-lived perennial herbaceous plant. This federally listed Threatened subspecies is distinguished from the New Mexico butterfly plant (*Gaura neomexicana* subsp. *neomexicana*) based upon differences in pubescence and its disjunct range.[364] All of the currently known populations of the Colorado butterfly plant occur within a small, 17,000-acre area in southeast Wyoming, western Nebraska, and north-central Colorado.[365] In Colorado, historic collections have been made in Boulder, Weld, Douglas, and Larimer counties.[366] However, the only natural populations (i.e., those that have not been introduced for conservation purposes) of the butterfly plant presently known in Colorado are at Meadow Springs Ranch in Weld County, Colorado and the Soapstone Ranch near Fort Collins in Larimer County, Colorado. There is also an introduced population on the Chambers Preserve in Jefferson County, Colorado.[367]

Gaura neomexicana subsp. *coloradensis* occurs primarily on sub-irrigated alluvial soils on level or slightly sloping floodplains and drainage bottoms at elevations between 5,000 and 6,400 feet elevation.[368] The butterfly plant requires early- to mid-successional riparian habitat, and populations are often found in low depressions or along bends in wide, active, meandering stream channels a short distance upslope of the actual channel.[369] The Colorado butterfly plant appears to require shallow subsurface water, and it is not found where streams are deeply incised.[370] In addition, the Colorado butterfly plant is an early successional plant adapted to grow in periodically disturbed stream channel habitats. The upper known elevation limit of Colorado butterfly plant is 6,200 feet range-wide, but habitat up to 7,000 feet could perhaps be considered suitable.[371]

The Colorado butterfly plant is excluded from further analysis in the Action Area because the area of water depletion along South Boulder Creek is above the known and suspected elevation range of the species. Refer to discussion concerning reservoir management for Ute ladies'-tresses orchid.

Western Prairie Fringed Orchid

The federally Threatened Western prairie fringed orchid (*Platanthera praeclara*) is an erect perennial forb that grows in Nebraska. The orchid is not known from Colorado, but water depletion within the state may affect habitat for this plant. The habitat of *P. praeclara* includes high quality deep-soil mesic prairies. In addition, the orchid is more likely to occur in areas with a rich flora and little grazing pressure. Although moist soil near the ground surface is critical to maintaining Western prairie fringed orchid

[364] Rocky Mountain Heritage Task Force, 1987; Raven & Gregory, 1972
[365] US Fish and Wildlife Service, 2000
[366] Ibid.
[367] Ibid.
[368] Ibid.
[369] Ibid.
[370] Rocky Mountain Heritage Task Force, 1987
[371] Popovich, 2013

populations, flooding may adversely affect the orchid, depending on the depth and duration of flooding.[372] *P. praeclara* is found in Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, and South Dakota, as well as in some Canadian provinces.[373] Published accounts and herbarium records suggest *P. praeclara* was widespread and perhaps locally common prior to European settlement.[374]

In 2006, the USFWS issued a Programmatic Biological Opinion and implemented the Platte River Recovery and Implementation Program to assist in the conservation and recovery of several federally listed South Platte River species, including the Western prairie fringed orchid, in Nebraska. The Program provides compliance with the Endangered Species Act (ESA), in part, through mandatory participation in the South Platte Water Related Activities Program, Inc. (SPWRAP), of which EMR is a member. On March 7, 2013 a Biological Assessment and Request for Formal Section 7 Consultation for EMR's Existing Water Use was prepared and submitted to the USFWS. EMR intends to rely on the provision of the SPWRAP to provide ESA compliance for future water depletion associated with the action alternatives. Therefore, the Western prairie fringed orchid is dropped from further consideration in this document.

Ute ladies'-tresses orchid

The Ute ladies'-tresses orchid is a federally Threatened perennial, terrestrial orchid endemic to moist soils in mesic or wet meadows near springs, lakes, or perennial streams and along riparian edges, gravel bars, old oxbows, and high flow channels. The orchid prefers sites with permanent sub-irrigation such as floodplains where the water table is near the surface throughout the growing season, but it may also be found in wetland and seepy areas near lakes and springs outside of floodplains. In the Front Range of Colorado, extant populations of Ute ladies'-tresses are known from Boulder, Jefferson and Larimer counties along Boulder Creek, South Boulder Creek, Left Hand Creek, Clear Creek, St. Vrain Creek, and Claymore Lake.[375] The upper known elevation limit of Ute ladies'-tresses orchid range-wide is approximately 7,000 feet, but habitat up to 8,000 feet could perhaps be considered potential suitable habitat.[376]

Ute ladies'-tresses orchid is excluded from further analysis due to lack of suitable habitat within the project area and along stream segments potentially affected by water depletion. More specifically, the project area lies above 8,900 feet elevation, which is 1,900 feet higher than occupied habitat and 900 feet higher than potentially suitable habitat. In addition, proposed water depletion related to EMR operations to Middle and South Boulder Creeks would be localized to stream segments above water storage reservoirs, which have regulated outflows. Any altered hydrology above both reservoirs would be attenuated by reservoir management, precluding potential effects from extending downstream to potential

[372] Sieg and Wolken, 1999
[373] US Fish and Wildlife Service, 2011
[374] Bowles and Duxbury, 1986
[375] Fettig et al., 2005
[376] Popovich, 2013

and occupied habitat. There is no suitable habitat for *Spiranthes diluvialis* along South Boulder Creek above Gross Reservoir.[377] Therefore, Ute ladies'-tresses orchid is excluded from further analysis.

Region 2 Sensitive Species

The Forest Service (under FSM 2670) defines a sensitive plant as one that is not presently listed as threatened or endangered by the USFWS, but concerns about the population viability have been identified as evidenced by:

1. Significant current or predicted downward trends in population numbers or density.
2. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

The Regional Forester has identified Sensitive species for the Rocky Mountain Region (R2).[378] Documented occurrences of Sensitive plants on the ARP came from Forest Service files, Forest Service personnel, pertinent literature, and records from the CNHP. Then, an evaluation was conducted of the remaining species on the current R2 Sensitive Species list to judge the likelihood of occurrence on the ARP, east of the Continental Divide. Table 3I-2 displays the species either known or suspected to occur on the ARP east of the Continental Divide, along with a brief habitat description, and shows the plant species excluded from further analysis and the rationale for exclusion. Rationale is supported where appropriate by rare plant survey results.

Table 3I-2:
USFS Region 2 Sensitive Plant Species for ARP East of the Continental Divide

Name	General Habitat & Colorado Range	Species Excluded	Rationale for Exclusion
Armeria maritima ssp. *sibirica* Ψ Sea pink	Grassy tundra slopes, on wet, sandy, or spongy organic soils; 11,460–12,580'; Park & Summit counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Asclepias uncialis ΨDwarf milkweed	Plains, short-grass prairie, outwash mesas and gravelly side-slopes; 3,920–7,640'; Baca, Bent, Cheyenne, Denver, El Paso, Fremont, Huerfano, Kit Carson, Las Animas, Otero, Pueblo, Prowers, Washington & Weld counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities

[377] Jennings, 2013
[378] USDA Forest Service, 2013c

Table 3I-2:
USFS Region 2 Sensitive Plant Species for ARP East of the Continental Divide

Name	General Habitat & Colorado Range	Species Excluded	Rationale for Exclusion
Astragalus leptaleus **Park milkvetch**	**Ecotone of saturated and dry soils; moist swales and meadows; 6,000–10,000'; Chaffee, Custer, Eagle, Fremont, Gunnison, Jackson, Larimer, Park & Summit counties, Colorado.**	**No**	**Species Analyzed**
Botrychium ascendens **ΨTrianglelobe moonwort**	**Disturbed but stabilized subalpine areas; several sites in Colorado.**	**No**	**Species Analyzed**
Botrychium campestre ΨPrairie moonwort	Native prairie, Yuma County, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Botrychium lineare [+] **ΨNarrowleaf moonwort**	**Disturbed but stabilized sites, barren sites, grass or grass-herb forest meadows, aspen stands, upper montane to alpine, 7,900–12,500'; numerous east and west-slope counties.**	**No**	**Species Analyzed**
Botrychium paradoxum **ΨParadox moonwort**	**Moist meadows to sparsely vegetated upland, one site in Colorado on West Slope.**	**No**	**Species Analyzed**
Carex diandra ***Lesser panicled sedge**	**Montane and subalpine wetland fens; 7,000–9,600'; Boulder, Garfield, Grand, Jackson, Larimer & Saguache counties, Colorado.**	**No**	**Species Analyzed**
Carex livida *Livid sedge	Mineral rich wetland fens; 9,000–10,100'; Boulder, Grand, Jackson, Larimer & Park counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Chenopodium cycloides Ψ Sandhill goosefoot	Sandy soils, most often on vegetated dunes surrounding blowouts of eastern Colorado; 4,000–5,500' Bent, Cheyenne, El Paso, Las Animas, Lincoln, Pueblo, Weld, Yuma counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Cypripedium parviflorum *Yellow lady's slipper	Moist forests including ponderosa pine, Douglas-fir, and aspen; 7,400–8,500' in CO; Clear Creek, Custer, Douglas, El Paso, Garfield, Huerfano, Jefferson, La Plata, Larimer, Las Animas, Montrose, Park, Pueblo & Teller counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities

Table 3I-2:
USFS Region 2 Sensitive Plant Species for ARP East of the Continental Divide

Name	General Habitat & Colorado Range	Species Excluded	Rationale for Exclusion
Draba exunguiculata *Clawless draba	Alpine on rocky and gravelly slopes or fell fields; 11,700–14,000'; Boulder, Clear Creek, El Paso, Gilpin, Grand, Lake, Park & Summit counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Draba grayana *Gray's Peak draba	Alpine and subalpine on tundra, gravelly slopes or fell fields; 11,600–14,100'; Chaffee, Clear Creek, Gilpin, Grand, Huerfano, Larimer, Park, Pitkin, Saguache & Summit counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Drosera anglica ▼ English sundew	Peat lands, bogs, and fens; typically growing on wet peat or Sphagnum; La Plata county, Colorado; 7,900–8,500'	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Drosera rotundifolia * Roundleaf sundew	Among Sphagnum peat moss on the margins of ponds, fens, and floating peat mats; 9,100–9,800'; Grand, Gunnison and Jackson counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Eleocharis elliptica ▼ Elliptic spikerush	Wetland habitats. Recent taxonomic treatment of species (Smith et al. 2002 in FNA) does not include Colorado in the distribution for this species.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Epipactis gigantea ▼ Giant helleborine	Warm-water seeps and springs. 4,800–8,000' Archuleta, Las Animas, Chaffee, Delta, Mesa, Montrose, Moffat, Saguache counties, Colorado	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Eriogonum exilifolium *Dropleaf buckwheat	Sagebrush flats; North and Middle Parks in Larimer, Jackson and Grand counties, Colorado. 7,500–9,000'	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Eriophorum altaicum var. *neogaeum* ▼ Altai cottongrass	Open areas with hydric soils, fens; 10,160–13,200 ft; Eagle, Gunnison, Hinsdale, La Plata, Mineral, Park, Pitkin, Saguache, San Juan & San Miguel counties; includes Eriophorum chamissonis	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Eriophorum chamissonis ▼ Chamisoi cottongrass	Open areas with hydric soils, fens; 10,160–13,200'; Eagle, Gunnison, Hinsdale, La Plata, Mineral, Park, Pitkin, Saguache, San Juan & San Miguel counties; includes Eriophorum altaicum var. neogaeum	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities

Table 3I-2:
USFS Region 2 Sensitive Plant Species for ARP East of the Continental Divide

Name	General Habitat & Colorado Range	Species Excluded	Rationale for Exclusion
Eriophorum gracile ***Slender cottongrass**	**Montane and subalpine fens, saturated soils; 8,100–11,140' in CO; Gunnison, Jackson, Larimer, Las Animas, Park, San Miguel & Summit counties, Colorado.**	**No**	**Species Analyzed**
Festuca hallii *Plains rough fescue	Alpine and subalpine grasslands and meadows; 8,500–11,500'; Huerfano & Larimer counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Ipomopsis aggregata ssp. *weberi* ▼ Scarlet gilia	Forb or shrub dominated montane meadows; 6,560–10,500', narrow endemic	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Kobresia simpliciuscula ***Simple kobresia**	**Fens and moist alpine areas; Boulder, Clear Creek, Grand, Gunnison, Park, Summit counties, Colorado. 8,970 to 12,800'**	**No**	**Species Analyzed**
Lesquerella pruinosa ▼ Pagosa bladderpod	Endemic to outcrops of Mancos Shale in Archuleta and Hinsdale counties, Colorado; 6,890 to 8,800' Also Rio Arriba County, New Mexico.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Lycopodium complanatum ▼ Groundcedar	Open coniferous or mixed hardwood forests. The southernmost Rocky Mountain distribution is in Wyoming.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Machaeranthera coloradoensis **Ψ Colorado tansyaster**	**Gravelly areas in mountain parks, slopes and rock outcrops up to dry tundra; 7,600–13,000'; Dolores, Gunnison, Hinsdale, La Plata, Lake, Mineral, Park, Pitkin, Gunnison, Rio Grande, Saguache & San Juan counties, Colorado.**	**No**	**Species Analyzed**
Malaxis brachypoda ΨWhite adder's-mouth orchid	Moist ground, shaded streamsides, among mosses; 7,200–8,000'; Boulder, El Paso & Jefferson counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Mimulus gemmiparus *** Rocky Mountain monkeyflower**	**Granitic seeps, slopes, and alluvium in open sites within spruce-fir and aspen forests; 8,500–10,500'; endemic to Boulder, Clear Creek, Grand, Jefferson Larimer and Park counties, Colorado.**	**No**	**Species Analyzed**

Table 3I-2:
USFS Region 2 Sensitive Plant Species for ARP East of the Continental Divide

Name	General Habitat & Colorado Range	Species Excluded	Rationale for Exclusion
Parnassia kotzebuei *** Kotzebue's grass of Parnassus**	**Alpine and subalpine, in wet rocky areas, amongst moss mats and along streamlets; 10,000–12,00'; north-central and southwestern Colorado, Boulder, Clear Creek, Garfield, Larimer, Grand, Park, San Juan, Summit counties, Colorado.**	**No**	**Species Analyzed**
Penstemon harringtonii Ψ Harrington penstemon	Sagebrush communities, often on calcareous substrates; 6,800–9,000'; endemic to Eagle, Garfield, Grand, Pitkin, Routt, and Summit counties of Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Potentilla rupincola *** Rock cinquefoil**	**Subalpine or montane granitic outcrops amongst ponderosa or limber pine; 6,900–10,500'; endemic to Boulder, Clear Creek, Larimer & Park counties, Colorado.**	**No**	**Species Analyzed**
Primula egaliksensis Ψ Greenland primrose	Calcareous wet meadows, streambanks, willow carrs, extreme rich fens, and on hummocks; 9,000–10,000'; Park County, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Ptilagrostis porteri ▼ Porter's false needlegrass	Hummocks in fens and willow carrs; 9,350–12,000'; El Paso, Lake, Park & Summit counties, Colorado. Also, n. New Mexico.	No	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Ranunculus karelinii ***** Ice cold buttercup	Alpine slopes among rocks and scree; 12,000–14,100'; central Colorado, including Chaffee, Clear Creek, Gunnison, Hinsdale, Lake, Ouray, Park & Summit counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Rubus arcticus* ssp. *acaulis *** Dwarf raspberry**	**Wetlands in willow carrs and mossy streamsides; 7,000–9,720'; Clear Creek, Grand, Park counties, Colorado.**	**No**	**Species Analyzed**
Salix candida *** Silver willow**	**Often associated, but not restricted to rich and extremely rich fens; 8,900–10,400'; Lake, Larimer & Park counties, Colorado.**	**No**	**Species Analyzed**
Salix myrtillifolia ▼ Blueberry willow	Extremely rich fens from foothills to alpine; 9,300'; Park County, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities

Table 3I-2:
USFS Region 2 Sensitive Plant Species for ARP East of the Continental Divide

Name	General Habitat & Colorado Range	Species Excluded	Rationale for Exclusion
Salix serissima *** Autumn willow**	**Wetland areas including marshes, fens, and bogs; 7,800–10,200'; Boulder, Custer, La Plata, Park, Larimer & Routt counties, Colorado.**	**No**	**Species Analyzed**
Selaginella selaginoides ▼ Club spikemoss	Marshy areas and wet spruce forests. Nearest known locations are from northwestern Wyoming.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Sphagnum angustifolium *Narrowleaf sphagnum	Acidic fens with high concentrations of iron and other ions. San Juan & Gunnison National Forests, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Sphagnum balticum ▼ Baltic sphagnum	Acidic fens with high concentrations of iron and other ions. San Juan National Forest, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
Utricularia minor *** Lesser bladderwort**	**Shallow water of subalpine ponds; 8,200–>10,000' in CO; Boulder, Delta, Gilpin. Jackson, La Plata, Larimer, Montezuma and Park counties, Colorado.**	**No**	**Species Analyzed**
Viola selkirkii *** Selkirk's violet**	**Moist, shaded forests or streamside edges; 8,500–9,100'; Boulder, Douglas, El Paso, Larimer & Park counties, Colorado.**	**No**	**Species Analyzed**

Notes:
* These species are documented on the ARNF
Ψ These species are moderately to strongly suspected to occur the ARNF.
▼ These species are remotely suspected on the ARNF.
+ includes forms assigned to provisional name *Botrychium* "furcatum," to be subsumed under *B. lineare*.
Bold indicates Species analyzed.

Lack of plants and suitable habitat was confirmed for Threatened and Endangered plants. No occupied habitat was observed for any R2 Sensitive Plant Species during field reconnaissance in 2012. The field survey efforts were completed by qualified and experienced botanists familiar with the target species, focusing on areas of potential habitat for the sensitive species, and none of the plants were encountered. As previously described, surveys were completed in 95 percent of Alternative 2ski area improvement project areas, including areas identified by Vegetation Management Prescriptions P1 and P4, but only in about 60 percent of the Alternative 3 ski area improvement project locations. In addition, the vegetation management prescriptions (P2, P3, P5, P6, P7, and P8) were not surveyed for either Action Alternative as it is more effective to conduct surveys once treatment prescriptions are fully defined, and specific treatment units narrowed and more accurately identified.

Other Noteworthy Plants and Plant Communities

A total of 52 PSOLC and 5 SNPC were targeted in the botanical survey work conducted in 2012. A list of these plants and plant communities is found in the BE/BA located in the project file.[379]

As a result of the field surveys, nine PSOLC were documented within the project area. These include: *Athyrium felix-femina* var. *californicum*, *Botrychium lanceolatum* red (common) form, *B. hesperium*, *B. echo*, *Calypso bulbosa*, *Cornus canadensis*, *Gymnocarpium dryopteris*, *Listera cordata*, and *Lycopodium annotinum*. Table 3I-3 contains a summary of the PSOLC found within the project area. In addition, various wetland spring/seep complexes, including wetland fens, were documented. Refer to Chapter 3 Section J – Watershed, Wetlands and Soils for a description the environmental effects of the alternatives on wetlands. Finally, a number of large and presumably old-aged limber pine were found throughout the project area. Such trees and stands are increasingly biologically important in serving as genetic reserves of limber pine as more stands exhibit die-off from MPB infestation or White Pine Blister Rust (WPBR) infection along the Colorado Front Range and across the Forest. Both the wetland spring/seep complexes, wetland fens, and stands of old-age limber pine are considered to be SNPC.

Table 3I-3:
Survey Result Summary of Species of Local Concern

Scientific Name	Common Name	No. of Locations	No. Plants Found	Ownership[a]
Athyrium felix-femina subsp. *angustum*	Lady Fern	1	1	NFS
Botrychium echo	Echo moonwort	1	7	PRI
Botrychium hesperium	Western moonwort	1	8	PRI
Botrychium lanceolatum subsp. *lanceolatum*	Triangle moonwort	2	2, 51	NFS/PRI
Calypso bulbosa	Fairy slipper orchid	11	55	NFS
Cornus canadensis	Bunchberry	7	~8,000	NFS
Gymnocarpium dryopteris	Oak fern	1	~500	NFS
Listera cordata	Heartleaf twayblade	22	~2,800	NFS
Lycopodium annotinum	Club moss	7	122	NFS

[a] NFS = National Forest System; PRI = Private

Noxious Weeds

Under its Colorado Weed Management Act, §35-5.5-101 C.R.S. (Colorado Weed Act), Colorado has officially designated 74 plant species as noxious, which are divided into three lists. Colorado State List A species (22 species) are noxious weeds that are not common to the state and require eradication statewide. List B species (37 species) are noxious weeds for which the state develops and implements state noxious weed management plans designed to stop the continued spread. List C species (15 species) are weed

[379] Western Ecological Resource, 2014

species commonly found throughout the state and for which the state recommends but does not require control. Additionally, 22 species are on the Watch List because they pose a threat to agricultural or environmental values of the state. The Watch List is for advisory and educational purposes.

EMR appears to have relatively limited occurrences of noxious weeds based upon 2011 and 2012 field reconnaissance. No List A Species, which require eradication by the State, were found. However, six List B (Canada thistle [*Cirsium arvense*], musk thistle [*Carduus nutans* subsp. *macrolepis*], houndstongue [*Cynoglossum officinale*], oxeye daisy [*Leucanthemum vulgare*], yellow toadflax butter-and-eggs [*Linaria vulgaris*], scentless chamomile [*Matricaria perforata*]) and two List C (chicory [*Cichorum intybus*] and common mullein [*Verbascum thapsus*]) species were observed. One species on the Watch List, reed canarygrass (*Phalaris arundinaceae)* was also observed. This species is widely considered to be invasive in wetland and riparian habitats. While required control for these species varies for lands within NFS lands, Gilpin and Boulder counties, a Noxious and Invasive Weed Management Plan was completed for EMR in 2014 and will be used to manage noxious weeds in the future. The Noxious and Invasive Weed Management Plan is contained within the VMP and would be implemented under both action alternatives.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

The following discussion summarizes the direct, indirect and cumulative effects of the No Action Alternative and the two action alternatives on the 16 R2 Sensitive Species carried forward in this analysis, PSOLC, SNPC, and Noxious Weeds. Determinations for R2 sensitive species are located in the project file.

Alternative 1 – No Action

Region 2 Sensitive Species

Under the No Action Alternative, there would be a continuation of existing management practices. There would be no new facilities, no new trails or glading projects, no additional chairlifts, chairlift replacements, or upgrades approved under the No Action. Snowmaking and associated water use/depletion would remain the same, as would the current configuration of the parking facilities. Finally, vegetation management practices would continue as currently authorized, which mainly includes targeted application of *Carbaryl* in order to control the MPB. There are no known or suspected sensitive plants in areas that are currently being impacted by the on-going management practices under this alternative. Therefore, due to presumed absence of plants, Alternative 1 would not result in any direct or indirect effects to R2 Sensitive Plant Species.

Rationale for the effects for the 16 R2 Sensitive Plants carried forward in the analysis for Alternative 1:

- No occurrences of any R2 Sensitive plant species are known from the analysis area.
- No new occurrences of any R2 Sensitive plant species were documented during the botanical survey work in 2012.

- Although occurrence(s) of the 16 R2 Sensitive Plant Species carried forward into the analysis could have been overlooked during surveys, which focused on ski area improvement projects only, there would be no impacts to these species under the continuation of existing management practices. It is presumed that if plants were present in areas that are subject to disturbance, such disturbance would have already occurred under current management activities and remaining plants would likely be undisturbed and viable; that is, impacts to plants are not now occurring.
- *Astragalus leptaleus*, *Rubus arcticus* subsp. *acaulis*, *Salix serissima*, and *Viola selkirkii* have the possibility of occurring in unsurveyed downstream habitats within the analysis area. However, there would be no additional water depletion associated with the No Action Alternative. It is presumed that if plants were present in areas that are subject to water current depletion, impacts, if any, would have already occurred under current management activities and remaining plants would likely be undisturbed and viable; that is, impacts to plants are not now occurring.

Other Noteworthy Plants and Plant Communities

Under the No Action Alternative, there would be a continuation of existing management practices. There could potentially be impacts to PSOLC as part of on-going maintenance activities as there are currently no PDC to protect these plants. In addition, indirect effects could potentially occur as the result of noxious weed invasion and the ongoing MPB epidemic. More specifically, noxious weeds, if left untreated, could spread into the areas occupied by plants and compete with individual plants for light, nutrients, and water. Invasive weeds would also degrade the functions and values of plant communities of concern such as spring/seep wetlands. Finally, there is currently MPB activity in the project area. The potential loss or reduction of forested overstory shading would increase the light intensity reaching the forest floor and cause negative impacts to shade loving species such as *Cornus canadensis*, *Calypso bulbosa*, *Lycopodium annotinum*, *Gymnocarpium dryopteris*, and *Listera cordata*. However, these indirect impacts are not expected to be of sufficient scale to compromise the long-term viability of these plant species within the planning area or range-wide.

Impacts to noteworthy old-aged limber pine may also continue to occur under the No Action Alternative. During the 2012 botanical field reconnaissance, numerous large limber pines were observed to have been killed by MPB. There are no existing PDC specifically designed for these trees or other noteworthy conifer stands. These impacts are expected to continue and may contribute to the overall decline of limber pine range-wide.

Noxious Weeds

Under the No Action Alternative, the Noxious and Invasive Weed Management Plan would not be implemented and noxious weed invasion and spread would continue to occur from ski area activities, visitors to NFS lands, and the ongoing MPB epidemic. If left untreated, noxious weeds could spread into the areas occupied by plants and communities of local concern and compete with individual plants for

light, nutrients, and water. Invasive weeds would also degrade the functions and values of plant communities of concern.

Alternative 2 – Proposed Action

According to NEPA, direct effects are caused by the action and occur at the same time and place (CFR 1508.8). More specifically, direct effects occur when plants are physically impacted by activities associated with the action alternatives. Direct impacts could potentially result from trampling, breaking, crushing, or uprooting of individuals as produced by machinery during the construction process. Individuals could also be directly impacted by smothering with slash, chips, or soil, and could also have trees fall on them, potentially interrupting photosynthesis and reproduction. Individuals could also be burned beneath slash piles. Direct impacts can physically damage plants or the habitats where they grow. Individuals impacted may die or experience reduced growth and development, as well as reduced or eliminated seed-set and reproduction. If direct impacts are large enough, the reduced population size may change meta-population structure, potentially affecting species viability on the planning unit or range-wide.

Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (CFR 1508.8). Indirect impacts to plant species could include changes in vegetation composition, such as the removal of a forest overstory leading to increased light regime, introducing non-native and weed seeds, the creation of habitat for and introduction of invasive plant species, altering hydrologic patterns, and causing increased soil erosion or sedimentation. In addition, increased dust from vehicular construction traffic may lead to clogged plant pores, reduced light transmission which potentially interferes with growth rates and water transpiration. Such indirect effects may cause similar effects to plants as direct effects, including causing individual mortality, reduced growth and development, as well as reduced or eliminated seed-set and reproduction. Indirect effects from water depletion could potentially affect plant species occurring downstream of the project area. Such water depletion, if of sufficient magnitude, could alter the habitat for plant species by decrease streambank flooding, lower the alluvial aquifer, or cause changes in stream geomorphology. Finally, snow compaction can alter the thermal characteristics of soil and therefore affect vegetation including PTES plants and PSOLC. Compacted snow has increased thermal conductivity, lowering surface soil temperatures and increasing frost depth.[380] These colder soil temperatures and deep freezing can negatively affect the survival of many plants including associated soil microorganisms and fungal mycorrhizae.[381] Compacted snow also melts later than uncompacted snow, which leads to delayed flowering times, reduced seed set, and possibly long-term population viability. However, delayed snow melt may also provide extra soil moisture during the growing season which may benefit some plant species.

[380] Neumann and Merriam, 1972; Waneck, 1971 and 1973; Wanek and Shumacher, 1975
[381] Waneck, 1971 and 1973

Region 2 Sensitive Species

No occurrences of R2 Sensitive plant species were found during surveys that were primarily focused in ski area improvement project areas that would be directly impacted under Alternative 2. In addition to the ski area improvement projects indentified in Chapter 2, a Vegetation Management Plan would be implemented in order to maintain and/or improve forest health within the SUP and adjacent private lands. Although all of prescription P1 (New Ski Trail Construction) and about 95 percent of P4 (New Tree and Gladed Skiing Area Construction) was surveyed for Alternative 2, none of the other six prescriptions were surveyed for rare plants. However, because un-surveyed areas will be surveyed prior to project implementation as stated in PDC and Section 2.3 of the VMP, and plants, if encountered, will be avoided or adverse impacts minimized, it may be possible that no impacts may occur to the analyzed species from vegetation management, or that the magnitude of impacts between ski area improvements and vegetation management proposed actions may be the same or similar.

Therefore, it is unlikely that there would be any direct effects to R2 Sensitive species. Nevertheless, because occurrences of these species may be present in unsurveyed areas, there is a possibility of direct and/or indirect effects to undetected plants. It is anticipated that these impacts would be localized and not of sufficient intensity or scale to cause a significant effect or loss of viability.

Rationale for the effects on the 16 R2 Sensitive plants carried forward in the analysis for Alternative 2:

- No occurrences of any R2 Sensitive plant species are known from the analysis area.
- No new occurrences of any R2 Sensitive plant species were documented during the botanical survey work in 2012, which focused primarily on ski area improvement projects and VMP prescriptions P1 and P2.
- Significant portions of the Alternative 2 VMP project area were not surveyed for Sensitive plants, and therefore these plants could be present, but undetected.
- Unsurveyed portions of the Alternative 2 VMP project area and surveyed portions of the ski improvement project areas will be surveyed for rare plants prior to project implementation. Sensitive plants, if encountered, will be avoided or adverse impacts minimized to the greatest extent practicable to ensure that there is not a loss of sensitive species viability on the Planning Unit or cause a trend toward listing.
- The additional 3 acre feet of water depletion via the Jenny Creek Pipeline (South Boulder Creek watershed) would occur during winter months and would not be of sufficient scale or change in timing to affect the hydrology of any suitable habitat downstream of the project area. Hence, any unknown downstream occurrences of the riparian-affinity species *Astragalus leptaleus*, *Rubus arcticus* subsp. *acaulis*, *Salix serissima*, and *Viola selkirkii* would not be impacted. However, these species still could be potentially present within the project area and impacted by VMP and ski improvement project activities.

Other Noteworthy Plants and Plant Communities

Impacts to PSOLC from Alternative 2 vary by species. Indirect impacts to *Athyrium felix-femina* var. *californicum* may occur as the result of constructing *P-6* trail 20 feet to the east of the only occurrence of this plant. Although PDC would be implemented to protect the plant during construction of the ski trail, the resultant increased light regime could negatively affect this shade-loving plant. However, any mortality is not expected to result in a loss of viability on the planning area or range-wide.

Two areas of *Botrychium* spp. were found within the project area. The first area, a location of two *Botrychium lanceolatum* subsp. *lanceolatum* (red stem form) on NFS lands within the proposed Salto Glades, would not likely be impacted by project activities. PDC would be implemented, if feasible, so that no skid-trails would be constructed or trees felled over this population. Over the long-term, increased ski-terrain may actually benefit *Botrychium* spp. as they prefer open, disturbed and stabilized sites. The other population of *Botrychium* spp. (*B. echo, B. hesperium, B. lanceolatum* subsp. *lanceolatum*) occurs on private land adjacent to the Challenge/Cannonball chairlifts. These chairlifts would be removed and replaced with a new chairlift further to the east. PDC would be implemented, if feasible, to protect these *Botrychium* spp. so they are not adversely impacted during chairlift removal. For the VMP projects, the effects on *Botrychium* spp. are not entirely known as much of the area for the VMP has not been surveyed. Regardless, PDC would applied to survey and avoid and/or minimize impacts to known and newly discovered PSOLC and any impacts would likely be minor and are not be expected to result in a species loss of viability on the planning area or range-wide.

Eleven occurrences of *Calypso bulbosa* were found on NFS lands in the proposed ski terrain above Middle Boulder Creek. The proposed Placer Glades could potentially impact five of these locations, either directly through skidding logs or equipment over them, or indirectly by causing an increased light regime. The other six locations occur within 30 feet of the outside edge of *P-6* trail. Again, these plants could be either directly or indirectly impacted by trail construction. However, any mortality associated with these 11 occurrences and 55 plants is not expected to result in a loss of viability on the planning area or range-wide. Impacts to *Calypso bulbosa* from implementation of the VMP projects are not entirely known as much of the area for the VMP has not been surveyed. Regardless, PDC would applied to survey and avoid and/or minimize impacts to known and newly discovered PSOLC and any impacts would likely be minor and are not be expected to result in a species loss of viability on the planning area or range-wide.

Seven areas of *Cornus canadensis* were found on NFS lands within the project area totaling over 8,000 individual plants. The largest population, which is 3.3 acres in size and about 5,000 plants, occurs at the lower end of proposed Salto Glades. PDC would be implemented prior to construction so that any new trails constructed through the area would only minimally impact this relatively large population. The majority of the impacts would likely be due to the indirect effect of increased light regime on the plants, which could result in reduced set and individual plant mortality for this shade loving species. Direct impacts to 0.03 acre of *Cornus canadensis* occupied habitat would occur as the result of the Corona

chairlift bottom terminal replacement. The area would require grading and overstory tree removal, resulting in the possible destruction of 50 to 100 individual plants. Finally, trail widening on the *Lower Ambush* trail would indirectly impact 0.02 acre of occupied habitat. The indirect effect of increased light regime would likely adversely affect 25 to 30 individual plants. Overall, the impacts to *Cornus canadensis* are expected to be minor and PDC would be implemented to protect the largest population of this plant within the project area. In addition PDC would be applied to VMP projects under Alternative 2 to survey and avoid and/or minimize impacts to known and newly discovered PSOLC. Therefore, Alternative 2would not compromise the viability of this species within the planning area or range-wide.

Gymnocarpium dryopteris occurs along a small stream 1 to 2 feet wide on the terrace above Middle Boulder Creek on NFS lands. The proposed *Collector* trail would bisect this population, resulting in forest overstory removal and indirect impacts to 0.06 acre of this 0.10-acre population. Any direct impacts to this plant would be minimized through implementation of PDC designed to protect the plant. Therefore, the ski area improvement projects associated with Alternative 2would not compromise the viability of this species within the planning area or range-wide. Likewise, any undiscovered populations of this plant within the areas affected by VMP projects would be avoided and/or PDC applied to minimize impacts. Alternative 2would not compromise the viability of this species within the planning area or range-wide.

Twenty-two occurrences of *Listera cordata* were found on NFS land within the project area. This plant appears to be common in and adjacent to the forested wetland seep and small stream channels. Indirect impacts to 0.17 acre of occupied *Listera cordata* habitat could potentially occur due to the proposed Salto Glades, and impacts to 0.29 acre of occupied habitat would occur due to various proposed trails in the Placer chairlift area, Trail C-2, and widening of the existing *Diamondback* and *Lower Ambush* trails. Finally, there would be a small direct impact of 0.005 acre to occupied *Listera cordata* habitat associated with the Corona chairlift bottom terminal replacement. There are no PDC specific to *Listera cordata*; however, PDC specific to wetlands and for *Cornus canadensis* in the Salto Glades area would benefit this plant. In addition, PDC associated with implementation of the VMP would ensure that no adverse impacts to these plants would occur. Overall, Alternative 2 would not compromise the viability of this species within the planning area or range-wide.

Seven occurrences of *Lycopodium annotinum* were found on NFS land within the project area. Six of these populations (118 plants) occur within the proposed Salto Glades area and one population (4 plants) is located 60 feet from the outside edge of a proposed trail associated with the Placer chairlift. PDC designed to protect *Lycopodium annotinum* within the proposed Salto Glades and adjacent to the *Placer* trail would minimize any adverse direct or indirect effects to this plant. Other PDC would be implemented to search for these plants in unsurveyed areas and avoid and/or minimize adverse impacts. Overall, Alternative 2would not compromise the viability of this species within the planning area or range-wide. Indirect impacts that may occur as the result of the Proposed Action may be reduced with PDC.

Ski area improvement projects and the VMP associated with Alternative 2would directly impact a total of 2.8 acres of habitat occupied by large and presumably old-aged *Pinus flexilis*. These impacts would be due to vegetation clearing and minor amounts of grading for trails associated with the Jolly Jug terrain, the Jolly Jug upper chairlift terminal, as well as the Placer chairlift and associated trails, and *C-1* and *C-3* trails. In addition, proposed glading areas may potentially impact another 4.4 acres of occupied *Pinus flexilis* habitat. Additional impacts may occur with implementation of the VMP projects. Although these old-age pine trees and stands do not qualify as "old-growth," they are still deemed noteworthy for their age and recreational/viewshed aesthetic values. Furthermore, healthy limber pine that have not yet been infected by WPBR may be important genetic reserves for this species which is declining range-wide. PDC would be implemented to asses for the presence of such trees, or other noteworthy old-age coniferous tree stands or individuals, and those that are deemed noteworthy will be considered for retention or for receiving reduced treatment impacts, when practicable. Because some impacts are expected to occur, the Proposed Action may contribute to the overall decline of limber pine within the Forest which is currently being exacerbated by the ongoing MPB epidemic and white pine blister rust.

Noxious Weeds

The potential for introduction and spread of noxious weeds is higher for the Proposed Action than the No Action Alternative due to the increases in proposed ground disturbance. Ground disturbances have the potential to increase noxious weed establishment throughout the area. Untreated infestations of noxious weeds have the potential to colonize adjacent landscapes, reduce plant diversity, alter ecosystem processes, and degrade wildlife habitat. However, PDC will be implemented and help minimize the potential for introduction and spread of weeds during ground-disturbing activities. The Noxious and Invasive Weed Management Plan addresses overall management of noxious weeds at EMR and will help to minimize future invasion and spread of weeds.

Forest Plan Amendment

The proposed Forest Plan amendment is not anticipated to have direct or indirect effects to plant species within the study area. This action is an administrative action and would not directly translate to physical impacts. Management Area 8.22 does allow the lands to be considered for more intensive development than the current allocations contemplate; however, this action alone does not impact plant species of concern.

Alternative 3

Similar types of direct and indirect effects to botanical resources as summarized in Alternative 2could occur with Alternative 3. Alternative 3 includes a different configuration of some of the ski area improvement projects. Like Alternative 2, a VMP would be implemented in order to maintain and/or improve forest health. See Chapter 2 for details on Alternative 3.

Region 2 Sensitive Species

Portions of the Alternative 3 project area were not surveyed for Forest Service Sensitive plants, and therefore there is a possibility that these plants may be present, but undetected. For Alternative 3, about 60 percent of prescription P1 (New Ski Trail Construction) and P4 (New Tree and Gladed Skiing Area Construction) was surveyed. None of the other six VMP prescriptions were surveyed for rare plants.

If Alternative 3 is chosen to be the preferred alternative, then PDC would be implemented to survey for R2 Sensitive Plants prior to construction. If R2 Sensitive Plants are found, the proposed activities would be modified to avoid or minimize effects to Sensitive Plants to the extent need to avoid loss of viability on the Planning Unit or to cause a trend toward listing under ESA.

Rationale for the effects for the 16 R2 Sensitive Plants carried forward in the analysis for Alternative 3:

- No occurrences of any R2 Sensitive plant species are known from the analysis area.
- No new occurrences of any R2 Sensitive plant species were documented during the botanical survey work in 2012, which focused primarily on ski area improvement projects and VMP prescriptions P1 and P2.
- Significant portions of the Alternative 3 project area were not surveyed for sensitive plants, and therefore these plants could be present, but undetected.
- Unsurveyed portions of the Alternative 3 project areas will be surveyed for rare plants prior to project implementation. Sensitive plants, if encountered, will be avoided or PDC applied to minimize adverse impacts to the greatest extent practicable to ensure that there is not a loss of sensitive species viability on the Planning Unit or cause a trend toward listing.
- The additional 3 acre feet of water depletion via the Jenny Creek Pipeline (South Boulder Creek watershed) would occur during winter months and would not be of sufficient scale or timing to affect the hydrology of any suitable habitat downstream of the project area. Hence, any unknown downstream occurrences of the riparian-affinity species *Astragalus leptaleus*, *Rubus arcticus* subsp. *acaulis*, *Salix serissima*, and *Viola selkirkii* would not be impacted. However, these species still could be potentially present within the project area and impacted by VMP or ski improvement activities.

Other Noteworthy Plants and Plant Communities

The anticipated impacts on PSOLC for Alternative 3 are similar to those listed above for Alternative 2, except that there would be no known impacts to any occurrences of *Calypso bulbosa, Athrium felix-femina,* or *Gymnocarpus dryopteris.* These plants occur in areas that would not be disturbed by Alternative 3 ski area improvement project area activities. Like Alternative 2, PDC would be applied to VMP projects and unsurveyed ski improvement projects under Alternative 3 to survey and avoid and/or

minimize impacts to known and newly discovered PSOLC. The PDC will ensure that both direct and indirect impacts are avoided and minimized to the maximum extent practicable.

Alternative 3 would directly impact a total of 1.4 acres of habitat occupied by large and presumably old-aged *Pinus flexilis*. These impacts would be due to vegetation clearing and minor amounts of grading for trails associated with the Jolly Jug terrain, the Jolly Jug upper chairlift terminal, as well as trails *C-1* and *C-4*. In addition, proposed glading areas may potentially impact another 4.8 acres of occupied *Pinus flexilis* habitat. Additional impacts may occur with implementation of the VMP projects. Although these old-age pine trees and stands do not qualify as "old-growth," they are still deemed noteworthy for their age and recreational/viewshed aesthetic values. Furthermore, healthy limber pine that have not yet been infected by WPBR may be important genetic reserves for this species which is declining range-wide. PDC would be implemented to asses for the presence of such trees, or other noteworthy old-age coniferous tree stands and those that are deemed noteworthy will be considered for retention or for receiving reduced treatment impacts, when practicable. Because some impacts are expected to occur, the Proposed Action may contribute to the overall decline of limber pine within the Forest which is currently being exacerbated by the ongoing MPB epidemic.

Noxious Weeds

The potential for introduction and spread of noxious weeds is higher for the Alternative 3 than the No Action Alternative due to the increases in proposed ground disturbance. Ground disturbances have the potential to increase noxious weed establishment throughout the area. Untreated infestations of noxious weeds have the potential to colonize adjacent landscapes, reduce plant diversity, alter ecosystem processes, and degrade wildlife habitat. However, PDC will be implemented and help minimize the potential for introduction and spread of weeds during ground-disturbing activities. The Noxious and Invasive Weed Management Plan addresses overall management of noxious weeds at EMR and will help to minimize future invasion and spread of weeds.

Forest Plan Amendment

The proposed Forest Plan amendment is not anticipated to have direct or indirect effects to plant species within the study area. This action is an administrative action and would not directly translate to physical impacts. Management Area 8.22 does allow the lands to be considered for more intensive development than the current allocations contemplate; however, this action alone does not impact plant species of concern.

CUMULATIVE EFFECTS

Scope of the Analysis

Cumulative effects are the result of the incremental direct and indirect effects of any action when added to other past, present, and reasonably foreseeable future actions, and can result from individually minor but

collectively major actions taking place over a period of time. For a detailed description of past, present, and reasonably foreseeable future projects within the cumulative effects analysis area, the reader is referred to Appendix A in this document.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for vegetation extends from EMR's inception as a ski area in 1961, through the foreseeable future in which EMR can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis are limited to public and private lands in the vicinity of the EMR SUP area.

Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable future actions that affect botanical resources within the analysis area include:

- 2011 Master Plan
- EMR Annual Winter and Summer Operating Plans
- Direct Control Efforts for Mountain Pine Beetle at Eldora Mountain Resort
- Past Ski Area Projects
- Corona Trail Grading EA and Implementation
- Continued Nederland and Eldora Residential Build-out
- Land Status Projects
- Forest Health and Fuels Projects
- Water Projects
- Recreational Use Outside of the Ski area
- Mining Activities
- Public and Private Road Infrastructure

Alternative 1

Alternative 1 would not result in any identified new cumulative effects to R2 Sensitive Plant Species as Alternative 1 would not result in any direct or indirect effects to these species. Cumulative effects to PSOLC would likely be inconsequential in their contribution to cumulative impacts, as the ongoing indirect impacts from noxious weed invasion and spread and MPB activity are not expected to be of sufficient scale to compromise the long-term viability of these plant species within the planning area or

range-wide. Impacts to noteworthy old-aged limber pine would continue to occur as MPB activity has been observed within the project area and there are no on-going conservation measures for these trees. These impacts are expected to continue to occur under the No Action and may contribute to the overall decline of limber pine range-wide. For noxious weeds, there would be no Noxious and Invasive Species Management Plan, and unmanaged weeds would continue to spread and cumulatively add to an increase in noxious and invasive species on lands within and adjacent to the EMR SUP area.

Alternative 2 – Proposed Action

Any ground disturbing activity has the potential to adversely impact botanical resources. However, due to the uncertainly with assessing impacts from the forest health management activities associated with the VMP, all 16 R2 Sensitive Species carried forward in the analysis could be potentially be impacted. However, these impacts would be inconsequential in their contribution to cumulative impacts, as although individual plants may be harmed, overall populations would be anticipated to remain viable at impacted sites due to implementation of the project design criteria.

Similarly for PSOLC and SNPC, including old-aged noteworthy limber pine stands, the cumulative impacts are anticipated to be minor and overall populations would remain viable at impacted sites due to implementation of the project design criteria.

Finally, with the implementation of the Noxious and Invasive Weed Management Plan under both action alternatives, the project should not substantially cumulatively add to an increase in noxious or invasive plant species populations within the SUP area.

Alternative 3

As mentioned above, any ground disturbing activity has the potential to impact botanical species. Considering the nature of the proposed projects as discussed above, the implementation of Alternative 3 could result in adverse impacts to R2 Sensitive Plant Species. However, Alternative 3 project components would be modified to avoid and minimize these effects through PDC, thus this alternative would have only a minor and inconsequential contribution to cumulative impacts to R2 Sensitive Plant Species. Like Alternative 2, cumulative impacts to PSOLC, SNPC, and noxious weeds are anticipated to be minor.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Ground disturbance related to ski trail and chairlift development would represent an irretrievable effect to botanical resources within the SUP area and adjacent private lands. However, this is not considered an irreversible commitment because vegetation is a renewable resource. Should ground disturbance occur to the point where potential habitat is removed entirely, an irreversible commitment of this resource could occur. However, as stated in the analysis, Threatened and Endangered species were not identified in the areas of disturbance, and R2 Sensitive Plant Species could be avoided and impacts minimized if any were encountered.

J. WATERSHED, WETLANDS AND SOILS

SCOPE OF THE ANALYSIS

The scope of the analysis varies between the watersheds, wetlands and soils. The scope of the analysis for watershed resources focuses on riparian and wetlands resources contained by drainage areas (the Study Watersheds) currently and potentially affected by EMR activities (refer to Figure 12). The surface area comprised by the Study Watersheds totals approximately 2,600 acres. Surface runoff within these watersheds generally flows in two main directions: southwest-to-northeast, tributary to Middle Boulder Creek (HUC12 101900050402); and north-to-south, tributary to Jenny Creek, tributary to the Headwaters South Boulder Creek (HUC12 101900050501).[382]

The scope of the analysis for the wetlands and soils resources extends across NFS lands, including the existing SUP area, as well as the proposed SUP boundary adjustment areas, encompassing all three alternatives. In addition to NFS lands, the study area also includes adjacent private lands.

FOREST PLAN DIRECTION

The Region 2 Watershed Conservation Practices Handbook (WCPH) includes conservation practices to protect soil, aquatic and riparian systems to ensure applicable Federal and State laws are met on NFS lands in Region 2.[383] The WCPH contains several Management Measures (MM) of relevance regarding water, wetlands and soils resources effects.[384] Applicable MM include MM-1 through 6, MM-8 through 11, and MM-16.

In addition, the 1997 Forest Plan provides direction to manage the soils, water, and aquatic resources. The applicable forest-wide Standards in the Forest Plan are numbers 4, 5, 7, 8, 9, 10, 12, 13, 15, and 16.

EXECUTIVE ORDER 11990

Additional direction regarding wetlands management for the U.S. Army Corps of Engineers (USACE) and Forest Service is provided by Executive Order (EO) 11990 – Protection of Wetlands. Presidential EO 11990 requires federal agencies to avoid to the extent practicable, long- and short-term adverse impacts associated with the destruction or modification of wetlands. More specifically, the Order directs federal agencies to avoid new construction in wetlands unless there is no reasonable alternative. The Order states further that where wetlands cannot be avoided, the proposed action must include all practicable measures to minimize harm to wetlands. As required by EO 11990 and the Clean Water Act (CWA), avoidance and minimization measures must be considered through the planning process.

[382] USDI Geological Survey, 2012 (12-digit Hydrologic Unit Code)
[383] USDA Forest Service, 2006
[384] The WCPH provides definitions for some terms that are important to conveying information. Refer to Chapter 7, Glossary: “WCPH.”

AFFECTED ENVIRONMENT

EMR is situated at elevations ranging from 9,400 to 10,800 feet, receiving a significant portion of its annual precipitation as snow during the winter months. Most of the precipitation in the study area occurs as snowfall, and total precipitation averages 30.6 inches annually.[385] Monthly mean temperatures range between 19 and 28 degrees Fahrenheit (ºF) and between 42 and 58ºF during the winter and summer months, respectively.[386]

Study Area Description

The Study Watersheds flowing in a general southwest-to-northeast direction are tributary to Middle Boulder Creek, whereas the area draining in a general north-to-south direction is tributary to Jenny Creek, which is tributary to South Boulder Creek. The Study Watersheds are depicted on Figure 12.

Table 3J-1 summarizes the quantitative description of aquatic resources existing in the Study Watersheds.

Table 3J-1:
Aquatic Resources in the Study Watersheds – Quantitative Description

Watershed	Lakes	Wetlands (acres)	Stream Channels
Corona	None	10.3	4 perennial stream channels, approx. 6,753'long Several intermittent channels, approx. 3,906' long
Indian Peaks	None	11.5	1 perennial stream channel, approx. 746' long Several discontinuous, intermittent channels, approx. 4,668' long
Peterson Lake	3 reservoirs & 4 small ponds. Total surface area approx. 31 acres	9.2	3 perennial streams, approx. 9,980' long 2 intermittent streams, approx. 1,186' long 1,800' of piped stream channel
Jenny Creek-EMR	None	7.2	1 perennial stream, approx. 3,300' long

The hydrology for wetlands within the study area is primarily provided by groundwater, with a smaller contribution from surface water flowing into and through the wetlands. The groundwater system is fed by precipitation recharge that occurs within the ski area. In addition, snowmaking activities may increase the snowfall depths within some locations of the area. As snowmelt occurs, generally between April and May, melt water moves downward through the glacial till and colluvium, toward the underlying bedrock. When the groundwater encounters this less permeable bedrock, it is diverted to the land surface, forming springs, seeps and small intermittent streams. Perennial streams such as Middle Boulder Creek, Jenny Creek, and others convey surface water into, and through, the study area, which produces saturated soil conditions along the stream banks and on the adjacent floodplains, where present. Finally, runoff from

[385] National Climate Data Center, 2013
[386] PRISM Climate Group, 2013

summer rains and pooled snowmelt are additional surface water sources to the wetland systems of the study area.

There are six types of "special aquatic sites:" sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle/pool complexes. From these, only riffle/pool complexes (Middle Boulder Creek and Jenny Creek) and wetlands apply to the study area.

The geology of the study area lies within the Precambrian core of the Front Range. Biotite gneiss, hornblende gneiss, and microcline gneiss of Precambrian age (older than 575 million years) occur north of the ski area base facilities, and the hornblende gneiss and the quartz monzonite group also occur along the steep mountainside to the south of Middle Boulder Creek. Most of the lower mountainsides above Middle Boulder and Jenny Creeks and south of the ski area base facilities consist of glacial terrace gravels and valley till.[387]

Most of the soils within the study area formed in glacial till, residuum, slope alluvium, and/or colluvium derived from igneous and metamorphic rocks. They occur on steep mountain slopes and glacial moraines and rolling ridges with slopes ranging from about 5 to 70 percent. The soils are very rocky, weakly developed, and generally have low fertility. Soils on the floodplains and alluvial terraces of Jenny and Middle Boulder Creeks formed in gravelly alluvium and/or gravelly glaciofluvial deposits derived from igneous and metamorphic rocks.

Watershed

Water Rights

EMR has a diverse portfolio of direct flow and storage water rights decreed for various uses including domestic, commercial, industrial (snowmaking), irrigation and recreational. EMR's storage rights include 259 acre feet in Peterson Lake, 33.3 acre feet in Lake Eldora, and 40 acre feet in Kettle Pond.[388] EMR also owns the Jenny Creek Pipeline surface diversion right (the decreed water right is 0.20 cfs and is usually diverted from April through October), located on the left bank of Jenny Creek, tributary to South Boulder Creek and owns or leases 60.41 acre feet of fully re-usable consumptive use credits in the Howard Ditch.[389] Use of these water rights during times of water right administration calls by senior downstream water users is facilitated through implementation of a decreed plan for augmentation that utilizes fully re-usable consumptive use credits owned or leased by EMR.

Approximately 4 acre feet of indoor and landscape irrigation uses are typically supplied by the Jenny Creek Pipeline. For snowmaking water supply, EMR operates its re-use and augmentation plans decreed in Water Court Case No. 02CW0400. In summary, EMR diverts and stores water in its storage facilities

[387] Ibid.
[388] State of Colorado Water Court Decrees, Case Numbers 82CW0239, 92CW0153, and 02CW0400
[389] State of Colorado Water Court Decrees, Case Numbers W-324 (South Boulder Creek); W-7786-74, 02CW0400, and 07CW0231 (pending) (Howard Ditch)

(i.e., Kettle Pond, Lake Eldora, and Peterson Lake), which is then used for snowmaking during the late fall and early winter months. Following the terms outlined in Case No. 02CW0400 (the decreed re-use and augmentation plan), EMR keeps detailed records of water volumes used for its snowmaking operations.

During the following spring, EMR re-captures the snowmaking return flows (i.e., water that results from man-made snow melt) resulting from use of fully consumable snowmaking water. The net volume of snowmaking return flows that may be re-captured by EMR is calculated based upon the volume of snowmaking water applied during the previous snowmaking season and the associated consumptive use component, as described in the Depletions section below.

A portion of the snowmaking return flows is tributary to EMR's on-mountain storage facilities and flows directly into Lake Eldora, Peterson Lake, and Kettle Pond. EMR receives a credit for the remaining portion of the snowmaking return flows that is tributary to Jenny Creek and Middle Boulder Creek. Accordingly, such return flows are re-captured in EMR's storage facilities by exchange or pump-back via its Jenny Creek Pipeline.

The Water Court approved re-use and augmentation plans decreed in Case No. 02CW0400 allow EMR to divert out-of-priority and replace depletions to the stream with its senior consumptive use credits, thus preventing injury to other water users.[390]

Depletions

Stream depletions associated with landscape irrigation and indoor uses are typically 4 acre feet per year (coincident with Jenny Creek Pipeline diversions, which are fully depletive to Jenny Creek). Depletions due to evaporative losses at EMR's storage facilities are as follows:

- up to 2.18 acre feet of evaporation above the natural lake level of Peterson Lake;
- up to 10.17 acre feet of evaporation at Lake Eldora; and
- up to 3.28 acre feet of evaporation at Kettle Pond.[391]

These depletions are covered under EMR's augmentation plan described above.

According to the terms included in EMR's plan for augmentation, the consumptive use associated with snowmaking at EMR is established each season based upon the computational procedures included in the Colorado Ski Country USA (CSCUSA) Handbook, but not less than 20 percent.[392] The study process was completed in consultation with the Colorado Department of Natural Resources and was approved by the State Engineer's Office by letter dated March 15, 1993. For example, depletions associated with the 256.7

[390] Johnson and Larson, 2012
[391] State of Colorado Water Court Decree, Case Number 02CW0400
[392] Colorado Ski Country USA, 1986

acre feet of snowmaking water used during the 2011/12 season were calculated to be 55.19 acre feet (21.5 percent). The snowmaking consumptive use corresponding to the last five seasons averages 20.9 percent. Depletions to the stream due to snowmaking operations are replaced per the terms of EMR's Water Court approved augmentation plan.

Clean Water Act 303(d) Impaired or Threatened Waterbody Segments

None of the stream segments or lakes within the Study Watersheds are listed on the Colorado State 303(d) list as impaired waters under the CWA. However, the main stem of Middle Boulder Creek is listed under the Monitoring and Evaluation (M&E) list, for Cadmium and Copper. The South Boulder Creek and its tributaries, such as Jenny Creek, from its headwaters to the outlet of Gross Reservoir are listed under M&E for aquatic life use. Stream reaches are included in the M&E list when "there is reason to suspect water quality problems, but there is also uncertainty regarding one or more listing factors, such as the representative nature of the available data." The M&E list is not subject to EPA approval. The State of Colorado monitors and evaluates waters in the M&E list to determine its appropriate status as either impaired or not within ten years of their inclusion in the M&E list.

Water Yield

Runoff hydrographs for the Study Watersheds were developed following the methodologies presented in the Water Resource Evaluation of Non-Point Silvicultural Sources (WRENSS) Procedural Handbook and supplemented by the CSCUSA Handbook.[393] Additional descriptions of the WRENSS model are found in the project file.

Water yields and distribution hydrographs were modeled for Alternatives 1, 2, and 3 and for baseline conditions using monthly average precipitation and temperature data for each watershed. The purpose of this modeling effort is to estimate the effects of existing and proposed ski area development and activities on the watersheds' yield and peak flow. The baseline hydrographs modeled conditions prior to any human impacts, such as logging or ski trail development, took place in these watersheds.

Under current conditions, water yields for the Study Watersheds are affected by tree removal associated with the existing ski terrain, roads, and parking areas (refer to Table 3J-2) and by the input of additional water in the form of snowmaking.

[393] Troendle and Leaf, 1980 as updated 2003

Table 3J-2:
Study Watersheds – Existing Conditions

Watershed	Surface Area (acres)				
	Total	Above Treeline	Forested	Thinned	Clear-Cut
Corona	663	67	453	93	50
Indian Peaks	268	0.0	198	22	48
Peterson Lake	952	0.0	786	65	111
Jenny Creek-EMR	719	2	628	74	15

Note: Figure 12 depicts the Study Watersheds

Currently, EMR utilizes, on average, 270 acre feet of water per season for its snowmaking operations. This average is based upon data available for the last five ski seasons and reflects the volume of water pumped through the snowmaking guns. A portion of the volume of water pumped through the snowmaking guns is subject to losses due to evaporation, sublimation, and evapotranspiration.[394] These losses depend upon air temperatures during the snowmaking process, the volume of water pumped, and the type of year (dry, average, or wet). For EMR, snowmaking water losses during average year conditions total approximately 22 percent. As shown in Table 3J-3, the amount of water used by EMR for snowmaking during the last five seasons ranges from 257 acre feet to 295 acre feet.

Table 3J-3:
Summary of Snowmaking Water Use From 2007–2012
Existing Conditions

Ski Season	Snowmaking Water (acre feet)
2007/08	261.9
2008/09	266.3
2009/10	294.5
2010/11	268.6
2011/12	256.7
Average	**269.6**
Minimum	**256.7**
Maximum	**294.5**

Source: Bishop-Brogden Associates, Inc., 2013

Man-made snow is currently applied on 164 acres of ski trails. The ratio of water usage to acreage of trail with snowmaking corresponding to current conditions is 1.65 acre feet/acre, including snowmaking on the EMR's terrain parks. This ratio is relatively high as compared to snowmaking water usage ratios calculated for ski areas located on Colorado's Western Slope (approximately 0.90 to 1.10 acre feet/acre). Table 3J-4 displays the existing snowmaking coverage and associated water usage by watershed.

[394] Ibid.

Table 3J-4:
Snowmaking Coverage on the Study Watersheds – Existing Conditions

Watershed	Ski Trails	Snowmaking Coverage	Average Snowmaking Water Used
	(acres)	(acres)	(acre feet)
Corona	48	41.0	67.5
Indian Peaks	45	41.3	68.0
Peterson Lake	82	73.1	120.4
Jenny Creek-EMR	13	8.3	13.7
Total	**188**[a]	**163.7**	**269.6**

[a] For snowmaking quantification purposes, acreage includes milling areas and chairlift terminal areas not included in existing ski trail acreage presented in Chapters 1 and 2 (184 acres is presented in Chapters 1 and 2).

Water yields and peak flows calculated using the WRENNS Model for each study watershed are summarized in Table 3J-5, for both baseline and current conditions assuming average precipitation and temperatures. Hydrograph plots that depict the character of these water yields in time were also developed using the WRENNS Model. These modeled hydrographs reveal flow characteristics reflective of the current ski trail system and snowmaking applications. In general, snowmelt hydrographs influenced by vegetative clearing and snowmaking have higher intensity peak flows which occur earlier in the runoff season as compared to pre-development conditions. This is a result of the higher volume and rate of snowmelt due to increased solar radiation in cleared areas and also due to the snowmaking water input (additional to natural precipitation) to the affected watersheds. As shown in Table 3J-5, the Study Watersheds' yield has increased, on average, between 6 (Jenny Creek-EMR Watershed) and 77 percent (Indian Peaks Watershed) relative to baseline conditions.

Based upon analysis of available soil data and field observations, it is evident that a significant portion of the snowmelt water occurring above approximately 9,600 feet of elevation infiltrates into the ground and travels through the soil as groundwater until it reaches less steep terrain between the elevations of 9,600 and 9,300 feet.[395] In this elevation range, several springs and wetlands are present and some intermittent streams become perennial, particularly in the Corona and Indian Peaks Watersheds. It is therefore reasonable to infer that groundwater yield that supplies the springs and wetlands referenced above has increased as compared to baseline conditions. In other words, a certain percentage of the watershed yield changes shown in Table 3J-5 corresponds to an increase of groundwater yield.

[395] Bishop-Brogden Associates, Inc., 2013

Table 3J-5:
WRENNS Model Output for an Average Year – Baseline and Existing Conditions

Watershed	Baseline Conditions		Existing Conditions	
	Water Yield (acre feet)	Peak Flow (cfs)	Water Yield (acre feet)	Peak Flow (cfs)
Corona	456	4.1	587	5.5
Indian Peaks	141	1.2	248	2.2
Peterson Lake	387	3.4	644	5.9
Jenny Creek-EMR	383	4.1	407	4.3

cfs = cubic feet per second

Table 3J-5 depicts the modeled yield and peak flow values corresponding to average precipitation and temperature for the Study Watersheds. However, watershed yield and peak flow can differ substantially from year to year due to natural variability of precipitation patterns. For example, a typical wet year, such as 1995, with annual precipitation about 30 percent higher than the average year produced an estimated yield and peak flow between 70 percent and 111 percent higher than those corresponding to the average precipitation year. Similarly, a typical dry year, such as 1989, with annual precipitation equal to 80 percent of the average generated a watershed yield and peak flow approximately 23 percent to 73 percent lower than the average year amounts.[396] The modeled results for the typical dry, average, and wet years are shown in Table 3J-6.

Table 3J-6:
WRENNS Model Output for Dry, Average, and Wet Years – Existing Conditions

Watershed	Dry Year		Average Year		Wet Year	
	Yield (acre feet)	Peak Flow (cfs)	Yield (acre feet)	Peak Flow (cfs)	Yield (acre feet)	Peak Flow (cfs)
Corona	304	3.0	587	5.5	996	9.3
Indian Peaks	170	1.7	248	2.2	443	4.0
Peterson Lake	305	3.1	644	5.9	1,169	10.5
Jenny Creek-EMR	130	1.2	407	4.3	828	9.1

cfs = cubic feet per second

Stream Health

Stream Health Definitions

In order to characterize the existing status of stream health the ARP, Aquatics Associates, Inc., and Resource Engineering, Inc. engaged in intensive field stream sampling surveys during the fall of 2012, utilizing the Forest Service Region 1/Region 4 survey methodology for measuring and quantifying specific stream health metrics. Surveyed stream health metrics included: percent surface fines, large

[396] USDA Natural Resources Conservation Service, 2008; Precipitation data for dry and wet years obtained from the USDA NRCS Lake Eldora SNOTEL Site (Site Number 564).

woody debris, undercut banks, and unstable banks. Stream health data was collected at different sites along Middle Boulder Creek near EMR in order to establish a Reference Reach and a response, or study, reach.

Reference stream reaches are located in basins with little to no development. Reference streams represent natural conditions that are attainable for a given channel type, climate, geology, aspect and slope. Reference stream reaches were surveyed to provide an analytical control against which to compare the conditions found in study reaches. Concurrently, study stream reaches were surveyed in areas downstream of the ski area that show impacts from ski area management and could be affected by implementation of the proposed projects.

As described above, the WCPH provides direction on projects that affect water resources. The WCPH mandates several Management Measures of relevance regarding stream health and water resources effects. To facilitate the evaluation of stream health compliance in the context of the WCPH Management Measures, the WCPH outlines several key definitions relevant to the quantification of stream health.

- Stream Health: The condition of a stream versus reference conditions for the stream type and geology, using metrics such as channel geometry, large woody debris, substrate, bank stability, flow regime, water chemistry, and/or aquatic biota.
- Stream Health Class: A category of stream health. Three classes are recognized in the Rocky Mountain Region: Robust, At-Risk, and Diminished. These classes are recommended to be used for assessing long-term stream health and impacts from management activities.

Throughout this document, analysis of stream health is conducted according to the definitions of stream classes as outlined in Table 3J-7.

Table 3J-7:
Stream Health Classes for Attainment of Forest Plan Direction (WCPH)

Stream Health Class	% of Reference	Habitat Condition
Robust	> 74 or < 126[a]	Stream exhibits high geomorphic, hydrologic and/or biotic integrity relative to its natural potentials condition. Physical, chemical and/or biologic conditions suggest that State assigned water quality (beneficial, designated or classified) uses are supported.
At-Risk	59 to 73 or 127 to 141[a]	Stream exhibits moderate geomorphic, hydrologic and/or biotic integrity relative to its natural potential condition (as represented by a suitable reference condition). Physical, chemical and/or biologic conditions suggest that State assigned water quality (beneficial, designated or classified) uses are at risk and may be threatened.
Diminished	< 58 or > 141[a]	Stream exhibits low geomorphic, hydrologic and/or biotic integrity relative to its natural potential conditions (as represented by a suitable reference condition). Physical, chemical and/or biologic conditions suggest that State assigned water quality (beneficial, designated or classified) uses may not be supported.

[a] For metrics that increase with decreasing stream health, such as fine sediment and unstable stream banks.

Existing Stream Health

In addition to stream surveys, Resource Engineering, Inc. performed a stream health survey within two reaches of Middle Boulder Creek. Middle Boulder Creek adjacent to the study area is a third-order stream and exhibits a riffle-pool-run channel form sequence typical of montane streams in the Colorado Rocky Mountains. The stream channel has an average width of 10 to 12 feet, with a slope of approximately 4.8 feet per 100 feet in its upper reaches within the study area, with a less steep slope of 3.5 feet per 100 feet in the lower reaches. Field observations indicate that channel substrate consists of gravels, cobbles, and boulder-sized materials, with generally stable stream banks.

The stream health survey conducted on Middle Boulder Creek consisted of two reaches: a Reference Reach and a Study Reach. The spatial location of both reaches was selected in consultation with the ARP hydrologist and fisheries biologist. The Reference Reach was established on Middle Boulder Creek, approximately 1,000 feet upstream of the confluence of the Corona Watershed with Middle Boulder Creek and coincident with Fish Sampling Site MBC1.[397] The Study Reach was located adjacent to the proposed Placer chairlift bottom terminal, between Fish Sampling Sites MBC2 and MBC3 (refer to Figure 12). Both stream reaches were classified as B3 Type under the Rosgen Stream Classification.[398]

The following stream health parameters, selected in coordination with the ARP hydrologist, were measured during the survey: percent of unstable banks, percent of undercut banks, percent of surface fines, and large woody debris. Additional survey data includes substrate composition (i.e., Wolman Pebble Counts) and stream channel geometry (e.g., longitudinal and cross-sectional profiles).

[397] Aquatics Associates, Inc., 2013
[398] Rosgen, 1994

By comparing data measured at the Study Reach against data measured at the reference channel, the Study Reach can be classified into one of three health classes: robust, at-risk, or diminished (refer to Table 3J-7). Stream health classes are used for assessing long-term stream health and impacts from management activities. In addition, MM-3 included in the WCPH states that "only those actions that maintain or improve long-term stream health and riparian ecosystem condition" shall be allowed.

The results of the stream health survey data and analysis at Middle Boulder Creek near EMR are summarized in Table 3J-8. Fine sediments (particles less than 6 mm in size) were not observed on the streambed (within low gradient riffles) of both Reference and Study Reaches. Also, only 8 percent of the stream banks within the Study Reach were found to be undercut, as compared to 19 percent of undercut banks found at the Reference Reach. Therefore, the Study Reach was classified as *Robust* for these two metrics.

In contrast, 6 percent of the Study Reach stream banks showed indications of stability problems versus only 3 percent of unstable banks observed at the Reference Reach, approximately a twofold increase (198 percent). Such increase in bank stability problems exceeds the health class threshold of 126 percent, thus the Study Reach is considered to be *Diminished* for bank stability. LWD pieces per length of stream channel found at the Study Reach represent only 39 percent of those found at the Reference Reach, less than the 58 percent health class threshold. Thus, the Study Reach was classified as *Diminished* for LWD as well. The reduction in LWD pieces found at the Study Reach is not surprising since this reach of Middle Boulder Creek is located about 1,000 feet downstream of a series of beaver ponds. Also, the Study Reach is adjacent to Hessie Road and its WIZ currently presents impacts, such as vegetation removal and terrain grading that are not associated with EMR's activities.

Table 3J-8:
Middle Boulder Creek near EMR – Stream Health Data

Metric	Reference Reach	Study Reach	Percent of Reference	Stream Health Class
Unstable Banks (ft/100 ft)	2.9	5.8	198%	Diminished
Undercut Banks (ft/100 ft)	18.7	7.7	41%	Robust
Large Woody Debris (#/100 ft)	2.4	1.0	39%	Diminished
Fine Sediments (% of Streambed)	0.0	0.0	N/A	Robust

The aquatic communities found in the drainages sampled in the vicinity of the proposed improvements to EMR were relatively healthy, except for the Peterson Return Ditch. No fish were collected at the Peterson Return Ditch site, and the macroinvertebrate community inhabiting this harsh flow limited environment was stressed and in poor condition.

Stream health surveys are typically conducted on streams of third-order or larger because the high variability of health metrics found on smaller streams makes it difficult to select adequate reference and

study reaches. Therefore, the condition of Jenny Creek and the small tributaries to Middle Boulder Creek, which are first or second-order streams, was assessed based upon field observations.

Five perennial streams tributary to Middle Boulder Creek were identified in the study area, four within the Corona Watershed and one in the Indian Peaks Watershed. These streams are relatively small, with channel widths ranging from 1 to 4 feet and average slopes of approximately 2 to 5 percent. The streams flow through forested areas and display step-pool patterns controlled by boulder-sized rocks. Stream banks are generally stable, although some undercut banks were observed during the site visits in the fall of 2012.

Although formal stream health surveys were not conducted for Jenny Creek or the Middle Boulder Creek tributaries, these streams are still managed to "maintain or improve" long-term stream health. Therefore, any proposed disturbance in the Study Watersheds need to be offset by adequate PDC to ensure that water quality and habitat conditions are not degraded by proposed activities.

Existing Connected Disturbed Area

The WCPH provides management measures and design criteria to protect the hydrologic function of watersheds. The WCPH states that maintaining good vegetation and ground cover and minimizing CDA help protect the watershed's hydrologic function. Direct connection of ground disturbances to the stream channel, such as roads via roadside ditches or waterbars, results in a net increase in the length of the existing channel network within the watershed. Connected disturbed areas capture surface runoff and concentrate flows within the watershed, increasing both volume and peak stream flows. This, in turn, creates a direct link between the sediment generated in disturbed areas and the stream system. As discussed before, CDA have a direct, negative impact in stream health metrics such as unstable banks and channel sedimentation.

To help further define existing conditions related to stream health, a field investigation was completed during the fall of 2012. Specifically, the goal of the field investigation was to provide insight as to the extent to which the existing roads and ski trails route surface flows directly to the stream system (i.e., are connected to the stream) within each watershed. Thus, field work focused on roads and ski trails that exist in the vicinity of the study area's streams. Data collected during the field investigation was incorporated into a Geographic Information System (GIS) database in order to estimate the spatial extent of CDA. Ski trails and roads where clear evidence of direct hydrologic connection to the stream system was observed were classified as CDA. In addition, ski trails and roads within 100-foot and 200-foot stream buffers respectively were assumed to be connected to the stream channel network, unless field observations proved otherwise.

Field observations indicate that a substantial component of the snowmelt runoff occurring on most ski trails rapidly infiltrates into the ground. This is consistent with information contained in the soils survey for the ARP Area, which describes the top layers of the soils (depths ranging from 12 to 62 inches) within

the Study Watersheds as being "well drained" to "somewhat excessively drained," with textures such as gravelly loam and cobbly sandy loam (saturated hydraulic conductivities between 2 and 6 inches per hour).[399] In addition, ski trails are generally well vegetated and indications of active surface runoff, such as rilling and sediment deposition, were seldom observed near stream channels.

On the other hand, mountain roads exhibited signs of erosion due to surface runoff. Indications of active erosion were observed in sections of road-side ditches and below the outlet of ditch-relief culverts in the vicinity of the study area streams. These road sections were therefore determined to be connected to the stream network. A portion of EMR's parking area was also determined to be hydrologically connected to the adjacent channel. In total, the connected roads and parking lot amount to approximately 5.2 acres of surface area.

Disturbed areas in the Study Watersheds, such as ski trails, roads, and parking lots, total 226 acres. Thus, the 5.2 acres of existing CDA represent approximately 2 percent of the total disturbed areas within the Study Watersheds. The Peterson Lake Watershed contains the largest CDA, with 3.3 acres of disturbed terrain connected to the stream system. The estimated length of roads connected to the stream system totals 9,550 feet or about 25 percent of the natural stream channel network length within the Study Watersheds. The majority of the connected roads are located within the Peterson Lake Watershed, due to the proximity of the access road and parking areas to the stream tributary to Lake Peterson. However, indications of CDA were also observed in the lower elevations of the EMR in the Indian Peaks Watershed. CDA also exist along portions of Jenny Creek Road, which is on private land and runs in close proximity (within 100 feet) to Jenny Creek. In summary, direct hydrologic connection was seldom observed on ski trails and mountain roads located in the upper half of the ski mountain. Results from the CDA investigation are displayed in Tables 3J-9 and 3J-10.

Table 3J-9:
Connected Roads within the Study Watersheds – Existing Conditions

Watershed	Natural Stream Channel Length[a] (feet)	Road Drainage Connected Length (feet)	Percent Increase of Channel Length (%)
Corona	10,660	820	8
Indian Peaks	5,415	1,825	34
Peterson Lake	11,170	3,050	27
Jenny Creek-EMR	10,830	3,855	36

[a] Includes intermittent, discontinuous streams.

[399] USDA Natural Resources Conservation Service, 2008

Table 3J-10:
CDA within the Study Watersheds – Existing Conditions

Watershed	Disturbed Areas[a]	Connected Disturbed Areas	Percent Disturbed Areas that are Connected
	(acres)	(acres)	(%)
Corona	48.4	0.2	0
Indian Peaks	48.5	0.7	1
Peterson Lake	112.5	3.3	3
Jenny Creek-EMR	16.5	1.0	6

[a] Examples of disturbed areas include ski trails, roads, and parking lots.
Note: Figure 12 depicts the Study Watersheds

Summary of Watershed Affected Environment

As mentioned in the Potential Management Effects to Stream Health section, disturbance of the WIZ has a direct impact in stream health metrics, such as channel sedimentation and woody frequency. The WCPH states the importance of the WIZ in the protection of interacting aquatic, riparian, and upland functions. Furthermore, MM-3 includes design criteria requiring that new concentrated-use sites be located outside the WIZ if practicable. Table 3J-11 compares the surface area of forests within the WIZ estimated for pre-development, or baseline, against existing conditions. Relative to baseline conditions, most of the tree removal in the WIZ has occurred within the Corona Watershed.

Table 3J-11:
Forested Areas within EMR's WIZ – Existing Conditions

Watershed	Baseline (acres)	Existing (acres)	Existing (% of Baseline)
Corona	56	42	74
Indian Peaks	34	31	90
Peterson Lake	80	66	83
Jenny Creek-EMR	36	35	99

Note: Figure 12 depicts the Study Watersheds.

Middle Boulder Creek adjacent to the Corona and Indian Peaks Watersheds exhibits bank stability problems and a deficit in woody debris density. The close proximity of Hessie Road to the stream channel and the beaver ponds located between the Reference and Study reaches are major factors leading to the current condition of the Study Reach. The calculated increases in water yield relative to baseline conditions, along with the increase in channel network length due to connected roads may be linked to the undercut banks observed on the small tributaries to Middle Boulder Creek.

The two metrics with a *Diminished* classification (bank stability and LWD) are mutually dependent, which presents an opportunity for enhancement of stream health by relatively simple measures, such as

introducing woody debris at specific locations to help stabilize the channel. The small tributaries to Middle Boulder Creek in the Corona and Indian Peaks Watersheds are generally stable, although undercut banks were observed. Jenny Creek downslope from EMR was observed to be overall in general good condition.

In order to maintain or improve stream health and riparian condition, any action within the Study Watersheds with potential to increase bank instability, affect LWD recruitment, and increase fine sediment loads to the streams would have to contain PDC to ensure that stream health and watershed condition are not negatively affected by such action.

Waters of the U.S., Including Wetlands

Wetlands and other waters of the U.S. were delineated in accordance with the 1987 USACE Wetland Delineation Manual and the 2010 Mountain West Regional Supplement during the 2011 and 2012 growing seasons. Detailed data forms were completed within sensitive wetland complexes and adjacent to proposed improvements. These included the Boulder Creek Terrace Wetlands, the Jenny Creek Fen and the Corona Fen. The wetland status of plants follows the 2012 National List for the Western Mountain Region.

On October 23, 2012, an on-site agency meeting was held by the ARP with personnel from the ARP, USACE and EPA. The USACE did not request any changes to wetland delineation boundaries at that time. On April 22, 2013, a wetlands delineation report for EMR was submitted to the USACE with a request for a Preliminary Jurisdictional Determination for wetlands and waters of the U.S. occurring within the study area. On April 25, 2013, the USACE granted the Preliminary Jurisdictional Determination (NWO-2012-473-DEN) for waters of the U.S., wetlands within the study area.

In total, approximately 37 acres of wetlands were mapped for the study area, including: 16 acres of forested wetlands, approximately 10 acres of scrub-shrub wetlands, and 11 acres of emergent wetlands. These wetlands mainly occur along Middle Boulder Creek and its stream terrace, on the forested slopes above Middle Boulder Creek, in ski runs, and along Jenny Creek which is tributary to South Boulder Creek. Within these wetlands approximately 3.5 acres of fen wetlands were identified within the study area. Other areas of wetlands, most notably within ski-runs, have been historically disturbed from grading associated with the original construction of the ski resort. In addition, ponds comprise 1 acre, intermittent stream channels without vegetation make up another 0.04 acre, and perennial streams 3 comprise 1.79 acres. Refer to Figure 12 for the locations of Waters of the U.S., including wetlands.

The wetlands occurring within the study area are typical of upper montane and lower subalpine wetlands of the region. Forested wetlands are typified by an overstory of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies bifolia*) with minor components of lodgepole pine (*Pinus contorta* subsp. *latifolia*) and aspen (*Populus tremuloides*). The understory is typically diverse with a wide variety of

herbaceous wetland graminoids and forbs. Species commonly encountered include arrowleaf groundsel (*Senecio triangularis*), chiming bells (*Mertensia ciliata*), Fendler cowbane (*Oxypolis fendleri*), bishop's cap (*Mitella pentandra*), brook saxifrage (*Micranthes odontoloma*), cow parsnip (*Heracleum sphondylium*), softleaf sedge (*Carex disperma*), and millet wood rush (*Luzula parviflora*). Scrub-shrub wetlands support an overstory of native willows (*Salix* spp.) along with alder (*Alnus tenuifolia* subsp. *incana*) and an understory that varies with light and hydrologic regime. Herbaceous wetlands are dominated by natives such as beaked sedge (*Carex utriculata*), water sedge (*Carex aquatilis*), tufted hairgrass (*Deschampsia caespitosa*), bluejoint reedgrass (*Calamagrostis canadensis*) as well as non-natives such as meadow foxtail (*Alopecurus pratensis*) and redtop (*Agrostis gigantea*).

Hydrology of wetlands within the study area is typically provided by a high groundwater table as evidenced by small seepage areas and springs. In addition, in some areas such as the Salto Glades, there are numerous small intermittent drainages. Local snowmaking also contributes to increased snowmelt runoff and hydrology for many of these wetlands.

Generally soils within the study area were not mapped as hydric; however, the wetlands identified within the study area did have hydric soils. Most of the hydric soils likely exhibit the depleted matrix or redox dark surface hydric soil indicators. Soils along Middle Boulder Creek and in the Jenny Creek fen are classified as the Cryaquolls-Gateview complex (refer to the Soils section below for additional information). Cryaquolls are classified as hydric soils, although Gateview soils are not. In addition, some of the soils in wetlands near Middle Boulder Creek and Jenny Creek wetlands have the histosol or histic epipedon hydric soil indicators.

Several areas of wetland fens were identified throughout the study area, totaling approximately 3.5 acres (refer to Figure 12). Fens are wetlands characterized by the accumulation of organic-rich soils and are primarily fed by groundwater sources. Because the rate of accumulation of peat in fens is so slow, these ecosystems are generally considered to be irreplaceable. The organic-rich soils include histosols, characterized by more than 16 inches of organic matter accumulation, commonly referred to as peat; and mineral soils with a histic epipedon, defined as an organic layer at least 8 inches thick. Fens are most well developed at the Jenny Creek fen, located at the southern end of the study area, and fens also occur northeast of the bottom terminal of the Corona chairlift. For example, the Corona Fen, located approximately 300 feet southeast of the bottom terminal of the Corona chairlift, has histosol organic soils at least 28 inches deep and would be classified as a Cryohemist. On-site investigations of the Jenny Creek fen wetland revealed the presence of histosols at least 33 inches deep.

Other areas of wetlands, most notably within ski-runs, have been historically disturbed from grading associated with the original construction of the ski resort. These wetlands support a variety of herbaceous or small wetland shrubs along with non-native opportunistic species.

Wetland Functions and Values

Wetlands are often described in terms of their functions and values. Functions refer to the ecological role or processes that a wetland performs. Values refer to the importance of these functions to the environment or to humans. However, these terms are interrelated and most often the distinction between functions versus values is not made. Wetland functions can be generally categorized into three major groups: hydrology, water quality, and habitat. Wetlands do not necessarily perform all functions nor do they perform all functions to the same degree. The location, vegetation and hydrology of a wetland often determine which functions it performs.

The major wetland functional groups which are evaluated in this document include: hydrology functions—groundwater discharge, groundwater recharge, velocity reduction, erosion protection, and floodwater retention/peak flood reduction; water quality functions—sediment removal, nutrient retention and removal; and wildlife habitat functions.

The qualitative assessments of wetland functions presented here are based on best professional judgment and knowledge of the study area wetlands. In general terms, these assessments rank the effectiveness of a function by considering both the presence of a particular process as well as the opportunity for that process to occur based on the wetland type and location. These assessments consider the overall condition of wetlands relative to the other wetlands in the study area and to similar wetlands in the Front Range of Colorado. The assessments represent average conditions for each group of wetlands or wetland complex. A summary of the ranking system is presented below in Table 3J-12, and a summary of the functions and values for each of the wetland group in the study area is presented in Table 3J-13. More detailed descriptions of the functions and values are found in the project file.

Table 3J-12:
Qualitative Wetland Assessment Rankings

Ranking	Description
None	Available observations and/or data confirm absence or prevention of a function
Low	Short duration, small volumes of water, or absence of opportunity cause the function to be insignificant
Moderate	The combined effects of size, frequency, and opportunity indicate the function occurs regularly but is not high quality or the dominant function
High	Function is very effective, because the wetland covers a large area and/or receives a large volume of water, there is a long duration, or it provides an unusual quality
Very High	Extremely significant function owing to its uniqueness, size, duration, and opportunity

Table 3J-13 is a summary of the study area wetland functions and their ranking values.

Table 3J-13:
Summary of Wetland Functions and Values in the Study Area

Wetland Type or Location	Function and Rating[a]
MIDDLE BOULDER CREEK STREAM & TERRACE WETLANDS	
Hydrology Functions	Groundwater Discharge – Moderate
	Groundwater Recharge – Moderate
	Velocity Reduction – Moderate
	Erosion Protection – High
	Floodwater Retention/Peak Flood Reduction – Low
Water Quality Functions	Sediment Removal – Moderate
	Nutrient Retention/Removal – Moderate
Habitat Functions	Wildlife Habitat Value – High
FEN WETLANDS	
Hydrology Functions	Groundwater Discharge – Very High
	Groundwater Recharge – None
	Velocity Reduction – Low
	Erosion Protection – Low
	Floodwater Retention/Peak Flood Reduction – Low
Water Quality Functions	Sediment Removal – Low
	Nutrient Retention/Removal – Moderate
Habitat Functions	Wildlife Habitat Value – High
WETLANDS ON SKI TRAILS	
Hydrology Functions	Groundwater Discharge – Low to Moderate
	Groundwater Recharge – None
	Velocity Reduction – Low to Moderate
	Erosion Protection – Low to Moderate
	Floodwater Retention/Peak Flood Reduction – None
Water Quality Functions	Sediment Removal – Low
	Nutrient Retention/Removal – Low
Habitat Functions	Wildlife Habitat Value – Low to Moderate
FORESTED WETLAND SEEPS (INCLUDING SMALL STREAM CHANNELS)	
Hydrology Functions	Groundwater Discharge – Moderate to High
	Groundwater Recharge – None
	Velocity Reduction – Low to Moderate
	Erosion Protection – Low to Moderate
	Floodwater Retention/Peak Flood Reduction – None
Water Quality Functions	Sediment Removal – Low
	Nutrient Retention/Removal – Low
Habitat Functions	Wildlife Habitat Value – Low to Moderate

Table 3J-13:
Summary of Wetland Functions and Values in the Study Area

Wetland Type or Location	Function and Rating[a]
POND WETLAND	
Hydrology Functions	Groundwater Discharge – Moderate
	Groundwater Recharge – None
	Velocity Reduction – None
	Erosion Protection – None
	Floodwater Retention/Peak Flood Reduction – None
Water Quality Functions	Sediment Removal – None to Low
	Nutrient Retention/Removal – None to Low
Habitat Functions	Wildlife Habitat Value – High

[a] Many functions are variable within each wetland type or grouping.

Riparian Areas

Riparian areas are those plant communities adjacent to and affected by surface and ground water of rivers, streams, lakes, ponds or other drainage ways. Within the study area, the limits of the riparian habitat roughly corresponds to that of wetland boundaries adjacent to streams and ponds. However, there are a few areas within the study area where the riparian habitat is slightly wider than the wetland zone including areas adjacent to Middle Boulder Creek and along the lower slopes of the Corona ski trail.

Soils

There are twelve soil map units and two miscellaneous map units defined in the Soil Survey of Arapaho-Roosevelt National Forest Area that occur in the study area.[400] The soil map units contain either one dominant soil or are a complex, which contains two or more dissimilar components that could not be reasonably mapped separately. The acreages of each map unit that occur on NFS lands and on private lands can be found in the project file. A description of each soil type can be found in the project file.

Soil interpretations that could affect ski area development and impact surrounding lands are discussed below. The interpretations were taken from the Soil Survey of Arapaho-Roosevelt National Forest Area.[401] These interpretations are related to soil erosion and include soil erodibility K factors, water erosion hazard rating, and landslide potential for each soil map unit. In addition to the above soil interpretations, soil limitations for revegetation and natural recovery following disturbance were made based on climate, and soil physical and chemical characteristics.

Ground disturbance activities from the action alternatives would affect soil bulk density, soil structure, soil loss due to erosion, soil hydrologic functions, and loss or displacement of the nutrient-rich surface

[400] Ibid.
[401] Ibid.

layer. The magnitude of the impacts could affect the success and time required for rehabilitation and stabilization of disturbances. The extent and severity of these impacts are discussed in the Environmental Consequences section.

The rating for the water erosion hazard following a disturbance is based on the slope and on the soil erodibility K-factor. The soil loss is caused by sheet or rill erosion where 50 to 75 percent of the surface has been exposed by a disturbance.

The Leighcan soil map units have a moderate erosion factor (K-factor) and severe or very severe erosion hazard after surface disturbance due to steepness of slope and susceptibility to erosion. Other map units with severe erosion hazard after surface disturbance are map units 6731C, 8772C and ML, also generally due to steepness of slopes and susceptibility to erosion.

Even though Map Unit ML (miscellaneous) within the study area has very shallow slopes, much of this map unit has been converted to unpaved parking lots, which generally experience high rates of erosion. Alluvial/wetland soil map unit 6101A has a moderate water erosion hazard after disturbance due to steepness of slope and susceptibility to erosion. Alluvial/wetland soil map unit 7101A has a very severe erosion hazard after surface disturbance due to high organic matter content. Map units 7702B and 7790B have slight erosion hazard after surface disturbance due to shallowness of slopes.

Results of the Watershed Erosion Prediction Project Model (WEPP) indicate that there would be a high probability of erosion and sediment delivered to waterways from new roads and disturbances along chairlift corridors. But with the proper implementation and maintenance of erosion control Best Management Practices (BMPs), these impacts would be minimized and sedimentation to waterways would be minor and eventually would be similar to natural rates. The WEPP results are discussed below in under Environmental Consequences.

The steep slopes above Middle Boulder Creek may have a higher landslide potential than indicated by the NRCS, due to deep, poorly consolidated soils; wetter conditions on north facing slopes creating water saturated soils; and localized very steep slopes. The Colorado Landslide Inventory Program of the Colorado Geologic Survey, however, has not identified any significant existing landslides within the study area.[402]

In addition, a preliminary landside evaluation was conducted on the steep slope above Middle Boulder Creek in areas of proposed grading. The evaluation determined that the landside potential is probably moderate for both the soils and the rock outcrop. NRCS has rated landslide potential of the soil in this map unit as low and rock outcrop as high. As mentioned above, these rating are forest wide and are not necessarily site specific.

[402] Colorado Geologic Survey, 2012

The landslide evaluation of the steep north facing slope found no evidence of past mass movement. Slopes are less than 60 percent, with the exception of near vertical rock ledges that are 5 to 15 feet tall, which have fracture joints that are not parallel to the slope. The numerous boulder talus piles on this slope and the rock ledges may pose minor rock slide hazards. Few bent aspen trees were observed, even on shallow slopes, which can be due to snow creep. There are areas of saturated soil on this mountainside which may pose a moderate risk of mass movement if not addressed by PDC or avoided.

Most map units have severe hazard of erosion on natural-surface roads due to steep slopes and susceptibility to erosion, and most are also poorly suited for natural-surface roads generally due to slope steepness. Large boulders up to 5 feet in diameter were noted on the north slope above Middle Boulder Creek in map unit 7757D. These boulders would require special handling for road or chairlift construction. Lithic Cryorthents (map units 7790B and 8772C) and rock outcrop (in map units 7709D and 7757D) are also rated as poorly suited for natural-surface roads due to high landslide potential. However, as discussed above, these map units rated with a high landslide potential probably have a low to moderate landslide potential within the study area.

Alluvial/wetland soil map unit 6101A has a moderate hazard of erosion on natural-surface roads due to slope steepness and susceptibility to erosion, and it is poorly suited for natural-surface roads due to slope steepness in some areas. Alluvial/wetland soil map unit 7101A has a very severe hazard of erosion on natural-surface roads due to high organic matter content and is poorly suited for natural-surface roads due to flooding and low soil strength.

Even though most map units have severe limitations for natural-surface roads and trails, this does not imply that the map unit is entirely unsuitable for that use, but can usually be overcome with proper PDC. However, these ratings indicate that frequent maintenance and costly erosion control measures would be required.[403]

Interpretations for re-establishment of vegetation and natural recovery following disturbance were based on soil characteristics that affect erosion, surface stability, and plant production potential. These characteristics included soil available water holding capacity; rock content; soil reaction; content of sodium, salts, calcium carbonate, and organic matter; erodibility; and soil texture.

Most soils have severe limitations for re-establishment of vegetation and natural recovery following disturbance, primarily due to low and very low available water holding capacity and high rock content. Thin soils (Rogert, Catamount, and Lithic Cryorthents) also have severe limitations due to shallowness to bedrock. In addition, low organic matter contents are a moderately limiting factor in these soils. Soils along Middle Boulder Creek and in wetlands (soil map units 6101A and 7101A) are better suited for vegetation re-establishment because they have higher water holding capacities, have fewer rocks, and

[403] USDA Natural Resources Conservation Service, 2008

have higher organic matter contents. With the proper applications of ARP-approved mulch and seed, and with proper implementation and maintenance of surface stabilizing BMPs, re-establishment of vegetation and natural recovery of disturbed areas would be expedited and would more quickly provide a stabilized ground surface.

Existing Soil Disturbances

There are a total of about 226 acres of existing soil disturbances within the existing study area. Existing soil disturbances are presented in Table 3J-14. Most of the disturbances are associated with ski trails, and 107.4 acres of disturbance occur on NFS lands.

Table 3J-14:
Disturbance Acres – Existing Conditions

Soil Disturbances		
Disturbance Type	**NFS Lands (acres)**	**Private Lands (acres)**
Ski Trails and Chairlifts	100.9	81.2
Roads	5.8	7.4
Base Area – Parking Lots, Roads and Buildings	0.5	23.8
Kettle Pond	0.0	3.8
Pipeline Corridor	0.2	0.3
Private Homes/Cabins	0.0	2.1
Total	**107.4**	**118.6**

Minor erosion and sedimentation was observed during site visits, primarily on access roads, and sediment deposition originating from road surfaces was noted at some culvert outlets. Evidence of sedimentation to waterways was very minimal. In general, erosion control management and the re-establishment of vegetation have minimized the risk of erosion from existing ski trails; however, not all ski trails, especially those that were graded or have had intermittent maintenance or that lack topsoil have been fully rehabilitated. And erosion has been noted on some ski trails where ground cover has been disturbed by equipment. In addition, compared to baseline conditions, tree removal from ski trails and snowmaking have increased the magnitude of peak runoffs, which has led to an increase risk of erosion and sedimentation. Typically, revegetation establishment on ski trails takes three to five years but potentially can take up to ten years especially in areas that were graded and had minimal restoration efforts.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

All of the Study Watersheds would experience development activities under the action alternatives. Clear-cut acreage would be similar under both action alternatives (65 acres versus 59 acres, respectively) while new gladed areas would be significantly larger under Alternative 3 (98 acres versus 196 acres). Table 3J-15 summarizes the actions included in Alternatives 2 and 3.

Table 3J-15:
Eldora Mountain Resort Watersheds

Watershed	Area (acres)	Summary of Alternative 2 Actions	Summary of Alternative 3 Actions
Corona	664	New Challenge Mountain facility, Corona chairlift replacement, ski terrain development and snowmaking.	New Challenge Mountain facility, Corona chairlift replacement, ski terrain development and snowmaking.
Indian Peaks	268	New Challenge Mountain facility, new Placer Express chairlift, ski terrain development, utilities trenching and snowmaking.	New Challenge Mountain facility, ski terrain development and snowmaking.
Peterson Lake	952	Challenge chairlift replacement, parking area expansion.	Challenge chairlift replacement, parking area expansion.
Jenny Creek-EMR	719	Lookout facility expansion, new Jolly Jug chairlift, ski terrain development and snowmaking.	Lookout facility expansion, new Jolly Jug chairlift, ski terrain development and snowmaking.

Note: Refer to Figure 12

Alternative 1

Watershed

Under the No Action Alternative, EMR would continue current summer and winter seasonal operations. Creation of additional skiing terrain would not occur with selection of this alternative. Man-made snow would continue to be applied on 164 acres of ski trails with existing snowmaking infrastructure, at the average ratio of 1.65 acre feet of water per acre of ski trail. This alternative would have no direct or indirect effects on the watershed and aquatic resources.

However, on-going ski area operations and maintenance would continue to require management to minimize erosion and sedimentation within EMR. Existing concerns regarding the stream health of Middle Boulder Creek are expected to continue. As discussed in the Affected Environment Stream Health section, Middle Boulder Creek downslope from the Corona and Indian Peaks Watersheds show degraded stream health relative to the LWD and bank stability metrics. Density of LWD is negatively affected by the existing beaver pond-complex and by tree removal within the WIZ. Currently, the WIZ along this reach of Middle Boulder Creek is affected by the proximity of Hessie Road and by public use. No additional impacts to the WIZ of the Study Watersheds would occur if Alternative 1 is selected, thus deterioration of this metric is not expected. Bank instability is primarily caused by increases in the length of channel network and CDA. Selection of Alternative 1 would not cause changes to these two parameters; however, the lower reaches of Middle Boulder Creek near EMR would continue to adjust to the effects of existing CDA, such as Hessie Road. Additional resource damage to Middle Boulder Creek stream banks would possibly occur under Alternative 1.

Riparian Areas

Within the study area, the limits of the riparian habitat roughly correspond to those of wetland boundaries adjacent to streams and ponds. On-going operations would continue to minimize impacts to riparian areas where possible.

Soils

Soils within the study area that have moderate to very severe erosion hazard after disturbance or on natural surface roads would continue to be managed to minimize impacts to soils and water resources from erosion. Due to the soil types, regular, on-going maintenance appears to be successful in most areas at minimizing erosion based on the lack of rilling and sediment deposition within the study area.

Ongoing and future maintenance of roads and ski trails and MPB management would continue to have minor impacts on soils, such as compaction, displacement of nutrient-rich topsoil, and increase in runoff, resulting in some erosion and sedimentation. As mentioned above in Existing Soil Disturbances, minor erosion and sedimentation continue to occur on existing roads and ski trails. These impacts are more pronounced in areas that had been graded. Better application and maintenance of BMPs are needed to further reduce existing erosion.

Alternative 2 – Proposed Action

Watershed

Alternative 2 involves clearing 65 acres and thinning 98 acres of existing forested areas within the Study Watersheds. Additionally, Vegetation Management Prescriptions would result in tree removal and are analyzed in the model (refer to Chapter 2 for a description of vegetation management projects contained in Alternative 2). The proposed tree removal would occur within all four Study Watersheds with 28 percent of the tree clearing (18 acres) occurring on private lands. Table 3J-16 provides a summary comparison between pre-development, existing, and proposed forest acreage. Tree removal has the potential to negatively impact surface and groundwater hydrology. For example, tree clearing may affect the water balance by decreasing the amount of water consumed by vegetation (i.e., evapotranspiration) and have an impact in wind scour, soil infiltration rates, and increased solar radiation reaching the snowpack. Such impacts to the watershed are often associated with increased annual water yields and with changes in runoff timing (earlier and faster snowmelt processes). These potential impacts are discussed in more detail in the Water Yield and Stream Health sections below.

Table 3J-16:
Comparison of Existing and Proposed Impacts to Forests at EMR

Watershed	Baseline Forested Areas	Existing Clear-Cut		Alternative 2 Clear-Cut (Existing + Alternative 2)	
		Surface Area	Percent of Baseline Forest	Surface Area	Percent of Baseline Forest
	(acres)	(acres)	(%)	(acres)	(%)
Corona	508	48	10	66	13
Indian Peaks	264	48	18	69	26
Peterson Lake	904	111	12	119	13
Jenny Creek-EMR	651	16	3	35	5

Note: Minor differences between table data and text may occur due to rounding.

Of the 115 acres of proposed new ski terrain, approximately 55 acres correspond to new ski trails, all of which would have snowmaking capabilities. In order to save energy and water needs, and to minimize potential impacts under the Proposed Action, EMR proposes to improve its snowmaking practices from an efficiency standpoint. As a result of the improved snowmaking practices, the average snowmaking water usage would not increase under the Proposed Action. In other words, under Alternative 2, EMR would continue to pump, on average, 270 acre feet of water through its snowmaking guns. Thus, the corresponding average ratio of snowmaking water applied per acre of ski trail would be reduced to 1.25 acre feet per acre, much closer, but still higher than, the ratios applied by other ski areas in Colorado.[404] During years with lower than average snowfall precipitation, EMR may have to use snowmaking water in excess of the 270 acre feet annual average. However, in years when snowfall is higher than average, EMR may use less than 270 acre feet for its snowmaking applications. A summary of the proposed changes in snowmaking coverage and water use is presented in Table 3J-17.

Table 3J-17:
Proposed Changes in Snowmaking Coverage and Water Use – Alternative 2

Watershed	Existing Snowmaking		Alternative 2 Snowmaking			
	Coverage (acres)	Water Use (acre feet)	Coverage (acres)	Percent Change (%)	Water Use (acre feet)	Percent Change (%)
Corona	41.0	67.5	58.6	43	73.1	8
Indian Peaks	41.3	68.0	59.7	44	74.4	9
Peterson Lake	73.1	120.4	73.1	0	91.2	-24
Jenny Creek-EMR	8.3	13.7	24.9	200	31.0	127
Total	**163.7**	**269.6**	**216.3**	**32**	**269.6**	**0**

[404] The ratio of snowmaking water pumped per acre of trail approximately ranges between 0.90 and 1.00 acre feet/acre, depending upon snowmaking required to build and maintain snow-park's features, such as half-pipes and jumps.

Water Rights

Indoor and landscape irrigation water uses and associated depletions under Alternative 2 are expected to increase by 3 acre feet to approximately 7 acre feet. This relatively small increase in water demand would be due to an increase in EMR's seating capacity with construction of the proposed Challenge Mountain Facility and renovation of the Lookout Facility and can be accommodated under EMR's existing augmentation plan. No changes to water use and stream depletions due to snowmaking operations are expected to result from implementation Alternative 2.

Water Yield

Hydrologic computations performed using the WRENSS Model show that, under the Proposed Action, water yields originating from the Study Watersheds would increase, on average, by about 3 percent relative to existing conditions and by approximately 43 percent as compared to baseline, or pre-ski area development, conditions. The WRENSS hydrologic model run for the Proposed Action shows that as a result of implementation of the Proposed Action, water yields and peak discharges would increase in some watersheds and decrease in others. These changes in water yields and peak discharges are a consequence of the combination of proposed tree removal and snowmaking applications. Within each watershed, tree removal reduces the amount of water intercepted, stored, and transpired by the vegetation; therefore, an increase in water yield may be expected as a result of tree removal. Application of snowmaking water also results in an increase of the watersheds' yield relative to baseline conditions. However, as compared to existing conditions, snowmaking water input would increase for some watersheds and decrease for others (refer to Table 3J-17). The analysis indicates that average annual yield produced by the Corona and Indian Peaks Watersheds (directly tributary to Middle Boulder Creek) would total 869 acre feet. This represents a 4 percent increase relative to the existing yield of these two watersheds combined. Water yield tributary to Jenny Creek would average 440 acre feet/year, an 8 percent increase as compared to existing average conditions, while yield tributary to Peterson Lake would be 631 acre feet during an average year, a 2 percent reduction relative to current conditions. Table 3J-18 summarizes the computed water yields for baseline, existing, and proposed conditions. Similarly, some of the Study Watersheds would experience an increase in their annual peak flows while others would see a reduction in peak discharge. As shown in Table 3J-19, annual peak flows are estimated to increase by 21 and 6 percent in the Indian Peaks and Jenny Creek-EMR Watersheds respectively. The Corona and Peterson Lake Watersheds, on the other hand, would experience a 2 percent decrease in their annual peak discharge. The calculated changes in peak flow are shown in Table 3J-19.

As described in the Water Yield paragraphs of the Affected Environment section, results from the WRENSS hydrologic model represent watershed yield available to the area streams. A portion of the modeled increase in water yield corresponds to groundwater, particularly during the beginning of the snowmelt season, before the upper layers of soil have been saturated. The hydrographs modeled for the Proposed Action display increases in watershed yields but do not show a significant change in the timing of peak flows. In other words, the WRENNS model predicts that peak flows would continue to occur, on

average, at approximately the same time of the year (late May/early June). However, the model also indicates that for the Jenny Creek-EMR and Indian Peaks Watersheds an increased volume of snowmelt water would be available for infiltration and runoff earlier in the season. Thus, it would be expected that in and around the proposed new trails in these two watersheds, the upper soil layers would be saturated earlier in the spring as compared to existing conditions. This could, in turn, cause the area springs and intermittent streams to flow at an increased rate during late April and early May, as compared to existing conditions.

Table 3J-18:
Estimated Changes to Annual Yield – Alternative 2

Watershed	Water Yield (acre feet)			Change Relative to Existing Yield (%)	Cumulative Change Relative to Baseline Yield (%)
	Baseline	Existing	Alt. 2		
Corona	456	587	585	0	28
Indian Peaks	141	248	284	14	102
Tributary to MBC[a]	**596**	**835**	**869**	**4**	**46**
Peterson Lake	387	644	631	-2	63
Jenny Creek-EMR	383	407	440	8	15
Total	**1,963**	**2,721**	**2,809**	**3**	**43**

[a] The Corona and Indian Peaks Watersheds are direct tributaries to Middle Boulder Creek.

Table 3J-19:
Estimated Changes to Peak Flows – Alternative 2

Watershed	Peak Flows (cfs)			Change Relative to Existing Peak Flow (%)	Cumulative Change Relative to Baseline Peak Flow (%)
	Baseline	Existing	Alt. 2		
Corona	4.1	5.5	5.4	-2	31
Indian Peaks	1.2	2.2	2.6	21	124
Peterson Lake	3.4	5.9	5.7	-2	70
Jenny Creek-EMR	4.1	4.3	4.6	6	12

Water Quality

As part of the Proposed Action, a new food and beverage facility would be constructed on Challenge Mountain, near the top terminal of the Indian Peaks chairlift. The proposed Challenge Mountain Facility would have 850 seats. Additionally, the existing Lookout Facility would be renovated and its capacity increased to 384 seats. Both facilities would treat and dispose wastewater through a septic tank-leach field sewage disposal system. Although the new Challenge Mountain Facility would be located within the Indian Peaks Watershed and the renovated Lookout Facility would be sited in the Jenny Creek-EMRWatershed, both sewage disposal systems would be constructed within the Corona Watershed.

Typically, bacteria in the septic tank help digest between 30 and 50 percent of the wastewater suspended solids; the remaining solids settle and have to be periodically removed from the tank.[405] Liquid effluent from the septic tank flows to the leach field where it percolates into the surrounding soil. Among the pollutants found in the effluent are bacteria, viruses, phosphorus and nitrates. A correctly designed and maintained system filters and kills bacteria and viruses. Native soils and/or proper fill retain phosphorus while nitrates are diluted in groundwater.

The soils survey for the ARP Area was consulted to obtain preliminary soil data.[406] The survey shows that soils at the location of the proposed sewage disposal systems belong to the Leighcan and Leighcan-Catamount families. These soils are generally described as silt loams, loams, and sandy loams, with textures ranging from gravelly to cobbly to extremely stony. The survey further describes the Leighcan-Catamount families as "somewhat excessively drained" with a saturated hydraulic conductivity of approximately 6 to 20 inches per hour. Additionally, the soil temperature regime at this site is classified as *Cryic*, which can be generally described as having a mean annual temperature higher than 32 and lower than 46ºF at 50 cm. Cold soil temperatures can lead to freezing problems and reduction in microbial activity in septic systems. These characteristics would indicate, at this preliminary level of analysis, that the type of soil present at the location of the proposed sewage disposal system shows limitations for the performance of septic tanks and absorption fields. However, these limitations can be overcome with proper engineering design and maintenance. Site specific investigation of the soils, including testing and analysis by qualified personnel would be necessary for design and construction of the septic system. In addition, an onsite wastewater system permit would be required through Boulder County.

Standards, rules, and regulations for location and construction of sewage disposal systems are included in the State of Colorado's Guidelines on Individual Sewage Disposal Systems (Guidelines).[407] The Guidelines include horizontal distances required between the septic tank-leach field system and relevant terrain features such as streams, lakes, and springs. For example, the minimum horizontal distance between a septic tank and a spring, lake, or stream is 50 feet. A streams and wetlands survey was conducted in 2012 within the Study Watersheds.[408] No wetlands or surface waters were mapped within 1,000 feet of the proposed sewage disposal systems. It is important to note that no water body within the Study Watersheds is included in the Colorado State 303(d) list of impaired waters.[409] In addition, the Guidelines establish that reasonable periodic collection and testing of effluent samples may be necessary to insure compliance with the rules and regulations. No impact to the water quality of the Study Watersheds is anticipated to occur as a consequence of installation of the described sewage disposal systems.

[405] Linderburg, 2008
[406] USDA Natural Resources Conservation Service, 2008
[407] Colorado Department of Public Health and Environment, 2004
[408] Western Ecological Resources, 2013
[409] Ibid.

Alternative 2 proposes to implement projects near intermittent and perennial streams within the study area, including Middle Boulder Creek. Such projects involve vegetation removal and terrain grading. Therefore, impacts to the water quality of the study area streams could result from increased sediment loading into the streams. These potential impacts and associated PDC are discussed in detail in the Stream Health paragraphs below.

Stream Health

Alternative 2 would involve tree removal and terrain grading within areas of the Study Watersheds, including the WIZ. Potential impacts of the Proposed Action were evaluated against stream health conditions measured on Middle Boulder Creek. As shown in Table 3J-8, the Study Reach on Middle Boulder Creek was classified as *Robust* for the undercut banks and fine sediments metrics, and as *Diminished* for bank stability and LWD. As discussed in the Affected Environment, tree removal within the WIZ can negatively affect the LWD stream health metric while trail construction and/or terrain grading may impact stream health in metrics such as banks stability and channel sedimentation. MM-3 included in the WCPH states that only those projects that maintain or improve long-term stream health should be allowed in the WIZ next to perennial and intermittent streams.

In order to evaluate the potential additional CDA resulting from the Proposed Action, the proposed vegetation clearing and grading were mapped and quantified. Approximately 12 acres of tree clearing, including 1.3 acres of grading, are proposed to occur within the Study Watersheds' WIZ. Tree clearing resulting from vegetation management prescriptions is also included. Table 3J-20 summarizes the acreage of vegetated WIZ under baseline, existing, and proposed conditions. The proposed ski trails would be constructed along approximately 605 feet of perennial and 998 feet of intermittent stream channels, all first order streams. In addition, the Proposed Action includes construction of one stream crossing: a bridge over Middle Boulder Creek to access the bottom terminal of the proposed Placer chairlift (for construction and maintenance only). The paragraphs below discuss potential impact to stream health within each study watershed.

Table 3J-20:
Proposed Tree Clearing within the WIZ of Study Watersheds – Alternative 2

Watershed	Baseline Vegetated WIZ (acres)	Existing Vegetated WIZ		Proposed Vegetated WIZ	
		Acreage	Percent of Baseline	Acreage	Percent of Baseline
Corona	56	42	74%	39	69%
Indian Peaks	34	31	90%	22	65%
Peterson Lake	80	66	83%	66	83%
Jenny Creek-EMR	36	35	99%	35	99%

Corona and Indian Peaks Watersheds (Both Tributary to Middle Boulder Creek)

Water yield originating in the Corona and Indian Peaks Watersheds is expected to increase by approximately 4 percent relative to existing conditions as a result of the Proposed Action. Approximately 18 acres in the Corona Watershed and an additional 20 acres in the Indian Peaks Watershed are proposed to be clear-cut. Glading would also occur in these watersheds, 47 acres and 20 acres respectively. From these totals, 2.9 acres of tree removal would take place within the WIZ of the Corona Watershed, while 8.6 acres of tree clearing would occur in the Indian Peaks Watershed WIZ (11.5 acres total for these two watersheds). As mentioned earlier in this report, the Corona and Indian Peaks Watersheds are directly tributary to Middle Boulder Creek and a portion of the WIZ for these two Study Watersheds overlaps the WIZ of Middle Boulder Creek. Of the 11.5 acres of total tree clearing, approximately 1.8 acres of tree clearing would occur within that portion of the Study Watersheds' WIZ that overlaps the Middle Boulder Creek WIZ. Included in this acreage are 0.6 acre of grading within the Indian Peaks/Middle Boulder Creek WIZ necessary to construct the proposed Placer chairlift bottom terminal and access road. The proposed road to access the Placer chairlift bottom terminal would be approximately 300 feet long and require a bridge to cross Middle Boulder Creek. It is important to note that the proposed bridge would be designed to comply with State and Federal regulations, including Section 404 of the CWA, and avoid impacts to special aquatic sites such as pool-riffle complexes.

Projects proposed for the Corona and Indian Peaks Watersheds would require appropriate PDC in order to "maintain or improve" stream health as stated in the WCPH's MM-3 and MM-5. Moreover, in accordance with Design Criteria included in MM-1, CDA within third-order watersheds (such as Middle Boulder Creek) or larger should be limited so the total length of the stream network is not increased by more than 10 percent. Further, the Design Criteria states that in third-order watersheds with *Diminished* stream health, only projects that would maintain or reduce watershed-scale CDA should be approved. Additionally, MM-4 and MM-9 through 11 provide direction for the design and construction of roads and stream crossings.

Analysis of field observations recorded during the fall 2012 site visits indicates that the approximately 2,645 feet of existing connected roads within the Corona and Indian Peaks Watersheds could be effectively disconnected from the stream network by properly implementing and maintaining standard PDC. Similarly, the 1,770 feet of new roads proposed for the Corona and Indian Peaks Watersheds must be designed, constructed, and maintained in compliance with MM-1, MM-3, MM-4, and MM-5 and would not be connected to the stream network. Proposed PDC are included in Table 2-3 under the heading "Watershed and Aquatic Resources." Specific PDC for the Corona and Indian Peaks Watersheds are included in Table 2-3 under the headings "Watershed and Aquatic Resources, Corona and Indian Peaks Watersheds (Alternative 2)" and are designed to:

- Minimize the impacts of 0.2 acre of existing roads currently connected to the perennial stream proximate to the Corona chairlift bottom terminal and effectively reduce the length of the total stream network;

- Minimize the impacts of 0.5 acre of existing roads currently connected to intermittent streams near the Indian Peaks chairlift bottom terminal, effectively reducing the length of the total stream network;
- Minimize the impacts of 0.9 acre of proposed grading (including 0.1 acre of re-grading) due to construction of new road segments to the proposed Challenge Mountain Facility, Challenge chairlift top terminal, and Placer chairlift top terminal, effectively limiting the extent of CDA and the length of total stream network within the Watershed;
- Minimize potential impacts to the stream health of Middle Boulder Creek associated with 0.2 acre of proposed grading resulting from the construction of the new access road to the proposed Placer chairlift bottom terminal, to be constructed on both sides of Middle Boulder Creek;
- Minimize potential impacts of 0.9 acre of vegetation removal and terrain grading needed for construction of the Placer chairlift bottom terminal and replacement of the Corona chairlift bottom terminal;
- Minimize potential impacts of approximately 10.4 acres of vegetation removal and terrain grading needed for construction of the proposed Placer chairlift top terminal, Corona chairlift replacement top terminal, Challenge Mountain Facility, Lookout facility expansion, grading of sections of ski trails *P-1, P-3, P-5,* and *P-6,* and various utility installation projects; and
- Minimize potential impacts associated with construction of proposed ski trails in the Corona and Indian Peaks Watersheds (approximately 35 acres of tree removal only, no grading).

Construction and implementation of the Proposed Action within the Corona and Indian Peaks Watersheds following the PDC outlined above would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of Middle Boulder Creek.

Peterson Lake Watershed

The Peterson Lake Watershed currently has approximately 3.3 acres of CDA (refer to Table 3J-10). This connected acreage corresponds to roads and parking located near streams tributary to Peterson Lake. The analysis of CDA shows that the channel network within this watershed has increased by approximately 27 percent due to connected roads. The Proposed Action would clear-cut approximately 8 acres of terrain, including 6 acres of terrain grading. These impacts are associated with proposed Challenge chairlift replacement/re-alignment, the expanded parking area, and a 130-foot section of the proposed road to access the Jolly Jug chairlift bottom terminal. It is important to note that the proposed clear-cut and grading in the Peterson Lake Watershed would be located outside of the watershed's WIZ; also, 90 percent of the proposed disturbance would be located on private lands. Under the Proposed Action, watershed yield and peak discharge would be reduced by about 2 percent as compared to existing conditions, due to a 24 percent reduction in the snowmaking water that would be applied to the Peterson Lake Watershed (refer to Table 3J-18).

In order to protect the stream health of Peterson Lake Watershed, impacts resulting from the proposed tree removal and terrain grading must include appropriate PDC. All areas proposed to be graded must be protected from surface erosion by implementing standard BMPs for erosion and sediment control. Implementing and maintaining PDC would ensure the proposed disturbed areas would not be connected to the stream system. In addition, areas currently connected to the Peterson Lake Watershed stream network could be disconnected by relatively simple improvements to the roads and parking areas' drainage features, such as sediment traps at the discharge of road-side ditches. Proposed PDC are included in Table 2-3 under the heading "Watershed and Aquatic Resources." Specific PDC for the Peterson Lake Watershed are included in Table 2-3 under the headings "Watershed and Aquatic Resources, Peterson Lake Watershed (Alternative 2)" and are designed to:

- Minimize the impacts of 0.5 acre of existing CDA and reduce the length of total stream network;
- Minimize impacts to stream health and watershed condition associated with approximately 7 acres of vegetation clearing and terrain grading proposed for construction of additional parking space; and
- Minimize impacts to the Watershed associated with approximately 2 acres of tree removal and 1 acre of terrain grading needed for construction of the proposed Challenge chairlift replacement.

Implementation of the Proposed Action within the Peterson Lake Watershed following PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of the watershed.

Jenny Creek-EMR Watershed

Tree removal within the Jenny Creek-EMR Watershed would be necessary to construct the Jolly Jug ski terrain, chairlift and associated access road. As shown in Tables 3J-16 and 3J-20, development under the Proposed Action would clear approximately 19 acres of forests located outside of the WIZ. No impact to this watershed's WIZ would occur under the Proposed Action. The 19 acres of tree clearing include approximately 2 acres of terrain grading. Additionally, 9 acres of forest would be thinned to create the Jolly Jug Glades.

The Jenny Creek-EMR Watershed has an existing CDA of approximately 1 acre, associated with sections of Jenny Creek Road that exist in close proximity to Jenny Creek. The analysis of CDA within the Jenny Creek-EMR Watershed also shows that the channel network length has been increased by approximately 36 percent due to this connected, non-ski area road. Water yield and peak discharge relative to existing conditions are expected to increase by approximately 8 and 6 percent respectively, as a result of implementation of the Proposed Action.

Implementation of the Proposed Action must include PDC to protect the stream health of Jenny Creek. All areas proposed to be graded (both chairlift terminals and access road) must be protected from surface

erosion by implementing standard PDC and BMPs for erosion and sediment control. Proposed PDC are included in Table 2-3 under the heading "Watershed and Aquatic Resources." Specific PDC for the Jenny Creek-EMR Watershed are included in Table 2-3 under the headings "Watershed and Aquatic Resources, Jenny Creek-EMR Watershed (Alternative 2)" and are designed to:

- Minimize impacts associated with construction of the *Jolly Jug* ski trail (16.5 acres); and
- Minimize potential impacts to the watershed by the proposed 2.4 acres of tree removal and terrain grading required for construction of the Lookout Facility expansion and the Jolly Jug chairlift terminals and access road, effectively limiting the extent of CDA and the length of total stream network in the Jenny Creek-EMR Watershed.

Construction and implementation of the Proposed Action, following the applicable PDC outlined above would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of Jenny Creek.

Wetlands

In accordance with EO 11990, the Proposed Action was designed to avoid and minimize impacts to wetlands wherever possible. Although due to the scale of the project some temporary impacts to wetlands would occur, permanent impacts to wetlands would be mitigated.

Alternative 2 would directly/permanently impact 0.07 acre of wetland (PEM/PSS/PFO wetland) for the construction of the proposed bottom terminal for the Corona chairlift. No wetland fens would be directly impacted by Alternative 2 project activities. In addition, there would be 0.02 acre of temporary wetland impacts for the installation of utility lines, which would be restored post-construction. Jurisdictional wetlands and waters of the U.S. are regulated by the USACE under Section 404 of the Clean Water Act, which requires a permit to discharge dredged or fill material into waters of the U.S., including wetlands. The Forest Service would require mitigation for this wetland impact. Mitigation would likely include purchasing compensatory wetland acreage from a wetland mitigation bank. The type and amount of wetland mitigation for EMR would be determined in partnership with the USACE during the 404 permit process.

Indirect impacts to wetlands through forested overstory removal are expected to impact 1.41 acres of wetlands including 0.11 acre of the Corona fen, associated with the proposed Placer chairlift line and associated ski trails on the slope above Middle Boulder Creek. The forested overstory removal would likely cause a change in the species composition of the wetlands away from shade tolerant species to more sun tolerant species. In addition, snow compaction from ski trail grooming and skier use may affect the underlying wetlands by increasing frost depth and delaying plant phenological development.

Overall, there would be little change to wetland functions and values under Alternative 2. There would be a small acreage of direct wetland impact (0.07 acre) for the installation of the proposed bottom terminal

for Corona chairlift, which would eliminate all functions for this small area of wetlands. However, these functions would be mitigated per terms and conditions of a 404 permit. It should be noted that the 0.07 acre of wetlands to be directly impacted in this area are primarily herbaceous wetlands located in ski tails and are not pristine high quality wetlands. In addition, a PDC would be implemented to ensure that the wetland fen below the bottom terminal of the Corona chairlift would not be adversely impacted during construction. The indirect impact to 1.41 acres of wetlands through overstory forest removal including 0.11 acre of overstory removal in the Corona fen would cause a change in wetland vegetation composition and structure. This change could affect some functions such as groundwater discharge, which may actually increase due to reduced evapotranspiration rates from tree removal. Other functions such as velocity reduction, erosion protection, and the water quality functions would stay the same as shade-loving forbs would be replaced by sun-loving sedges, grasses and small shrubs which generally have deep binding root masses that slow the velocity of water, control erosion, and uptake sediments and nutrients. Finally, wetland habitat functions would likely change under Alternative 2. For example, the removal of overstory trees would eliminate nesting habitat for some species of birds; however, over time the understory vegetation may become dominated willows or other shrubs which provide nesting habitat for other species. Snow compaction may also lead to changes in wetland function. Snow compaction can alter the thermal characteristics of soil lowering surface soil temperatures and increasing frost depth.[410] These colder soil temperatures and deep freezing can negatively affect the survival of many plants including associated soil microorganisms and fungal mycorrhizae.[411] Compacted snow also melts later than uncompacted snow, which leads to delayed flowering times, reduced seed set, and possibly long-term population viability. However, delayed snow melt may also provide extra soil moisture during the growing season which may benefit some plant species. As described above, changes in wetland species composition may affect the functioning of wetlands in various ways. The effect of snow compaction on wetlands with deep layers of organic soils (histic epipedons and histosols), commonly known as fens, has recently been examined in Colorado. Although Cooper and Gage found no significant impacts to fens from moderate snow compaction due to Nordic skiing and more intensive and frequent snow compaction from snowmobiling and snowcat use, they did find that high intensity and frequent snow compaction from mechanized grooming did show a decrease in peat soil temperatures and a reduction in effective growing season length.[412] Likewise, at EMR the effects to fens from snow compaction would also be variable depending on if the area is an intensively groomed ski trail or an off-trail ski glade. For the intensively groomed and compacted ski-trails, the reduction in growing season length of fens could potentially affect ecosystem processes such as production and decomposition and overall site carbon dynamics. However, the high interannual variability in mountain snowpack may dwarf any antropogenic effects from snow compaction, except in areas receiving early, frequent, and intense use.[413]

[410] Neumann and Merriam, 1972; Wanek, 1971 and 1973; Wanek and Shumacher, 1975
[411] Wanek, 1971 and 1973
[412] Cooper and Gage, 2013
[413] Ibid.

Both direct and indirect impacts to wetlands under Alternative 2 would be avoided and minimized to the maximum extent practicable. The proposed bottom terminal of the Corona chairlift is designed to minimize disturbance to surrounding wetlands to the greatest extent possible. The existing bottom terminal site would be raised approximately 6 feet to minimize the footprint necessary for this larger terminal structure (a grading plan for this terminal is located in the project file). To better manage surface and ground water in this location, a French drain would be constructed to appropriately route water around the terminal footprint and minimize erosion and sedimentation. However, the French drain would be installed in such a manner as to not adversely drain any adjacent wetlands. In addition, PDC would be implemented to ensure there are no direct impacts to fens from the construction of the terminal. Note, the proposed chairlift upgrade is located in the current alignment/location, minimizing impacts to other resources within the area. The bridge over Middle Boulder Creek would be designed to span any wetlands along Middle Boulder Creek, and PDC would be designed to ensure that trees are flush-cut by hand within wetlands, that tree boles are not skidded over wetland vegetation, and slash is piled outside known wetlands. There could be potential indirect negative impacts to the wetland vegetation from shading of the bridge, but these changes would be relatively insignificant to the function and area of the wetland as a whole.

Riparian Areas

Impacts to riparian habitat are similar to those discussed for wetlands. In summary, there would be both direct impacts to riparian areas, where there would be a loss of function, and indirect impacts to riparian areas, where functions may change slightly due to the eliminated of a forested overstory. Refer to the Wetlands section above, for details. Under Alternative 2, there would be a direct impact to 0.01 acre of the relatively narrow riparian habitat along Middle Boulder Creek due to the installation of the bridge to access the bottom terminal of the Placer Express chairlift; direct impact to 0.07 acre or riparian/wetland habitat for the installation of the bottom terminal of the Corona chairlift; and temporary impact to 0.02 acre for the installation of utility lines. In addition, there may be secondary impacts to 1.41 acres of riparian/wetland habitat through forest overstory removal for Alternative 2.

All impacts to riparian areas, as well as their corresponding wetlands, would be avoided and minimized to the extent possible. PDCs are listed in Table 2-3.

Soils

Under Alternative 2 there would be 25 acres of soil that would be disturbed by grading, of which 10.6 acres would be on NFS lands and 14.4 acres on private lands (refer to Table 3J-21). Areas that would be disturbed by grading include sections of certain proposed ski trails, new roads, new or upgraded mountain facilities, parking lots, chairlift terminals, and utility lines. All utility lines, however, would be buried in access roads or under new and existing ski trails.

There would also be approximately 156.6 acres of soil disturbance resulting from tree removal operations, of which 138.6 acres would be on NFS lands and 18 acres on private lands (refer to Table 3J-21).

Table 3J-21:
Disturbance Acres – Alternative 2

Soil Disturbed by Grading		
Disturbance Type	**NFS Lands (acres)**	**Private Lands (acres)**
New Ski Trails	2.2	0.0
New Roads	0.6	0.8
New or Upgraded On-Mountain Facilities (includes septic fields)	1.9	0
Parking Lots	0	11.7
Chairlift Terminals	2.6	1.6
Utility Lines	3.3	0.3
Total	**10.6**	**14.4**
Soil Disturbed by Forest Overstory Removal (No Grading)		
Disturbance Type	**NFS Lands (acres)**	**Private Lands (acres)**
New Ski Trails and Chairlift Alignments	41.2	10.4
New Tree and Glades Skiing	97.4	0.6
Defensible Space	0[a]	7.0
Total	**138.6**	**18.0**

[a] Defensible space on NFS lands is including in the soil disturbed by grading calculation under new or upgraded on-mountain facilities.

Impacts from ground disturbance activities in Alternative 2 would include an increase in soil erosion and sedimentation, changes to soil physical and chemical characteristics reducing soil productivity, permanent loss of soil resources, and a potential increase in landslide and slump hazards (refer to Table 3J-22).

Grading by use of heavy machinery would create severe and long-term impacts to the soil by removing the protective vegetation cover, displacing the organic-rich surface layer, degrading soil structure, altering the soil profile, and increasing soil compaction resulting in reduced water infiltration and increase in runoff. All of these impacts lead to an increase risk in erosion and sedimentation and reduction in soil productivity. On NFS lands, the greatest impacts from grading would result from construction of chairlift terminals, mountain facilities, ski trails, and new roads. Utility lines would be buried in new or existing ski trails. The original contour of graded areas, with the exception of buried utility lines, would be permanently altered and replaced with slope shapes designed for other specific uses.

Of the total 25 acres that would be graded, 10.8 acres would be reclaimed, of which most would be on NFS lands (refer to Tables 3J-21 and 22). The impacts from grading activities would be minimized with proper implementation and maintenance of BMPs/PDC, which would have a high probability in

preventing sediments from reaching waterways in the long-term. Erosion and sedimentation may occur over the short-term prior to vegetation re-establishment. Typically, revegetation establishment takes three to five years but potentially can take up to ten years. In addition, in the unlikely event of a very intense storm during construction, erosion and sediment controls could be overwhelmed creating a higher probability of short-term sediment delivery to waterways.

There would be severe and long-term impacts to the soil profile, soil structure, soil hydrologic functions, and soil productivity in reclaimed areas following grading activities. The extent of these areas is small compared to overall project disturbances. The length of time to re-establish the soil profile and structure may take decades. Over time, natural processes would rebuild the soil profile and soil structure that may or may not resemble the pre-disturbance condition. The loss or displacement of the nutrient-rich surface layer would affect the re-establishment of vegetation. The soil surface layer contains nutrient-rich organic matter, which also protects the surface from erosion and increases water holding capacity, and contains microbes essential to nutrient cycling for plant growth. If the biologically-active and nutrient-rich surface layer is not replaced on the surface, the re-establishment of vegetation would be more difficult and would require more time to provide a protective cover to erosion. To minimize these impacts and to expedite restoration, topsoil would be salvaged and then replaced following construction and then ARP-approved seed and mulch would be applied to promote soil stabilization and to minimize erosion.

Tree removal operations using heavy equipment on new ski trails can create minor ground disturbances on about 75 to 85 percent of the study area and moderate to severe ground disturbances over 15 to 25 percent of the area with skid-trails and landings. The impacts from tree removal operations, of which 138.6 acres would occur on NFS lands (refer to Table 3J-22), would be similar to the impacts of grading but would be less severe since soil displacement would be minimal. However, operation of heavy equipment could result in soil compaction and displacement of the surface, particularly where multiple passes with heavy equipment are made. Such impacts are expected to occur on temporary roads, skid trails, and log landings.

The spatial extent of impacts from tree removal operations would be significantly greater than the extent of impacts from grading activities. New glade skiing areas, where approximately 30 to 50 percent of the trees would be removed, would have a greater extent but experience less soil disturbance than on new ski trails where there would be complete tree removal. Since there would be less ground disturbance, soil impacts would be less severe in glade skiing areas than on new ski trails. In addition, new ski trails and gladed skiing areas would experience increases in peak runoffs due to the effects of tree removal and snowmaking, increasing the risk of erosion and sedimentation. With implementation of PDC, these impacts would be minimized.

Additional impacts to the soils resource could result from operations necessary for proper disposal of slash. Typically, ski areas dispose slash by one or more of the following methods: pile burning, chipping,

and/or lop and scatter. Pile burning is expected to be minimal due to local burn restrictions and air quality concerns. Burn piles built using heavy equipment generally measure less than 20 feet in diameter and are about 12 feet high. Hand-built piles are usually about 7 feet in diameter and less than 8 feet high. However, on a per acre basis large burn piles impact less ground than several small piles. On the other hand, large burn piles generate more heat during longer periods of time as compared to small, hand-built piles. Impacts to the soils resource associated with pile burning include the following: mortality of soil organisms and loss of their habitat; increase in soil pH; loss of nutrients; loss of organic matter; loss of soil structure.[414]

Slash disposal by chipping offers advantages and disadvantages, depending on the amount and spatial distribution of material. A chipper reduces tree tops and branches into pieces (chips) approximately 1 inch by 1 inch by 0.25 inch. These chips decompose on the ground, immobilizing nitrogen during the early stages of decomposition. However, when the chips become mostly decomposed, nitrogen is released and soil nutrient availability increases. In addition, properly dispersed chips help retain soil moisture, provide habitat for soil insects and microbes, and ground cover for erosion control. Lop and scatter requires cutting trees and branches into smaller pieces so all the slash lays relatively flat on the ground. Usually, this method reduces the slash to a depth of 12 to 24 inches. During subsequent winters, the snow would typically compress the material and provide moisture to the woody debris. PDC to minimize impacts by slash disposal are presented below.

There would be a permanent loss of 14.1 acres of soil resources in areas where soil productivity and soil hydrologic functions would be permanently replaced by other uses. These areas include parking lots, roads, chairlift terminals, and new or upgraded facilities. Only 1.5 of these acres would occur on NFS lands (refer to Table 3J-22). There would also be a long-term change of soil resources use on 138.6 acres of NFS land from forest/timber management to ski area management. This change in management would last through the lifespan of EMR.

[414] USDA Forest Service, 2011b

Table 3J-22:
Direct Impacts to Soil Resource – Alternative 2

Disturbance Type	NFS Lands (acres)	Private Lands (acres)
Soils disturbed by grading that would have severe and very severe water erosion hazard after disturbance	10.4	3.4
Areas that would be reclaimed and where there would be changes to soil physical and chemical characteristics	9.0	1.8
Permanent loss of soil resources	1.5	12.6
Grading disturbance in areas having moderate landslide potential[a]	2.7	0.0

[a] According to NRCS Soil Quality Indicators, these soils were mapped as having high landslide potential (USDA NRCS 2008). However, site specific review of the area found no evidence of past mass movement, slopes ranged from 20 to 55%, soil texture is generally sandy loam with 25 to 65% rock fragments, there are some seep saturated soils above and or near these areas, and the dominate bedrock fracture joints are at 20, 70, and 130 degrees (the aspect of the mountainside is generally about 30 to 40 degrees NE). There were very few scattered bent aspen tree trunks observed, even on shallow slopes, which can also indicate snow creep. There were no bent fir or spruce tree trunks observed. Based on results of the evaluation, these 2.7 acres have a moderate mass movement potential rather than a high potential. There are, however, numerous boulder talus piles and rock ledges (5 to 15 feet tall) on this mountain side which may pose minor rock slide hazards and areas of saturated soils that may have high mass movement potential.

Soil losses and sedimentation due to erosion from implementation of proposed projects would be long-term, but would return to natural rates once vegetation is re-established and stabilizes reclaimed areas, in about three to five years following reclamation if not affected by ongoing activities. Over steepened and south- and west-facing cut slopes may require more than five years for the vegetation ground cover to reach pre-disturbance levels without soil amendments.

The Forest Service estimated potential erosion and sedimentation of the impacts shown in Table 3J-22 using the WEPP. PDC were assigned in order to reduce erosion and the potential for sediment to reach waterways. The PDC identified by WEPP have been incorporated with the proposed PDC in the above Watershed section of Alternative 2. Refer to Table 2-3 for PDC identified to reduce impacts to soil characteristics and productivity.

An erosion-control monitoring and maintenance plan would be prepared and approved by the ARP prior to construction. The plan would include inspection by EMR of erosion control measures daily during construction. And during the re-stabilization period following construction, EMR shall inspect erosion control measures weekly, or anytime 0.5 inch or more of precipitation occurs within a 24-hour period. Erosion control measures found to be functioning improperly would be immediately addressed and corrected. Construction BMPs would be removed following construction. EMR would monitor the site over three years to ensure adequate ground cover is present to prevent erosion. As identified in Table 3J-22, 2.7 acres of grading would occur in areas classified as moderate landslide potential (all of these acres occur on NFS lands, primarily on the northeast sloping mountainside above Middle Boulder Creek). The grading would occur on proposed ski trails only. The slope contains areas of saturated soils and minor, seasonal flowing water, so if water is encountered, surface and subsurface drainage structures may be

required to intercept seepage and flow that could affect slope stability. Cut and fill slopes should be immediately stabilized with revegetation measures, mulch, erosion control fabrics, if needed, and other appropriate BMPs.

If the Proposed Action is carefully managed with effective erosion control, considering the low to moderate erodibility of soil management units these projects could be implemented without further impacts to the soils resource, and would not affect the soil management unit as a whole.

Alternative 2 Summary

Projects proposed under Alternative 2 impacting watershed, wetland and soil resources involve the following activities: tree removal; terrain grading; expansion of snowmaking coverage; implementation of improved snowmaking practices; parking (connected action); a new restaurant and improvements to an existing restaurant to increase its seating capacity. As discussed in the paragraphs above, these activities would result in changes to the surface and groundwater yields, which could in turn have a negative impact in water quality, stream health, and general watershed condition. However, implementation of the Proposed Action following the described PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the water quality or the health of the Study Watersheds, including the integrity of riffle-pool complexes.

Alternative 2 would directly impact 0.07 acre of wetland for the construction of the proposed Corona chairlift bottom terminal. The Forest Service would require mitigation for this wetland impact, and the mitigation would likely include purchasing compensatory wetland acreage from a wetland mitigation bank. There would also be temporary impacts to 0.02 acre of wetlands for the installation of utility lines, which would be restored post-construction. Indirect impacts to wetlands through forest overstory removal are expected to impact 1.41 acres of wetlands including 0.11 acre of the Corona fen. Overall, there would be little change to wetland functions and values under Alternative 2.

Under Alternative 2 there would be 25 acres of soil that would be disturbed by grading and approximately 156.6 acres of soil disturbance resulting from tree removal operations. There would be a 14.1 acres permanent loss of soils due to parking lot, chairlift and facility construction. Impacts from grading and tree removal in Alternative 2 would include an increase in soil erosion and sedimentation, changes to soil physical and chemical characteristics reducing soil productivity, permanent loss of soil resources, and a potential increase in landslide and slump hazards. With implementation of PDC, these impacts would be minimized and consistent with WCPH and Forest Plan direction. Table 2-5 in Chapter 2 of this report provides a summary comparison of potential environmental consequences between Alternatives 1, 2, and 3.

Alternative 3

Watershed

Alternative 3 includes most of the projects contained in the Proposed Action, except for the Placer Express chairlift and associated ski terrain. Instead, Alternative 3 proposes additional ski terrain within the current SUP boundary and an alternative design for the Jolly Jug skiable terrain and chairlift alignment. Implementation of Alternative 3 would involve 59 acres of tree clearing, including 9 acres of terrain grading, and 196 acres of tree thinning. Additionally, Vegetation Management Prescriptions would result in tree removal (refer to Chapter 2 for a description of vegetation management projects contained in Alternative 2). Approximately 46 percent of the tree clearing (28 acres) would occur on private lands. Table 3J-23 compares the acreage of baseline forests against clear-cut areas under existing and Alternative 3 conditions. A decrease in the consumption of water by vegetation; acceleration of the rate of snowmelt due to an enlarged area exposed to direct sunlight; and changes to soil infiltration rates are among the potential effects to the Study Watersheds expected to occur as a result of tree clearing. A discussion of potential impacts to the surface and groundwater hydrology follows in the Water Yield and Stream Health sections below.

Table 3J-23:
Comparison of Existing and Alternative 3 Impacts to Forests at EMR

Watershed	Baseline Forested Areas (acres)	Existing Clear-Cut		Alternative 3 Clear-Cut (Existing + Alternative 3)	
		Surface Area (acres)	Percent of Baseline Forest (%)	Surface Area (acres)	Percent of Baseline Forest (%)
Corona	508	48	10	67	13
Indian Peaks	264	48	18	54	21
Peterson Lake	904	111	12	119	13
Jenny Creek-EMR	651	16	3	43	7

Note: Minor differences between table data and text may occur due to rounding.

The approximately 49 acres of ski trails proposed under Alternative 3 would have snowmaking coverage. Similar to Alternative 2, EMR would improve its snowmaking practices to achieve energy and water savings and to minimize potential impacts to watershed resources. Under Alternative 3, EMR would continue to pump, on average, 270 acre feet of water through its snowmaking system, at a ratio of 1.27 acre feet of water per acre of trail with snowmaking coverage. Such ratio of water pumped per acre of snowmaking coverage is much lower than the proportion currently applied by EMR (1.6 acre feet/acre) and closer to, yet still higher than, the average volume of snowmaking water per acre of ski trail utilized by other ski areas in Colorado (approximately 0.90 to 1.00 acre feet/acre, depending on the extent of the ski area's snow-parks). The 270 acre feet of snowmaking water represent the volume of water pumped through the snowmaking guns during an average ski season. In other words, EMR may pump more water

for snowmaking operations during years when snowfall is lower than usual; during years with higher than average snow precipitation, EMR may pump less than 270 acre feet. Table 3J-24 displays a summary of changes in snowmaking coverage and water demands per watershed that would result from implementation of Alternative 3.

Table 3J-24:
Changes in Snowmaking Coverage and Water Use – Alternative 3

Watershed	Existing Snowmaking		Alternative 3 Snowmaking			
	Coverage (acres)	Water Use (acre feet)	Coverage (acres)	Percent Change (%)	Water Use (acre feet)	Percent Change (%)
Corona	41.0	67.5	59.2	45	75.2	11
Indian Peaks	41.3	68.0	46.6	13	59.1	-13
Peterson Lake	73.1	120.4	73.1	0	92.9	-23
Jenny Creek-EMR	8.3	13.7	33.4	302	42.4	210
Total	**163.7**	**269.6**	**212.3**	**30**	**269.6**	**0**

Water Rights

Water use and associated depletions to streams under Alternative 3 would be identical to the Proposed Action. The reader is referred to the Alternative 2 Water Rights description for details.

Water Yield

Implementation of Alternative 3 would involve clearing 59 acres of existing forested areas including approximately 49 acres of new snowmaking coverage, most of which would be located in the Jenny Creek-EMR Watershed (25 acres) and in the Corona Watershed (18 acres). Results from the WRENSS Model run for Alternative 3 indicate that, on average, total water yield originating in the Study Watersheds would remain approximately unchanged as compared to existing conditions. The average water yield modeled for existing conditions totals 2,721 acre feet, while the calculated average water yield for Alternative 3 totals 2,733 acre feet. The combination of tree removal with lower volume of snowmaking water usage would result in an increase of water yield for some of the Study Watersheds and a decrease for others. Trees transpire (i.e., consume) water, thus tree removal generally increases watershed yield. A decrease in water used for snowmaking generally results in less snowmelt runoff and a corresponding decrease in watershed yield. The combined yield from the Corona and Indian Peaks Watersheds (both directly tributary to Middle Boulder Creek) would total 820 acre feet, a 2 percent reduction as compared to the existing average yield of 835 acre feet. The Peterson Lake Watershed would also experience a 2 percent reduction of its water yield, from 644 acre feet to 632 acre feet for the typical, average year. However, the Jenny Creek-EMR would experience an increase of 13 percent in its annual yield, from 407 acre feet to 462 acre feet. Peak discharges estimated for Alternative 3 would also increase for some watersheds (Corona and Jenny Creek-EMR Watersheds) and decrease for others (Indian Peaks

and Peterson Lake Watersheds). Tables 3J-25 and 3J-26 display a summary of the WRENSS Model results for Alternative 3.

As discussed in the Affected Environment section, the modeled increases in water yield have an effect in the hydrology of surface runoff and groundwater. The computed hydrographs show that for the Indian Peaks and Jenny Creek-EMR Watersheds, the increases in water yield would occur primarily during April and May of a typical average year. This indicates that for these two watersheds a larger volume of snowmelt water would be available for infiltration into the ground earlier in the snowmelt season. Thus, the upper soil layers in the vicinity of the new ski trails in these two watersheds would be saturated earlier in the spring as compared to existing conditions. As a result, the Indian Peaks and Jenny Creek-EMR intermittent streams and springs could experience an increase in flow rate during the late spring and early summer months. No substantial changes in groundwater hydrology are expected to occur in the Corona and Peterson Lake Watersheds.

Table 3J-25:
Estimated Changes to Annual Yield – Alternative 3

Watershed	Water Yield (acre feet)			Change Relative to Existing Yield (%)	Cumulative Change Relative to Baseline Yield (%)
	Baseline	Existing	Alt. 3		
Corona	456	587	610	4	34
Indian Peaks	141	248	210	-15	49
Tributary to MBC[a]	**596**	**835**	**820**	**-2**	**37**
Peterson Lake	387	644	632	-2	63
Jenny Creek-EMR	383	407	462	13	20
Total	**1,963**	**2,721**	**2,733**	**0**	**39**

[a] The Corona and Indian Peaks Watersheds are direct tributaries to Middle Boulder Creek.
Note: As previously disclosed the snowmaking ratio would reduce from 1.6 acre feet/acre to 1.27 acre feet/acre.

Table 3J-26:
Estimated Changes to Peak Flows – Alternative 3

Watershed	Peak Flows (cfs)			Change Relative to Existing Peak Flow (%)	Cumulative Change Relative to Baseline Peak Flow (%)
	Baseline	Existing	Alt. 3		
Corona	4.1	5.5	5.6	2	36
Indian Peaks	1.2	2.2	1.7	-21	46
Peterson Lake	3.4	5.9	5.7	-2	70
Jenny Creek-EMR	4.1	4.3	4.8	11	17

Note: As previously disclosed the snowmaking ratio would reduce from 1.6 acre feet/acre to 1.27 acre feet/acre.

Water Quality

Water quality analysis and conclusions, as it relates to the food and beverages facilities proposed under Alternative 3, is identical to Alternative 2. Please refer to the Water Quality paragraphs of Alternative 2 for details.

Stream Health

Projects included in Alternative 3 would require approximately 59 acres of tree removal by clear-cut, including 21 acres of terrain grading, needed for construction of new ski trails, chairlifts, and on-mountain facilities. In addition, Alternative 3 would create 196 acres of new tree and gladed skiing areas. Of the total of 59 acres of clear-cut, approximately 2.4 acres would occur within the Study Watershed's WIZ; terrain grading would not occur within the WIZ under Alternative 3. No stream crossings are proposed under Alternative 3.

The WCPH's MM-3 states that only those projects that maintain or improve the long-term health of the stream should be allowed with the WIZ. In particular, tree removal within the WIZ can impact the LWD stream health metric, while terrain grading may affect bank stability and input of sediment to the stream channel. Table 3J-27 summarizes the spatial extent of tree clearing within the Study Watershed's WIZ corresponding to baseline, existing, and Alternative 3 conditions. Potential impacts to the stream health of each Study Watershed are discussed in the paragraphs below.

Table 3J-27:
Proposed Tree Clearing within the WIZ of Study Watersheds – Alternative 3

Watershed	Baseline Vegetated WIZ (acres)	Existing Vegetated WIZ		Alternative 3 Vegetated WIZ	
		(acres)	Percent of Baseline (%)	(acres)	Percent of Baseline (%)
Corona	56	42	74	40	72
Indian Peaks	34	31	90	30	87
Peterson Lake	80	66	83	66	83
Jenny Creek-EMR	36	35	99	35	99

Corona and Indian Peaks Watersheds (both Direct Tributaries to Middle Boulder Creek)

As discussed before, the Corona and Indian Peaks Watersheds are direct tributaries to Middle Boulder Creek, as opposed to the surface runoff originating in the Peterson Lake Watershed which is routed through Peterson Lake and then conveyed through a 4,200-foot stream channel before discharging into Middle Boulder Creek. The WRENSS hydrologic model indicates that water yield originating in the Corona and Indian Peaks Watersheds would decrease by 2 percent as compared to existing conditions (essentially unchanged). Peak discharge corresponding to the Corona Watershed would increase by 2 percent, while the Indian Peaks Watershed would experience a 21 percent decrease in its peak discharge (refer to Tables 3J-18 and 3J-19).

Total clear-cut within the Corona and Indian Peaks Watersheds amounts to 24 acres, while an additional 117 acres would be thinned to create gladed ski terrain. Approximately 2.4 acres of clear-cut would occur within the WIZ of these watersheds (1.3 acres within the Corona Watershed and 1.1 acres in the Indian Peaks Watershed). A new road of approximately 1,200 feet of length would be constructed under this alternative to access the proposed Challenge Mountain Facility. Construction of this road would involve grading 0.5 acre of terrain. No impacts would occur in the WIZ of Middle Boulder Creek under Alternative 3.

PDC associated with Alternative 3 projects within the Corona and Indian Peaks Watersheds to maintain or improve stream health are presented below. In summary, the proposed PDC are designed to reduce CDA and minimize impacts of the proposed projects. Proposed PDC are included in Table 2-3 under the heading "Watershed and Aquatic Resources." Specific PDC for the Corona and Indian Peaks Watersheds are included in Table 2-3 under the headings "Watershed and Aquatic Resources, Corona and Indian Peaks Watersheds (Alternative 3)" and are designed to:

- Minimize the impacts of 0.2 acre of existing roads connected to the perennial stream proximate to the Corona chairlift bottom terminal and effectively reduce the length of the total stream network;
- Offset the impacts of 0.5 acre of existing roads connected to intermittent streams near the Indian Peaks chairlift bottom terminal, effectively reducing the length of the total stream network;
- Offset the impacts of 0.45 acre of proposed grading (including 0.1 acre of re-grading) due to the construction of new road sections to the proposed Challenge Mountain Facility, and Challenge chairlift top terminal, effectively limiting the extent of CDA and the length of total stream network within the watershed;
- Minimize potential impacts of 0.2 acre of vegetation removal and terrain grading needed for the replacement of the Corona chairlift bottom terminal;
- Minimize potential impacts of approximately 4.6 acres of vegetation removal and terrain grading needed for construction of the Corona chairlift replacement top terminal, Challenge Mountain Facility, Lookout facility expansion, and various utility installation projects; and
- Minimize potential impacts associated with proposed ski trails in the Corona and Indian Peaks Watersheds (approximately 24 acres of tree removal only, no grading).

Construction of the Alternative 3 projects in the Corona and Indian Peaks Watersheds following PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of the watersheds.

Peterson Lake Watershed

Alternative 3 would clear-cut 7.7 acres in the Peterson Lake Watershed, including 5.7 acres of terrain grading. Most of this disturbance would occur within private lands and is associated with the proposed

expansion of the parking lot near the base area. No impact to the watershed's WIZ would occur under Alternative 3. Average year water yield and peak discharge into Peterson Lake would remain approximately unchanged relative to existing conditions. This is because the increase in water yield and peak discharge expected from tree clearing is balanced out by a 23 percent reduction in snowmaking water input to the watershed (refer to Table 3J-24).

In order to protect the stream health of Peterson Lake Watershed, impacts resulting from the tree removal and terrain grading proposed under Alternative 3 must include appropriate PDC. All areas proposed to be graded must be protected from surface erosion by implementing standard BMPs for erosion and sediment control. Implementing and maintaining standard PDC would ensure the proposed disturbed areas would not be connected to the stream system. In addition, areas currently connected to the Peterson Lake Watershed stream network could be disconnected by relatively simple improvements to the roads and parking areas' drainage features, such as sediment traps at the discharge of road-side ditches. Proposed PDC are included in Table 2-3 under the heading "Watershed and Aquatic Resources." Specific PDC for the Peterson Lake Watershed are included in Table 2-3 under the headings "Watershed and Aquatic Resources, Peterson Lake Watershed (Alternative 3)" and are designed to:

- Offset the impacts of 0.5 acre of existing CDA and reduce the length of total stream network associated with approximately 1,770 feet of the mountain road from the base area to the maintenance shop within 200 feet of a stream channel tributary to Peterson Lake;
- Minimize impacts to stream health and watershed condition associated with approximately 7 acres of vegetation clearing and terrain grading proposed for construction of additional parking space; and
- Minimize impacts to the Watershed associated with approximately 2 acres of tree removal and 1 acre of terrain grading needed for construction of the proposed Challenge chairlift replacement.

Implementation of the Proposed Action within the Peterson Lake Watershed following PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of the watershed.

Jenny Creek-EMR Watershed

Alternative 3 proposes an alternative design for the *Jolly Jug* trails which involves 24 acres of clear-cut, in addition to approximately 3 acres of tree clearing and grading associated with construction of the Jolly Jug chairlift and enlarged Lookout facility. Alternative 3 also involves 30 acres of tree thinning to create the Jolly Jug Glades. No impact to the Jenny Creek WIZ would occur under this alternative. Snowmaking water use within this watershed would increase from the current average of 14 acre feet to approximately 42 acre feet as a result of the new snowmaking infrastructure desired for the *Jolly Jug* trails. These impacts would produce an increase in water yield and peak discharge of approximately 13 and 11 percent

relative to existing conditions, or 20 and 17 percent as compared to baseline conditions (refer to Tables 3J-25 and 3J-26).

Increases in annual yield and peak discharge can negatively affect the health of the watershed. In addition, graded areas, such as access road and top and bottom terminals for the proposed Jolly Jug chairlift, may increase sediment supply to the stream. Impacts resulting from implementation of Alternative 3 projects must include appropriate PDC in order to maintain or improve stream health and comply with the WCPH. Proposed PDC are included in Table 2-3 under the heading "Watershed and Aquatic Resources." Specific PDC for the Jenny Creek-EMR Watershed are included in Table 2-3 under the headings "Watershed and Aquatic Resources, Jenny Creek-EMR Watershed (Alternative 3)" and are designed to:

- Minimize potential impacts of 0.4 acre of vegetation removal and terrain grading needed for construction of the Jolly Jug chairlift bottom terminal and disconnect the chairlift terminal from the stream network;
- Minimize potential impacts to the stream health of Jenny Creek associated with approximately 1.2 acres of terrain grading needed for construction of the access road to the Jolly Jug chairlift bottom terminal;
- Minimize potential impacts to the watershed by approximately1.5 acres of tree removal and terrain grading required for construction of the Lookout Facility expansion and the Jolly Jug chairlift top terminal and access road, effectively limiting the extent of CDA and the length of total stream network in the Jenny Creek-EMR Watershed; and
- Offset impacts associated with tree removal needed for construction of the *Jolly Jug* ski trails (24 acres).

Implementation of Alternative 3 projects in the Jenny Creek-EMR Watershed, following the PDC would be consistent with the WCPH and Forest Plan standards and would not adversely impact the health of Jenny Creek.

Wetlands

In accordance with EO 11990, the Alternative 3 was designed to avoid and minimize impacts to wetlands wherever possible. Some temporary impacts to wetlands would occur; permanent impacts to wetlands would be mitigated.

Direct effects to wetlands from Alternative 3 projects are similar to those under Alternative 2. The construction of the proposed Corona chairlift bottom terminal would directly impact 0.07 acre of wetland (PEM/PSS/PFO wetland); no wetland fens would be directly impacted, and a PDC would be implemented to ensure adjacent fens are not impacted. The Forest Service would require mitigation for this wetland impact. Mitigation would likely include purchasing compensatory wetland acreage from a wetland mitigation bank. The type and amount of wetland mitigation for EMR would be determined in partnership

with the USACE during the 404 permit process. In addition, there would be temporary impacts to 0.05 acre of wetland for the installation of underground utility lines. These temporary impacts would be restored after construction.

The indirect impacts to wetlands through forested overstory removal for trail construction may impact an additional 0.51 acre of wetlands; no fens would be indirectly impacted under Alternative 3. The forested overstory removal from 0.51 acre of wetlands would likely cause a change in the species composition of the wetlands away from shade tolerant species to more sun-tolerant species.

Both direct and indirect impacts to wetlands under Alternative 3 would be avoided and minimized to the maximum extent practicable. PDC would be designed to ensure that trees are flush-cut by hand within wetlands, that tree boles are not skidded over wetland vegetation, and that no slash is piled in wetland habitats. Overall, there would be little change to wetland functions and values under Alternative 3. There would be a small acreage of direct wetland impact (0.07 acre) for the installation of the proposed Corona chairlift bottom which would eliminate all functions for this small area of wetlands. As discussed under the Proposed Action, direct and indirect impacts to wetlands under Alternative 3 would be avoided and minimized to the maximum extent practicable. The Corona chairlift was designed to minimize disturbance to surrounding wetlands to the greatest extent possible by maintaining the currently alignment, minimizing the footprint necessary for the bottom terminal structure and installation of a French drain to manage ground and surface water. Wetland functions would be mitigated per terms and conditions of a 404 permit. The indirect impact to 0.51 acre of wetlands through overstory forest removal would cause a change in wetland vegetation composition and structure. This change could affect some functions such as groundwater discharge, which may actually increase due to reduced evapotranspiration rates from tree removal. Other functions such as velocity reduction, erosion protection, and the water quality functions would likely stay the same as shade-loving forbs would be replaced by sun-loving sedges, grasses and small shrubs which have deep binding root masses that slow the velocity of water, control erosion, and uptake sediments and nutrients. Finally, wetland habitat functions would likely change under Alternative 3. For example, the removal of overstory trees would eliminate nesting habitat for some species of birds, however, over time the understory vegetation may become dominated willows or other shrubs which provide nesting habitat for other species.

Riparian Areas

Impacts to riparian habitat under Alternative 3 are slightly less than for Alternative 2. There would be no bridge to access the bottom terminal of the Placer Express chairlift and thus no impact to riparian habitat along Middle Boulder Creek and the impact of 0.07 acre to riparian/wetland habitat in the vicinity of the Corona chairlift terminal would be the same as Alternative 2. Temporary riparian/wetland impacts due to utility lines are 0.05 acre for Alternative 3. Finally, secondary impacts due to forested overstory removal are 0.5 acre under Alternative 3.

All impacts to riparian areas, as well as their corresponding wetlands, would be avoided and minimized to the extent possible. PDCs are listed in Table 2-3.

Soils

Under Alternative 3 there would be 21.6 acres of soil that would be disturbed by grading, of which 6.3 acres would be on NFS lands and 15.3 acres on private lands. There would also be about 253.1 acres disturbed by tree removal operations (does not include areas proposed for removal of only dead and disease trees), of which 199.0 acres would be on NFS lands and 54.1 acres on private lands.

Table 3J-28:
Disturbance Acres – Alternative 3

Soil Disturbed by Grading		
Disturbance Type	**Alternative 3 NFS Lands (acres)**	**Alternative 3 Private Lands (acres)**
New Ski Trails	0.0	0.6
New Roads	0.6	0.1
New or Upgraded On-Mountain Facilities (includes septic fields)	1.9	0
Parking Lots	0	11.7
Chairlift Terminals	1.7	1.5
Utility Lines	2.1	1.4
Total	**6.3**	**15.3**
Soil Disturbed by Forest Overstory Removal (No Grading)		
Disturbance Type	**Alternative 3 NFS Lands (acres)**	**Alternative 3 Private Lands (acres)**
New Ski Trails and Chairlift Alignments	30.0	19.8
New Tree and Glades Skiing	169.0	27.3
Defensible Space	0[a]	7.0
Total	**199.0**	**54.1**

[a] Defensible space on NFS lands is including in the soil disturbed by grading calculation under new or upgraded on-mountain facilities.

Table 3J-29:
Direct Impacts to Soil Resource – Alternative 3

Disturbance Type	Alternative 3 NFS Lands (acres)	Alternative 3 Private Lands (acres)
Soils disturbed by grading that would have severe and very severe water erosion hazard after disturbance	6.3	4.1
Areas that would be reclaimed and where there would be changes to soil physical and chemical characteristics	4.9	3.6
Permanent loss of soil resources	1.4	11.8
Grading disturbance in areas having moderate landslide potential	0.0	0.0

Refer to Tables 3J-28 and 3J-29 for detail on project disturbance. Under Alternative 3, the potential disturbance would be similar as for those projects discussed under Alternative 2, with the exception of the Placer Express chairlift which is not included in this alternative. Compared to Alternative 2, Alternative 3 would have slightly fewer acres that would be graded (21.6 versus 25 acres), but would have nearly 100 more areas of soil disturbances due to tree removal (253.1 versus 156.6 acres), of which most would occur on NFS lands. Alternative 3 would have 2.3 fewer graded acres that would be reclaimed than Alternative 2 (8.5 versus 10.8 acres).

No areas of severe landslide potential were identified under this alternative. The same PDCs apply to minimize impacts to soil characteristics and productivity as were identified for Alternative 2, with the exception of the PDC that was identified for the Placer chairlift.

Under Alternative 3, the loss of soil resources from construction of new roads, facilities and chairlifts would be similar to Alternative 2 and would be long-term and permanent. These developments have been reduced to the minimum disturbance to meet the Purpose and Need and facilitate Alternative 3. If this alternative is carefully managed with effective erosion control, considering the low to moderate erodibility of soil management units these projects could be implemented without further impacts to the soils resource, and would not affect the soil management unit as a whole.

Alternative 3 Summary

The projects included in Alternative 3 involve tree clearing; tree thinning; terrain grading; additional snowmaking coverage; improved snowmaking practices; parking (connected action); a new restaurant and an enlarged capacity for an existing on-mountain restaurant. Construction of these projects would have an impact in watershed and aquatic resources, such as increased water yields and peak discharges. However, implementation of Alternative 3 projects following PDC as outlined above would be consistent with the WCPH and Forest Plan direction and would not adversely impact the water quality or the health of the Study Watersheds. Moreover, no impact to pool-riffle complexes would occur as a result of implementation of Alternative 3.

Alternative 3 would directly impact 0.07 acre of wetlands for the construction of the proposed Corona chairlift bottom terminal. The Forest Service would require mitigation for this wetland impact and the mitigation would likely include purchasing compensatory wetland acreage from a wetland mitigation bank. There would also be temporary impacts to 0.05 acre of wetlands for the installation of utility lines, which would be restored post-construction. Indirect impacts to wetlands through forested overstory removal are expected to impact 0.51 acre of wetlands. Overall, there would be little change to wetland functions and values under Alternative 3.

Under Alternative 3 there would be 21.6 acres of soil that would be disturbed by grading and approximately 253.1 acres of soil disturbance resulting from tree removal operations. There would be a 13.2-acre permanent loss of soils due to parking lot, chairlift and facility construction. Impacts from grading and tree removal in Alternative 3 would include an increase in soil erosion and sedimentation, changes to soil physical and chemical characteristics reducing soil productivity, permanent loss of soil resources, and a potential increase in landslide and slump hazards. With implementation of PDC, these impacts would be minimized. Table 2-5 in Chapter 2 of this document provides a summary comparison of potential environmental consequences between Alternatives 1, 2, and 3.

CUMULATIVE EFFECTS

Scope of the Analysis

Temporal Bounds

The temporal extent of the analysis commences with conditions before the development of EMR, extending through the history of EMR to the present, and includes the lifespan of current proposed projects as well as those that are current reasonably foreseeable future actions, in general ten to twenty years into the future from the date of this document.

Spatial Bounds

The effects on watershed resources of existing and proposed activities that take place at EMR are most evident in those stream reaches located near EMR: where the Corona and Indian Peaks Watersheds meet Middle Boulder Creek; at Lake Peterson, tributary to Middle Boulder Creek; and at the reach of Jenny Creek, tributary to South Boulder Creek, that flows downslope from the proposed Jolly Jug Glades. The Study Watersheds, discussed in the Affected Environment section of this report, are relatively small in surface area as compared to the much larger Middle Boulder Creek (HUC12 101900050402) and Upper South Boulder Creek (HUC12 101900050501) basins. The Study Watersheds tributary to Middle Boulder Creek (the Corona, Indian Peaks, and Peterson Lake Watersheds) comprise 2.3 square miles; the Middle Boulder Creek basin, from its headwaters to the inlet of Barker Reservoir, totals 31.1 square miles. The Jenny Creek-EMR study watershed, which is tributary to Jenny Creek, tributary to South Boulder Creek, measures 1.1 square miles in surface area; the Jenny Creek-EMR Watershed, from its headwaters to its confluence with South Boulder Creek measures 7.7 square miles, while the Upper South Boulder Creek

basin extends over 71.2 square miles. In addition, Barker Reservoir (located on Middle Boulder Creek) and Denver Water's transbasin diversion system on South Boulder Creek have a significant impact on the basins' hydrology. Thus, Middle Boulder Creek from its headwaters to the inlet of Barker Reservoir, and Jenny Creek from its headwaters to its confluence with South Boulder Creek define the downstream spatial boundaries for the Watershed Resources cumulative effects analysis. Figure 12 displays the cumulative effects boundaries described above.

The spatial extent of the cumulative effects analysis for wetlands, riparian areas and soils encompasses NFS lands, within the existing SUP area, as well as the proposed SUP boundary adjustment areas and adjacent private lands.

Past, Present, and Reasonably Foreseeable Future Projects

Existing and proposed activities that may have a cumulative effect on the watershed and soil resources are listed below:

- Activities within EMR:
  - 2011 Master Plan
  - Corona Trail Grading EA
  - Summer Operating Plan
  - Direct Control Efforts for Mountain Pine Beetle at Eldora Mountain Resort
- Public and Private Road Infrastructure (including the Peper Private Property Access and Forest Legacy Conservation Easement)
- Forest Health and Fuels Projects
- Continued Nederland and Eldora Residential Build-Out
- Water Projects
- Moffat Collection System EIS
- Jenny Creek Restoration and Reroute of Motorized Trail
- High Peaks to Headwaters Watershed and Fisheries Restoration Project
- Recreational use outside of the ski area
- Mining Activities

The above projects and activities could potentially affect soil resources, and the impacts would likely be similar to the soil impacts described under Alternative 2 in the Environmental Consequences section. The extent and degree of soil impacts would be a function of the scale and magnitude of the proposed project. Of the potential activities within EMR, the *Corona* trail grading project would likely have the most

significant impacts to soil resources. Again, these impacts would be similar to the impacts described under Alternative 2, and the same or similar BMPs/PDC identified under Alternative 2 would be implemented to minimize impacts to soil resources.

Alternative 1

The ARP has completed an assessment of its watersheds per the USFS Watershed Condition Framework Implementation Guide.[415] The assessment rated the Middle Boulder Creek Watershed as "Functioning Properly," while the Upper South Boulder Creek Watershed was rated as "Functioning at Risk." Twelve indicators of watershed condition were rated by the ARP for the assessment. Indicators rated "Poor" for the Upper South Boulder Creek Watershed are: aquatic biota; water quantity; roads and trails; and forest coverage. The indicators rated poor for the Middle Boulder Creek Watershed are: aquatic biota; forest coverage; and forest health. The remaining indicators (riparian/wetland vegetation, water quality, aquatic habitat, soils, fire regime, rangeland vegetation, and terrestrial invasive species, were all rated either as *Fair* or as *Good*.

None of the stream segments within the study area are listed on the Colorado State 303(d) list as impaired streams under the CWA. However, the main stem of Middle Boulder Creek is listed under the M&E list, for Cadmium and Copper. The South Boulder Creek and its tributaries are listed under M&E for aquatic life. Stream reaches are included in the M&E list when "there is reason to suspect water quality problems, but there is also uncertainty regarding one or more factors."[416]

Watersheds subjected to activities associated with ski area management, including trail construction and snowmaking, tend to exhibit cumulative changes to channel conditions as compared to watersheds in undeveloped conditions. These changes are caused by increases in peak runoff magnitude and duration due to the effects of tree removal, terrain grading, and snowmaking. Affected channel reaches typically exhibit long-term, continuing adjustments to their dynamic equilibria due to changes in magnitude, timing, and duration of their corresponding hydrographs.

When considered cumulatively with Alternative 1, ski area operations and maintenance, private and public road infrastructure, Nederland and Eldora residential build-out, area forest health and fuels projects, water projects and mining activities have affected water, wetlands and soil resources. Impacts to these resources include changes to streamflow hydrology, soil erosion, increased input of sediment and other pollutants into stream waters, and decreased vegetation cover. It is anticipated that these on-going activities would continue to require management to minimize potential impact to waters, wetlands and soils within the project area watersheds. Existing concerns regarding the stream health of Upper South Boulder Creek and Middle Boulder Creek would be expected to continue. Future implementation of

[415] USDA Forest Service, 2010b
[416] Ibid.

projects would require site specific surveys and thus impacts to water, wetlands and soils would be minimized to the extent practicable.

Alternative 2

Past ski area development (a majority of which occurred prior to the CWA, Section 404 of 1972) at EMR has cumulatively affected wetlands and riparian areas on NFS lands within the SUP area. In addition, construction in the base area on private lands owned by EMR has had wetland and riparian area impacts. Construction of parking lots, facilities, chairlifts and trails have resulted on a loss of wetland and riparian acreage and/or a reduction or change in wetland functions and values. Wetland impacts under Alternative 2 would be fully mitigated and with time wetlands temporarily impacted are expected to recover to existing conditions. Therefore there would be no net loss of wetlands due to implementation of the projects. Regarding projects contained in the 2011 Master Plan, those projects would be required to be consistent with Forest Plan direction and EO 11990. Therefore, there is an expectation that those projects avoid and/or minimize impacts to waters of the U.S., including wetlands. Also, in accordance with the CWA, there would be a no net loss of wetlands. Because within the study area the limits of the riparian habitat roughly correspond to that of wetland boundaries adjacent to streams and ponds, impacts would be the same as described for wetlands; however, if mitigation occurs in wetlands that are not located adjacent streams or ponds, the area of riparian vegetation would be reduced. Impacts to riparian vegetation could be minimized by looking for an opportunity to mitigate wetland impacts within riparian areas. Cumulatively, when the projects are added to past losses within the ski area boundary, this could further reduce the acreage of riparian vegetation within the study area.

Cumulatively there has been a loss of soils resources within the study area where impermeable parking lots and permanent structures have been installed for ski area development. The proposed projects under Alternative 2 would add 14.1 acres to that permanent loss. Although this acreage when added to the existing loss from ski area development is considerable, when compared to the soil resources as a whole within the ARP, the losses are minor. Cumulatively there have also been impacts to soils from ground disturbance activities on ski trails and lift alignments. Alternative 2 would add 156.6 acres of soil disturbance resulting from tree removal operations and 25 acres that would be impacted by grading activities. Soil impacts related to these disturbances would be addressed by appropriate PDC and reversible. Temporary impacts to soils resources have been rehabilitated and little evidence of ongoing erosion and sedimentation exists within the study area.

As discussed earlier in this report, connected roads increase the intensity of surface runoff and constitute a source of sediment input into the stream system. The total length of existing roads within the spatial extent of the cumulative effects analysis is approximately 40 miles, with a corresponding road density of 0.9 mile per square mile. Although a study of road connectedness at the spatial extent of the cumulative effects analysis was not completed, both alternative actions would implement PDC that would reduce the length of connected roads within EMR. This would have a beneficial effect and reduce the adverse,

cumulative effects of roads on watershed and soils resources. Loss of wetlands and riparian areas has occurred due to road construction, project impacts to wetlands and riparian areas are limited to those within the study area and would be mitigated. Therefore, although there may be a minimal loss of riparian vegetation no net loss of wetlands would be realized.

Vegetation management programs, or forest health and fuels projects, such as tree thinning, are usually timed to minimize environmental impacts by spreading the potential effects over time. Vegetation management projects within NFS lands usually include revegetation plans, such as planting of young trees. The goals of these programs include the improvement of forest health by means of increasing the forest structural and species diversity. Thus, a beneficial cumulative effect is expected as a result of implementation of such programs. Vegetation management projects would have short-term impacts to soils resources; however, impacts to wetlands and riparian areas would be avoided unless improvement projects are identified.

Residential and urban development may occur in the towns of Nederland and Eldora, as well as in private lands outside of the towns' limits and within the spatial extent of the cumulative effects analysis. Residential and urban development and the associated land use changes would have a cumulative effect on the stream health and water quality of Middle Boulder Creek. However, it is anticipated that such development would be subject to local, State, and Federal regulations requiring water quality protection measures. Any residential development would require proper permitting grading and wetlands impacts. Residential development would result in a loss of soils. Wetland impacts would be monitored by the USACE and would require mitigation.

Potential changes to water resources from water projects include water right augmentation, changes in stream flows, recreation use, water quality impacts and economic components. Cumulatively, because there is not a change in the quantity of water EMR would use, and EMR currently has the appropriate water rights for their existing and proposed use, there would be no direct or indirect impacts and therefore there are no cumulative impacts to consider with other proposed water projects.

Dispersed recreation occurs on both private and NFS lands surrounding EMR during the summer and winter. Two primary access points to recreation opportunities north and south of EMR are the Hessie Trailhead and the Jenny Creek Trail. Access to the north of EMR (to Indian Peaks Wilderness) occurs from the Hessie Trailhead and Fourth of July Road. Fourth of July Road is very popular, and when Middle Boulder Creek is high enough, the stream runs across the road north of the trailhead. Erosion and sedimentation occur in this location and are exacerbated by recreationists driving through the creek when conditions allow. To the south of EMR is the Jenny Creek Trail. Recreation trails can impacts to water, wetlands and soils resources by contributing an unvegetated, impermeable surface where erosion and sedimentation can be routed toward drainages, wetlands, or onto unstable soils. When considered cumulatively with trail, facility and chairlift projects included in the Proposed Action, increased potential

for erosion and sedimentation does exist, however, with implementation of PDC, these impacts would be minimized.

Historic mining activities are associated with ground disturbance, and unvegetated areas that contribute to increased erosion and sediment transport. Erosion and sedimentation has impacts on fisheries habitat by changing stream patterns and filling riffle/pool complexes. In addition, heavy metals loading from mining waste rock and tailings can impact fish habitat as well as general water quality. Cumulatively, because there are no impacts to water quality anticipated from any of the project components within Alternative 2, there would be no cumulative impacts to water quality.

Despite direct project effects of 12 acres of clearing and 1.3 acres of grading within the WIZ in the Corona and Indian Peaks Watersheds, when considered cumulatively, in addition to past, present, and reasonably foreseeable future actions, implementation of Alternative 2 would maintain stream health through successful implementation of PDC described in the Environmental Consequences section above. By maintaining the health of the streams, Alternative 2 would not exhibit a negative influence upon watershed conditions in a cumulative context. Because mitigation for wetland losses would occur, no additional net loss is anticipated to come from the cumulative effects of the projects discussed above and total function and values of wetlands within the study area should be maintained. Additional loss of riparian habitat is possible from additional developments, however the proposed projects would contribute minimally to these projects (potentially 0.7 acre under either action alternative). Finally, the development of trails, chairlifts, infrastructure, and skier facilities on NFS lands in the SUP area has occurred since 1972. Over four decades of resort development, there has been a loss soil organic content (organic O and mineral A) horizons and increased impermeable surfaces within these soil map units. Approximately 14.1 or 13.2 acres of soils would be permanently lost under Alternatives 2 and 3. When considered cumulatively, considering the size of soil management units, these projects would not affect the soil management unit as a whole.

Alternative 3

In a cumulative context, impacts from ski area development, road infrastructure, vegetation management, continued residential build-out, water projects, area recreation use and mining activities combined with projects identified under Alternative 3 would be the same as discussed above under Alternative 2. With successful implementation of PDC described in Alternative 3 of the Environmental Consequences section above, stream health would be maintained and the study area would continue to meet standards and guidelines identified in the WCPH and 1997 Forest Plan.

The proposed projects under Alternative 3 would add an additional 13.2 acres to the existing 41.3 acres of soil resources that are permanently lost. This additional loss would be about the same as under Alternative 2. Alternative 3 projects would add an additional 253.1 acres to the existing 182.1 acres of soils that have been disturbed from tree removal operations. This additional soil disturbance would be about 100 more

acres than under Alternative 2. Finally, grading activities under Alternative 3 would impact 21.6 acres of soil, which is about the same amount as Alternative 2. Soil impacts related to these disturbances would be addressed by appropriate PDC and reversible.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Long-term impacts to watershed resources, including stream health, are not expected to occur as a consequence of implementation of any of the alternatives analyzed in this report. Both action alternatives include PDC that would maintain stream health. Cumulative changes to watershed resources would be realized in water yield and peak discharge. As discussed in the Direct and Indirect Environmental Consequences section of this report, cumulative changes in water yield would range from 15 to 60 percent at the scale of the Study Watersheds (about 4.1 square miles total). However, these changes would be negligible and immeasurable at the spatial scale established for the cumulative effects analysis (approximately 44.3 square miles). In summary, no irreversible or irretrievable commitments of watershed resources associated with any of the alternatives have been identified.

No irreversible or irretrievable commitment of wetlands or riparian resources would occur, however approximately 14.1 and 13.2 acres of soils would be replaced with permanent structures such as the parking lot, chairlifts and facilities. Soil is a very slowly renewable resource, as estimates for rates of soil formation range from 0.0056 cm to 0.00078 cm a year.[417] Globally, rates of soil formation are not keeping pace with erosion, leading to widespread soil loss that in part is caused by grading activities such as those associated with ski area development.[418] In this sense, soil loss from development from these projects is an irreversible and irretrievable commitment of resources.

[417] Alexander, 1988
[418] Wakatsuki and Rasyidin, 1992

Chapter 4
Consultation and Coordination

4. CONSULTATION AND COORDINATION

A. PREPARERS

FOREST SERVICE TEAM

The following people participated in initial scoping, were members of the Interdisciplinary Team, and/or provided direction and assistance during the preparation of this Draft EIS.

Glenn Casamassa	Arapaho-Roosevelt National Forests and Pawnee National Grassland Supervisor, Responsible Official
Sylvia Clark	Boulder District Ranger, Line Officer
Paul Alford	ID Team Leader
Karen Roth	NEPA Coordinator
Sue Struthers	Archaeologist
Judy Kittson	Civil Engineer
Bev Baker	Wildlife Biologist
Steve Popovich	Botanist
Eric Schroder	Soil Scientist
Carl Chambers	Hydrologist
Matt Fairchild	Fisheries Biologist
Chris Carroll	Fisheries Biologist
Cody Hutchinson	Silviculturist
Jaime Oliva	Ski Area Permit Administrator
Paul Cruz	Recreation Staff
Elsha Kirby	Public Affairs Officer
Mary Hattis	GIS Coordinator
Will Briggs	Fire Management Officer
Mike Johnson	Lands Staff
Ed Perault	Recreation Staff
Erich Roeber	Landscape Architect

CONSULTANT TEAM

The use of a third party consulting firm for preparation of an EIS is addressed in the Code of Federal Regulations at 40 CFR Title 40, Part 1506.5(c). If an EIS is prepared with the assistance of a consulting firm, the firm must execute a disclosure statement, as indicated below:

> *Except as provided in §§1506.2 and 1506.3 any environmental impact statement prepared pursuant to the requirements of NEPA shall be prepared directly by or by a contractor selected by the lead agency or where appropriate under §1501.6(b), a cooperating agency. It is the intent of these regulations that the contractor be chosen solely by the lead agency, or by the lead agency in cooperation with cooperating agencies, or where appropriate by a cooperating agency to avoid any conflict of interest. Contractors shall execute a disclosure statement prepared by the lead agency, or where appropriate the cooperating agency, specifying that they have no financial or other interest in the outcome of the project. If the document is prepared by contract, the responsible Federal official shall furnish guidance and participate in the preparation and shall independently evaluate the statement prior to its approval and take responsibility for its scope and contents. Nothing in this section is intended to prohibit any agency from requesting any person to submit information to it or to prohibit any person from submitting information to any agency.*

Furthermore, the use of a third party contractor in preparing an EIS is specifically addressed by the Council on Environmental Quality (CEQ) in its "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" in question #17a.[419] Per this CEQ direction:

> *When a consulting firm has been involved in developing initial data and plans for the project, but does not have any financial or other interest in the outcome of the decision, it need not be disqualified from preparing the EIS. However, a disclosure statement in the draft EIS should clearly state the scope and extent of the firm's prior involvement to expose any potential conflicts of interest that may exist.*

Accordingly, disclosure statements were signed by all entities that make up the third party consulting team. These disclosure statements are included in the project record. SE Group has been involved in several other projects at EMR. SE Group has been a prime consultant for the Forest Service for the preparation of one previous NEPA process at EMR, 2011 Corona Grading Project EA. A disclosure of this project is contained in the project file.

SE Group

Travis Beck	Senior Project Manager
Kent Sharp	Principal-in-Charge
Kelly Owens	Assistant Project Manager
Mitch Lefevre	Landscape Architect
Melissa Sherburne	GIS Manager

[419] Council on Environmental Quality, 1981

Andrew Pollak-Bruce	Environmental Planner
Caroline McHugh	Environmental Analyst
Paul Donegan	Environmental Analyst
Paula Samuelson	Document Production Specialist

Alpine Geophysics

James Wilkinson	Senior Engineer

Aquatics Associates, Inc

Tami L. Schneck	Senior Aquatic Biologist

Buscher Soil & Environmental, Inc.

Dave Buscher	Soil Scientist/Geological Engineer

Doug Kennedy Advisors

Doug Kennedy	Economist

Metcalf Archaeological Consultants, Inc.

Craig M. Lee	Principal Archaeological Investigator (2011)
Sarah Jennings	Principal Archaeological Investigator (2013)

Resource Engineering, Inc.

Raúl Passerini, P.E.	Water Resources Engineer

TDA Colorado, Inc. – Denver, CO

David Leahy, P.E.	Transportation Engineer

Western Ecological Resource

Rea Orthner	Ecologist

Western Ecosystems, Inc.

Rick Thompson	Wildlife Biologist

B. AGENCIES, ORGANIZATIONS, TRIBAL GOVERNMENTS, AND PERSONS CONTACTED

FEDERAL GOVERNMENT

US Army Corps of Engineers

US Environmental Protection Agency

US Fish and Wildlife Service

Advisory Council on Historic Preservation

TRIBAL GOVERNMENT

Southern Ute Indian Tribe

Uintah and Ouray Tribe

Northern Arapaho Tribe

Northern Cheyenne Tribe

Cheyenne and Arapaho Tribes of Oklahoma

STATE GOVERNMENT

Colorado Department of Transportation

State Historic Preservation Office

Colorado Parks and Wildlife

Colorado Water Conservation Board

Colorado Division of Water Resources

Colorado State Forest Service

Colorado Department of Public Health and Environment

LOCAL GOVERNMENT

Boulder County

Gilpin County

City of Boulder

City of Nederland

Eldora Civic Association

OTHER ORGANIZATIONS

Middle Boulder Creek Coalition

Rocky Mountain Wild

INDIVIDUALS WHO COMMENTED DURING SCOPING OR WHO HAVE PARTICIPATED IN THE NEPA PROCESS

MJ Aardsma

Lynn Ackerman

Frederica Acora

Miriam Adame

Jay Adams

Monoiette Adams

Robert Adams

Anthony Adane

Kristin Adcock

Emma Addison

Janet Adelfio

Todd Adelman

Deborah Ahlers

David Alessi

George Alexander

Kathryn Alexander

Charlie Allen

Nancy Allis

Shirley Allison

Damian Alvarado

Mario Alzaga

Marian Amaranto
Susan Ambler
Cara Anderson
Tom Andrews
Jorge Andromidas
Jan Angel
Danielle Antonio
Gina Apt
Alex Aranow
Tanya Arguello
Joyce Armstrong
Jennifer Askey
William Atkison
Eric August
Sally August
Rachel Austin
Sara Avery
Stephanie Aymami
Barbara Babin
Barbara Bachman
Robin Baer
Stephanie Bair
Lawrence Baird
Jennifer Baker
Trace Baker
John Baldwin
Betty Ball
Sharon Balzano
Alicia Banister
Michael Banks
James Bannerman
Ken Barber
Bevin Barber-Campbell
J. Barbour
Ansel Barnes
Diana Barnes
Rachel Barnes
David Barr
Carlos Barradas
Robert Bartelma
Nicholas Barth
B. Bartony
Bob Basker
Paul Bassis
Carole Bayer
David Beale
Gretchen Beatty
Mary Bedard
Dean Bedford
Tim Beecken
Katie Behnke
Carla Behrens
Gary Belanger
Wilfred Bellemare
Debi Benenati
Scott Benenati
Charley Bercow
Alan Bernat
A.A. Berni
Lane Binder
Stacey Birkby
Peter Birkeland
Suzanne Birkeland
Karina Black
Larry Black
Sama Blackwell
Tori Blanchard
Miguel Blanco
Vivian Blau
Ruth Bleuze
Delilah Blount
David Bluebaugh
Logan Bobzien
Sosi Bocchieriyan
Debbie Bochert
Gisela Boderke
Scott Bogart
Michael Bohn
Em Boldt
Aaron Boranian
Patricia Borri
Julia Bottom
Tim Bourdelais
Hank Bourscheidt
Pat Bowen
Chad Bowers
Maggie Boys
Ashley Bozekowski
Eric Bradac
Luanne Bradac
Rich Bradfield
Heather Brandon
Lorena Brauer
Carla Brauer-Lalezari
Sally Breaux
Nicole Brennan
Raymond Bridge
Stacey Bridges
Susan Brillante
Daniel Brindley
Alan Brockett
John Brocklehurst

Louise Brooke
Shaun Brooks
Dennis Brown
Diane Brown
Gloria Brown
L. Brown
Nathaniel Brown
Roya Brown
Diane Brownell
Doug Brownell
Joan Brownell
Sara Brownell
April Browning
Susan Bruce
Renate Brummer
Dennis Bryan
Joan Bryant
Julia Brymer
Linda Buch
Mark Buchanan
Todd Buchanan
Becky Buckley
Marsi Buckmelter
Charles Bufe
Ian Buller
Jesse Bullington
Allan Bumgartner
Jane Bunin
Conner Burba
Donna Burbank
Jeri Burnham
Gordon Burt
Linda Burt
Nanci Burtman
Johannes Busch
Deirdre Butler
Patricia Butler
William Butler
Margo Butner
Ed Byrne
Angelica Cabral
Marea Calderone
Sherry Caldwell
Carole Camberos
Lori Cameron
Brian Campbell
John Campbell
Carla Capritta
Nancy Carabell
Timothy Carey
J. Carlbom
Cheryl Carnahan
Bonnie Carol
Francoise Carpenter
Michelle Carpenter
James Carr
Adam Carroll
Helen Carta
Merrill Carter
Rob Carter
Janet Caspers
Elizabeth Cather
Peter Cedergren
Kristi Celico
Celine Celine
Tracy Ceravolo
Tim Chadd
David Chagala
Clay Chase
David Chazin
Oak Chezar
Kathryn Chouinard
Leslie Chouinard
Robert Chrisley
Cindy Christen
Felicia Christensen
Jeanne Christensen
Mona Christenson-Fansher
Darrick Christodaro
Lisa Chumley
Sharon Chung
Michael Cicerchi
Alfred Clark
Francesca Clark
Garry Clark
Thomas Clinger
Carol Coblentz
Laura Coblentz
Cameron Coffman
Randi Colberg
Kevin Colby
George Cole
Jennifer Cole
Gillian Collins
Lynne Collins
Melissa Collins
Eric Colon
Mary Commers
Jim Conaghan
Flynn Conlin
Carrie Cono
Leah Conroe-Luzius

Myriah Conroy
Sebastien Constans
Rich Cook
Andrew Cookler
Barbara Coombs
Alex Cooper
Debra Cooper
Jordan Cooper
Lenora Cooper
Cindy Copeland
Ethan Corkery
John Cornely
K. Coseglia
Edward Cowan
Regina Cowles
Anne Craddock
Bruce Cratty
Richard Creswell
Dale Cromer
Elen Crone
Scott Crossen
Lawrence Crowley
Rebecca Cueto
Victoria Culbeaux - Burke
C. Cullinan
Susan Cummings
Kirk Cunningham
Diane Curlette
Erin and Dean Curtis
Ruth Carol Cushman
Lucy Daberkow
Nathan Dadey
Sue Dailey
Brian Daniell
Edwin Dauenhauer
Eithne Davis
William Davis
John Dawson
Stacia Dawson
Joe Day
Steven Day
Spencer Dean
Kenneth Debey
Melany Deem
Martha Deitch
Elizabeth Delahunt
Alan Delamere
William Delamere
Edward Delissio
Maryanne Dellafera
Margaret Deluca
David Deremer
Clara Deser
Seleyn Deyarus
Fernando Diaz
Kathy DiCenzo
Martha Dick
Maddie Dillon
Emeline Dimitroff
Julie Dipaolo-Hickox
Jim Disinger
Michael Dombrowski
Collin Donahue-Oponski
Sue Donaldson
Andrew Doolen
Saadi Doucet
Becky Doughdrill
Jackie Dow
Mary Dowling
Laura Downing
Linda Drake
Roger Drake
Matthew Druckenmiller
Frank Drumm
Peter Dudley
Timmy Duggan
Mike Duignan
Lynette Dumont
Steve Dundorf
Kinloch Dunlap
Pat Dunn
Kathy Durrum
Andrew Dutson
Keri Earl
Petrina Easterbrooks
Robert Easton
Jeffrey Eaton
Kristine Edwards
Mike Edwards
Susan Eikenbary
Barry Elder
Tracey Elder
Anders Elgerd
M. Elizabeth England
Jeannine Elliott
Larry Elmore
Susanne Emerick
Richard Engelmann
Jill English
Dean Enix
Laurie Enke
Vicki Epley

Steven Eppelheimer
Shelby Epperson
Ellen Erany
Cassandra Ersland
Judy Evans
Scot Everhart
Jerry Eyden
Paige Eynon
David Fairbank
Julie Falkenberg
Bert Farin
Quinn Farrington
Ian Ferguson
Jackie Feulner
Yarrow Fewless
Brian Field
Heather Finlayson
Pamela Finnegan
Tom Finneran
Robert Fiorino
Chelsie Fisher
Laura Fisher
Stewart Fisher
Brian Fitzpatrick
Barbara Fleming
Ingrid Fleming
Robert Flick
Kathleen Flynn
Peter Fogg
Richard Folsom
Lori Fortier
Jean Foster
Barbara Fox
David Fox
Dotty Fox
Robin Franco
Rachael Frank
Leroy Frankel
Barbara Franklin
Jack Franssen
Scott Frantz
Megan Franz
Joseph Fraser
Mack Freestone
Thomas Freewind
Michael Freiwald
Rob Fremgen
Joe Fretz
Amy Frisina
Keoki Fuentes
Janine Fugere
Wendell Funk
Lisa Gallagher
Anthony Garcia
Sean Gardner
Tim Gaub
Kevin Gawenus
Bernie Gay
Bethany Gaylor
Elissa Gease
Cristina Geck
Brandy Gee
Elizabeth Gehring
Jean Gehring
Ronald Gelden
Marielle Gerard
Michael Gerstner
Mila Getsina
Patricia Giarratano
Peter Giffin
Janice Girocco
Lynne Glaeske
Ben Glennon
Allen Gnuschke
Audrey Godell
Murlin Goeken
Myrna Goff
Joyce Goglio
Nanci Goldberg
Kenneth Gomez
K. Gooden
Christina Goodman
Gary Goodman
Ann Goolsby
Robert Goolsby
Thomas Gootz
Lavonne Gordon
Eben Goresko
Mark Gowan
Jolie Graf
Pamela Graham
John Gray
William Gray
Alice Green
Rhonda Green
Kathryn Greeson
Bonnetta Gregory
Joyce Gregory
Kathleen Gresh
Fredric Griffin
Mark Griffin
Mildred Griffin

Martin Grims
Kathy Groth
Jakob Grothe
Judy Gunkler
Lincoln Gup
Andrew Gustus
Marvin Guymon
Rob Hacker
Dawn Hagan
Andree Hall
Patsy Hall
David Hallock
Jerry Halsey
Mandy Halsey
David Hamel
Chuck Hammond
Alan Hansen
Andreas Hansen
Eric Hansen
Marilyn Hansen
Greg Hanson
Ronald Harden
Jack Harlan
Heather Harpster
Sean Harpster
S. Harrell
Althea Harris
Carroll Harris
Jamie Harris
Kathy Harris
Victor Harris
Mary Nelson Harrold
Frances Hartogh
Elizabeth Hasse
Neil Hastings
David Hatcher
Daniel Hauer
Marjorie Haun
Karen Hauser
Tiffany Hawk
Alison Hawkins
Nancy Hawkins
Sarah Haworth
Stacey Hayduk
Keri Hayes
Russell Hayes
Tom Hayes
Shawndra Hayes-Budgen
Caitlin Haynes
Mary Headley
Rosemary Heagrty
Duncan Heitman
Janet Heller
Tania Henderson
Dawn Hendry
David Hennig
Karen Henry-Morningstar
Andrew Herring
Peter Herrold
Nate Hershey
Michiko Hester
Logan Hestetter
Colette Heun
Karen Hewitt
Maria Heymans
Megan Higgs
Steven Higgs
Clive Hill
Dana Hills
Opal Hilty
Pete Himelstieb
Harvey Hine
Teri Hodge
Robbin Hoffman
Tim Hogan
Frank Hogg
Karen Hollweg
Reggie Holmes
Donna Holton
Max Hopewell
Helena Horine
Tyler Houlton
Richard Hourigan
Chris House
JoNell How
Rosean Howard
Sully Howard
Lonnie Howell
Mark Howell
Kelsie Hower
Linda Hsieh
John Huddle
John Hughes
David Hughson
Carey Hume
John Hundemann
Anne-Barrie Hunter
Stephanie Huntington
Randall Huntsberry
Kevin Hurtack
Michael Husson
Bill Huston

Aaron Ibbotson
L. Iguchi
Bill Ikler
Valerie Illg
Eve Ilsen
Rachel Ingraham
K. Inman
Christine Ipolyi
Wes Isenhart
Bethany Jackson
Judy Jackson
Suellyn Jackson
Beverly Jacobson
Ashlee Janasek
Karen Janda
Robert Janini
Jolynn Jarboe
Kathleen Jefferies
Chris Jenner
Sara Joern
Andrew Johnson
Chris Johnson
Erik Johnson
Judith Johnson
Kaelen Johnson
Margaret Johnson
Alan Jolley
Al Jones
David Jones
Libby Jones
Michael Jones
Taylor Jones
Rich Jortberg
Mary Joyce
Mark Juliano
Kathy Kaiser
Melissa Kallick
Candace Kane
Dvora Kanegis
Jeremiah Kaplan
Marnie Kaplan
Pete Karba
Katherine Karnopp
Mary Kate Willett
Sandra Kay Hartman
Djerek Kayzakian-Rowe
Kevin Keilbach
Stacie Kelly
Sean Kendall
Kathleen Kenny
Philip Kerr
Samuel Kesend
Steve Kestrel
Samantha Kidd
Ian Kimsey
Kirsten Kindt
Charlie King
Janet King
Meryl Kingery
Bob Kinsey
Eileen Kintsch
Jason Kintzel
Susan Kinyon
Matthew Kiszka
Jan Kleckler
Julie Klein
Peter Kleinman
James Knight
Sue Knight
Jan Kochmeister
Sharisa Kochmeister
Jean Koebler
Roberta Koeppe
Janine Kondreck
John Kormos
Teresa Kosmicki
Kathryn Kramer
Misty Krawczyk
Kathleen Kreiselmeyer
Susan Krems
Cosima Krueger-Cunningham
Suzanne Krueger-Koplin
Deb Kulczewski
Karen Kuoppala
Clint Kuppenhafer
Lynn Kutalek
Mary Lafontise
Erin Lamb
Joseph Lamb
Max Lamb
Shari Lamb
Lisa Lamendola
Margaret Lamitie
Lisa Lammers
Scott Landolt
Sandra Lane
Martha Lankton
Jonathan Lantz
Kodid Laraque-Two
Sarah Larrabee
Tina Larter

Barb Lasley
Sandra Laursen
James Laven
Viktoria Lawson
R Lazcano
Rand Lechner
Alice Lecinski
Richard Leddon
Sharon Lee
Ron Leever
Y. Lefevre
Steven Lehti
Frank Leidy
Lee L'Enfant
Pamela Lennon
Sonja Leonard
Laura Leprino
Michael Levitt
William Lewis
Niels Liebisch
Robert Liedike
Erik Lindholm
Brad Lindseth
Bret Linenfelser
Brandon Linn
Susan Linner
Rick Linsky
Red Lion
Kurt Liss
Bill Little
Angela Loder
Leland Long
Tina Loomis
Linda Loose
Penelope Loughhead
Tara Lowe
Kevin Luby
David Lucas
Barbara Luccon
Aeric Luciano
Ana Luna
Stacey Lunn
Melissa Lupinski
Eric Lupo
Joan Lutz
Toni Lynn Bercha
Kelly Lyon
Tracey Macdonald
Angie Mackey
Kristyn MacPhail
Chris Macwaters
Brooke Maddaford
James Madsen
Chanoa Maestas
Virginia Maguire
Ken Mahannah
Mary Ann Mahoney
Ellen Mains
Myrna Maldonado
Becky Manders
Sarah Manno
Cynthia Manuel
James Mapes
Linda Marie
Susan Marie
Christel Markevich
Barbara Marshall
Carer Marshall
James Martin
Jim Martin
Katy Martin
Patrick Martin
Robert Martin
Matthew Martin-Croft
Kathy Martinez
Elliot Mason
Cindy Massey
Kimberly Matney
Betina Mattesen
Ashley Matthews
Georgia Mattingly
Lynn Mattson
Kai Mazurczyk
Shaun Mazurek
Todd Mazzitelli
Christian McCarthy
Tim McCarthy
Margery McCarty
Trish and Chris McCarthy
Sherri Mcclain
Rosalind McClellan
Roz McClellan
Holly Mcclelland
Keri Mccloskey
Brad McCloud
Joe McComb
Candice McConnell
Alan Mccormick
Patricia McCoy
Michael and Patricia McCoy
John Mccrystal
Joe McDonald

Austin Mcdougal
Russell Mcdougal
Ryan Mcduffee
Alison Mcginty
D. McGowan
Nancy McIntyre
Richard Mckee
Larry McKinley
Sandra McLuckie
Timothy Mcmahon
Joan Mcmullen
Patricia McNally-Leef
Lori McNeill
Eric Mcpherson
David Medina
Marla Meehl
Chris Meeker
Esther Meima
Dragan Mejic
Paul Melamed
Patricia Melendes
Gene Melick
Stacy Mercord
Alicia Merritt
Sharon Messinger
Teri Metallo
Mary Meyer
Marcia Mielke
Brock Miera
Mark Miesch
Aimee Millensifer
August Miller
Judi Miller
Richard Miller
Tidd Miller
Wendy Miller
Christie Mills
Howard Mills
Claudia Mishell
James Mittl
Sarah Mohagen
Lauren Molina
Cynthia Molinero
Mark Moll
John Monahan
Alan Monchak
Frank Montarelli
Abbie Mood
Kristen Mooer
Pam Mooney
Carrie Moore
Laverne Moore
Tom Moore
Renne Moran
Daniel Moriarty
Penny Morrow
Karen Mosteller
Jack Mudry
Deana Mueller
Joan Mulcahy
Brendan Murphy
Finn Murphy
Margaret Murray
Myra Mussack
William Musser
Barbara Mussil
John Myers
Gary Myre
Lisa Nagle
Maryann Nason
Jason Neff
Michael Neil
Doug Nelson
Eloise Nelson
Ike Nelson
Sarah Nelson
Lindsay Nerad
Rob Nevitt
Lisa Newkirk
Melody Newkirk
Michael Newport
Ron Nichols
Jan Nickoloff
Vincent Nicoletti
David Nitsch
Lori Nitzel
Brenda Nix
Gail Nolan
Teri Nolin
David Norcross
Bruce Nordwall
Jody Norman
Donella Novak
Ann Nowicki
Pat Noyes
Tom Noyes
Mo Oakley
Chris O'Brien
Michael O'Brien
Steve O'Dorisio
James Oelsner
Vickey Ohm

Kevin O'Hornett
Michael O'Leary
Annette Olivas
Lin Olmsted
Nancy Olsen
Bradley Olwin
Elaine Opdahl
Bonnie Orkow
Deborah Ortlip
James Osborn
Matthew Oscadal
Colleen Ostlund
Beth O'Toole
Irina Overeem
Michael Overlie
Donald Paden
Louis Palazzini
Russ Panneton
Anapaula Papa
Natalie Parker
Thomas Parker
Micheal Patrick
Bela Pattiasina
Erik Pattison
Lee Patton
Laura Peake
Bruce Pech
Jerry Pecks
John Penna
Evan Perkins
Susan Perkins
Denise Perreault
Janette Perry
James Peters
Robert Peters
Silvia Pettem
Anne Pfeffer
Matt Phillips
Wendy Phillips
Weslie Phillips
Hal Pierson
Ray Piira
Dave Pines
John Pinezich
Amy Platt
Domenic Policaro
David Polich
Kurt Portwich
Sebastian Posern
Steve Pott
Meredith Potter
Ruth Potter
Sue Prant
Priscilla Press
Sheri Price
Steve Priem
Irene Pritsak
Andrea Putman
John Putnam
Jim Quinlan
Michael Raab
Paul Raab
Joe Racco
Aron Ralston
Christian Ramage
Mike Ramsey
Carol Rankin
Mary Rapisardo
Bill Rawsky
Mandy Ray
Janice Reamer
Alison Recek
Art Recek
Dustina Reed
J. Reed Nelson
Jack Reed
Michael Rees
Gordon Reese
Diane Rehner
Terriann Reini
Devona Renee
Iris Reyes
Cheri Rhodes
Brandt Rhomberg
Caitlin Rice
Rodney Rice
Peggy Richardson
Rhonda Richardson
Roberta Richardson
Christine Richers
Daniel Rifkin
Marilyn Rifkin
Sandy Righter
R Riley
Paul Rindfleisch
Walter Ritzman
Tristen Robbins
Katelyn Roberts
Janet Robertson
Sharon Robertson
Sharalynn Rocha
Marc Rockhold

Sue Rodgers
John Rody
Judith Roehm
Jessica Rogers
Mark Rogers
Larry Rogstad
Rosalyn Rohloff
Joyce Rohr
Anne Rojo
Mikel Rooks
Arthur Rooze
Nolan Rosall
Kathryn Rose
Miriam Rosenblum
Steven Ross
Constance Roth
Julie Roth
Andrea Roy
David Rubine
Ronald Rudolph
Patrick Runions
Patricia Rustanius
Michael Ryan
William Ryder
Rebecca and John Saccardi
Ruth Sachnoff
Crystal Salas
Virgil Salzman
Doug Sammond
Lisa Samoy
Earl Sampson
Raul San Narciso
Tami Sandaker
Egan Sanders
Vicky Sanders
Stephen Sanderson
Reginald Saner
Manuel Santos
Jack Sasson
Holly Sauers
Gillian Scarlett
Rita Schelin
Brette Schell
Linda Schliebe
Deo Schlupp
Sylvia Schneider
Jan & Harold Schneider
Jan Schockner
Ann Schonlau
Wendy Schroeder
Jon Schroth
Barbara Schultheis
Arnold Schultz
Tobias Schunck
Suellen Scott
Brad Seago
Nancy Seccurro
Austin Seley
Ragen Serra
Michelle Sewald
Helen Shaffer
Jeffrey Shainline
Michael Shainline
Henry Shands
Karen Shanley
Paula Shapiro
Rachel Shapiro
Robert Shapiro
Flax Sharkey
Tanushree Sharma
Fran Sheets
Gabriela Sheets
Payson Sheets
Randolph Shires
Shaun Short
Glen Shue
Jessica Shupp
Lisa Siconolfi
Marion Sikes
Susan Silberberg
Bill Silberstein
Sam Simakis
Carole Simmons
Christopher Simmons
Jena Simms
Kenneth Simons
Donna Sims
Sidney Sisk
Jud Skaife
Jarrod Skulavik
Diana Slough
Rob Slutz
Todd Smarr
Mark Smith
Rocky Smith
Spencer Smith
Terra Smith
Michael Smithhisler
Charles Smythe
David Snider
Vince Snowberger
Jofrid Sodal

Sally Sodal
Kate Sparks
Gregory Speer
Bobby Spencer
Jim Spenst
Taggart Spenst
Yarrow Spitzfaden
Pamela Spivey
Ronald Spoerl
Lee St. John
Sarah St. Onge
Marilyn Staff
Margaret Stahl
Rachael Stalker
Lauri Stankewicz
Susan Stantejsky
Joan Stearns
Andrew Steel
John Steele
Cheryl Stegman
Jahnavi Stenflo
Davin Stephens
Sabrina Stern
Ron Stevens
Jennifer Stewart
Terri Stewart
Sandy Sticken
Sarah Stimely
David Stockland
Catherine Stone
Robert Storus
Peggy Story
L. Street
Zach Street
Katherine Streicher
Nan Streicker
Tracy Strickland
Kristin Strohm
Greg Strom
Tori Struble
Cassandra Stube
Lynne Sullivan
Stephenie Suttman
Carolyne Sutton
Avi Swartz
Stuart Swineford
Josh Swink
David Taenzer
Ann Tagawa
Betty Tagge
Phyllis Tainey
Craig Talbot
Ed Talbot
Thomas Talbot
Kristen Tamblyn
Marilyn Tanner
Andrew Taylor
Chuck Taylor
Kathleen Taylor
Rhonda Taylor
Gwen Tenney
Steven Terjak
Rebecca Tesich
Laraine Thelin
Nicholas Theobald
Antony Therroth
Craig Thomas
Nancy Thomas
Michael Thomason
Aimee Thompson
Dave Thompson
Ed Thornton
James Thrailkill
Marion Thurnauer
Sam Todd
Matt Tomasko
Christina Torres
Viktoriia Tovstolyp
Colin Towner
Norman Traum
Aurora Trischka
Sue Troller
Kenneth Troy
Kathryn Turbitt
Doug Turley
Anne Turnacliff
Kay Turnbaugh
Douglas Turner
Angie Unruh
Joan Unruh
Donna Urban
Larry Utter
Claudia Van Gerven
Pamela Van Pelt
Nicholas Vanderborogh
Joann Vanvliet
Theresa Vaughn
Rosario Vega
Eduardo Velasco
John Vernon
Brian Vick
Anne Vickery

Arlene Vickrey
Robert Victoria
Amanda Villa
Margaret Von Feldt
Sarah Wade
Tim Wadkins
Gretchen Wagner
Mark Walker
Rhondda Walker
Steven Walker
Sandra and Jacob Walker
Amanda Wallace
Chris Wallace
Don Waller
Jean Walsh
Kelly Walsh
Maria Ward
John Warnes
Brent Warren
Billie Watkins
Kirk Watson
John Waugh
Kym Waugh
Marilynn Weaver
Jeff Webb
Kelly Webb
Randee Webb
Sarah Webb
Philip Wegener
Stuart Weiss
Brant Wellman
Kathleen Wellman
Ann Wells
Dianne Wells
Robin Welsh
Barbara Werner
Scott Westfall
Joey Westhead
Angela Wetzel
Jeffrey Wheeler
Faith White
Mark White
Tanya White
Susan Wiberg
Hollace Widdowfield
Matt Wight
Burt Williams
Jane Williams
Kay Williams
Lynn Williams
Robert Williams
Martha Williamson
Lynn Wilsey
Mark Winchester
Matthew Winkel
Amy Winter
Theresa Wirth
D. Wiseman
Linell Wohlers
Em Wolf
Judy Wood
Ellen Woodbury
Joann Wooley
Cecil Woolley
Lynde Wooster
Allan Worthing
Vivien Wu
Andrew Wynne
Anna Yankelevich
Jill Yarger
Gary Yeomans
Gregg Yeomans
Linda Yokota
Margaret Young
Jake Zambrano
Laurajane Zimmer-Reed
Janice Zinkl
Dustin Zronek
Jennifer Zuniga
Jeff Zurakowski
Susie Zurbrugg
Sandra Zwingelber

Chapter 5
References

5. REFERENCES

16 USC 497. 1999. 64 FR 8681-8690. National Forest Ski Area Permit Act of 1986, as adopted in 1999. February 22.

36 CFR 60.4. 2004. National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq., and E.O. 11593.

36 CFR 219. 2012. National Forest System Land Management Planning and Pre-Decisional Administrative Review Process.

40 CFR 59, 80, 85 and 86. 2006. Control of Hazardous Air Pollutants from Mobile Sources. March 29.

40 CFR 1500-1508.28. 1978. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, as amended July 1, 1986.

42 USC 7470-7479. 2011. Public Health and Welfare: Air Pollution Prevention and Control.

42 USC 7475[a]. 2010. Prevention of Significant Deterioration of Air Quality: Preconstruction Requirements: Major emitting facilities on which construction is commenced.

42 USC 7479[1]. 2009. Prevention of Significant Deterioration of Air Quality: Definitions.

50 CFR 402. 2009. Interagency Cooperation-Endangered Species Act of 1973, as Amended: Formal Consultation. 51 FR 19957, 54 FR 40350, 73 FR 76287, 74 FR 20423.

Acoustical Consulting Services. 2003. Noise Effects of Proposed Snowmaking at Arizona Snowbowl. Mesa, Arizona.

Air Resource Specialists. 1993. IMPROVE Newsletter. Volume 2. Number 1. April 1993. vista.cira.colostate.edu/improve/publications/NewsLetters/apr_93.pdf.

Alexander, E. 1988. Rates of soil formation: Implications for soil-loss tolerance. Soil Science 145:1.Burroughs, E.R. and J.G. King. 1989. Reduction of Soil Erosion on Forest Roads. G.T.R INT-264, Ogden, UT. USDA, Forest Service, Intermountain Research Station.

Alexander, S. 1998. Personal communication with University of Calgary personnel. June 17.

Alexander, S. M., P.C. Paquet, and N.M. Waters. 2004. Carnivores, roads and habitat permeability in the Canadian Rocky Mountains: a community level study. Paper presented at the Defenders of

Wildlife Carnivores 2004 Conf: expanding partnerships in carnivore conservation. Nov. 14–17, 2004, Santa Fe, NM.

Alexander, S. M., N.M. Waters, and P.C. Paquet. 2005. Traffic volume and highway permeability for a mammalian community in the Canadian Rocky Mountains. Can. Geographer. 49:321–331.

Alldredge, A.W. and M.W. Alldredge. 2006. Pete's Bowl wildlife plots summary report 2003–2004. Unpubl. Rep., Thermopolis, WY. 15 pp.

Alpine Geophysics. 2013. MOVES2010b and NONROAD2008 Emissions Estimates Due to Proposed Eldora Mountain Resort Expansion.

Anchor Point Group. 2011. Nederland Fire Protection District Community Wildfire Protection Plan. Available at http://csfs.colostate.edu/pdfs/Nederland_FPD_CWPP_FINAL_2011.pdf. May 2011, Boulder, Colorado, 185 pp.

Anderson, T. 2005. Rocky Mountain capshell snail (*Acroloxus coloradensis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/rockymountaincapshellsnail.pdf. Accessed Oct. 26, 2005.

Andree, B. N.d. Personal communication with CDOW personnel.

Andrews, R. and R. Righter. 1992. Colorado birds: a reference to their distribution and habitat. Denver Museum of Natural History. Denver, CO. 442 pp.

Apps, C.D. 1998. Personal communication with Parks Canada and BC Environment personnel. June 17.

———. 1999. Space-use, diet, demographics, and topographic association of lynx in the southern Canadian Rocky Mountains: a study. Pages 351–372 *in* Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey and J.R. Squires, eds. Ecology and conservation of lynx in the United States. Univ. Colorado Press and USDA Rocky Mtn. Res. Stn., USDA Gen. Tech. Rep. RMRS-GTR-30WWW. 480 pp.

Aquatic Associates, Inc. 2012. Aquatic assessment for the Eldora EIS Project, Fall 2012. Aquatics Associates, Inc. Ft. Collins, CO.

———. 2013. Aquatic Assessment for the Eldora EIS Project. January 2013.

Arapaho-Roosevelt National Forests. 2003. Decision Notice and Finding of No Significant Impact for Noxious Weed Management Plan.

Arapaho-Roosevelt National Forests and Cirrus Ecological Solutions. 1996. Biological Assessment for proposed mountain pine beetle control efforts, Eldora Ski Area, Arapaho-Roosevelt National Forests, Boulder County, Colorado. Cirrus Ecological Solutions, Logan, UT. Apr. 30 pp.

Armstrong, D.M. 1972. Distribution of mammals in Colorado. Univ. Kansas Mus. Nat. Hist. Mono. 3. 415 pp.

Associated Press. 2010. Colorado explores reintroducing wolverines. Denver Post. December 14.

Aubry, K.B., K.S McKelvey, and J.P. Copeland. 2007. Distribution and broadscale habitat relations of the wolverine in the contiguous United States. J. Wildl. Manage. 71:2147–2158.

Aubry, S.W. Buskirk, G.M. Koehler, and J.R. Squires. 1999. Ecology of Canada lynx in southern boreal forests. Pages 373–396 *in* Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey and J.R. Squires, eds. Ecology and conservation of lynx in the United States. Univ. Colorado Press and USDA Rocky Mtn. Res. Stn., USDA Gen. Tech. Rep. RMRS-GTR-30WWW. 480 pp.

Baker, B. 2007. Middle Boulder Creek Road Association, special use authorization, biological report – terrestrial wildlife, Boulder Ranger District, Arapaho-Roosevelt National Forests and Pawnee National Grassland. Arapaho and Roosevelt National Forests and Pawnee National Grassland. Boulder Ranger District, Boulder, CO. Mar.

———. 2010. Personal communication with USFS personnel. March 18.

———. 2011. Personal communication with USFS personnel. March 30.

———. 2013. Personal communication with USFS personnel. March 5, April 15 and December 19.

———. 2014. Personal communication with USFS personnel. January 6.

Baker, B. S.J. Popovich, and M. Fairchild. 2011. Allenspark recreational shooting project, biological report for terrestrial wildlife, fish, and plants, Boulder Ranger District, Arapaho and Roosevelt National Forests and Pawnee National Grassland. Boulder Ranger District, Boulder, CO. Mar.

Banci, V. 1994. Wolverine. Pages 99–127 *in* Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, tech. eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen. Tech. Rep. RM-254. USDA For. Serv. Rocky Mountain Range and Exper. Stn., Ft. Collins, CO. 184 pp.

Banfield, A.W.F. 1974. The mammals of Canada. Univ. Toronto Press, Toronto. 438 pp.

Barclay, D. 1993. Eldora Ski Area Cultural Resource Inventory, Boulder County, Colorado. Metcalf Archeological Consultants, Inc. Submitted to USDA Forest Service. Prepared for Pioneer Environmental Consultants, Inc. On file, Colorado Office of Archaeology and Historic Preservation, Denver.

Barnum, S.A. 2000. Summary of Animal/Vehicle Collisions from Glenwood Springs to the Morrison Exit. Colorado Department of Transportation, Denver, CO. Unpub. Rep.

———. 2003. Identifying the best locations along highways to provide safe crossing opportunities for wildlife. Colorado Department of Transportation, Denver, CO. Rep. No. CDOT-DTD-UCD-2003-9. 60 pp.

Bartmann, R.M., and Byrne, G. 2001. Analysis and Critique of the 1998 Snowshoe Hare Pellet Survey. Colorado Division of Wildlife Special Report No. 20.

Bashenia, N.V. 1956. Influence of the quality of subnivian air on the distribution of winter nests of voles. Zool. Zhur. 35:940–942. (*In* Russian, as cited in Jarvinen and Schmid 1971)

Beauvais, G.P. and J. McCumber. 2006. Pygmy shrew (Sorex hoyi): a technical conservation assessment. Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project. Nov. 30. Available online: http://www.fs.fed.us/r2/projects/scp/assessments/pygmyshrew.pdf. Accessed May 2, 2007.

Beidleman, C.A. 2000. Partners in Flight land bird conservation plan, Colorado. Colorado Partners in Flight, Brighton, CO. Vers. 1.0. Available online: http://www.rmbo.org/pif/bcp/index.htm.

Beier P. and Loe S. 1992. In My Experience: A Checklist for Evaluating Impacts to Wildlife Movement Corridors. Wildlife Society Bulletin 20:4, 434–440.

Bennet, A.F. 1990. Habitat Corridors and the Conservation of Small Mammals in a Fragmented Forest Environment. Landscape Ecology 4:2-3, 109–122.

Bertram, T. and J. Claar. 2008. Horizontal cover – interim guidance for assessing multi-stories stands within lynx habitat. USDA Forest Service, Reg. 1, Missoula, MT. June 5.

Bishop-Brogden Associates, Inc. 2013. Personal communication (via email) with Julia Keedy, Bishop-Brogden Associates, Inc. Water Resources Engineer. May 17, 2013.

Bissell, S.J. 1978a. Wolverine, *Gulo gulo* L. Pages 76–77 *in* Essential habitat for threatened and endangered wildlife in Colorado. Colorado Div. Wildl., Denver, CO. 84 pp.

———. 1978b. River otter, *Lutra canadensis* Schreber. Pages 78–797 *in* Essential habitat for threatened and endangered wildlife in Colorado. Colorado Div. Wildl., Denver, CO. 84 pp.

Bleich, V.C., Wehausen, J.D., and Holl, A. 1990. Desert-dwelling Mountain Sheep: Conservation Impactions of a Naturally Fragmented Distribution. Conservation Biology 4:4, 383–390.

Boag, D.A. 1986. Dispersal in pond snails: potential role of waterfowl. Canadian Journal of Zoology 64:904–909.

Boals, C.W. 1994. A photographic and behavioral guide to aging nestling northern goshawks. Studies in Avian Biology No. 16:32–40.

Boreal Toad Conservation Strategy Team. 1997. Draft conservation strategy for the southern Rocky Mountain population of the boreal toad (*Bufo boreas boreas*). U.S. Fish and Wildlife Service. Denver, CO.

Boreal Toad Recovery Team. 1998. Boreal toad conservation plan and agreement. Colorado Div. Wildl., Denver, CO.

———. 2006. Report on the status and conservation of the boreal toad, *Bufo boreas boreas*, in the Southern Rocky Mountains, 2005. T. Jackson, Coord. ed. CDOW, Denver, CO. Feb. http://wildlife.state.co.us/NR/rdonlyres/64D119FD-DC6C-4DA8-B4EF-CB039935888D/0/BUBOstatus2005.pdf.

———. 2008. Boreal Toad Recovery Team 2008 meeting minutes, March 12 and 13, 2008, Comfort Inn, Alamosa, CO. Colorado Div. Wildl., Denver, CO. 12 pp.

Boulder County. 2013. Ordinance NO.92-28. An Ordinance Pertaining To The Regulation Of Noise On Public And Private Property. Boulder, CO.

Bowles, M.L. and A. Duxbury. 1986. Report on the Status of *Platanthera praeclara* Sheviak and Bowles in Oklahoma, Kansas, Nebraska, South Dakota and North Dakota. Report submitted to USFWS, Endangered Species, Denver.

Boyd, R.J. 1978. American elk. Pages 11–29 *in* J.W. Schmidt and D.L. Gilbert. Big game of North America. Stackpole Books. Harrisburg, PA. 494 pp.

Boyd, R.J. and E.E. Ryland. 1971. Breeding dates of Colorado elk as estimated by fetal growth curves. Colorado Div. Wildl. Info. Leaf. No. 88. 2 pp.

Boyle and Rogers. 1991. 1991 field surveys by the CDOW for the Mexican spotted owl. CDOW (as cited *in* Grother 1992).

Boyle, S. 2006. North American river otter (*Lontra canadensis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/northamericanriverotter.pdf. Accessed Jan. 23, 2013.

Brand, C.J., L.B. Keith, and C.A. Fischer. 1976. Lynx responses to changing snowshoe hare densities in Central Alberta. The Journal of Wildlife Management 40:3, 416–428.

Brennan, C. 2013. Boulder confirms first North American river otter sighting in a century. Boulder Camera. Mar. 7.

Brittell, J.D., R.J. Poelker, S.J. Sweeney, and G.M. Koehler. 1989. Native Cats of Washington. Section III: Lnyx. Washington Department of Wildlife, Olympia, Washington.

Brocke, R.H., K.A. Gustafson, and A.R. Major. 1990. Restoration of the Lynx in New York: Biopolitical Lessons. Trans. North American Wildlife and Natural Resources Conf 55, 590–598 (as cited *in* Ruediger et al. 2000).

Brocke, R.H., K.A. Gustafson, and L.B. Fox. 1991. Restoration of Large Predators: Potentials and Problems. Challenges in the Conservation of Biological Resources: A Practitioner's Guide. Westview Press, Boulder, CO, 303–315 (as cited *in* Ruediger et al. 2000).

Brocke, R.H., J. Belant and K.A. Gustafson. 1993. Lynx Population and Habitat Survey in the White Mountain National Forest, New Hampshire. State of University of New York, College of Environmental Sciences and Forestry, Syracuse, NY (as cited *in* Ruediger et al. 2000).

Broderdorp, K. 2003. Problems with information being provided in Biological Assessments. USFWS, Grand Jct., CO. 3 pp.

———. 2007. Personal communication with USFWS personnel. June 18.

Bryce, G.W., Jr. 1970. Rediscovery of the limpet, *Acroloxus coloradensis* (Basommatophora: Acroloxidae) in Colorado. Nautilus 83:105–108.

Buell Environmental, LLC. 2013. Old Growth (Late-successional Forest) Assessment.

Burns. 2013. Personal communication on March 13.

Burroughs, E.R. and J.G. King. 1989. Reduction of Soil Erosion on Forest Roads. G.T.R INT-264, Ogden, UT. USDA Forest Service, Intermountain Research Station.

Buskirk, S.W. 1983. Ecology of the marten in south-central Alaska. Univ. Alaska, Fairbanks. Ph.D. Thesis. 131 pp. (as cited *in* Buskirk and Ruggiero 1994).

Buskirk, S.W. and L.F. Ruggiero. 1994. American marten. Pages 7–37 *in* Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, tech. eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen. Tech. Rep. RM-254. USDA For. Serv. Rocky Mountain Range and Exper. Stn., Ft. Collins, CO. 184 pp.

Byrne, G. 1998. A Colorado winter track survey for snowshoe hares and other species. CDOW, Glenwood Springs. Unpubl. Rep. July 10. 35 pp.

Byrne, G. and J. Copeland. 1997. An aerial survey for wolverine (*Gulo gulo*) in Colorado. Colorado Div. of Wild. Unpubl. Rep. 18 pp.

Byrne, G. and T. Shenk. 2000. Personal communication with CDOW personnel. June 12.

Call, M.W. 1970. Beaver pond ecology and beaver-trout relationships in southeastern Wyoming. Ph.D. Dissertation. Univ. of Wyoming, Laramie. 319 pp.

Campbell, T.M. 1979. Short-term effects of timber harvests on pine marten ecology. M.S. Thesis, Colorado State University, Fort Collins. Published in The Relationship between Habitat and Furbearers, by A.W. Allen. 1987. Pages 164–179 *in* Wild Furbearer Management and Conservation in North America, edited by M. Novak, J.A. Baker, M.E. Obbard, and B. Mallock. Ontario Ministry of Natural Resources, Canada.

Carter, M.F., W.C. Hunter, D.N. Pashley, and K.V. Rosenberg. 2000. Setting conservation priorities for landbirds in the United States: The Partners In Flight approach. Auk 117:541–548.

Cary, M. 1911. A biological survey of Colorado. N. Amer. Fauna. 33:1–256.

Ciesla, W.M. 2010. 2010 Report on the health of Colorado's forests, continuing challenges for Colorado's forests: recurring & emerging threats. Forest Health Management International, Fort Collins, CO. Colorado State Forest Service, Fort Collins, CO. 46 pp. http://csfs.colostate.edu/pdfs/FINAL_2010_Forest_Health_Report_www.pdf.

Cirrus Ecological Solutions. 1996a. Rocky Mountain capshell snail status summary. Cirrus Ecological Solutions, Logan, UT. Nov. 14. 20 pp.

———. 1996b. Biological Evaluation for proposed mountain pine beetle control efforts, Eldora Ski Area, Arapaho-Roosevelt National Forests, Boulder County, Colorado. Cirrus Ecological Solutions, Logan, UT. Apr. 40 pp.

———. 1996c. Management Indicator Species report, proposed mountain pine beetle control efforts, Eldora Ski Area, Arapaho-Roosevelt National Forests, Boulder County, Colorado. Cirrus Ecological Solutions, Logan, UT. May. 12 pp.

———. 1996d. Biological Assessment, proposed improvements at Eldora Mountain Resort. Cirrus Ecological Solutions, Logan, UT. Nov.

———. 2000. Eldora Mountain Resort, northern goshawk survey report. Cirrus Ecological Solutions, Logan, UT. May 5. 4 pp.

———. 2007a. Biological Assessment for proposed mountain pine beetle control efforts, Eldora Ski Area, Arapaho-Roosevelt National Forests, Boulder County, Colorado. Cirrus Ecological Solutions, Logan, UT. Apr. 30 pp.

———. 2007b. Biological Evaluation for proposed mountain pine beetle control efforts, Eldora Ski Area, Arapaho-Roosevelt National Forests, Boulder County, Colorado. Cirrus Ecological Solutions, Logan, UT. Apr. 40 pp.

———. 2007c. Management Indicator Species report, proposed mountain pine beetle control efforts, Eldora Ski Area, Arapaho-Roosevelt National Forests, Boulder County, Colorado. Cirrus Ecological Solutions, Logan, UT. May. 12 pp.

Clark, A.H., Jr. 1993. Final report submitted to the Fish and Wildlife Service on the survival status of two species of bivalve mollusks and 12 species and subspecies of terrestrial mollusks, and one species of aquatic mollusk. Contract No. 14-16-0006-01-046. USFWS.

Clark, T.W. and T.M. Campbell. 1977. Short-term effects of timber harvest on pine marten behavior and ecology. Idaho State Univ., Pocatello. 60 pp. (as cited *in* Fitzgerald et al. 1994).

Clark, T.W., E. Anderson, C. Douglas and M. Strickand. 1987. *Martes americana.* Amer. Soc. Mammal., Mammalian Species, 289:1–8.

Clark, T.W., M. Bekoff, T.M. Campbell, T. Hauptman, and B.D. Roberts. 1989. American marten, *Martes americana*, home ranges in Grand Teton National Park, Wyoming. Can. Field-Nat. 103:423–425.

Clarke, A. H., Jr. 1973. The freshwater mollusks of the Canadian Interior Basin. Malacologia 13 (½);1–509.

Clevenger, A.P., B. Chruszcz, K. Gunson, and M. Brumfit. 2002. Highway Mitigation Monitoring: Three Sisters Parkway Interchange. Final Report. Alberta Sustainable Resources Development, Canmore, Alberta, Canada.

Colfer, K. 2005. Eldora Mountain Resort 10" high-pressure gas pipeline replacement Biological Report, Boulder Ranger District, Arapaho-Roosevelt National Forests and Pawnee National Grassland. June. 59 pp.

Colorado Department of Labor and Employment. 2013. LAUS Unit, LAUS system output file. Denver, CO.

Colorado Department of Local Affairs. 2013. Economic Forecasts. Denver, CO. http://www.colorado.gov/cs/Satellite?c=Page&childpagename=DOLA-Main%2FCBONLayout&cid=1251593349151&pagename=CBONWrapper.

Colorado Department of Transportation. 2002. State of Colorado state highway access code. Vol. 2, Code of Colorado Regulations, 601-1, March.

———. 2013. CDOT Online Transportation Information System. Accessed December 2013 at http://dtdapps.coloradodot.info/Otis/.

Colorado Division of Wildlife. 1993. Appendix A, WRIS elk seasonal activity areas, Feb. Colorado Div. Wildl., Denver, CO. 2 pp.

———. 2002. Wildlife Report. (1/14/02) DOW authority for deer, elk importation approved. www.dnr.state.co.us/cdnr_news 2 pp.

———. 2003. State of Colorado river otter recovery plan, June 2003. Unpublished report, Colorado Division of Wildlife, Denver, CO.

———. 2004. Prevalence and distribution of chronic wasting disease in Colorado 2003–2004. Colorado Div. Wildlife, Denver. 5 pp.

———. 2006. CDOW researchers release 2006 lynx kitten count. 8/8/2006 press release. http://wildlife.state.co.us/newsapp/press.asp?pressid=3993.

———. 2009a. Greenback cutthroat trout. CDOW website. June 12 update. http://wildlife.state.co.us/WildlifeSpecies/Profiles/Fish/GreenbackCutthroat.htm.

———. 2009b. Lynx update. May, 25. http://wildlife.state.co.us/NR/rdonlyres/1E7C95D0-53F3-41EB-82DD-26134C0FF261/0/LynxUpdateMay252009.pdf.

———. 2010a. Draft plan to reintroduce wolverine (*Gulo gulo*) to Colorado. Draft dated 9/27/10. Denver, Colorado. 28 pp.

———. 2010b. Press Release: DOW Declares Colorado Lynx Reintroduction Program a Success http://wildlife.state.co.us/NewsMedia/PressReleases/Press.asp?PressId=6650.

Colorado Geological Survey. 2012. Colorado Inventory Program. Available: www.cgsmaps.state.co.us/Colorado_landslide_intentory. Accessed February 14, 2013.

Colorado Natural Heritage Program. 2002. Evaluation of amphibian and mammalian management indicator species on the Arapho-Roosevelt National Forests and Pawnee National Grassland. Colorado Natural Heritage Program, Colorado State University, Fort Collins, CO.

———. 2009. Colorado Natural Heritage Program's Biodiversity Assessment of Arapaho and Roosevelt National Forest.

Colorado Parks and Wildlife. 2012. Bald eagle, Species of Special Concern in Colorado. CPW, Denver, Colorado. http://wildlife.state.co.us/WildlifeSpecies/Profiles/Birds/Pages/baldeagle.aspx. Accessed Apr. 15, 2013.

Colorado Ski Country USA. 1986. A Final Report on The Colorado Ski Country USA Water Management Research Project. Eisel, L.M., Mills, K.D., Leaf, C.F. February 1986.

Colorado State Demography Office. 2013. Population Totals for Colorado Counties. Denver, CO. http://www.colorado.gov/cs/Satellite?c=Page&childpagename=DOLA-Main%2FCBONLayout&cid=1251593346867&pagename=CBONWrapper.

Cooper, D.J. and E. Gage. 2013. Evaluating snow compaction effects to fen wetlands on Rabbit Ears and Buffalo Pass of the Routt National Forest. Colorado State University Department of Forest and Rangeland Stewardship Warner College of Natural Resources. May 30.

Copeland, J.P. 1996. Biology of the wolverine in central Idaho. M.S. Thesis, Univ. of Idaho. 138 pp.

———. 1999. Personal correspondence between J. Copeland and R. Thompson at Western Forest Carnivore Committee Meeting, Missoula, Montana, May 12, 1999. Re: Requirements for extreme isolation of wolverine denning areas from temporal human activity areas.

Copeland, J.P., J.M. Peek, C.R. Groves, W.E. Melquist, K.S. McKelvey, G.W. McDaniel, C.D. Long, and C.E. Harris. 2007. Seasonal habitat association of the wolverine in Central Idaho. Journal of Wildlife Management 71:2201–2212.

Copeland, J.P., K.S. McKelvey, K.B. Aubry, A. Landa, J. Persson, R.M. Inman, J. Krebs, E. Lofroth, H. Golden, J.R. Squires, A. Magoun, M.K. Schwartz, J. Wilmot, C.L. Copeland, R.E. Yates, I. Kojola, and R. May. 2010. The bioclimatic envelope of the wolverine (*Gulo gulo*): do climatic constraints limit its geographic distribution? Canadian Journal of Zoology 88(3):233–246.

Corbet, P.S. 1999. Dragonflies behavior and ecology of Odonata. Comstock Publ. Assoc., Cornell Univ. Press. 829 pp.

Corn, P.S. and J.C. Fogelman. 1984. Extinction of montane populations of the northern leopard frog (*Rana pipiens*) in Colorado. J. Herpetol. 18:147-152.

Council on Environmental Quality. 1981. Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulation. http://energy.gov/sites/prod/files/G-CEQ-40Questions.pdf.

———. 1997a. Considering cumulative effects under the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President. Wash., D.C. 64 pp.

———. 1997b. Environmental Justice: Guidance under the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President. Wash., D.C. 40 pp. http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf.

Cowardin, L.M., V. Carter, C.G. Francis, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, U.S. Fish and Wildlife Service, Office of Biological Services, Washington, DC.

Craig, G.R. 1978a. American peregrine falcon, Falco peregrinus anatum. Pages 40–45 *in* Essential habitat for threatened or endangered wildlife in Colorado. CDOW, Denver. 84 pp.

———. 1978b. Southern bald eagle, *Haliaeetus leucocephalus leucocephalus*. Pages 46–47 *in* Essential habitat for threatened or endangered wildlife in Colorado. CDOW, Denver. 84 pp.

———. 1982. Personal communications with CDOW personnel in 1982.

———. 1985. Personal communications with CDOW personnel in 1985.

———. 2007. Personal communications with CDOW Raptor Biologist on October 3.

Craig, G.R. and J.H. Enderson. 2004. Peregrine falcon biology and management in Colorado. Colorado Div. of Wildlife Techn. Publ. No. 43. DOW-R-T-43-04. CDOW, Denver, CO. 80 pp.

Danby, R.K. and D.S. Hik. 2007. Variability, contingency, and rapid change in recent subarctic alpine tree line dynamics. J. Ecol. 95:352–363.

Deems, E.F. and D. Pursley. 1978. North American furbearers: their management, research and harvest status in 1976. Int. Assoc: Fish Wildl. Agencies. Univ. Maryland, College Park, MD.

Dejours, R. 1966. Respiration. Oxford Univ. Press, New York. 244 pp. (as cited *in* Jarvinen and Schmid 1971).

DeMott, S.L. and G.P. Lindsey. 1975. Pygmy shrew, *Microsorex hoyi*, in Gunnison County, Colorado. Southwest. Nat. 20:417–418.

Doug Kennedy Advisors. 2013. Economic Impact Assessment for Eldora Mountain Resort Alternatives.

Dobkin, D. S. 1994. Conservation and management of Neotropical migrant landbirds in the northern Rockies and Great Plains. Univ. Idaho Press, Moscow, ID. 238 pp.

Dolbeer, R.A. and W.R. Clark. 1975. Population ecology of snowshoe hares in the central Rocky Mountains. J. Wildl. Manage. 39:535–549.

Dryer, M. P. and A.J. Sandvol. 1993. Recovery Plan for the pallid sturgeon (*Scaphirhynchus abus*). U.S. Fish and Wildlife Service, Denver, Colorado. 55 pp.

Dunkle, S.W. 2000. Dragonflies through binoculars, a field guide to dragonflies of North America. Oxford. Univ. Press. New York, NY. 266 pp.

Eberhart, P. 1969. Guide to the Colorado Ghost Towns and Mining Camps. Second Edition, Swallow Press, Athens, Ohio.

Ellwood, L. 2004. Personal communication with USFWS personnel on September 7, 2004.

———. 2007. Email from Leslie Ellwood, USFWS, to Lynne Deibel, ARP Forest Biologist, Feb. 8, 2007.

———. 2010. Telephone communication between Bev Baker, USFS and Leslie Ellwood, USFWS regarding consultation for ongoing operations under Eldora's SUP. Nov. 18, 2010.

———. 2013. Telephone communication between Bev Baker (USFS) and Leslie Ellwood (USFWS) regarding consultation for ongoing operations for Platte River and other listed species under Eldora's SUP. April 3, 2013.

Emerick, J.C. and P.J. Webber. 1982. The effects of augmented winter snow cover on the canopy structure of alpine vegetation. *In* J.C. Halfpenny, ed. Ecological studies in the Colorado alpine. Occ. Paper No. 37. Inst. Arctic and Alpine Res. Univ. Colorado, Boulder.

Eldora Mountain Resort. 1994. Eldora Mountain Resort Master Plan 1994.

———. 2010. Eldora Mountain Resort Corona Grading Project, Environmental Assessment, Decision Notice and Finding of No Significant Impact.

———. 2011. Eldora Mountain Resort Master Plan 2011.

———. 2013. Eldora Mountain Resort Vegetation Management Plan. March 2013.

———. N.d. Snowmaking Operating Days and Hours Data.

ENSR Consulting and Engineering. 1991. Summary report-Mexican spotted owl surveys for the Transcolorado Pipeline (as cited *in* Grother 1992).

Evans, K.E. and R.N. Connor. 1979. Snag management. Pages 215–225 *in* R.M. Degrauf and K.E. Evans (eds.). Management of north central and northeastern forests for nongame.

Ewer, R.F. 1973. The carnivores. Cornell Univ. Press, Ithaca, NY. 494 pp.

Fairchild, M. 2012. Personal communication with USFS personnel on November 20, 2012.

Federal Register. 1995. Executive Order 12962—Recreational Fisheries. Fed. Regist. 60(111):30769-30770. June 9.

———. 2001. Executive Order 13186—Responsibilities of Federal Agencies to Protect Migratory Birds. Fed. Regist. 66(11):3853-3856. Jan. 20.

———. 2008. Executive Order 13474— Amendments to Executive Order 12962. Fed. Regist. 73(191):57229-57230. Sep. 26.

Ferland, C. 2005. Northern goshawk (*Accipiter gentillis atricapillus*) breeding status in the San Juan and Rio Grande National Forests, southwestern Colorado. Unpubl. Rep. prepared for the San Juan and Rio Grande National Forests, 26 Jan., 2005. 40 pp.

Fettig, C. J., K.D. Klepzig, R.F. Billings, A.S. Munson, T.E. Nebeker, J.F. Negro´n and J.T. Nowak. 2007. The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of the western and southern United States. Forest Ecology and Management 238 (2007) 24–53.

Finch, D.M. 1992. Threatened, endangered, and vulnerable species of terrestrial vertebrates in the Rocky Mountain Region. General Technical Report RM-215. USDA Forest Service. Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado in Routt National Forest. Routt National Forest Plan EIS. 1997. Appendix J: Biological Assessment and Evaluation.

Findley, J.S. and S. Anderson. 1956. Zoogeography of the montane mammals of Colorado. J. Mammal. 37:80–82.

Findley, J.S., A.H. Harris, D.E. Wilson and C. Jones. 1975. Mammals of New Mexico. Univ. of New Mexico Press, Albuquerque, NM. 360 pp.

Fitzgerald, G., R. Ghormley and T. Harris. 2006. Beaver species assessment, San Juan National Forest. U.S. Forest Service. San Juan National Forest. Jan. 9 pp.

Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. Denver Mus. Nat. Hist. and Univ. Press of Colorado. Niwot, CO. 467 pp.

———. 2011. Mammals of Colorado. 2nd ed. Denver Mus. Nat. Hist. and Univ. Press of Colorado. Boulder, CO. 620 pp.

Forman, R.T.T. and M. Godron. 1986. Landscape ecology. John Wiley and Sons, New York, N.Y. 619 pp.

Forman, R.T.T. and L.E. Alexander. 1998. Roads and their major ecological effects. Ann. Rev. Ecol. Syst. 29:207–231.

Forman, R.T.T., D. Sperling, J. Bissonette, A.P. Clevenger, C. Cutshall, V. Dale, L. Fahrig, R. France, C.S. Goldman, K. Heanue, J. Jones, F. Swanson, T. Turrentine, and T. Winter. 2003. Road ecology: science and solutions. Wash., D.C. Island Press. Forrest, L.R. 1988. Field guide to tracking animals in snow. Stackpole Books. Harrisburg, PA. 193 pp.

Fox, R. and B. Rhea. 1989. Spotted owls in the Rockies. J. For. 87:41–45 (as cited *in* Kingery 1998).

Freddy, D.J., W.M. Bronaugh, and M.C. Fowler. 1986. Responses of mule deer to disturbance by persons afoot and snowmobiles. Wildl. Soc. Bull. 14:63–68.

Freddy, D.J. 1987. The White River elk herd: a perspective, 1960-85. Tech. Publ., Colorado Div. Wildl., Denver, CO. 37:1–64.

Freddy, D.J., D.L. Baker, R.M. Bartmann, and R.C. Kufeld. 1993. Deer and elk management analysis guide, 1992–94. Div. Rep. No. 17. Colorado Div. Wildl., Ft. Collins, CO.

Gable, D.J. 1969. Geologic Map of the Nederland Quadrangle, Boulder and Gilpin Counties, Colorado. Map GQ-833. U.S. Geological Survey, Washington, D.C.

Ganey, J.L. and R.P. Balda. 1989. Home-range characteristics of spotted owls in northern Arizona. J. Wildl. Manage. 53:1159–1165 (as cited *in* Kingery 1998).

Ganey, J.L., J.A. Johnson, R.P. Balda, and R.W. Skaggs. 1988. Mexican spotted owl. Pages 145–150 *in* Proceedings southwest raptor management symposium workshop. R.L. Glinski, B.G. Pendleton, M.B. Moss, M.N. LeFranc, Jr., B.A. Millsap, and S.W. Hoffman, eds. Natl. Wildl. Fed. Sci. Tech. Ser. No. 11 (as cited *in* Kingery 1998).

Ganey, J.L., R.P. Balda, and R.M. King. 1993. Metabolic rate and evaporative water loss of Mexican spotted owls and great horned owls. Wilson Bull. 105:645–656 (as cited *in* Kingery 1998).

Gano, R.D. 1981. Woodpecker nesting habitat and artificial cavity use. M.S. Thesis, Frostburg St. Coll. 63 pp.

Ghalambor, C.K. and R.C. Dobbs. 2006. Pygmy nuthatch (*Sitta pygmaea*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. August 10, 2006. Available: http://www.fs.fed.us/r2/projects/scp/assessments /pygmynuthatch.pdf. Accessed April 11, 2007.

Ghormley, R. 2012. Personal communication with USFS personnel on August 30, 2012.

Goettl, J.P. and Boreal Toad Recovery Team. 1997. Boreal toad (*Bufo boreas boreas*) (southern Rocky Mountain population) recovery plan. Colorado Div. Wildl. Denver. 50 pp.

Gonzalez, P., R.P. Neilson, K.S. McKelvey, J.M. Lenihan, and R.J. Drapek. 2007. Potential impacts of climate change on habitat and conservation priority areas for *Lynx canadensis* (Canada lynx). The Nature Conservancy, Arlington, VA. Oct. 2. 19 pp.

Grode, J. 2008. Supplemental biological assessment of the Southern Rockies Lynx Amendment on threatened, endangered and proposed species for the following National Forest Land and Resource Management Plan Amendments: Arapaho and Roosevelt National Forests; Grand Mesa, Uncompahgre and Gunnison National Forests; Pike and San Isabel National Forests; Medicine

Bow and Routt National Forests; Rio Grande National Forest; San Juan National Forest; White River National Forest. U.S. Forest Service, Rocky Mountain Region, Apr. 25, 2008. 132 pp.

Grother, C. 1992. Biological assessment: Krammer Land Exchange, Norwood Ranger District, Grand Mesa, Uncompahgre, Gunnison National Forest. USFS, Norwood, CO. 7 pp. (as cited *in* Grother et al. 1994).

Grother, C., S. Kaye, and Pioneer Environmental Services. 1994. Biological assessment and Biological evaluation, Telluride Ski Area expansion, Norwood Ranger District, Grand Mesa, Uncompahgre, Gunnison National Forest. USFS, Norwood, CO.

Groves, C.R. 1988. Distribution of the wolverine in Idaho as determined by mail questionnaire. Northwest Sci. 62:181–185.

Hadley, G.L. and K.R. Wilson. 2002. Final report: effects of ski-run development on small mammal populations at Vail Ski Area. Colorado State Univ., Dept. Fishery and Wildlife Biol. Ft. Collins, CO. 53 pp.

———. 2004. Patterns of density and survival in small mammals in ski runs and adjacent forest patches. J. Wildl. Manage. 68:288–298.

Halfpenny, J.C. 1981. History and status of wolverine in Colorado. Colorado Div. Wildl. Res. Rept. 1:67–82.

———. 1986. A field guide to mammal tracking in western America. Johnson Books, Boulder, CO. 164 pp.

Halfpenny, J.C., S.J. Bissel, and D. Need. 1982. Lynx verification program: history and status of the lynx in Colorado and its distributional ecology for western North American. Unpubl. Man. 23 pp.

Halfpenny, J.C., R.W. Thompson, S.C. Morse, T. Holden, and P. Rezendes. 1995. Chapter 5: Snow tracking. Pages 91–163 *in* Zielinski, W.J. and T.E. Kucera, tech. eds. American marten, fisher, lynx, and wolverine: survey methods for their detection. Gen. Tech. Rep. PSW-GTR-157. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Dept. Agric. 163 pp.

Hall, E.R. 1981. Mammals of North America. John Wiley and Sons, New York.

Hallock, D. 2010. Personal communication with Eldora resident. February 24.

———. 2013. Birds respond to hotter and drier weather. Boulder County Nature Association. Vol. 31: 3–4.

Hallock, D. and S. Jones. 2011. Boulder County Avian Species of Special Concern – 2010. Boulder County Nature Series. No. 1. Boulder County Nature Association. 32 pp.

Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado: 2nd Edition. University Press of Colorado. 484 pp.

Harris, L.D. and P.B. Gallagher. 1989. New initiatives for wildlife conservation: the need for movement corridors. Pages 11–34 *in* G. Mackintosh, ed. Preserving communities and corridors. Defenders of Wildl., Washington, D.C. 96 pp.

Hash, H.S. 1987. Wolverine. Pages 575–585 *in* Novak, M., J.A. Baker, M.E. Obbard, and B. Malloch, eds. Wild furbearer management and conservation in North America. Ontario Min. Nat. Resourc. Ashton-Potter Ltd. Ontario. 1150 pp.

Hatler, D.F. 1989. A wolverine management strategy for British Columbia. British Columbia Min. Environ. Wildl. Bull. No. B-60. 124 pp.

Hayward, G.D. and J. Verner, tech. eds. 1994. Flammulated, boreal, and great gray owl in the United States: a technical conservation assessment. Gen. Tech. Rep. RM-253. USDA For. Serv. Rocky Mountain Range and Exper. Stn., Ft. Collins, CO. 214 pp. 3 maps.

Headwaters Economics. 2013. Economic Profile System – Human Dimensions Toolkit (EPS-HDT). Bozeman, MT.

Henein, K. and G. Merriam. 1990. The elements of connectivity where corridor quality is variable. Landscape Ecol. 4:157-170.

Hennessy, S.P. 1978. Ecological relationships of *Accipiters* in northern Utah with special emphasis on the effects of human disturbance. Logan, UT. M.S. Thesis, Utah State Univ. 66 pp. (as cited *in* Rhea et al. 2006).

HKD Snowmakers. 2013. SV10201 Tower Sound Test. Natick, MA.

Hoak, J.H., J.L. Weaver, and T.W. Clark. 1982. Wolverines in western Wyoming. Northwest Sci. 56:159–161.

Hoback, J. 2013. Close to the flame: CSU, CU scientists unraveling mysteries of wildfires. Res. Colo. 2:28–30.

Hoover, R.L. and D.L. Wills, eds. 1984. Managing forested lands for wildlife. Colorado Div. Wildlife in coop. with USDA Forest Service, Rocky Mtn. Reg. Denver, CO. 459 pp.

Hornocker, M.G. and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Can J. Zool. 59:1286–1301.

Huckaby, Laurie. 2012. Ecologist, Rocky Mountain Research Station. Fort Collins, Colorado. Email communication to Steve Popovich Oct. 15.

Huenecke, H.S., A.B. Erickson, and W.H. Marshall. 1958. Marsh gases in muskrat houses in winter. J. Wildl. Manage. 22:241–24.

Hughes, P. and E. Petterson. 1994. Mexican Spotted Owl Inventory on Arapaho-Roosevelt National Forest: First year efforts.

Hunter, D. 2012. Personal communication with Eldora Mountain Resort on October 17.

Hutto, R.L. and J.S. Young. 1999. Habitat relationships of landbirds in the northern region, USDA Forest Service. Gen. Tech. Rep. RMRS-GTR-32. Ogden, UT. USDA Forest Service Rocky Mtn. Res. Stn. 72 pp.

Inman, R., M. Packila, K. Inman, B, Aber, R. Spence, and D. McCauley. 2009. Male wolverine travels 900 km and crosses I-80 on his way to Colorado, the first documented occurrence there since 1919. Prog. Rept. Greater Yellowstone Wolverine Program. Ennis, MT.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate change 2007: impacts, adaptation, and vulnerability. Cambridge Univ. Press. Cambridge, UK.

Ivan, J.S. 2009. Density, demography, and seasonal movements of snowshoe hares in Colorado. App. 1, pp. 29–42, *in* Shenk, 2009. Colorado Div. Wildlife, Ft. Collins, CO.

———. 2011. Putative Canada lynx (Lynx canadensis) movements across Highway 114 near North Pass, Colorado. Colorado Division of Wildlife, May 31, 2011. 6 pp.

Ivan, J., M. Rice, T. Shenk, D. Theobald, and E. Odell. 2012. Predictive map of Canada lynx habitat use in Colorado. Colorado Parks Wildlife, Ft. Collins, CO. 17 pp.

Jackson, J. A., H. R. Ouellet, and B. J. S. Jackson. 2002. Hairy woodpecker (Picoides villosus). The Birds of North America, No. 702 (A. Poole and F. Gill, eds.). The birds of North America, Inc., Philadelphia, PA.

Jarvinen, J.A. and W.D. Schmid. 1971. Snowmobile use and winter mortality of small mammals. Pages 131–141 *in* Chubb, M. ed. Proceedings of the 1971 snowmobile and off the road vehicle research symposium. Michigan State Univ. East Lansing, MI.

Jennings. 2013. Jennings Personal communication with Western Ecological Resources. May 7.

Jiron, D.R. 2013. Proposed rules for the North American wolverine in the United States. U.S. For. Serv. Rocky Mtn. Reg. Off. Golden, CO. Feb. 14. 2 pp.

Johnsgard, P.A. 1990. Hawks, eagles, and falcons of North America. Smithsonian Inst. Press, Washington, D.C.

Johnson, C.L. 1997. Distribution, habitat, and ecology of the Mexican spotted owl in Colorado. M.S. Thesis. Univ. Northern Colorado. Greeley. 78 pp. (as cited *in* Kingery 1998).

Johnson, R.A. and S. Larson. 2012. Water Narrative for EIS. Eldora Mountain Resort Water Supply summary memorandum to Jim Spenst. December 10, 2012.

———. 2013a. Eldora Mountain Resort water rights. Ltr. to T. Beck, SE Group. Johnson & Reppucci, LLP., Boulder, CO. Mar. 4. 1 pp.

———. 2013b. Eldora Mountain Resort water system summary. Ltr. to T. Beck, SE Group. Johnson & Reppucci, LLP., Boulder, CO. Mar. 4. 2 pp.

Jones, S. 1987. Breeding status of small owls in Boulder County, Colorado. C.F.O. Journal. 21:35 (abstract only).

———. 1991. Distribution of small forest owls in Boulder County, Colorado. J. Colo. Field Ornithol. 25:55–70.

———. 2003. Owls of Boulder County. Boulder County Nature Assn., Boulder, CO. 51 pp.

Kaufmann, M., W.H. Moir and W.W. Covington. 1992. Old-Growth Forests: What Do We Know About Their Ecology and Management in the Southwest and Rocky Mountain Regions? *In* Old-Growth Forests in the Southwest and Rocky Mountain Regions – Proceedings of a Workshop. March 9–13, Portal, AZ. RMF&R Experimental Station, Forest Service, USDA, Fort Collins, CO. June 1992.

Keane, R.E., R.A. Loehman, and L.M. Holsinger. 2011. The FireBGCv2 Landscape Fire Succession Model: a research simulation platform for exploring fire and vegetation dynamics. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, 2011.

Keinath, D.A. 2004. Fringed Myotis (*Myotis thysanodes*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/fringedmyotis.pdf.

Keinath, D. and M. McGee. 2005. Boreal toad (*Bufo boreas boreas*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/borealtoad.pdf.

Kennedy, P.A. and D.W. Stahlecker. 1991. Broadcast calls of the northern goshawk: their effectiveness and their use in inventory and long-term monitoring programs. Eagle Environmental, Inc. Santa Fe, NM. Unpubl. Man. 24 pp.

Kennedy, P.L. 2003. Northern goshawk (*Accipiter gentiles atricapillus*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/northerngoshawk.pdf.

Kenvin, D. 1992. Wolverine study results. Internal unpubl. data. CDOW, Monte Vista, CO.

———. 1993. Wolverine study results. Internal unpubl. data. CDOW, Monte Vista, CO.

———. 1994. Wolverine study results. Internal unpubl. data. CDOW, Monte Vista, CO.

———. 1995. Wolverine study results. Internal unpubl. data. CDOW, Monte Vista, CO.

Kingery, H., ed. 1998. Colorado breeding bird atlas. Colorado Bird Atlas Partnership. Denver, CO. 636 pp.

Knight, R.L and D.N. Cole. 1995. Wildlife responses to recreationists. Pages 51–70 *in* R.L Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through- management and research. Island Press, Wash. D.C.

Knowles, N., M.D. Dettinger, and D.R. Cayan. 2006. Trends in snowfall versus rainfall in the western Unites States. J. Climate. 19:4545–4559.

Koehler, G.M. 1990. Population and habitat characteristics of lynx and snowshoe hares in northcentral Washington. Can. J. Zool. 68:845–851.

Koehler, G.M. and K.B. Aubry. 1994. Lynx. Pages 74–98 *in* Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, tech. eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. Gen. Tech. Rep. RM-254. USDA For. Serv. Rocky Mountain Range and Exper. Stn., Ft. Collins, CO. 184 pp.

Koehler, G.M. and M.G. Hornocker. 1977. Fire effects on marten habitat in the Selway-Bitterroot Wilderness. J. Wildl. Manage. 41:500–505.

Koprowski, J.L, M.I. Alanen, and A.M. Lynch. 2005. Nowhere to run and nowhere to hide: response of endemic Mt. Graham red squirrels to catastrophic forest damage. Biological conservation 126(4), 491–498.

Kotliar, N.B. 2007. Olive-sided flycatcher (*Contopus cooperi*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/olivesidedflycatcher.pdf.

Krott, P. 1960. Ways of the wolverine. Nat. Hist. 69:16–29.

Krutzsch, P.H. 1954. North American jumping mice (genus *Zapus*). University of Kansas Publications, Museum of Natural History 7:349–472.

Lambert, B., C. Malleck, and K. Huhn. 2000. Colorado Natural Heritage Program Boreal Toad Survey and Monitoring Project. Colorado State University. Ft. Collins CO.

Lambert, R. 1998. Brewer's sparrow. Pages 456–457 *in* H. E. Kingery, ed., Colorado breeding bird atlas. Colorado Bird Atlas Partnership. Denver, CO. 636 pp.

Leatherman, D.A., I. Aguayo, and T.M. Mehall. 2011. Mountain Pine Beetle. Colorado State University. http://www.ext.colostate.edu/pubs/insect/05528.html. Accessed February 28, 2013.

Lechleitner, R.R. 1969. Wild mammals of Colorado: their appearance, habitats, distribution, and abundance. Pruett Publ. Co. Boulder, CO. 254 pp.

Lee, J.S. and J.D. Ackerman. 2001. COSEWIC Status Report on The Rocky Mountain Capshell *Acroloxus coloradensis* (J. Henderson, 1930). Unpublished report submitted to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Leonard, Jr., D.L. 2001. American three-toed woodpecker (*Picoides dorsalis*), The birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/588.

Linderburg, M.R. 2008. Civil Engineering Reference Manual, 11th Edition. Professional Publications, Inc.

Livo, L.J. 2001. Procedures for monitoring and surveying boreal toad populations. Colorado Division of Wildlife, Denver.

Loeffler, C. (ed.) 1998. Conservation plan and agreement for the management and recovery of the Southern Rocky Mountain population of the boreal toad (*Bufo boreas boreas*). Boreal Toad Recovery Team. 66 pp. + appendices.

———. 2001. Conservation plan and agreement for the management and recovery of the southern Rocky Mountain population of the boreal toad (*Bufo boreas boreas*), Boreal Toad Recovery Team. Unpublished Report, Colorado Division of Wildlife, Denver.

Longcore, J.E., A.P. Pessier and D.K. Nichols. 1999. *Batrachochytrium dendrobatidis* gen. et sp. nov., a chytrid pathogenic to amphibians. Mycologia 91:219–227.McComb, W.C. 1985. Habitat associations of birds and mammals in an Appalachian forest. Proc. Ann. Conf. SE. Assoc. Fish and Wildl. Agencies. 39:420–429.

Lowry, D. 2002. Criteria and rationale for mapping lynx habitat, Arapaho and Roosevelt National Forests. USDA Forest Service, Arapaho-Roosevelt National Forests and Pawnee National Grasslands, Ft. Collins, CO. Jan. 8. 3 pp.

Lyon, L.J. 1979. Habitat effectiveness for elk as influenced by roads and cover. J. Forestry. 77:658–660.

———. 1983. Road density models describing habitat effectiveness for elk. J. Forestry. 81:592–595.

Lyon, L.J. and C. E. Jensen. 1980. Management implications of elk and deer use of clear-cuts in Montana. J. Wildl. Manage. 44:352–361.

MacArthur, R.A., V. Geist, and R.H. Johnston. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. J. Wildl. Manage. 46:351-358.

Mack, C.M. 1985. River otter restoration in Grand County, Colorado. Unpubl. M.S. thesis, Colorado State Univ., Ft. Collins, 133 pp. (as cited *in* Fitzgerald et al. 1994).

Magoun, A.J. 1985. Population characteristics, ecology, and management of wolverines in northwestern Alaska. Ph.D. Thesis, Univ. Alaska, Fairbanks. 211 pp. (as cited *in* Hash 1987).

Martin, S.K. 1994. Feeding ecology of American martens and fishers. Pages 297–315 *in* Martens, sables and fishers: biology and conservation. S.W. Buskirk, A.S. Harestad, M.G. Raphael and R.A. Powell, eds. Cornell Univ. Press, Ithaca, NY.

Matsouka, S.M., C.M. Handel and D.R. Ruthrauff. 2001. Densities of breeding birds and changes in vegetation in an Alaskan boreal forest following a massive disturbance by spruce beetles. Canadian Journal of Zoology, 79(9), 1678–1690.

McComb, W.C. 1985. Habitat associations of birds and mammals in an Appalachian forest. Proc. Ann. Conf. SE. Assoc. Fish and Wildl. Agencies. 39:420–429.

McCormick, B. 2013. Yankee Hill Fuels Treatment Project, wildlife input for Supplemental Information Report. USFS, Arapaho-Roosevelt National Forest, Clear Creek Ranger District. Mar. 12.

McKelvey, K.S., J.P. Copeland, M.K. Schwartz, J.S. Littell, K.B. Aubry, J.R. Squires, S.A. Parks, M.M. Elsner, and G.S. Mauger. 2011. Climate change predicted to shift wolverine distributions, connectivity, and dispersal corridors. Ecological Applications, 21:2882–2897.

McMahon, R.F. 1983. Physiological ecology of freshwater pulmonates. Pages 359–430 *in* W.D. Russell-Hunter, editor. The Mollusca, Volume 6, Ecology. Academic Press, Inc., Orlando, FL.

Mech, L.D. 1977. Record movement of a Canadian lynx. J. Mammal. 58:676–677.

Mehl, M. 1992. Old-growth descriptions for the major forest cover types in the Rocky Mountain Region. *In* Old-Growth Forests in the Southwest and Rocky Mountain Regions – Proceedings of a Workshop. March 9–13, Portal, AZ. RMF&R Experimental Station, Forest Service, USDA, Ft. Collins, CO. June 1992.

Melquist, W.E. and M.G. Hornocker. 1979. Methods and techniques for studying and censusing river otter populations. Tech. Rep. Univ. Idaho For., Wildl. and Range Exper. Sta. 1:1–17 (as cited *in* Fitzgerald et al. 1994).

———. 1983. Ecology of river otters in west central Idaho. Wildl. Monogr. 83:1–60.

Metcalf. 2013. Results of the Class III Cultural Resources Inventory for Eldora Mountain Resort's Proposed Special Use Permit Expansion Boulder County, Colorado.

Morrison, J.R., W.J. de Vergie, A.W. Alldredge, A.E. Byrne, and W.A. Andree. 1995. The effects of ski area expansion on elk. Wildl. Soc. Bull. 23:481–489.

Mowat, G., K.G. Poole, and M.O. Donoghue. 1999. Ecology of lynx in northern Canada and Alaska. Pages 265-306 *in* Ruggiero, et al. Ecology and conservation of lynx in the United States. Univ. Colorado Press and USDA Rocky Mtn. Res. Stn., USDA Gen. Tech. Rep. RMRS-GTR-30WWW. 480 pp.

National Ski Areas Association. 2013. Kottke National End of Season Survey 2012/2013, Final Report. Thirty-Forth Edition, July 2013.

NatureServe: An online encyclopedia of life [web application]. 2001–2013. Version 1.4. Arlington, Virginia, USA: Association for Biodiversity Information. Available: http://www.natureserve.org/.

National Climate Data Center. 2013. Computed Monthly Precipitation Average from 1981–2010 for the Lake Eldora Station, elev. 9,701 ft. Lat. 39.933°N. Long: 105.583°W. GHCND: USS0005J41S. www.ncdc.noaa.gov.

Natural Diversity Information Source. 2013. Colorado's Biological Map and Data Resource. Accessed September 9, 2013. http://ndis.nrel.colostate.edu/.

Navo, K. 2013. Personal communication with Colorado Parks and Wildlife on April 17.

Nead, D.M., J.C. Halfpenny and S. Bissell. 1985. The status of wolverines in Colorado. Northwest Sci. 58:286–289.

Needham, J.G., M.J. Westfall Jr., and M.L. May. 2000. Dragonflies of North America. Scientific Publishers, Gainesville, FL. 939 pp.

Nellis, C.H. and L.B. Keith. 1968. Hunting activities and success of lynxes in Alberta. J. Wildl. Manage. 32:718–722.

Nellis, C.H. and S.P. Wetmore. 1969. Long-range movement of lynx in Alberta. J. Mammal. 50:640.

Nettles, A. 2013. Personal communications with UDSA Forest Service on February 1.

Neumann, P.W. and H.G. Merriam. 1972. Ecological effects of snowmobiles. Canadian Field Naturalist 86:207–212.

Nordstrom, L.H. 1998. Endangered and threatened wildlife and plants: proposal to list the contiguous United States distinct population segment of the Canada lynx; proposed rule. Fed. Register 63(130):36993–37013.

Noss, R.F. 1983. A regional landscape approach to maintain diversity. Bioscience 33:700–706.

O'Donoghue, M., S. Boutin, C.J. Krebs, D.L. Murray, and E.J. Hofer. 1998. Behavioural responses of coyotes and lynx to the snowshoe hare cycle. Oikos 82:169–183.

Oberlag, D. 2012. Wildlife Report and Biological Evaluation for the Cedar Park Fuels Reduction Project, Arapaho-Roosevelt National Forest, Canyon Lakes Ranger District.

Olson, R. and W.A. Hubert. 1994. Beaver: water resources and riparian habitat manager. Wyoming Coop. Fish and Wildlife Res. Unit, Univ. Wyoming, Laramie, WY. 48 pp.

Orthner, R. 2012. Personal communication on October 23.

———. 2013. Botanical biological report, including a Biological Assessment & Biological Evaluation for plant species, Eldora Mountain Resort Ski Area Projects, Boulder Ranger District, Arapaho & Roosevelt National Forests. Western Ecological Resource. Boulder, CO. June.

Packauskas, R.J. 2005. Hudsonian emerald dragonfly (*Somatochlora hudsonica*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/hudsonianemeralddragonfly.pdf. Accessed Jan. 22, 2013.

Page, W.G. and M. J. Jenkins. 2006. Predicted Fire Behavior in Selected Mountain Pine Beetle–Infested Lodgepole Pine. FOR. SCI. 53 (6) 2007:662–674.

Palmer, D.A. 1984. Current status of the boreal owl in Colorado. C.F.O. Journal 18:62 (abstract only).

Pankratz, H. 2009. Wolverine trots out rare hike into Colorado. Denver Post. Denver, CO. June 19.

Parker, G.R., J.W. Maxwell, and L.D. Morton. 1983. The ecology of lynx (Lynx canadensis) on Cape Breton Island. Can. J. Zool. 61:770–786.

Parks, C.G., E.L. Bull, and T.R. Torgerson. 1997. Field guide for the identification of snags and logs in the interior Columbia River Basin. Gen. Tech. Rep. PNW-GTR-390. Portland, OR: U.S. Dept. Agricul., For. Serv., Pacific Northwest Res. Stn. 40 pp.

Pennak, R.W. 1989. Fresh-water invertebrates of the United States: Protozoa to Mollusca. 3rd ed. John Wiley and Sons, Inc. New York.

Peters, E.J. and J.E. Parham. 2008. Pallid sturgeon literature review final report to the Platte River Recovery Implementation Program. Univ. Nebraska, Lincoln and Parham and Associates. 61 pp.

Pettus, D. and R.R. Lechleitner. 1963. Microsorex in Colorado. J. Mammal. 44:119.

Phillips, G.E. 1998. Effects of human-induced disturbance during calving season on reproductive success of elk in the upper Eagle River Valley, Colorado. PhD. Diss. Colorado State Univ. Ft. Collins, CO. 101 pp.

Phillips, G.E. and A.W. Alldredge. 2000. Reproductive success of elk following disturbance by humans during calving season. J. Wildl. Manage. 64:521–530.

Pioneer Environmental Services. 1992. Eldora Mountain Ski Resort: Summary of hydrology reports; Peterson Lake. Draft Report, Pioneer Environmental Services, Inc. Logan, UT.

———. 1993a. Biological Assessment, proposed improvements at Eldora Mountain Resort. Pioneer Environmental Services, Logan, UT. Nov. 79 pp.

———. 1993b. [Boreal toad] Biological Assessment, proposed improvements at Eldora Mountain Resort. Pioneer Environmental Services, Logan, UT. Nov. 5 pp.

———. 1994. Boreal western toad information. Letter from Neal Artz to Tom Spangler. Pioneer Environmental Services, Logan, UT. Dec. 30. 10 pp.

———. 1995. Rocky Mountain Capshell Snail. Report prepared for Eldora Enterprises Limited Liability Company by Pioneer Environmental Services, Inc. Logan, Utah.

———. 1996. Rocky Mountain capshell snail status summary. Pioneer Environmental Services, Logan, UT. Nov. 14. 23 pp.

Platte River Recovery Implementation Program. 2013. Available: https://www.platteriverprogram.org/Pages/Default.aspx. Accessed Jan. 9, 2013.

Poole, K.G. 1997. Dispersal patterns of lynx in the Northwest Territories. J. Wildl. Manage. 61:497–505.

Popovich, S. 2013. Personal communication with S. Popovich, Forest Service Botanist. February 25, 2013.

PRISM Climate Group. Northwest Alliance for Computational Science and Engineering. Available: http://www.prism.oregonstate.edu/.

Quimby, D.C. 1951. The life history and ecology of the jumping mouse, *Zapus hudsonius*. Ecol. Monogr. 21:61–95.

Raven, P.H. and D.P. Gregory. 1972. A revision of the genus *Gaura* (Onagraceae). Memoirs Torrey Botanical Club 23:1–96.

Remmington, T. 2010. Personal communications with the Associated Press on December 14.

Retzer, J.L., H. Swope, J.D. Remington and W.H. Rutherford. 1956. Suitability of physical factors for beaver management in the Rocky Mountains of Colorado. CDOW Tech. Bull. No. 2. 32 pp.

Reynolds, R.T. 1989. Survey of Mexican spotted owls in Colorado, 1989. USFS Rocky Mtn. For. Range Exp. Stn., Laramie, WY. Unpubl. Sum. Rept. (as cited *in* Kingery 1998).

———. 1990. Distribution and habitat of Mexican spotted owls in Colorado: preliminary results. Unpubl. Rep. Rocky Mtn. For. Range Exp. Stn., Laramie, WY (as cited *in* Kingery 1998).

Reynolds, R.T. and B.D. Linkhart. 1987. Fidelity to territory and mate in flammulated owls. Pages 234–238 *in* Nero, R.W. et al., eds. Biology and conservation of northern forest owls: symposium proceedings. Gen. Tech. Rep. RM-142. USDA Forest Service, Rocky Mtn. For. Range Exp. Stn., Fort Collins, CO.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management recommendations for the northern goshawk in the southwestern United States. USDA-FS, Rocky Mtn. For. Range Exp. Stn. Ft. Collins, CO. Gen. Tech. Rep. RM-217. 90 pp.

Rhea, B., G. Vos, R. Ghormley and T. Harris. 2006. Northern goshawk species assessment, San Juan National Forest. U.S. Forest Service. San Juan National Forest. Feb. 19 pp.

Richmond, M.L., L.R. DeWeese, and R.E. Pillmore. 1980. Brief observations on the breeding biology of the flammulated owl in Colorado. Western Birds. 11:35–46.

Riebesell, J.F., T.L. Thrasher, A. Bazzi, and W.P. Kovalak. 2001. Habitat characteristics of Rocky Mountain (Colorado) populations of *Acroloxus coloradensis*. American Malacological Bulletin 16:33–40.

Roberts, E. 2009. White River NF-lynx habitat examples. Tab 9f in U.S. Forest Service. 2009. Implementation guide to the Southern Rockies Lynx Amendment. USDA Forest Service, Rocky Mountain Reg. Denver, CO.

———. 2011. Personal communication with USFS Wildlife Biologist/Botanist. September 15, October 25, and December 16.

Rocky Mountain Bird Observatory (RMBO). 2002. Population Data for U.S. Forest Service Avian Management Indicator Species on the Arapaho-Roosevelt National Forests and Pawnee National Grassland. Rocky Mountain Bird Observatory, Brighton, Colorado. pp. 57.

———. 2004. Monitoring Colorado Birds Relational Access Database, 1998–2004. Computer compact disc. Rocky Mountain Bird Observatory, Brighton Colorado.

———. 2008. Transect survey results for warbling vireo, Wilson's warbler, pygmy nuthatch, hairy woodpecker, mountain bluebird, and golden-crowned kinglet for Arapaho and Roosevelt National Forests, 1998–2007. Monitoring Colorado Birds Program, unpublished report.

Rocky Mountain Heritage Task Force. 1987. Field inventory and demographic studies of the Colorado butterfly plant (*Gaura neomexicana* ssp, *coloradensis*) in Colorado, Nebraska and Wyoming. Unpublished report preparted for the Department of Defense, FE Warren Air Force Base.

Roe, N.A., K.G. Poole, and D.L. Day. 2000. A review of lynx behaviour and ecology and its application to ski area planning and management. Final Rep. Iris Environmental Systems, Calgary, Alberta. 63 pp.

Rosenberg, D.K., B.R. Noon and E.C. Meslow. 1997. Biological corridors: form, function, and efficacy. Biosci. 47:677–687.

Rosgen, D.L. 1994. A Classification of Natural Rivers. Catena 22, 169–199. June 1994.

———. 2006. Watershed Assessment of River Stability and Sediment Supply.

Rowland, M.M., M.J. Wisdom, B.K. Johnson and J.G. Kie. 2000. Elk distribution and modeling in relation to roads. J. Wildl. Manage. 64:672–684.

Roy, G., S. Kelso, and A. Tonnesen. 1993. Habitat Characteristics of *Eutrema penlandii* (Brassicaceae) in Colorado Rockies: A Study of Alpine Endemism. Madrono. 40, 4:236–245.

RRC Associates. 2013. Eldora Mountain Resort Market Analysis Memorandum.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada lynx conservation assessment and strategy. USDA For. Serv., USDI Fish & Wildl. Serv., USDI Bur. Land. Manage. and USDI Nat'l. Park Serv. FS Publ. #R1-00-53. Missoula, MT. 142 pp.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. Ecology and conservation of lynx in the United States. Univ. Colorado Press and USDA Rocky Mtn. Res. Stn., USDA Gen. Tech. Rep. RMRS-GTR-30WWW. 480 pp.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, J.L. Lyon, and W.J. Zielinski, tech eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American marten, fisher, lynx, and wolverine in the western United States. USDA Forest Service General Technical Report RM-254. 184 pp.

Rutherford, W. H. 1964. The beaver in Colorado, its biology, ecology, management and economics. CO Game, Fish and Parks Dept. Fed. Aid. *In* Wildl. Rest. Proj. W-83-R. Denver, CO 49 pp.

Ryder, R.A. 1991. Distribution and status of the boreal owl in western North America: an update. J. Colorado-Wyoming Acad. Sci. 23:26.

Ryder, R.A., D.A. Palmer, and J.J. Rawinski. 1987. Distribution and status of the boreal owl in Colorado. Pages 169–174 *in* Nero, R.W. et al., eds. Biology and conservation of northern forest owls: symposium proceedings. Gen. Tech. Rep. RM-142. USDA Forest Service, Rocky Mtn. For. Range Exp. Stn., Fort Collins, CO.

Saunders, J.K. 1963. Movements and activities of the lynx in Newfoundland. J. Wildl. Manage. 27:390–400.

Schmid, W.D. 1971. Modification of the subnivian environment by snowmobiles. Pages 251–255 *in* Haugen, A.O., ed. Snow and ice in relation to wildlife and recreation symposium. Iowa State Univ. Ames, IA.

Schoettle, A. W. 2004. Ecological roles of five-needle pines in Colorado: Potential consequences of their loss. *In* Sniezko, Richard; S. Samman; S. Schlarbaum; H. Kriebel; eds. Breeding and genetic resources of five-needle pines: growth adaptability and pest resistance. 2001 July 24–25; Medford, OR.

Schultz, R.D. and J.A. Bailey. 1978. Responses of National Park elk to human activity. J. Wildl. Manage. 42:91–100.

Scriven, D.H. 1999. Bluebird trails, a guide to success. Third ed. Bluebird Recovery Program, Minneapolis, MN. 210 pp.

Seidel, J., B. Andree, S. Berlinger, K. Buell, G. Byrne, B. Gill, D. Kenvin, and D. Reed. 1998. Draft strategy for the conservation and reestablishment of lynx and wolverine in the southern Rocky Mountains. Colorado Div. Wildl., U.S. For. Serv., National Park Serv., U.S. Fish and Wildl. Serv., New Mexico Game and Fish Dept., and Wyoming Game and Fish Dept. Denver, CO. 115 pp.

Seidel, J.W. 1977. Elk calving behavior in west central Colorado. Pages 38–40 *in* Proc. Western States Elk Workshop, Colorado Div. of Wildl. Denver, CO. 64 pp.

Shenk, T. 2004. Personal communication with Colorado Division of Wildlife personnel. July 9.

———. 2005. General locations of lynx (*Lynx canadensis*) reintroduced to southwestern Colorado from February 4, 1999 through February 1, 2005. Colorado Division of Wildlife, Ft. Collins, CO. 12 pp. April.

———. 2006. Lynx update, March 12, 2006. Colorado Division of Wildlife, Denver. 3 pp. http://wildlife.state.co.us/species_cons/lynx.asp.

———. 2007. Post release monitoring of lynx reintroduced to Colorado. CDOW, Denver. June. 57 pp.

———. 2008. Personal communication with Colorado Division of Wildlife personnel. October 8 and 9.

———. 2009. Post release monitoring of lynx reintroduced to Colorado. Wildlife Research Report. CDOW, Denver. Aug. 55 pp.

———. 2010. Personal communication on March 27.

Shuster, W.C. 1976. Northern goshawk nesting densities in montane Colorado. West. Birds 7:108–110.

———. 1980. Northern goshawk nest requirements in the Colorado Rockies. West. Birds 11:89–96.

Sieg, C.H. and P.M. Wolken. 1999. Dynamics of a threatened orchid in flooded wetlands. J.T. Springer (ed.), Proceedings of the Sixteenth North American Prairie Conference: 193–201.

Siemers, J.L. 2009. Pygmy shrew (*Sorex hoyi*) survey on the White River National Forest. Colorado Natural Heritage Program, Fort Collins, CO. 19 pp.

Skaggs, R. and R. Raitt. 1988. A spotted owl inventory on the Lincoln National Forest. Final Rept. N. Mexico State Univ (as cited *in* Fox and Rhea).

Slough, B.G. and G. Mowat. 1996. Lynx population dynamics in an untrapped refugium. J. Wildl. Manage. 60:946–961.

Smith, B.E. and D.A. Keinath. 2007. Northern leopard frog (*Rana pipiens*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/northernleopardfrog.pdf.

Smith, C. C. 1968. The adaptive nature of social organization in the genus of three squirrels Tamiasciurus. Ecological Monographs, 38(1), 31–63.

Smith, D. A. 2009. The Trail of Gold and Silver: Mining in Colorado, 1859–2009. University Press of Colorado, Denver, Colorado.

Snider, E.A. 2011. Region 2 sensitive species evaluation form: Hoary bat, *Lasiurus cinereus.* Available: http://www.fs.usda.gov/detail/r2/landmanagement/?cid=stelprdb5350842.

Soutiere, E.C. 1979. Effects of timber harvesting on marten in Maine. J. Wildl. Manage. 43:850–860.

Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado Rare Plant Field Guide. Prepared for the Bureau of Land Management, the U.S. Forest Service and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.

Spencer, A.W. and D. Pettus. 1966. Habitat preferences of five sympatric species of long-tailed shrews. Ecology. 47:677–683.

Spencer, W.D. 1987. Seasonal rest-site preferences of pine martens in the northern Sierra Nevada. J. Wildl. Manage. 51:616–621.

Squires, J. and E. Roberts. 2009. The effects of winter recreation on the movements and resource use of Canada lynx on the Vail Pass Recreation Area: a pilot study. U.S. Forest Service. Rocky Mountain Research Station, Missoula, MT. Nov. 19 pp.

Squires, J. N.D. Measuring horizontal cover (as cited *in* Bertram and Claar, 2008 and USFS, 2009).

Squires, J.R., and N.J. Decesare. 2009. Excerpts from PowerPoint presentation by John Squires at Lynx Workshop in Missoula, MT – Feb. 20, 2008: "Measuring horizontal cover of forests associated with lynx habitat." Tab 7b in USFS 2009. Implementation guide to the Southern Rockies Lynx Amendment. USDA Forest Service, Rocky Mountain Reg. Denver, CO.

Squires, J.R., N.J. Decesare, J.A. Kolbe and L.F. Ruggiero. 2010. Seasonal resource selection of Canada lynx in managed forests of the northern Rocky Mountains. J. Wildl. Manage. 74:1648–1660.

Stalecker, D.W. and J.J. Rawinski. 1990. First records for the boreal owl in New Mexico. Condor 92:517–519.

Stanford University. 1999. Sound Pressure Level and Power. Center for Computer Research in Music and Acoustics. Stanford, CA. https://ccrma.stanford.edu/CCRMA/Courses/152/SPL.html.

Colorado Department of Public Health and Environment. 2004. Guidelines on Individual Sewage Disposal Systems. Water Quality Control Division. Amended September 15, 2004.

———. 2012. Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List. Water Quality Control Commission Regulation #93. March 30, 2012.

State of Colorado Water Court Decrees. Case Numbers 82CW0239, 92CW0153, and 02CW0400, W-324 (South Boulder Creek); W-7786-74, 02CW0400, and 07CW0231 (pending) (Howard Ditch).

Stebbins, R.C. 1966. A field guide to western reptiles and amphibians. Houghton Mifflin Co., Boston. 279 pp.

Steele, M. A. 1998. Tamiasciurus hudsonicus. Mammalian Species, (586), 1–9.

Stevens, S., C. Callaghan, and R. Owchar. 1996. Wildlife corridors around developed areas of Banff National Park. Rep. Prepared for Parks Canada, Banff, AB (as cited *in* Gibeau and Heuer 1996 and Ruediger 1996).

Streeter, R.G. and C.E. Braun. 1968. Occurrence of pine marten, *Martes americana* (Carnivora: Mustelidae) in Colorado alpine areas. Southwest. Nat.13:449–451.

Strickland, M.A., C.W. Douglas, M. Novak, and N.P. Hunzinger. 1982. Marten. Pages 599–612 *in* J.A. Chapman and G.A. Feldhamer, eds. Wild mammals of North America: biology, management, and economics. Johns Hopkins Univ. Press, Baltimore, MD. 1147 pp.

Sturm, M., C. Racine, and K. Tape. 2001. Increasing shrub abundance in the Arctic. Nature. 411–546.

Sumerlin, D. 2011. Personal communication between B. Baker and D. Sumerlin, USFS wildlife biologist and R2 Center of Excellence for boreal toads. February 17, 2011.

Swigle, B. 2012. Personal communication with Colorado Parks and Wildlife personnel on November 28.

Tanimoto, P.D. 1998. Lynx management assessment and comment to the U.S. Fish and Wildlife Service's proposal to list lynx under the Endangered Species Act of 1973. Unpubl. Rep. Predator Project, Bozeman, Montana (as cited *in* USFWS 2006).

Taylor, P.D., L. Fahrig, K. Henein, and G. Merriam. 1993. Connectivity is a vital element of landscape structure. Oikos. 68:571–573.

TDA Research, Inc. 2013. Eldora Mountain Resort Ski Area Projects Traffic and Parking Technical Report.

Tester, J.R., S. Malchow, C. McLain, and J.B. Lehrer. 1993. Movements and habitat use by meadow jumping mice in northwestern Minnesota. Prairie Naturalist 25:33–37.

Theobald, D.M. and T.M. Shenk. 2011. Areas of high habitat use from 1999–2010 for radio-collared Canada lynx reintroduced to Colorado. Dept. Fish, Wildlife, and Cons. Biol. Colorado State Univ. Ft. Collins, CO. 19 pp.

Thomas, J.W. and D.E. Toweill, eds. 1982. Elk of North America: ecology and management. Stackpole Books, Harrisburg, PA. 698 pp.

Thomas, J.W., Anderson, R.G., Masar, C. and E.L. Bull. 1979. Snags. Pages 60–77 *in* J.W. Thomas, Tech Ed. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. USDA For. Ser. Agric. Hand. No. 553. U.S. Gov. Prtg. Offc., Wash., D.C. 512pp.

Thompson, I.D. and P.W. Colgan. 1987. Numerical responses of martens to a food shortage in northcentral Ontario. J. Wildl. Manage. 51:824–835.

Thompson, R.W. 1994a. 1992–93 baseline wildlife studies for Vail Ski Area's proposed Category 3 expansion. Western Ecosystems, Inc. Boulder, CO. 113 pp.

———. 1994b. 1994 wildlife baseline studies for Vail Ski Area's proposed Category 3 expansion. Western Ecosystems, Inc. Boulder, CO. 77 pp.

———. 1996a. Wildlife evaluation of Stickline snowboard park, Beaver Creek Ski Area, Eagle County, Colorado. Western Ecosystems, Inc. 37 pp.

———. 1996b. Baseline small mammal survey of Sheer Terror snowboard trail, Vail Ski Area, Eagle County, Colorado. Western Ecosystems, Inc. Boulder, CO. unpubl. data.

———. 1997. Baseline small mammal survey of Malitos snowboard trail, Beaver Creek Ski Area, Eagle County, Colorado. Western Ecosystems, Inc. Boulder, CO. 25 pp.

———. 1998a. Biological assessment/ biological evaluation of the Alta land exchange, San Miguel, Dolores, and Ouray Counties, Colorado. Western Ecosystems, Inc. Boulder, CO. 51 pp. July

———. 1998b. Biological evaluation for Monarch Ski Area upgrading, Chaffee County, Colorado. Western Ecosystems, Inc. Boulder, CO. 52 pp.

———. 1999. Biological assessment for the Ski Cooper Master Development Plan, Lake and Eagle Counties, Colorado. Western Ecosystems, Inc. Boulder, CO. 68 pp.

———. 2001. Biological assessment for Powderhorn Resort's Master Development Plan, Phase 1 Environmental Assessment, Mesa County, Colorado. Western Ecosystems, Inc. Boulder, CO. 92 pp.

———. 2003a. Biological Assessment for Keystone Ski Resort's Little Bowl and Erickson Bowl Snowcoach Tours, Summit County, Colorado. Western Ecosystems, Inc. Boulder, CO. 72 pp.

———. 2003b. Biological Assessment for Copper Mountain Resort's trails and facilities improvement plan, Summit County, Colorado. Western Ecosystems, Inc. Boulder, CO. 147 pp.

———. 2005. Biological Assessment for transportation and utility systems and facilities for the Village at Wolf Creek, Divide Ranger District, Rio Grande National Forest, Colorado. Western Ecosystems, Inc. Boulder, CO. 142 pp.

———. 2006. Biological Assessments for Durango Mountain Resort's 2006 Master Development Plan EIS and private base area development. Western Ecosystems, Inc. Boulder, CO. Dec. 31. 230 pp.

———. 2008. Biological Evaluation and Management Indicator Species specialist report for Durango Mountain Resort's 2006 Master Development Plan EIS and private base area development. Western Ecosystems, Inc. Boulder, CO. Feb. 214 pp.

———. 2011a. Biological Assessment, Biological Evaluation, and Management Indicator Species Report for Eldora Mountain Resort's Corona Trail Regrading Project, Arapaho and Roosevelt National Forests and the Pawnee National Grassland, Boulder County, Colorado. Western Ecosystems, Inc. Boulder, Co. May. 78 pp.

———. 2011b. Wildlife Biological Evaluation and Management Indicator Species Report for Breckenridge Ski Resort's Peak 6 Improvements Project, White River National Forest, Summit County, Colorado. Western Ecosystems, Inc. Boulder, Co. Aug. 148 pp.

———. 2012. Summary of wildlife baseline surveys conducted for Eldora Mountain Resort's Master Development Plan, Arapaho and Roosevelt National Forests and the Pawnee National Grassland, Boulder and Gilpin Counties, Colorado. Western Ecosystems, Inc. Boulder, CO. Aug.

———. 2013a. Lynx habitat field validation associated with Eldora Mountain Resort's proposed Master Plan analysis. Western Ecosystems, Inc. Boulder, Co. Feb. 15. 18 pp.

———. 2013b. Animal Biological Evaluation, Management Indicator Species, and Specialist's Report for Eldora Mountain Resort's Master Plan, Boulder Ranger District, Arapaho and Roosevelt National Forests and the Pawnee National Grassland. Western Ecosystems, Inc. Boulder, Co. (in prep.).

Thompson, R.W. and D. Steinmann. 2011. Biological Assessment for Breckenridge Ski Resort's Peak 6 improvements project, White River National Forest, Summit County, Colorado. Western Ecosystems, Inc. Boulder, CO. Dec. 131 pp.

Thompson, R.W. and J.C. Halfpenny. 1989. Canada lynx presence on Vail Ski Area and proposed expansion areas. Western Ecosystems, Inc. Lafayette, CO. 29 pp.

———. 1991. Canada lynx presence on the proposed East Fork Ski Area. Western Ecosystems, Inc. Boulder, CO. 38 pp.

Thompson, R.W., T.J. Watts, and J.C. Halfpenny. 1992. Wolverine survey in the vicinity of the proposed East Fork Ski Area. Western Ecosystems, Inc. 21 pp.

Thornbury, William D. 1965. Regional Geomorphology of the United States. John Wiley and Sons Inc., New York, New York.

Towry, R.K. 1984. Wildlife habitat requirements. Pages 72–209 *in* R.L. Hoover and D.L. Wills, eds. Managing forested lands for wildlife. Colorado Div. Wildlife in coop. with USDA Forest Service, Rocky Mtn. Reg. Denver, CO. 459 pp.

Troendle, C.A. and Leaf, C.F. 1980. Hydrology, An Approach to Water Resources Evaluation of Non-point Silvicultural Sources (WRENSS). EPA60018-80-012, Environmental Research Laboratory, Athens, GA.

Troendle, C.A. and Olsen, W.K., 1994. Potential effects of timber harvest and water management on streamflow dynamics and sediment transport. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. p. 34–41.

Troendle, C.A., Nankervis J.M., and Porth, L.S. 2003. The Impact of Forest Service Activities on the Stream Flow Regime in the Platte River.

U.S. Army Corps of Engineers. 2012. Final Regional Conditions to Nationwide Permit in the State of Colorado. U.S. Army Corps of Engineers, Albuquerque District, Albuquerque, NM.

U.S. Census Bureau. 2010. 2006–2010 American Community Survey and 2010 Census. Washington, DC. http://factfinder2.census.gov.

U.S. Department of Agriculture Natural Resource Conservation Service. 2006. Keys to Soil Taxonomy, 10th edition, 2006. Pocahontas Press, Inc., Blacksburg, Virginia, pp. 57.

———. 2008. Soil Survey of Arapaho-Roosevelt National Forest Area, Colorado Parts of Boulder, Clear Creek, Gilpin, Grand, Park and Larimer Counties. USDA. February 04, 2008.

———. 2009. Soil Quality Indicators. Available: www.soils.usda.gov/sqi/assessment/files/respiration_sq_biological_indicator _sheet. Accessed February 14, 2013.

U.S. Department of Commerce. 2013. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C.; U.S. Department of Commerce. 2012. Census Bureau, County Business Patterns, Washington, D.C. http://www.bea.gov/regional/.

U.S. Energy Information Administration. 2009. International Energy Statistics Global CO2 emissions from fossil fuel combustion. http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm. EIA (2009).

U.S. Environmental Protection Agency. 1999. Consideration of cumulative effects in EPA review of NEPA documents. U.S. EPA Off. Fed. Activities. Wash., D.C. 18 pp.

———. 2001. Visibility in Mandatory Federal Class I Areas (1994–1998): A Report to Congress. Chapter 1. Introduction to Visibility Issues. November. Available: www.epa.gov/visibility/report/CHAP01.pdf.

———. 2010. Inventory of US Greenhouse Gas Emissions and Sinks: 1990–2008.

U.S. Fish and Wildlife Service. 1993a. Draft biological opinion on the Platte River off-site effects of the Barnes Meadow Reservoir, City of Greeley, CO. Letter from U.S. Fish and Wildlife Service, Denver, CO., to U.S. Forest Service, Lakewood, CO., dated October 19, 1993.

———. 1993b. Final rule to list the Mexican spotted owl (*Strix occidentalis lucida*) as a threatened species. 50 CFR Part 17; Vol. 58, No. 49 (March 16, 1993) U.S. Fish and Wildlife Service, Denver Colorado.

———. 1995. Recovery plan for the Mexican spotted owl: Vol. I. Albuquerque, New Mexico. 347pp.

———. 1998. Final rule to list the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) as a threatened species. 50 CFR Part 17; Vol. 63, No. 92 (May 13, 1998) U.S. Fish and Wildlife Service, Denver, Colorado.

———. 2000. Endangered and threatened wildlife and plants; determination of threatened status for the contiguous U.S. distinct population segment of the Canada lynx and related rule. Fed. Regist. 65(58):16051–16086.

———. 2001a. Hine's emerald dragonfly (*Somatochlora hineana* Williamson) Recovery Plan. Fort Snelling, MN. 120 pp. Accessed by Packauskas (2005) on July 15, 2003 at http://www.museum.state.il.us/research/entomology/hedplan.pdf. Website non-viable on Jan. 22, 2013.

———. 2001b. Pallid sturgeon (*Scaphirhynchus albus*) fact sheet. Onalaska, WI. May 2, 2011. https://www.platteriverprogram.org/News/Documents/USFWS%20Pallid%20Sturgeon%20Fact%20Sheet.pdf.

———. 2003. Endangered and threatened wildlife and plants; designation of critical habitat for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*): Final Rule. 50 CFR Part 17. Federal Register Vol. 68, No. 120, June 23, 2003, Rules and Regulations, pp. 37276–37332.

———. 2004. Final designation of critical habitat for the Mexican spotted owl (*Strix occidentalis lucida*). 50 CFR Part 17; Volume 69, Number 168. U.S. Fish and Wildlife Service, Denver, Colorado.

———. 2006a. Biological Opinion on the Platte River Recovery Implementation Program. Nebraska Field Office, Grand Island, NE. June 16. 371 pp.

———. 2006b. Endangered and threatened wildlife and plants; designation of critical habitat for the contiguous United States distinct population segment of the Canada lynx. Fed. Regist. 71(217):66008–66061. Nov. 9.

———. 2006c. Sep. 14 letter from Susan Linner to C.J. Peter, U.S. Army Corps of Engineers, reviewing two Preble's meadow jumping mouse reports related to the Moffat Collection System Project. U.S. Fish and Wildlife Service, Denver, Colorado. 2 pp.

———. 2007. Colorado template biological assessment & request for formal section 7 consultation. Nebraska Field Office, Grand Island, NE. Aug. 3 pp.

———. 2008. Biological Opinion on the effects of the Southern Rocky Mountains Lynx Amendment on the Distinct Population Segment of Canada lynx (*Lynx canadensis*) in the contiguous United States. USFWS, Denver, CO. July 25. (ES/CO: USFS/SRLA, Tails: 65412-2008-F-00370, BO ESILK-6-e0-08-F-024)

———. 2010. Endangered and threatened wildlife and plants; revised critical habitat for the Preble's meadow jumping mouse in Colorado; Final Rule. 50 CFR Part 17. Fed. Reg. Vol. 75, No. 240, Dec. 15, 2010, Rules and Regulations, pp. 78430–78483.

———. 2011. Species profiles for Western Prairie Fringed Orchid (*Platanthera praeclara*) available at http://ecos.fws.gov/speciesprofile/.

———. 2013a. Species profile for the Mexican spotted owl. Accessed Jan. 8, 2013. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B074#recovery.

———. 2013b. Species profile for the Preble's meadow jumping mouse. Accessed Jan. 8, 2013. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0C2#lifeHistory.

———. 2013c. Endangered and threatened wildlife and plants; threatened status for the distinct population segment of the North American wolverine occurring in the contiguous United States; establishment of a nonessential experimental population of the North American wolverine in Colorado, Wyoming, and New Mexico; proposed rules. 50 CFR Part 17. Fed. Reg. Vol. 78, No. 23, Feb. 4. pp. 7864–7890.

———. 2014. Biological Assessment & request for formal section 7 consultation for Eldora Mountain Resort's existing water use. Western Ecosystems, Inc. Boulder, CO.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered species consultation handbook: procedures for conducting consultation and conference activities under

section 7 of the Endangered Species Act. U.S. Fish and Wildlife Serv. and Nat'l Marine Fisheries Serv. March.

U.S. Fish and Wildlife Service and U.S. Forest Service. 2001a. Programmatic consultation agreement for Canada lynx in Colorado. Colorado Field Office, Denver, CO. 3 pp.

———. 2001b. SRM lynx project decision tree. Colorado Field Office, Denver, CO.

———. 2004. Colorado lynx project decision screens. Colorado Field Office, Denver, CO. June.

———. 2010. Programmatic Consultation Agreement between U.S. Forest Service and U.S. Fish and Wildlife Service for the Southern Rockies Lynx Project Screens. U.S. Forest Service, Rocky Mountain Region, and U.S. Fish and Wildlife Service, Colorado and Wyoming.

U.S. Geological Survey. 2012. 12-digit Hydrologic Unit Code for Middle Bounder Creek (HUC12 101900050402) and the Headwaters South Boulder Creek (HUC12 101900050501).

U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service. 2012. Federal Standards and Procedures for the National Watershed Boundary Dataset (WBD) (3d ed.): U.S. Geological Survey Techniques and Methods 11–A3, 63 p.

USA.com. 2013. Eldora, CO Weather. Available: http://www.usa.com/eldora-co-weather.htm. Accessed April 19, 2013.

USDA Forest Service – Rocky Mountain Research Station. 2012. The WEPP Model. Available at http://forest.moscowfsl.wsu.edu/fswepp/. Accessed March through May, 2013.

USDA Forest Service. 1974. Guidelines for Making Soil Interpretations. Branch of Soils, Division of Watershed Management, Rocky Mountain Region. 37 p.

———. 1987. Plant Associations of Region Two. Edition 4. B.C. Johnston, ed. publication R2-ECOL-87-2, USDA-FS Lakewood, CO. 429 p.

———. 1991. Threatened, endangered, and sensitive species of the Intermountain Region. Fish. and Wildl. Manage., Intermtn. Reg. Ogden, UT (as cited *in* USFS 1996).

———. 1992. Forest Service Handbook. USDA Forest Service, Rocky Mountain Region. Denver, CO.

———. 1993. RMRIS data dictionary. USDA Forest Service, Nov. 29.

———. 1994. Forest Service Handbook 1909.12 Section 5.32(3)(a). Land and Resource Management Planning.

———. 1995. Landscape Aesthetics: Scenery Management System Handbook. AH 701-f.

———. 1996a. Final Environmental Impact Statement Telluride Ski Area expansion. Grand Mesa, Uncompahgre, Gunnison National Forest. USDA Forest Service, Delta, CO.

———. 1996b. Final environmental impact statement: Vail Category III Ski Area development. USDA Forest Service, White River National Forest, Holy Cross Ranger District. Minturn, CO.

———. 1997a. 1997 Revision to the Land and Resource Management Plan. USDA Forest Service, Arapaho and Roosevelt National Forests and Pawnee National Grassland. Fort Collins, CO.

———. 1997b. Final Environmental Impact Statement to Accompany the 1997 Revision to the Land and Resource Management Plan. Arapaho and Roosevelt National Forests and Pawnee National Grassland. Fort Collins, CO.

———. 1997c. R1/R4 (Northern/Intermountain Regions) Fish and Fish habitat Standard Inventory Procedures Handbook.

———. 1997d. Review of changes in Eldora's C Lift Pod development proposal, associated environmental concerns, and potential environmental impacts. Boulder Ranger District Office, Boulder, CO.

———. 2001. Built Environmental Image Guide. USDA Forest Service, Rocky Mountain Region. Denver, CO.

———. 2002. Land and resource management plan-2002 revision for the White River National Forest. Glenwood Springs. CO

———. 2005a. Forest Plan Amendment for Management Indicator Species. Decision Notice, Finding of No-significant Impact, Finding of Non-significant Amendment. USDA Forest Service, Arapaho-Roosevelt National Forests and Pawnee National Grasslands. Apr. 29.

———. 2005b. Forest-wide Direction. Replacement Pages 27–30 via Amendment 6 (May 2005). USDA Forest Service, Arapaho-Roosevelt National Forests and Pawnee National Grasslands.

———. 2005c. 1997 revision of the Land and Resource Management Plan, Amendment No. 6. USDA Forest Service, Arapaho-Roosevelt National Forests and Pawnee National Grasslands. July 8. 1p.

———. 2006. FSH 2509.25 Watershed Conservation Practices Handbook. USDA Forest Service, Rocky Mountain Region 2, Denver, CO.

———. 2007a. Old growth discussion for the Arapahoe-Roosevelt. USDA Forest Service, Arapaho-Roosevelt National Forests and Pawnee National Grasslands. 12pp.

———. 2007b. Species Conservation Program: Region 2 Regional Forester's Sensitive Species. http://www.fs.fed.us/r2/projects/scp/sensitivespecies/index.shtml. Accessed Oct. 22, 2007.

———. 2008a. Final Environmental Impact Statement, Southern Rockies Lynx Amendment Management Direction, Vol. 1. USDA Forest Service, Rocky Mountain Region. Denver, CO. Oct.

———. 2008b. Supplemental Biological Assessment of the Southern Rockies Lynx Amendment on Threatened, Endangered and Proposed Species for the following National Forest Land and Resource Management Plan Amendments: Arapaho and Roosevelt National Forests; Grand Mesa, Uncompahgre and Gunnison National Forests; Pike and San Isabel National Forests; Medicine Bow and Routt National Forests; Rio Grande National Forest; San Juan National Forest; White River National Forest. USDA Forest Service, Rocky Mountain Region.

———. 2008c. Record of Decision, Southern Rockies Lynx Amendment Management Direction. USDA Forest Service, Rocky Mountain Region. Denver, CO. Oct. 2008

———. 2008d. Forest Service Handbook. FSH 1909.15 National Environmental Policy Act Handbook. July 2008.

———. 2009a. Implementation guide to the Southern Rockies Lynx Amendment. USDA Forest Service, Rocky Mountain Region. Denver, CO.

———. 2009b. Rocky Mountain Region endangered, threatened, proposed, and sensitive species matrix. USDA Forest Service, Rocky Mountain Region. Denver, CO. May.

———. 2010a. Corona Trail grading scoping notice. USDA Forest Service, Arapaho-Roosevelt National Forests and Pawnee National Grasslands. Boulder, CO. Jan. 22. 5pp.

———. 2010b. Watershed Condition Framework. A Framework for Assessing and Tracking Changes to Watershed Condition. FS-977. May 2011.

———. 2011a. Forest and grassland health, spruce beetle. USDA Forest Service, Rocky Mountain Reg. Denver, CO. website: http://www.fs.usda.gov/detail/r2/forest-grasslandhealth/?cid=stelprdb5348787. Accessed Feb. 02, 2012.

———. 2011b. Forest Service Handbook 7709.56 – Road Reconstruction Handbook, effective August 19, 2011.

———. 2011c. Review of Forest Service Response: The Bark Beetle Outbreak in Northern Colorado and Southern Wyoming.

———. 2012a. Aerial detection survey: Highlights for 2012. From Aerial Detection Survey website: www.fs.usda.gov/wp.

———. 2012b. Forest Service Handbook 1909.15: Chapter 10, 12.3. USDA Forest Service, Rocky Mountain Region.

———. 2013a. Biological Assessment & Request for Formal Section 7 Consultation for Eldora Mountain Resort's Existing Water Use. Dated March 7, 2013. Prepared by Richard W. Thompson, Western Ecosystems Inc. Boulder, Colorado. Submitted to USFWS December 6, 2013.

———. 2013b. Final Revised Southern Rockies Lynx Screens for Ski Areas. USDA Forest Service, Rocky Mountain Region. Denver, CO. Dec. 20.

———. 2013c. Sensitive species for the Rocky Mountain Region (R2). Regional Supplement 2600-2011-1 to FSM 2670; updated August 24, 2013.

———. 2014. Mountain Pine Beetle. http://www.fs.usda.gov/detail/r2/forest-grasslandhealth/?cid=stelprdb5408531. Accessed January 1, 2014.

Vaughan, T.A. 1969. Reproduction and population densities in a montane small mammal fauna. Pages 51–74 *in* Jones, J.K., ed. Contributions in mammalogy. Misc. Publ. Mus. Nat. Hist., Univ. Kansas. 51:1–428.

Verner, J. 1993. Forest owl inventory protocol (flammulated and boreal owls). USFS. Pike and San Isabel National Forests. Pueblo, CO. Unpubl. Man. 7 pp.

Wakatsuki, T. and A. Rasyidin. 1992. Rates of weathering and soil formation. Geoderma 52(3), 251–263.

Walker, B. 1925. New species of North American Ancylidae and Lancidae. Occasional Papers of the Museum of Zoology, Univ. Michigan, Ann Arbor, Michigan. No. 165:1–13, 3 pp.

Walker, E.M. 1925. The North American dragonflies of the genus *Somatochlora*. (Replica, 1999). Univ. of Toronto Press, Toronto, Ontario, Canada. 202 pp.

Waneck, W.J. 1971. Snowmobile impacts on vegetation, temperatures, and soil microbes. Chubb, M (ed.), Proceedings of the 1971 snowmobile and off-road vehicle research symposium, *Michigan State University Department of Parks and Recreation Resources Technical Report No.8*¸ Michigan State University, East Lancing, pp. 116–129.

———. 1973. The ecological impact of snowmobiling in Northern Minnesota. The Center for Environmental Studies. Bemidji State College, Bemidji, MN, pp. 57–76.

Wanek, W.J. and L.H. Shamacher. 1975. A continuing study of ecological impact of snowmobiling in northern Minnesota. Final report for 1974–1975. Bemidji State College, Bemidji, MN.

Ward, R.M.P. and C.J. Krebs. 1985. Behavioral responses of lynx to declining snowshoe hare abundance. Can. Field-Nat. 80:18–23.

Webb, B. 1982a. Distribution and nesting requirements of montane forest owls in Colorado. Part II: northern pygmy owl (*Glaucidium gnoma*) and boreal owl (*Aegolius funereus*). C.F.O. Journal. 16:58–65.

———. 1982b. Distribution and nesting requirements of montane forest owls in Colorado. Part III: flammulated owl (*Otus flammeolus*). C.F.O. Journal. 16:76–82.

Weldon, L.A.C. 2012. Uncapped pipes and animal mortality. Memo to Regional Foresters. U.S. Forest Service. Sep. 19. 1p.

Wenger and LeFever. 1990. Report on Mexican spotted owl surveys conducted on the Uncompahgre National Forest. USFS (as cited *in* Grother 1992).

———. 1991. Report on Mexican spotted owl surveys conducted on the Uncompahgre National Forest. USFS (as cited *in* Grother 1992).

Western Ecological Resource, Inc. 2013. Waters of the U.S. Including Wetlands Delineation Report, Eldora Mountain Resort Ski Area Projects, Boulder & Gilpin Counties, Colorado. April 2013.

———. 2014. Draft Botanical Biological Report, Biological Assessment/Biological Evaluation & Specialist Report Eldora Mountain Resort Ski Area Projects. Boulder Ranger District, Arapaho & Roosevelt National Forests and Boulder & Gilpin Counties, Colorado. January 2014.

Wiens, J.A. 1997. Metapopulation dynamics and landscape ecology. Pages 43–62 *in* I. Hanski and M.E. Gilpin. Eds. Metapopulation biology: ecology, genetics, and evolution. Academic Press, San Diego. CA.

Wiggins, D. 2004. American three-toed woodpecker (*Picoides dorsalis*): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/projects/scp/assessments/americanthreetoedwoodpecker.pdf.

Williams, S. 2003a. Migratory bird permit memorandum. US Fish and Wildlife Service, Wash. D.C. MBPM-2. Apr. 15. 2pp.

———. 2003b. Nest destruction, Migratory Bird Permit memorandum. US Fish and Wildlife Service, Wash., D.C. MBPM-2. Apr. 15. 2pp.

Wilson, D.E. 1982. Wolverine (*Gulo gulo*). Pages 644–652 *in* J.A. Chapman and G.A. Feldhamer, eds. Wild mammals of North America: biology, management and economics. Johns Hopkins Press, Baltimore.

Winternitz, B. 1998. Hairy woodpecker. Pages 262–263 *in* H. E. Kingery, ed., Colorado breeding bird atlas. Colorado Bird Atlas Partnership. Denver, Colorado.

Wright Water Engineers, Inc. 1990. Water resources investigations for Lake Eldora Ski Area. Report prepared for Vail Associates, Inc. by Wright Water Engineers, Inc. Denver, CO.

———. 1992. Investigation of physical and legal availability of water for increased snowmaking at Eldora Mountain Resort. Report prepared for Eldora Enterprises Limited Liability Company by Wright Water Engineers, Inc. Denver, CO.

Wu, S.K. 1993. Memo to Jose´ Bernardo Garza, UWFWS from Dr. Ski-Kuei Wu, Professor of Natural History, University of Colorado at Boulder: Unpublished field notes of George W. Bryce. Boulder, Colorado.

Yeager, L.E. and L.E. Riordan. 1953. Effects of beetle-killed timber on range and wildlife in Colorado. Trans. N. Amer. Wildl. Nat. Res. Conf. 18:596–616.

Chapter 6

Figures

6. FIGURES

VICINITY MAP

FIGURE 1: ALTERNATIVE 1 – NO ACTION

FIGURE 2: ALTERNATIVE 2 – PROPOSED ACTION

FIGURE 3: ALTERNATIVE 2 – PROPOSED ACTION *VEGETATION MANAGEMENT PROJECTS*

FIGURE 4: ALTERNATIVE 3

FIGURE 5: ALTERNATIVE 3 *VEGETATION MANAGEMENT PROJECTS*

FIGURE 6: FOREST PLAN SIOS AND CRITICAL VIEWPOINTS

FIGURE 7: CRITICAL VIEWPOINT 1 FOURTH OF JULY ROAD *VISUAL SIMULATION*

FIGURE 8: CRITICAL VIEWPOINT 2 HESSIE/FOURTH OF JULY ROAD FORK *VISUAL SIMULATION*

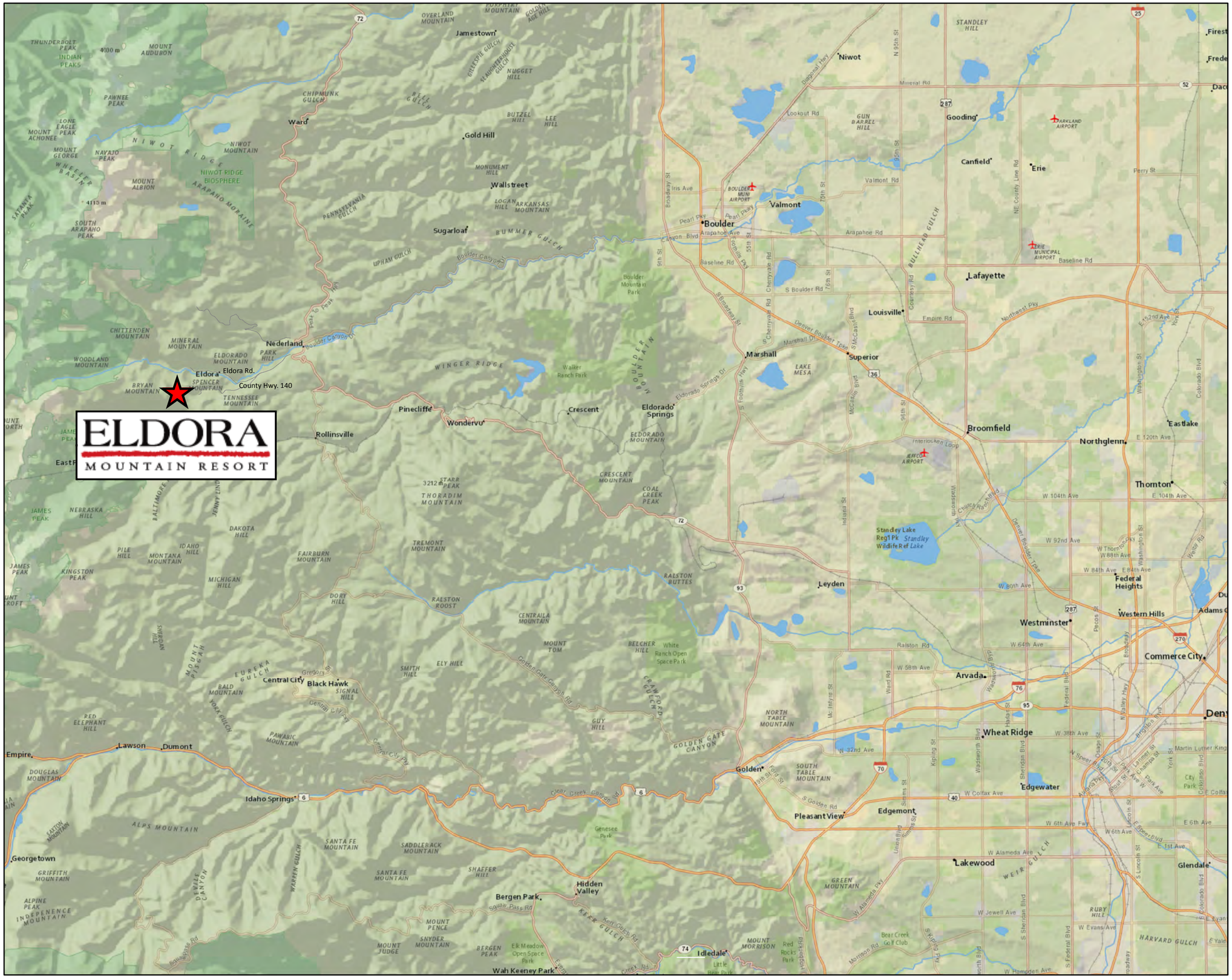
FIGURE 9: CRITICAL VIEWPOINT 3 ELDORADO AVENUE/CR 130 *VISUAL SIMULATION*

FIGURE 10: CRITICAL VIEWPOINT 4 PROPOSED BRIDGE *3D RENDERING*

FIGURE 11: FOREST PLAN AMENDMENT

FIGURE 12: WATER RESOURCES AND ALTERNATIVE 2 IMPACTS

FIGURE 13: WATER RESOURCES AND ALTERNATIVE 3 IMPACTS



Arapaho and Roosevelt National Forests
and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

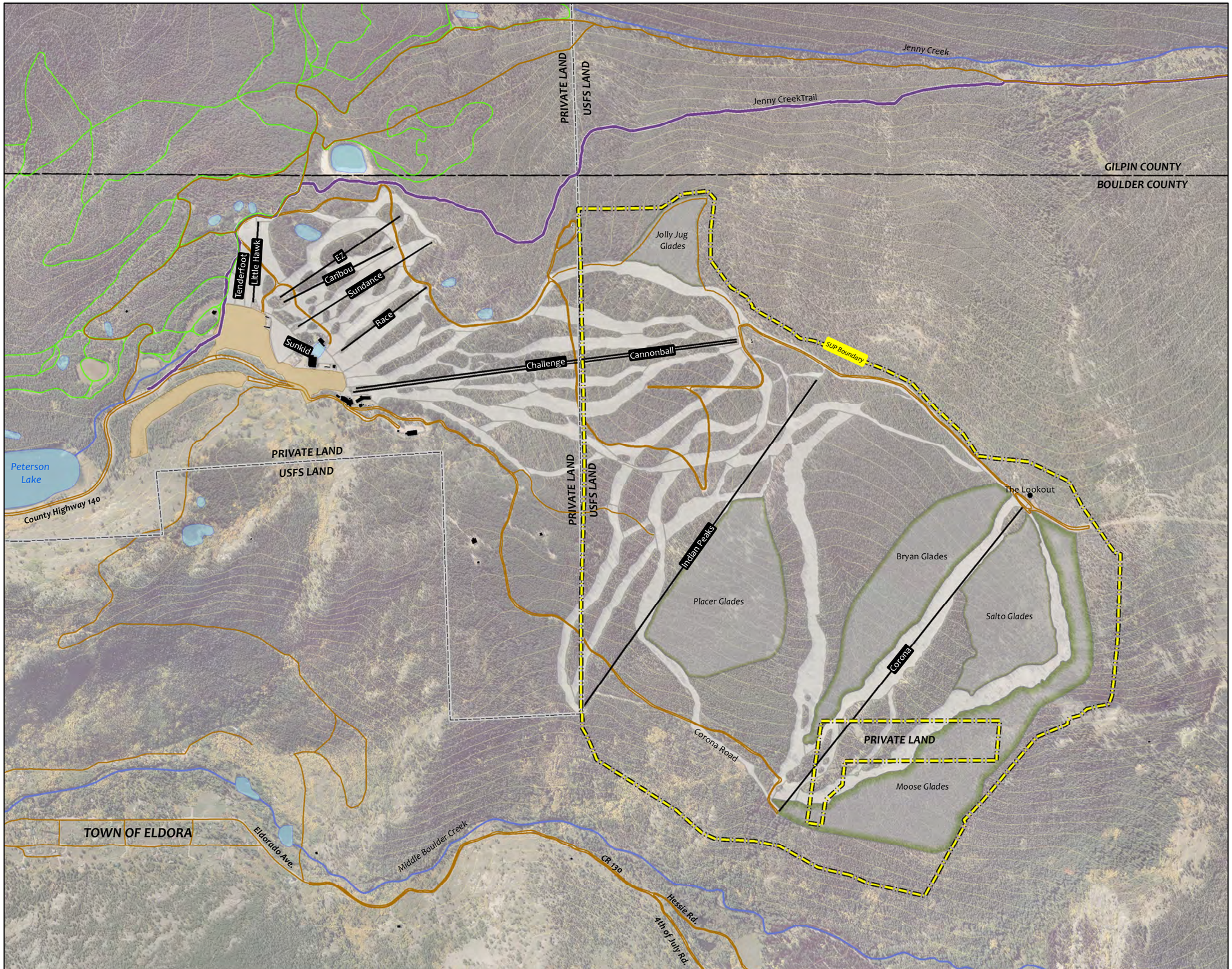
Vicinity Map

0 1 2 4 Miles

N

Date: February 2014
Prepared By:

SE GROUP



Arapaho and Roosevelt National Forests
and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 1:
Alternative 1
No Action

LEGEND

Existing Conditions

- Lifts
- Ski Trails
- Tree and Gladed Skiing Areas
- SUP Boundary
- Buildings
- Parking
- Roads
- Nordic Trails
- Lake/Pond

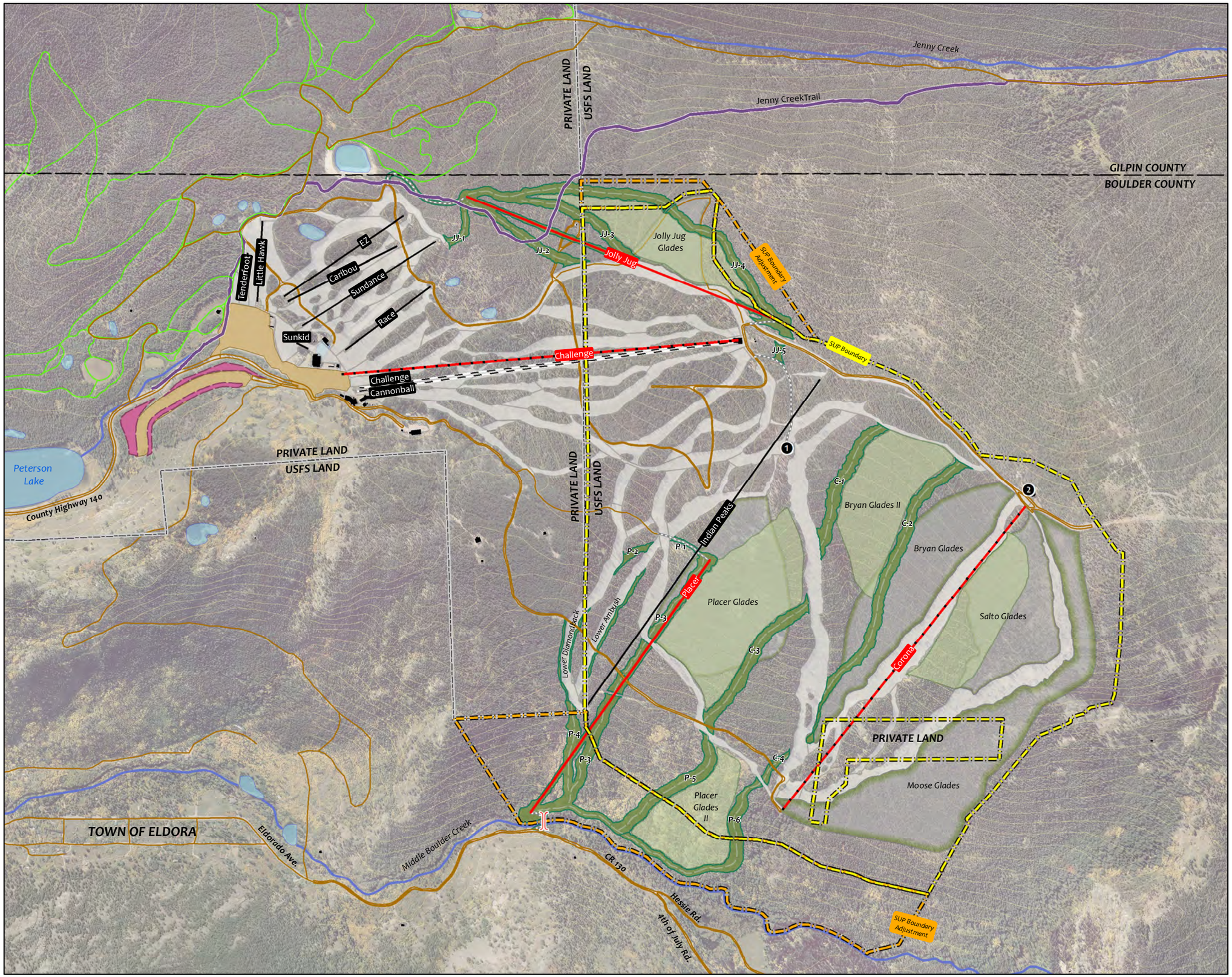
0 450 900 1,800 Feet

1 inch = 900 feet

N

Date: February 2014
Prepared By:

SE GROUP



Arapaho and Roosevelt National Forests and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort Ski Area Projects Environmental Impact Statement

Figure 2: Alternative 2 Proposed Action

LEGEND

Existing Conditions

- Lifts
- Ski Trails
- Tree and Gladed Skiing Areas
- SUP Boundary
- Buildings
- Parking
- Roads
- Nordic Trails
- Lake/Pond

Proposed Projects

- New Lift
- Lift Removal
- Lift Replacement
- Ski Trails
- Tree and Gladed Skiing Areas
- SUP Boundary Adjustment
- Additional Parking
- 1 Challenge Mountain Facility
- 2 Lookout Facility Renovation
- New Road
- Bridge

Note: Snowmaking coverage is proposed on all proposed trails, excluding the glading projects.

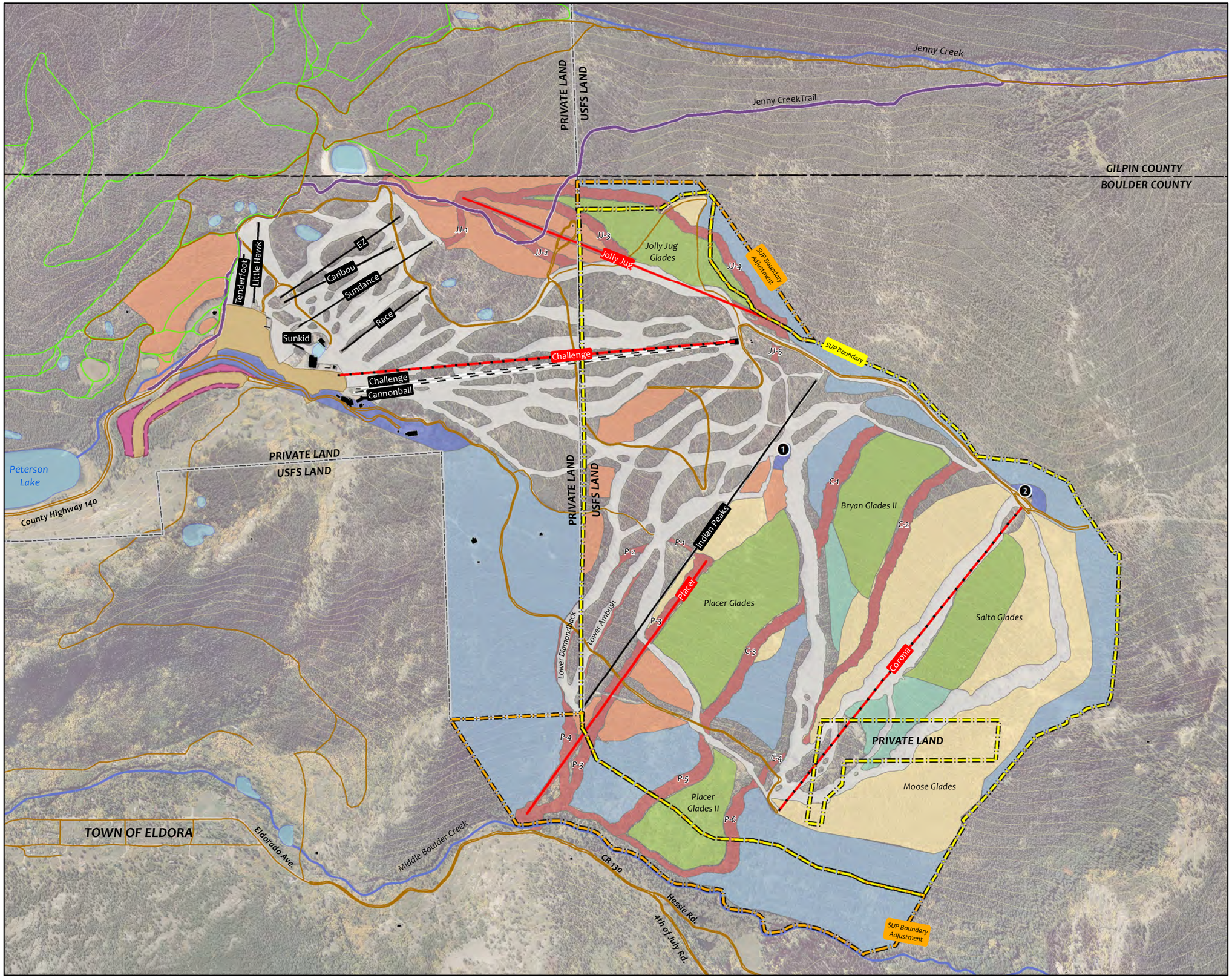
0 450 900 1,800 Feet

1 inch = 900 feet

N

Date: February 2014
Prepared By:

SE GROUP



Arapaho and Roosevelt National Forests and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 3: Alternative 2 Proposed Action

Vegetation Management Projects

LEGEND

Existing Conditions

- Lifts
- SUP Boundary
- Buildings
- Parking
- Roads
- Nordic Trails
- Lake/Pond

Proposed Projects

- New Lift
- Lift Removal
- Lift Replacement
- SUP Boundary Adjustment
- Additional Parking
- 1 Challenge Mountain Facility
- 2 Lookout Facility Renovation

Vegetation Management Prescription

- P1- New Ski Trail Construction
- P2- Existing Ski Trail Maintenance
- P3- Defensible Space
- P4- New Tree and Gladed Skiing Area Construction
- P5- Existing Tree and Gladed Skiing Area Maintenance
- P6- Sanitation/Salvage with Removal in Lodgepole Pine
- P7- Sanitation/Salvage with Removal in Spruce/Fir
- P8- Continued Forest Monitoring

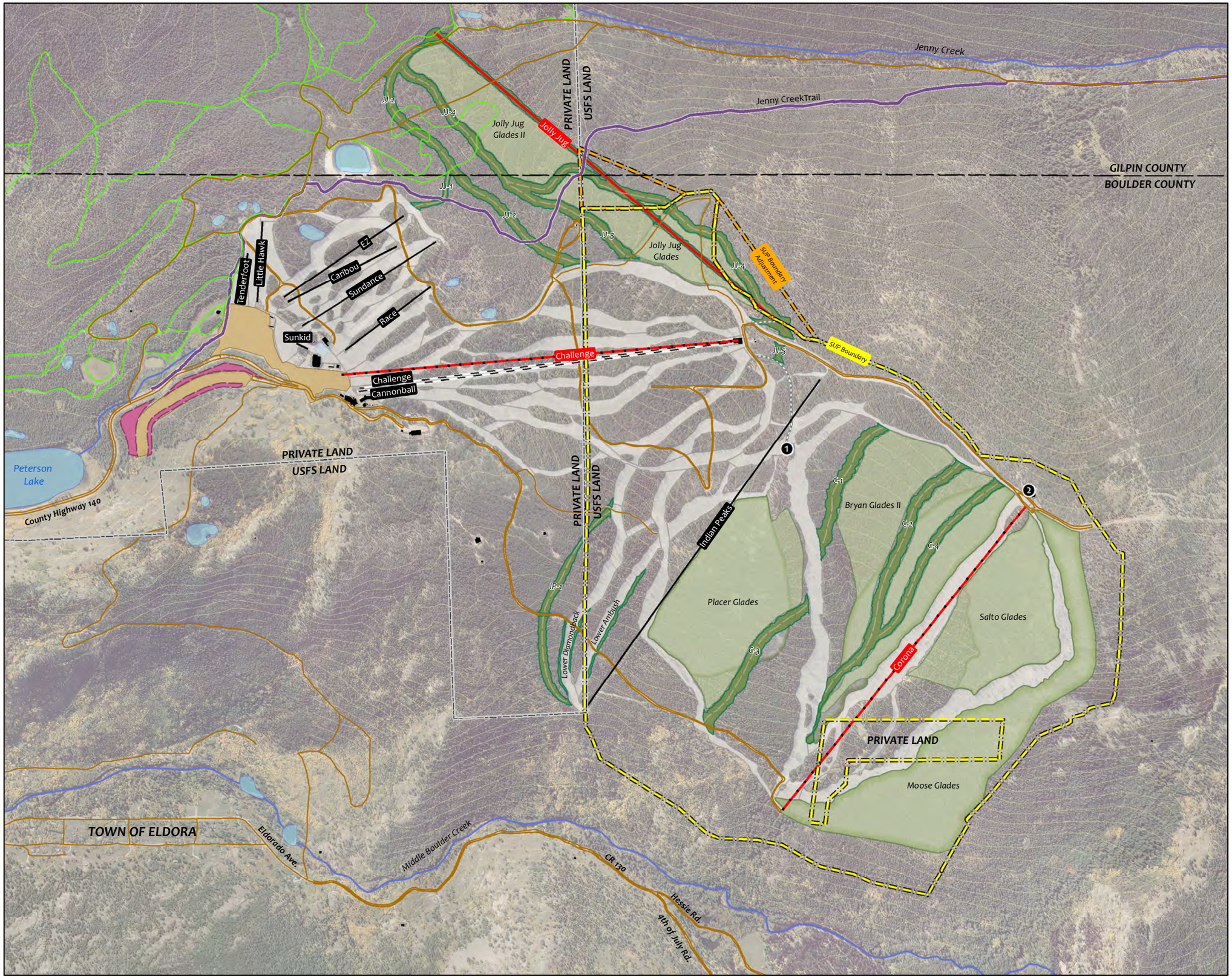
0 450 900 1,800 Feet

1 inch = 900 feet

N

Date: February 2014
Prepared By:

SE GROUP



Arapaho and Roosevelt National Forests and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort Ski Area Projects Environmental Impact Statement

Figure 4: Alternative 3

LEGEND

Existing Conditions

- Lifts
- Ski Trails
- Tree and Gladed Skiing Areas
- SUP Boundary
- Buildings
- Parking
- Roads
- Nordic Trails
- Lake/Pond

Proposed Projects

- New Lift
- Lift Removal
- Lift Replacement
- Ski Trails
- Tree and Gladed Skiing Areas
- SUP Boundary Adjustment
- Additional Parking
- 1 Challenge Mountain Facility
- 2 Lookout Facility Renovation
- New Road

Note: Snowmaking coverage is proposed on all proposed trails, excluding the glading projects.

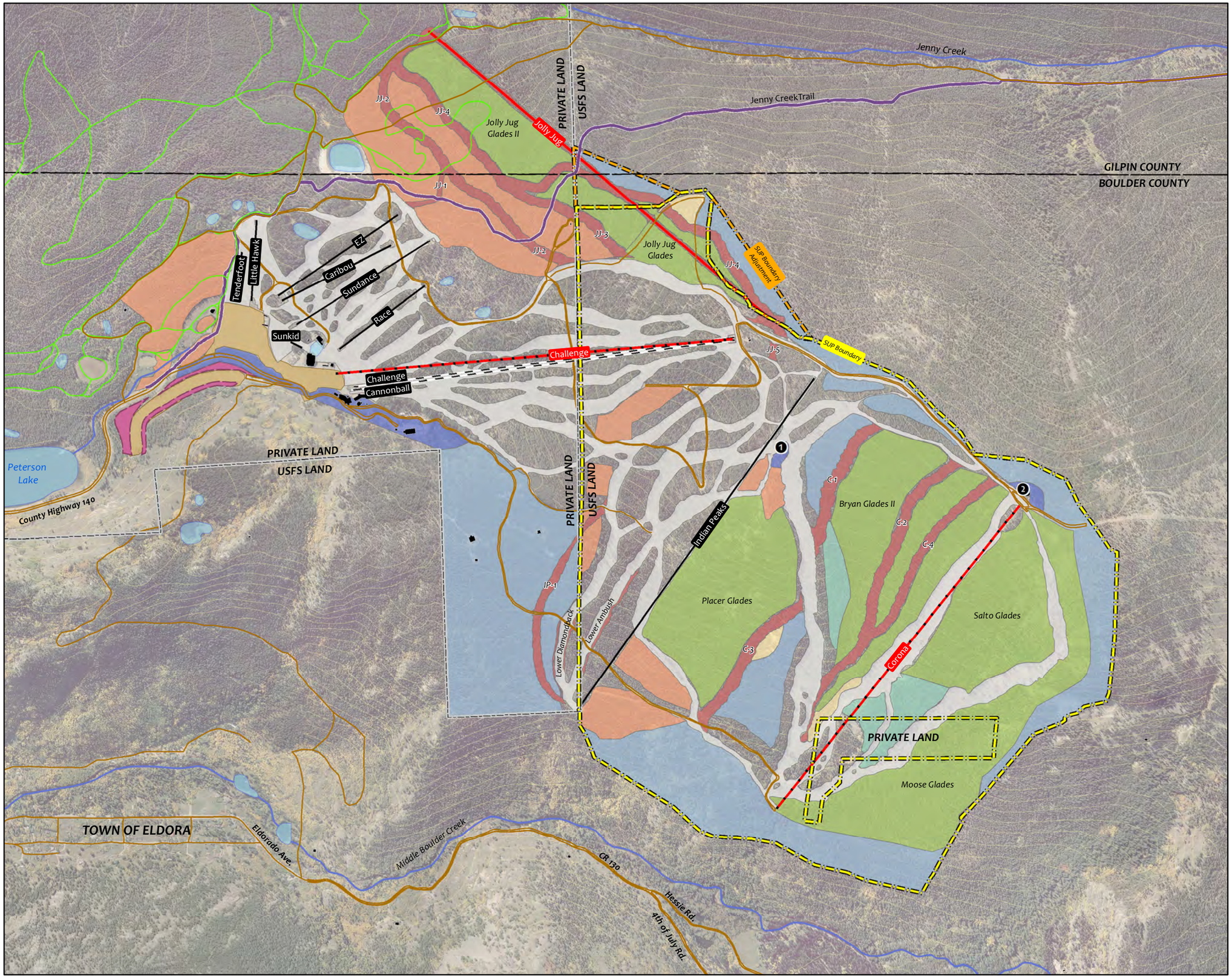
0 450 900 1,800 Feet

1 inch = 900 feet

N

Date: February 2014
Prepared By:

SE GROUP



Arapaho and Roosevelt National Forests and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort Ski Area Projects Environmental Impact Statement

Figure 5: Alternative 3

Vegetation Management Projects

LEGEND

Existing Conditions

- Lifts
- SUP Boundary
- Buildings
- Parking
- Roads
- Nordic Trails
- Lake/Pond

Proposed Projects

- New Lift
- Lift Removal
- Lift Replacement
- SUP Boundary Adjustment
- Additional Parking
- 1 Challenge Mountain Facility
- 2 Lookout Facility Renovation

Vegetation Management Prescription

- P1- New Ski Trail Construction
- P2- Existing Ski Trail Maintenance
- P3- Defensible Space
- P4- New Tree and Gladed Skiing Area Construction
- P5- Existing Tree and Gladed Skiing Area Maintenance
- P6- Sanitation/Salvage with Removal in Lodgepole Pine
- P7- Sanitation/Salvage with Removal in Spruce/Fir
- P8- Continued Forest Monitoring

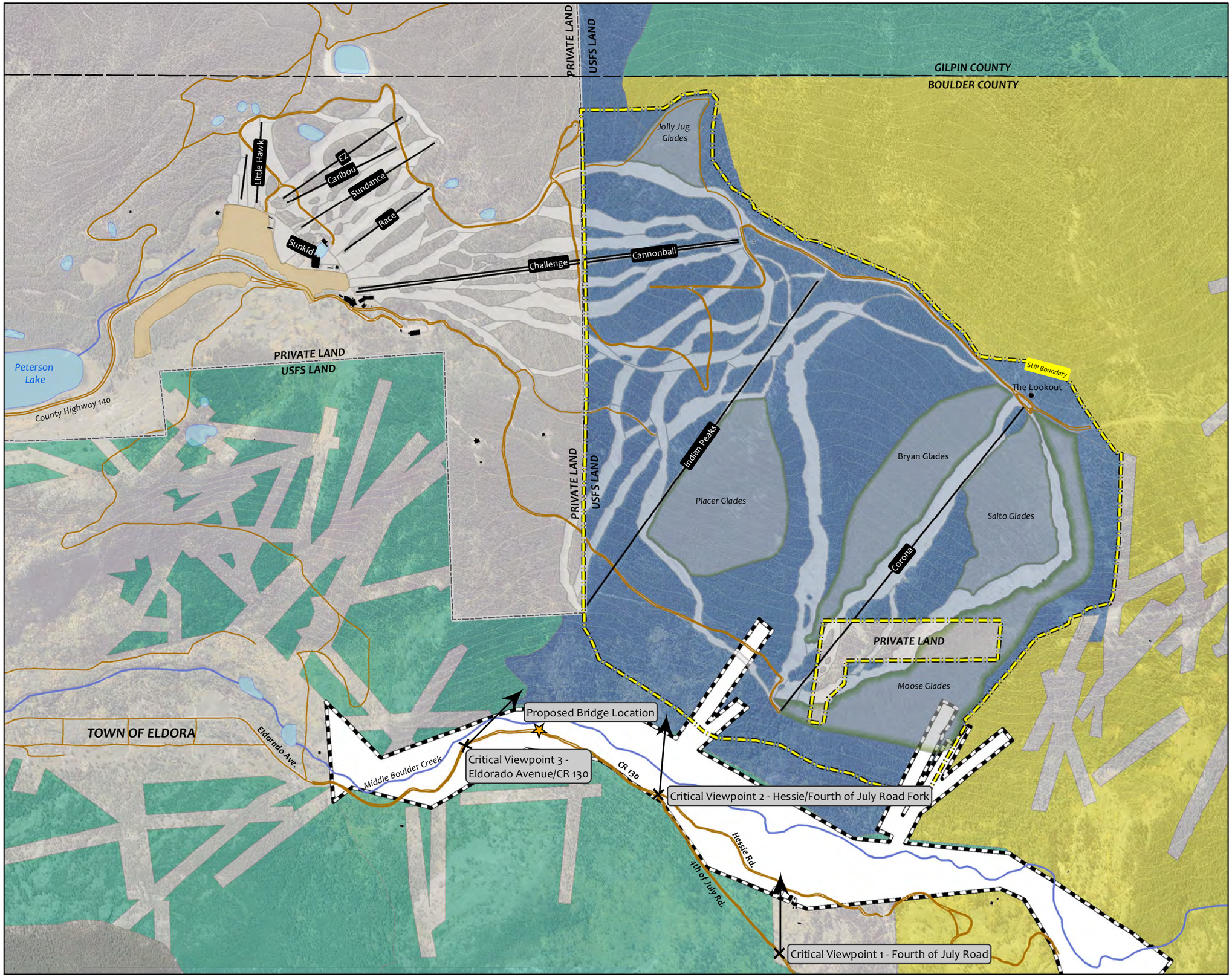
0 450 900 1,800 Feet

1 inch = 900 feet

N

Date: February 2014
Prepared By:

SE GROUP



Arapaho and Roosevelt National Forests and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 6: Forest Plan SIOs and Critical Viewpoints

LEGEND

Existing Conditions

- Lifts
- Ski Trails
- Tree and Gladed Skiing Areas
- SUP Boundary
- Buildings
- Parking
- Roads
- Lake/Pond

SIO Value

- Private Land
- High
- Moderate
- Low
- Not Officially Designated Lands in the Forest Plan

0 450 900 1,800 Feet

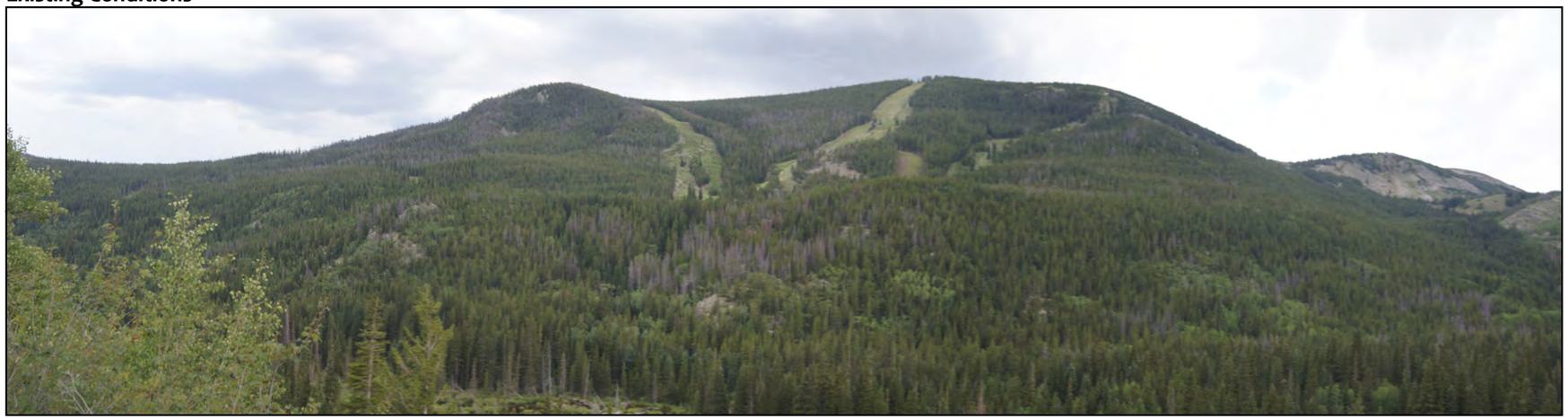
1 inch = 900 feet

N

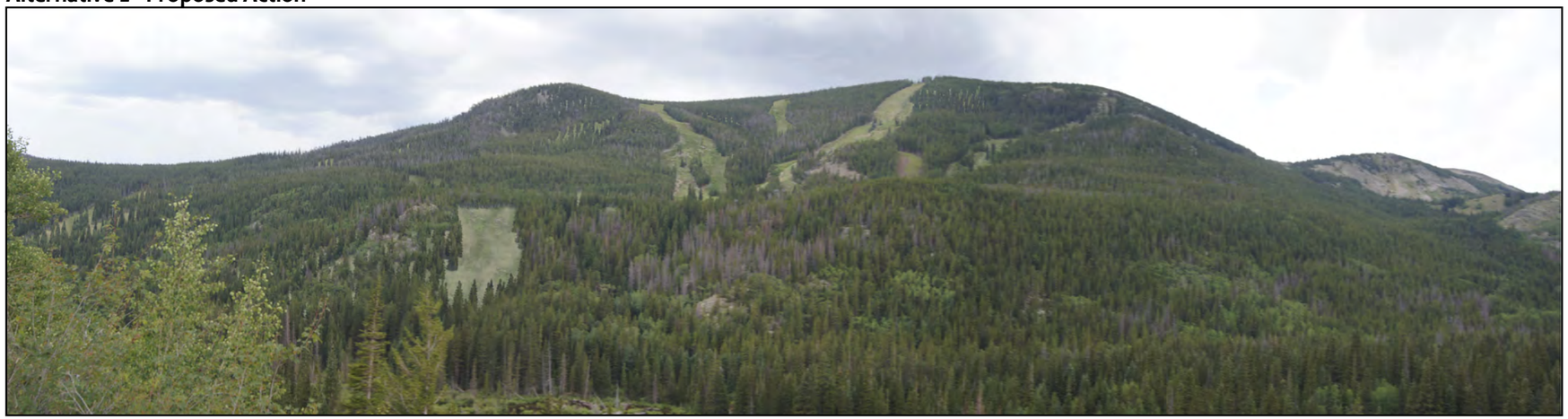
Date: February 2014
Prepared By:

SE GROUP

Existing Conditions



Alternative 2 - Proposed Action



Alternative 3

Arapaho and Roosevelt National Forests
and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 7:
Critical Viewpoint 1
Fourth of July Road
Visual Simulation

Viewpoint Details:
Distance to top of Corona Chairlift/ Lookout:
- approximately 1.1 miles

Distance to base of Corona Chairlift:
- approximately 0.5 mile

Date: February 2014
Prepared By:
SE GROUP

Existing Conditions

Alternative 2 - Proposed Action

Alternative 3

Arapaho and Roosevelt National Forests
and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 8:
Critical Viewpoint 2
Hessie/Fourth of July
Road Fork
Visual Simulation

Viewpoint Details:

Distance to top of Corona Chairlift/ Lookout:
- approximately 1 mile

Distance to base of Corona Chairlift:
- approximately 0.3 mile

Distance to base of Indian Peaks Chairlift:
- approximately 0.4 mile

Date: February 2014
Prepared By:

Existing Conditions

Alternative 2 - Proposed Action

Alternative 3

Arapaho and Roosevelt National Forests
and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 9:
Critical Viewpoint 3
Eldorado Avenue/CR 130
Visual Simulation

Viewpoint Details:
Distance to top of Corona Chairlift/ Lookout:
- approximately 1.2 miles

Distance to base of Corona Chairlift:
- approximately 0.6 mile

Distance to base of Indian Peaks Chairlift:
- approximately 0.3 mile

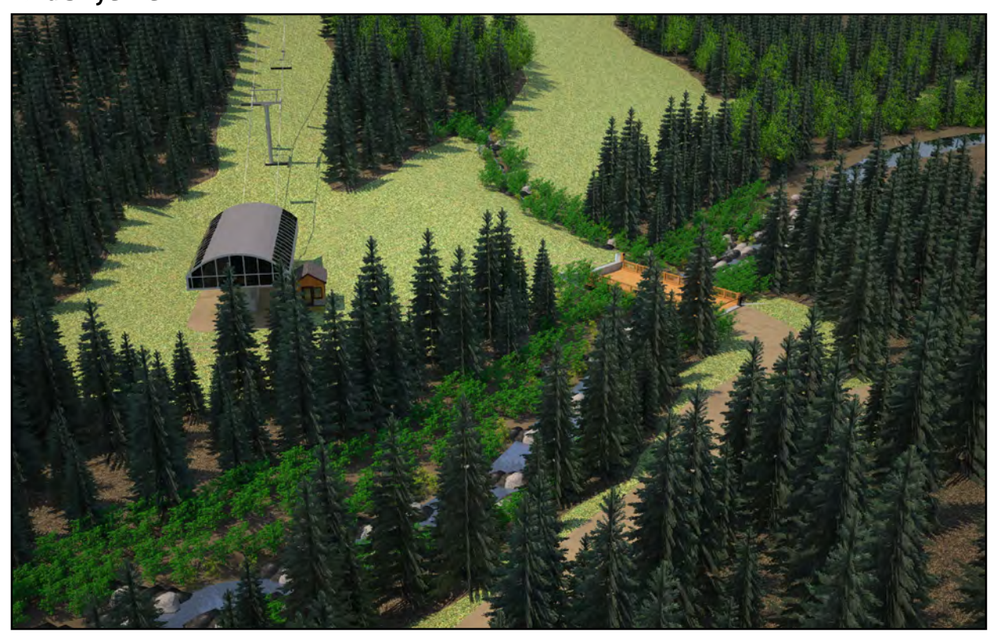
Date: February 2014
Prepared By:

Existing Conditions - Ground View

Ground View

Bird's Eye View 1

Bird's Eye View 2



Arapaho and Roosevelt National Forests
and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 10:
Critical Viewpoint 4
Proposed Bridge
3D Perspective

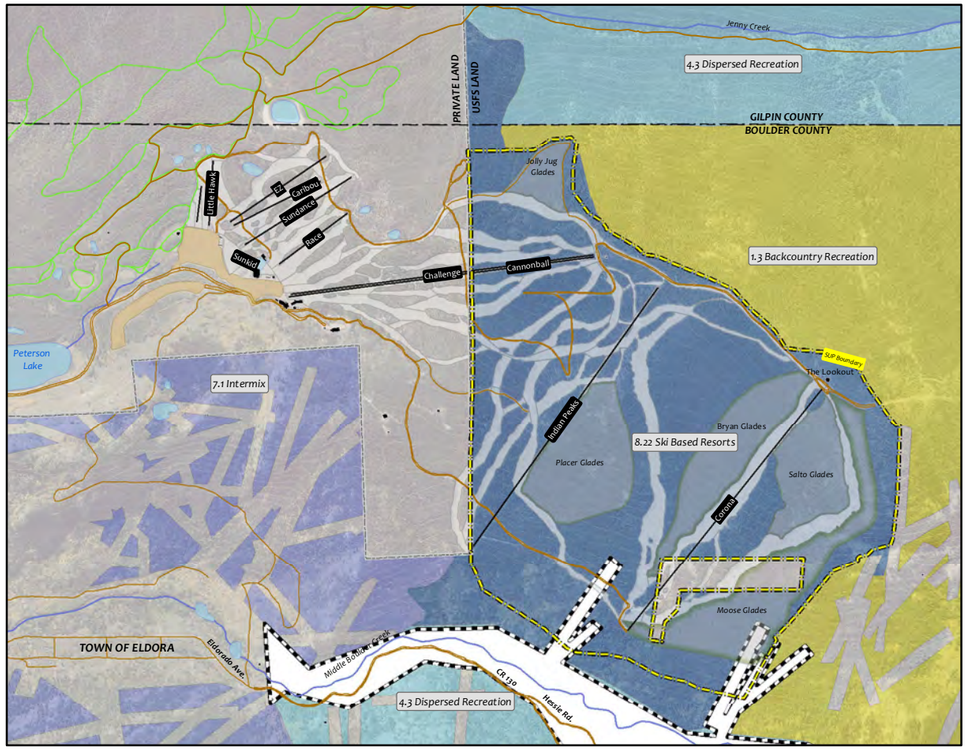
Viewpoint Details:

Existing Condition- Ground View photo looks roughly southwest from Eldorado Avenue towards Middle Boulder Creek and the site of the proposed bridge and road spur.
Ground View perspective looks roughly south from the junction of Eldorado Avenue and proposed road spur.
Bird's Eye View 1 looks roughly northeast at the bottom terminal of the Placer Express chairlift, proposed bridge, and proposed road spur from approximately proposed trail P-3.
Bird's Eye View 2 looks roughly south across Eldorado Avenue to provide a direct view of the proposed road spur, bridge, trails and bottom terminal of the Placer Express chairlift.

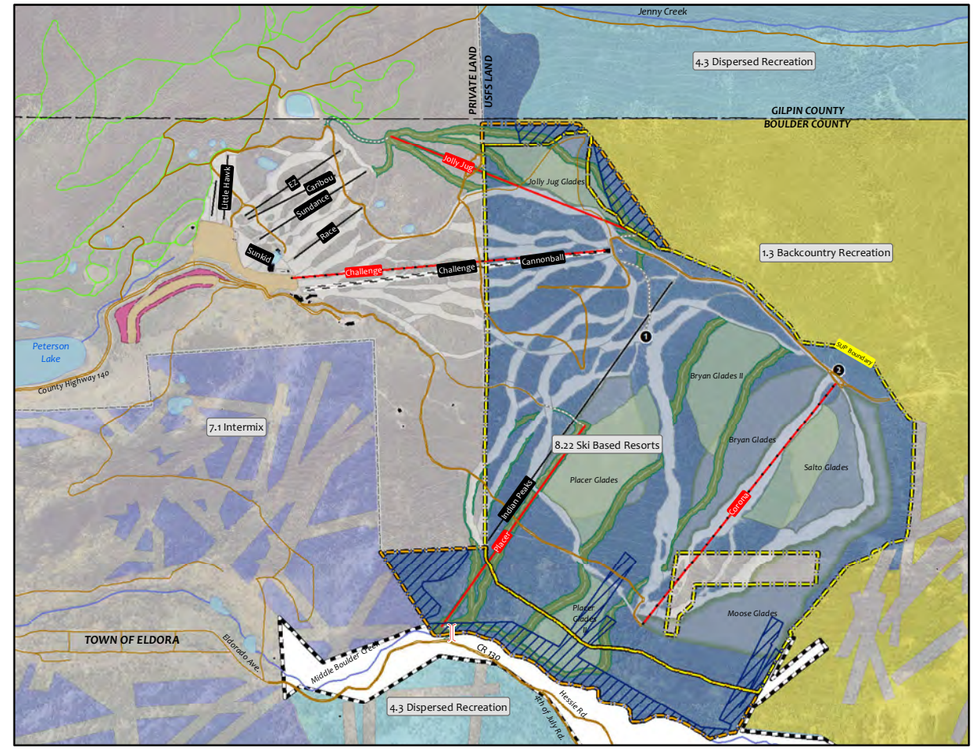
Date: February 2014
Prepared By:

SE GROUP

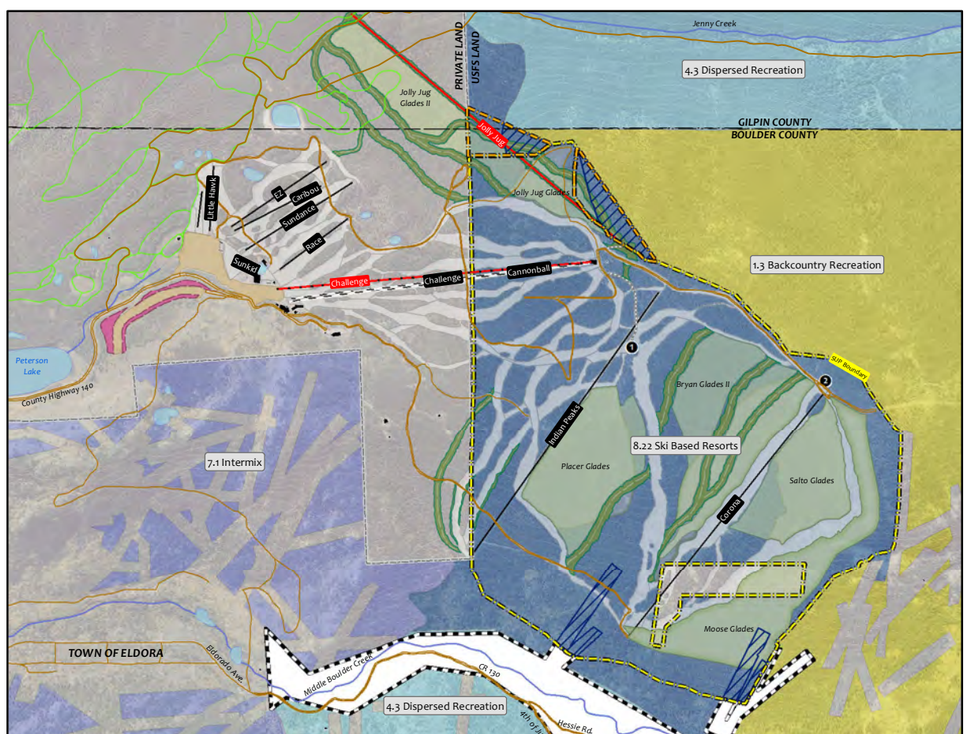
Existing Conditions and Alternative 1 - No Action



Alternative 2 - Proposed Action



Alternative 3



Arapaho and Roosevelt National Forests and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 11: Forest Plan Amendment

LEGEND

Existing Conditions

- Lifts
- Ski Trails
- Tree and Gladed Skiing Areas
- SUP Boundary
- Buildings
- Parking
- Roads
- Nordic Trails
- Lake/Pond

MA (SIO)

- 1.3 (High)
- 4.3 (Moderate)
- 7.1 (Moderate)
- 8.22 (Low)
- Private Land
- Not Officially Designated Lands in the Forest Plan

Proposed Forest Plan Amendment

- Area Amended to Management Area 8.22- Ski-Based Resorts (Low)

Proposed Projects

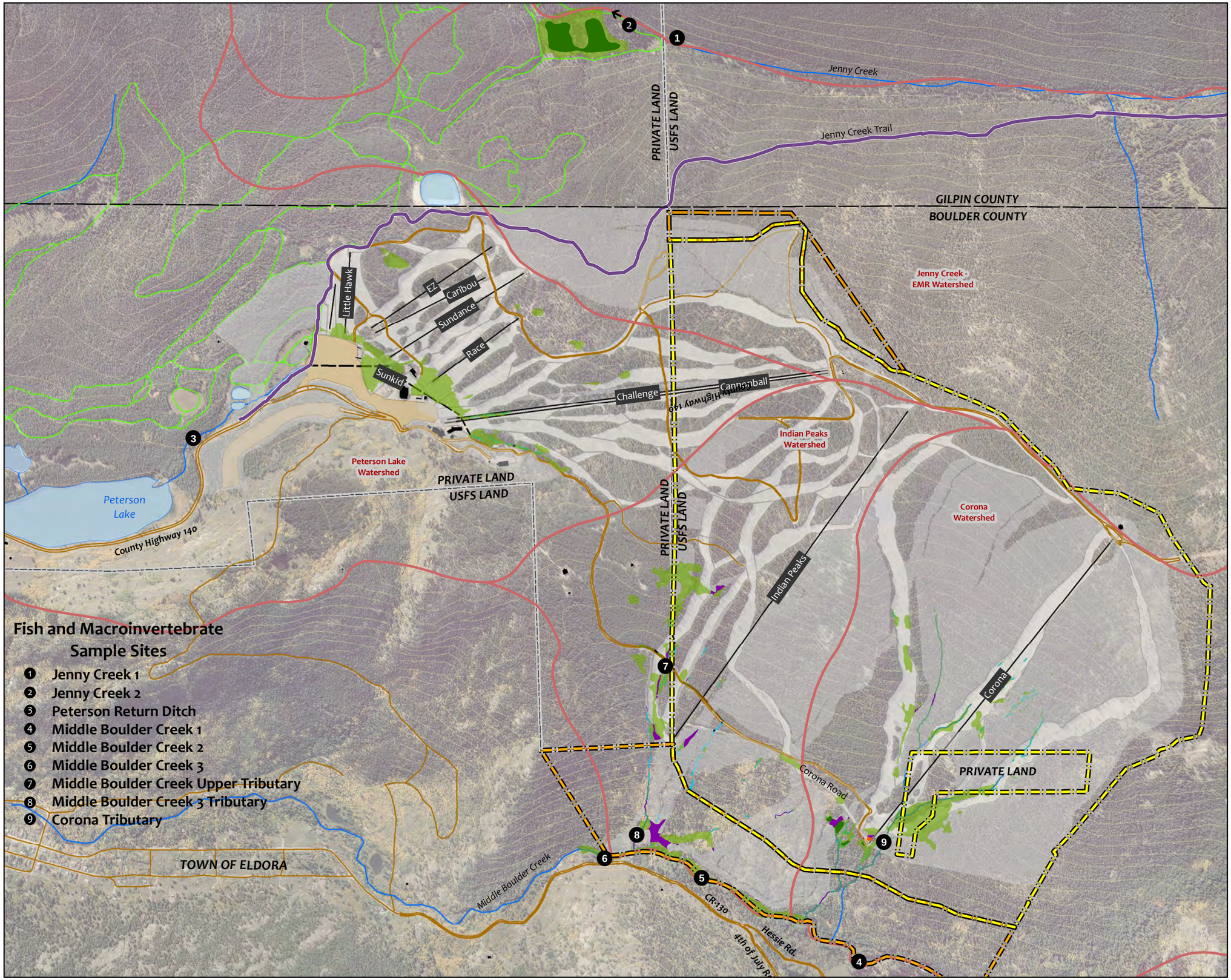
- New Lift
- Lift Removal
- Lift Replacement
- Ski Trails
- Tree and Gladed Skiing Areas
- SUP Boundary Adjustment
- Additional Parking
- 1 Challenge Mountain Facility
- 2 Lookout Facility Renovation
- New Road
- Bridge

0 1,000 2,000 4,000 Feet

N

Date: February 2014
Prepared By:

SE GROUP



Arapaho and Roosevelt National Forests and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 12: Water Resources and Alternative 2 Impacts

LEGEND

Existing Conditions

- Lifts
- SUP Boundary
- Ski Trails
- Parking
- Nordic Trails
- Culvert
- Ditch
- Intermediate Stream Channel
- Perennial Stream Channel
- Fen Wetlands
- Wetlands
- Watershed Boundary

Proposed Conditions

- SUP Boundary Adjustment
- Alternative 2 Projects and Vegetation Management

Alternative 2 Wetland Impacts

- Palustrine Emergent (PEM)
- Palustrine Forested (PFO)

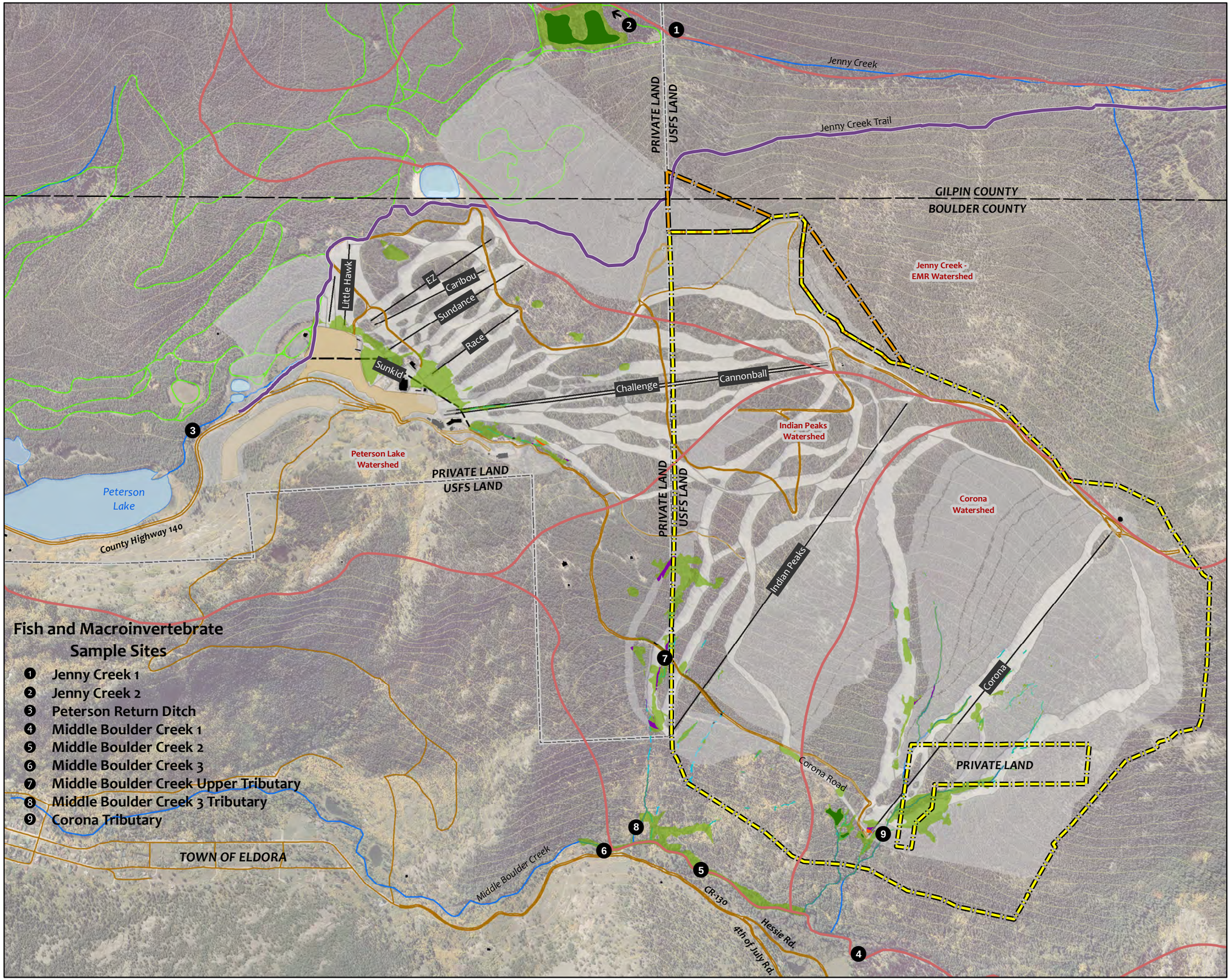
0 450 900 1,800 Feet

1 inch = 900 feet

N

Date: February 2014
Prepared By:

SE GROUP



Arapaho and Roosevelt National Forests and Pawnee National Grassland

Boulder Ranger District

Eldora Mountain Resort
Ski Area Projects
Environmental Impact Statement

Figure 13:
Water Resources
and
Alternative 3 Impacts

LEGEND

Existing Conditions
- Lifts
- SUP Boundary
- Ski Trails
- Parking
- Nordic Trails
- Culvert
- Ditch
- Intermediate Stream Channel
- Perennial Stream Channel
- Fen Wetlands
- Wetlands
- Watershed Boundary

Proposed Conditions
- SUP Boundary Adjustment
- Alternative 3 Projects and Vegetation Management

Alternative 3 Wetland Impacts
- Palustrine Emergent (PEM)
- Palustrine Forested (PFO)

0 450 900 1,800 Feet

1 inch = 900 feet

N

Date: February 2014
Prepared By:

SE GROUP

Chapter 7

Glossary

7. GLOSSARY

Ability level: The relative rank of a skier or snowboarder, or the relative rank given to alpine terrain. The six ability levels are as follows: beginner, novice, low intermediate, intermediate, advanced intermediate, and expert.

Acre foot: The amount of water necessary to cover 1 acre to a depth of 1 foot; equals 43,560 cubic feet or 325,851 gallons.

Action Alternative: Any alternative that includes upgrading and/or expansion of existing winter and summer recreational development within the area.

Affected environment: The physical, biological, social, and economic environment that would or may be changed by actions proposed and the relationship of people to that environment.

Airshed: A geographical area that, because of topography, meteorology, and climate, shares the same air. The Clean Air Act establishes three air quality classes (I, II, and III), each with defined air quality standards.

- **Class I airsheds** are areas designated for the most stringent degree for protection from future degradation of air quality.
- **Class II airsheds** are areas where a moderate amount of development could occur.
- **Class III airsheds** are areas where significant development could occur as long as National Ambient Air Quality Standards are not exceeded.

Alternative: One of several conceptual development plans described and evaluated in the EIS.

Annual Average Daily Traffic (AADT): Annual average two-way daily traffic volume represents the total traffic on a section of roadway for the year, divided by 365. It includes both weekday and weekend traffic volumes.

Army Corps of Engineers (USACE): The federal agency charged with enforcing the Clean Water Act by regulation of dredge and fill activities in waters of the United States, including wetlands.

Artifact: A simple object (such as a tool or ornament) showing early human workmanship or modifications.

Assessment area: The geographical area and/or physical, biological, and social environments which are analyzed for specific resources in the EIS.

Average Daily Traffic (ADT): Average daily two-way traffic volume represents the total traffic on a section of roadway for a given day or sampling period, but not necessarily for a given year. It is equivalent to VPD, defined below.

Background: A landscape viewing area visible to a viewer from approximately 3 to 5 miles to infinity. Also, in economics, naturally occurring; uninduced.

Baseline condition: The existing dynamic conditions prior to development, against which potential effects are judged.

Best Management Practices (BMPs): Methods, measures, and practices specifically adopted for local conditions that minimize or avoid impacts to resources. BMPs include, but are not limited to, construction practices, structural and nonstructural controls, operations protocol, and maintenance procedures.

Biodiversity: The variety of biotic communities, species, and genes and their interaction with ecological processes and functions, within ecosystems and across landscapes. The number of species present is the basic unit of measurement. More complex measurements also exist.

Biological Evaluation: An evaluation conducted to determine whether a proposed action is likely to affect any species which are listed as sensitive (USFS), candidate (USFS), or other special designations.

CO_2e: The carbon dioxide equivalent is a metric used to compare the emissions from various greenhouse gases based upon their global warming potential.

Candidate species: Those plant and animal species that, in the opinion of the U.S. Fish and Wildlife Service, may become threatened or endangered. Not protected under the Endangered Species Act.

Canopy: The more-or-less continuous cover of leaves, needles and/or branches collectively formed by the crowns of adjacent trees in a stand or forest.

CDPHE: Colorado Department of Public Health and Environment. The State of Colorado Department responsible for overseeing water quality regulation within Colorado.

Clean Water Act: An act that was enacted by the U.S. Congress in 1977 to maintain and restore the chemical, physical, and biological integrity of the waters of the United States. This act was formerly known as the Federal Water Pollution Control Act (33 U.S.C. 1344).

Comfortable Carrying Capacity (CCC): Comfortable Carrying Capacity is a planning tool used to determine the optimum level of utilization that facilitates a pleasant recreational experience. This is a planning figure only and does not represent a regulatory cap on visitation. CCC is used to ensure that different aspects of a resort's facilities are designed to work in harmony, that capacities are equivalent

across facilities, and sufficient to meet anticipated demand. CCC is based on factors such as vertical transport and trail capacities.

Consumptive use: Use of a resource that reduces the supply.

Cooperating Agency: A federal agency, other than a lead agency, which has jurisdiction by law or special expertise with respect to any environmental impact associated with the proposed action or one of the alternatives. A state or local agency or an Indian tribe may be a cooperating agency with agreement from the lead agency.

Corridor: A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries. Also, a contiguous strip of habitat suitable to facilitate animal dispersal or migration.

Council on Environmental Quality (CEQ): An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Cover: Vegetation used by wildlife for protection from predators and weather conditions, or in which to reproduce.

Cover density: Forest cover density is an index which theoretically ranges from zero to less than one. It references the capability of the stand or cover to integrate and utilize the energy input to transpire water. Cover density represents the efficiency of the three-dimensional canopy system to respond to the energy input. It varies according to crown closure, vertical foliage distribution, species, season, and stocking.

Critical habitat: A formal designation pursuant to the Endangered Species Act which may be applied to a particular habitat that is essential to the life cycle of a given species, and if lost, would adversely affect that species. Critical habitat can have a less formal meaning when used outside the context of the Endangered Species Act.

Cubic feet per second (cfs): Unit measure of streamflow or discharge, equivalent to 449 gallons per minute or about 2 acre feet per day.

Cultural resource: Cultural resources are the tangible and intangible aspects of cultural systems, living and dead, that are valued by a given culture or contain information about the culture. Cultural resources include, but are not limited to sites, structures, buildings, districts, and objects associated with or representative of people, cultures, and human activities and events.

Cumulative impact: The impact on the environment which results from the incremental impact of the action when added to other past, present and reasonable foreseeable future actions regardless of what

agency or person undertakes such other actions. Each increment from each project may not be noticeable but cumulative impacts may be noticeable when all increments are considered together.

Day skier: Visitors that arrive in the morning to ski and drive back home at the end of the day (as opposed to a "destination visitor").

Destination Visitor: A visitor that stays overnight within the resort community (as opposed to a "day skier").

Developed recreation site: An area with characteristics that enable to accommodate, or be used for intense recreation. Such sites are often enhanced to augment the recreational value. Improvements range from those designed to provide great comfort and convenience to the user to rudimentary improvements in isolated areas.

Developed terrain network: consists of its named, defined, lift-served, maintained (groomed) runs. These trails represent the baseline of the terrain at any resort, as they are where the majority of guests ski, and are usually the only place to ski during the early season, periods of poor or undesirable snow conditions and certain weather conditions.

Direct impact: An effect which occurs as a result of an action associated with implementing the proposal or one of the alternatives, including construction, operation, and maintenance.

Dispersed recreation: Recreation that occurs outside of a developed recreation site and includes such activities as scenic driving, hunting, backpacking, and recreation activities in primitive environments.

Distance zone: One of three categories used in the visual management system to divide a view into near and far components. The three categories are (1) foreground, (2) middleground, and (3) background. See individual entries.

District Ranger: The official responsible for administering the National Forest System lands on a Ranger District.

Diversity: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

Economic impacts: Employment and dollar flows are typically defined at three levels:

Direct: Employment created as a direct impact of a business. On and off-site construction jobs, resort-based jobs and non-resort jobs generated by visitor expenditures are included in this category. The majority of these jobs would be created within a small geographic area—typically in the immediate area of the resort.

Indirect: Employment created by industry-to-industry spending. For instance, increased food and beverage spending at EMR would result in the purchase of more supplies from food vendors. This revenue would allow the food vendors to create more employment. These are indirect jobs. These jobs would be created both locally and throughout the geographic area in which the resort regularly conducts business.

Induced: Employment created by increased household spending. The additional jobs and income created by direct spending would allow consumers to increase their spending on goods and services. This spending would allow a number of businesses to create more jobs. These are induced jobs. Induced jobs would be generated over a relatively broad geographic area.

Economic impacts specific to EMR are defined as follows:

Direct: Employment at EMR and employment at area businesses that benefit from expenditures by EMR visitors. This would include: EMR, restaurants, retail shops, hotels, etc. These jobs are primarily local.

Indirect: Employment at businesses that benefit from increased activity at EMR and businesses supported by EMR visitor expenditures. This would include food vendors, service businesses, etc. These jobs are generated regionally.

Induced: Employment created by increased household spending. The jobs and income created by EMR allows consumers to increase spending on goods and services within the economy. In turn, allowing a number of businesses to create more jobs. For example, a lift operator goes to a restaurant more now that he has a job and the restaurant hires a new employee—this is an induced job. Induced jobs are generated over a relatively broad geographic area.

Ecosystem: The system formed by the interaction of a group of organisms and their environment, for example, marsh, watershed, or lake.

Effects: Results expected to be achieved from implementation of the alternatives relative to physical, biological, economic, and social factors. Effects can be direct, indirect, or cumulative and may be either beneficial or detrimental.

Endangered species: An official designation for any species of plant or animal that is in danger of extinction throughout all or a significant portion of its range. An endangered species must be designated in the Federal Register by the appropriate Federal Agency Secretary.

Environmental analysis: An analysis of alternative actions and their predictable short- and long-term environmental effects, which include physical, biological, economic, social and environmental design factors and their interactions.

Environmental Assessment (EA): A concise public document required by the regulations implementing the National Environmental Policy Act which briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.

Environmental Impact Statement (EIS): A disclosure document required by the National Environmental Policy Act (NEPA) that documents the anticipated environmental effects of a proposed action that may significantly affect the quality of the human environment.

Environmental Protection Agency (EPA): The federal agency charged with lead enforcement of multiple environmental laws, including review of Environmental Impact Statements.

Erosion: The detachment and movement of soil from the land surface by wind, water, ice, or gravity.

Erosion control: Materials, structure, and techniques designed to reduce erosion. Erosion control may include rapid revegetation, avoiding steep or highly erosive sites, and installation of cross-slope drainage structures.

Erosion hazard: Soil ratings to predict the erosion hazard or potential to be eroded.

Fall-line: The fall-line is defined as the path an object would naturally take as it descends a slope under the influence of gravity. Fall-line paths indicate the natural flow of potential trails, from the top of ridges to the elevations below. Fall-line terrain allows skiers and snowboarders to make equally weighted, left and right turns.

Finding of No Significant Impact (FONSI): A document that is prepared if the agency finds, in an environmental assessment, that the proposed action will not significantly affect the human environment. It must set forth the reasons for such a decision.

Forage: All browse and non-woody plants used for grazing or harvested for feeding livestock or game animals.

Forb: Any non-grass-like plant having little or no woody material on it. A palatable, broadleaved, flowering herb whose stem, above ground, does not become woody and persistent.

Foreground: The landscape area visible to an observer from the immediate area to 0.5 mile.

Forest Service: The agency of the United States Department of Agriculture responsible for managing National Forests and Grasslands.

Forest Supervisor: The official responsible for administering the National Forest System lands in a Forest Service administrative unit who reports to the Regional Forester.

Forest Plan: A comprehensive management plan prepared under the National Forest Management Act of 1976 that provides standards and guidelines for management activities specific to each National Forest. The ARP Forest Plan was approved in 1997.

Full-Time Equivalent (FTEs): Sufficient work to keep one person employed full-time for one year. In seasonal industries one FTE may be represented by several employment positions.

GIS: Geographic information system, a computer mapping system composed of hardware and software.

Glades: Trees stands that are naturally thin, or have been thinned specifically in varying degrees to improve the skiing experience by increasing the spacing between individual trees. Stands with tree clearing to the extent that they can be groomed are described as "Groomable Glades."

GPS: Global Positioning System, a satellite-based surveying system

Gradient: The vertical distance divided by the horizontal distance, usually measured as percent. Gradient is used to describe streams and ski slopes.

Grading: the practice of moving or re-contouring earthen materials to achieve a specified slope in the landform.

Grooming: The preparation and smoothing of the developed trail network's snow surface, using large over-the-snow vehicles (commonly referred to as "snow cats" or "groomers"). Groomers are equipped with front-mounted blades to push snow and rear-mounted implements to flatten and/or till the snow to an the desired consistency.

Groundwater: Subsurface water in the part of the ground that is wholly saturated.

Guest services facilities or guest services: Facilities or services that are supplied by a resort—both on-mountain and at the base area—to accommodate guests' needs and to enhance the quality of the recreational experience. Examples of guest services facilities include: restaurants, warming huts, general information desks, resort lost and found departments, restrooms and lounges, ski school, daycare, public lockers and ski-check facilities, ski patrol, first aid clinics, etc.

Guideline: Is a preferred course of action designed by policy to achieve a goal, respond to variable site conditions, or respond to an overall condition.

Habitat: The sum of environmental conditions of a specific place that is occupied by an organism, a population, or a community.

Habitat type: A classification of the vegetation resource based on dominant growth forms. The forested areas are more specifically classified by the dominant tree species.

Hydric soils: Soils characterized by, or requiring an abundance of moisture, used in the identification of wetlands.

Impacts: See effects.

Indicator species: An animal species used to represent a group of species that utilize the same habitat. For monitoring purposes, the well-being of the indicator species is assumed to reflect the general health of the community.

Indirect impact: Secondary consequences to the environment resulting from a direct impact. An example of an indirect impact is the deposition of sediment in a wetland resulting from surface disturbance in the upland.

Instream flow: The volume of surface water in a stream system passing a given point at a given time.

Interdisciplinary Team (ID Team): A group of individuals each representing specialty resource areas assembled to solve a problem or perform a task through frequent interaction so that different disciplines can combine to provide new solutions.

K-factor: A measure of soil erodibility based on soil texture, organic matter, structure and runoff potential.

Lift line wait times: Time spent in lift lines throughout the course of the season.

Management direction: A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

Management emphasis: Long-term management direction for a specific area or type of land.

Management Indicator Species (MIS): A representative group of species that are dependant of a specific habitat type. The health of an indicator species is used to gauge function of the habitat on which it depends.

Management practice: A specific activity, measure, course of action, or treatment.

Master Plan: A document that is required as a condition of the ski area term special use permit, designed to guide resort planning and development in the long- and short-term—typically across both public and private lands.

Middleground: The landscape area visible to a viewer from 0.5 mile to about 3 to 5 miles.

Mitigation: Actions taken to avoid, minimize, or compensate for adverse environmental impacts.

Mountain roads: On-mountain primary and secondary roads that provide summertime access to mountain buildings and lift terminal locations.

National Ambient Air Quality Standards (NAAQS): Established under the Clean Air Act of 1963, there are primary standards, designed to protect public health, and secondary standards, designed to protect public welfare from known or anticipated air pollutants.

National Environmental Policy Act (NEPA): A law enacted by Congress in 1969 that requires federal agencies to analyze the environmental effects of all major federal activities that may have a significant impact on the quality of the human environment.

National Forest Management Act (NFMA): A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of regulations to guide that development.

National Forest System (NFS) lands: National Forests, National Grasslands, and other related lands for which the Forest Service is assigned administrative responsibility.

National Historic Preservation Act (NHPA): An act that was enacted by the U.S. Congress in 1966 to protect historic sites and artifacts (16 U.S.C. 470). Section 106 of the Act requires consultation with members and representatives of Indian tribes.

National Register of Historic Places: A listing maintained by the National Park Service of areas which have been designated as historically significant. The register includes places of local and state significance, as well as those of value to the nation in general.

No Action Alternative: The management direction, activities, outputs, and effects that are likely to exist in the future if the current trends and management would continue unchanged. Under NEPA, it means following the current approved Forest Plan management direction and guidance.

Objective: A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

Off-piste: refers to skiing terrain that is left in a natural Alpine snow condition, receives very infrequent grooming (if any) and presents natural, variable surface conditions and textures.

Particulates: Small particles suspended in the air and generally considered pollutants.

Peak day visitation: Days during which skier visitation exceeds the CCC by as much as 25 percent.

Piste: a term borrowed from French vernacular meaning skiing terrain that provides a traditional, groomed, prepared sliding surface.

Pod: a chairlift and all of the terrain that is serviced by that chairlift.

Preferred Alternative: The alternative selected from the range of alternatives which is favored by the lead agency.

Project area: The area encompassed by the development proposal including base area and the permit area.

Project Design Criteria (PDC): Specific measures designed to minimize or avoid impacts anticipated to occur as a result of implementation of the action alternatives. PDC are incorporated within the proposal of specified action alternatives.

Record of Decision (ROD): A document prepared within 30 days after the final EIS is issued which states the agency's decision and why one alternative was favored over another, what factors entered into the agency's decision, and whether all practicable means to avoid or minimize environmental harm have been adopted, and if not, why not.

Revegetation: The re-establishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance such as seedbed preparation, reseeding, and mulching.

Revegetation potential: The ability or capacity of a site to be revegetated after a disturbance, which often depends on the quantity and quality of topsoil remaining in place.

Rilling: Erosion by concentrated overland flow.

Riparian habitat or area: Land situated along the bank of a stream or other body of water and directly influenced by the presence of water (e.g., streamsides, lake shores, etc.).

Scenic integrity: State of naturalness or, conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation for the existing landscape character in a national forest.

Scenic Integrity Objectives (SIOs): The objectives that define the minimum level to which landscapes are to be managed from an aesthetics standpoint. There are five objectives that describe the landscape in varying degrees from naturalness: Very High (Unaltered), High (Appears Unaltered), Moderate (Slightly Altered), Low (Moderately Altered), Very Low (Heavily Altered).

Scenery management: The art and science of arranging, planning and designing landscape attributes relative to the appearance of places and expanses in outdoor settings.

Scoping process: A process that determines the issues, concerns, and opportunities which should be considered in analyzing the impacts of a proposal by receiving input from the public and affected agencies. The depths of analysis for these issues identified are determined during scoping.

Sediment: Solid material, both organic and mineral, that has been transported from its site of origin by air, water, or ice.

Sensitive species: Species which have appeared in the Federal Register as proposed additions to the endangered or threatened species list; those which are on an official State list or are recognized by the Regional Forester to need special management in order to prevent them from becoming endangered or threatened.

Short-term: In this analysis, short-term describes the period from construction up to five years after project completion.

Significant impact: A somewhat subjective judgment based on the context and intensity of the impact. Generally, a significant impact is one that exceeds a standard, guideline, law, or regulation.

Ski area operational boundary: Within the SUP boundary, the boundary which defines the current extent to which ski patrol conducts snow safety activities and maintains a presence. The ski area operational boundary includes developed (i.e., maintained) and undeveloped (i.e., hike-to and off-piste) terrain.

Skier: At ski areas, one may see people using Alpine, snowboard, telemark, cross-country, and other specialized ski equipment, such as that used by disabled or other skiers. Accordingly, the terms “ski, skier, and skiing” in this document encompass all lift-served sliding sports typically associated with a winter sports resort.

Skier circulation: How guests navigate throughout a ski area; specifically, how a guest would migrate from one side of the ski area to the other and potentially back again.

Skier visit: One skier utilizing the ski area for any length of time; a skier visit is typically recorded as a ticket scan. Regardless of how many times a single ticket is scanned, it counts a one skier visit.

Soil: A dynamic natural body on the surface of the earth in which plants grow, composed of mineral and organic materials and living forms.

Soil productivity: The capacity of a soil for producing plant biomass under a specific system of management. It is expressed in terms of volume or weight/unit area/year.

Special Use Permit (SUP): A legal document, similar to a lease, issued by the U.S. Forest Service. These permits are issued to private individuals or corporations to conduct commercial operations on National Forest System lands. They specify the terms and conditions under which the permitted activity may be conducted.

Special Use Permit area: That area of National Forest lands encompassed within the permit boundary held by Eldora Mountain Resort and designated for recreational use (e.g., downhill skiing). The Special Use Permit area excludes private land.

Special Use Permit boundary: The extent of the Special Use permit Area, within which Eldora Mountain Resort is permitted to provide operational facilities and guest services.

Stand: A community of trees or other vegetation, which is sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities and to thus, form a management entity.

Study area: The geographical area that was analyzed to predict the possible effect that may be associated with proposed alternatives. This area varies depending on the resource, but often coincides with the special use permit boundary.

Standard: a course of action which must be followed; adherence is mandatory.

Threatened species: Any species which is likely to become an endangered species within the foreseeable future and which has been designated in the Federal Register as a threatened species.

Trail density: The number of skiers per acre on any trail at one time.

Understory: Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory.

U.S. Fish and Wildlife Service (USFWS): The agency of the Department of the Interior responsible for managing wildlife, including non-ocean going species protected by the Endangered Species Act.

Vehicles per day (VPD): The total two-way daily traffic volume on a section of roadway.

Vehicle trips: The number of times vehicles use a segment of road.

Visual resource: The composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Water rights: The legal right to use water.

Watershed: The entire area that contributes water to a drainage system or stream.

WCPH: Watershed Conservation Practices Handbook. A Forest Service Region 2 manual suggesting design criteria and guidelines for watershed projects. Important terms from the WCPH:

Concentrated-Use Site: Areas designed and managed for high density of people or livestock, such as developed recreation sites and livestock watering areas.

Ephemeral Stream: A stream that flows only in direct response to precipitation in the immediate locality (watershed or catchment basin), and whose channel is at all times above the zone of saturation.

Hydrologic Function: The ability of a watershed to infiltrate precipitation and naturally regulate runoff so streams are in dynamic equilibrium with their channels and floodplains.

Intermittent Stream: A stream or reach of stream channel that flows, in its natural conditions, only during certain times of the year or in several years. It is characterized by interspersed, permanent surface water areas containing aquatic flora and fauna adapted to the relatively harsh environmental conditions found in these types of environments.

Gully: An erosion channel greater than 1 foot deep.

Permanent Stream: A stream or reach of a channel that flows continuously or nearly so throughout the year and whose upper surface is generally lower than the top of the zone of saturation in the areas adjacent to the stream.

Rill: An erosion channel less than 1 foot deep.

Swale: A landform feature lower in elevation than adjacent hillslopes, usually present in headwater areas of limited areal extent, generally without display of a defined watercourse or channel that may or may not flow water in response to snowmelt or rainfall. Swales exhibit little evidence of surface runoff and may be underlain by porous soils and bedrock that readily accepts infiltrating water.

WEPP: Water Erosion Prediction Project. A computer erosion model developed by the USDA Agricultural Research service (ARS) in cooperation with the Forest Service to model the physical processes involved in soil erosion mechanics, to produce erosion estimates.

Wilderness: Under the 1964 Wilderness Act, wilderness is undeveloped federal land retaining its primeval character and influence without permanent improvements of human habitation. It is protected and managed so to preserve its natural conditions.

Winter range: That part of the home range of a species where 90 percent of the individuals are located during the winter at least five out of ten winters.

WIZ (Water Influence Zone): The land next to water bodies where vegetation plays a major role in sustaining long-term integrity of aquatic systems. It includes the geomorphic floodplain (valley bottom), riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is 100 feet or the mean height of mature dominant late-seral vegetation, whichever is most.

WRENSS: The Environmental Protection Agency's Handbook *An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources* (WRENSS).

Chapter 8

Index

8. INDEX

B

Biological Assessment
Chapter 3 .....148, 151–153, 162, 196, 197, 261, 268

Biological Evaluation
Chapter 3 ..... 148, 151–153, 203, 228, 268
Chapter 7 2

C

CDPHE
Chapter 7 2

Clean Air Act
Chapter 7 .....1, 9

Clean Water Act
Chapter 1 .....16, 21
Chapter 2 .....45, 72
Chapter 3 .....198, 280, 284, 312
Chapter 7 .....1, 2

comfortable carrying capacity
Chapter 1 4
Chapter 2 ..... 48, 49, 52, 53
Chapter 3 .....3–5, 8, 9, 14, 15, 23, 52–56, 58, 59, 61
Chapter 7 .....2, 9

Connected Disturbed Area
Chapter 1 15
Chapter 2 .....28, 30, 33, 35, 70, 71
Chapter 3 .. 291–293, 302, 308–312, 324–326

consumptive use
Chapter 3 ..... 185, 196, 198, 282, 283

Council on Environmental Quality
Chapter 1 ..... 1, 18, 19
Chapter 2 1
Chapter 3 ..... 1, 97, 247
Chapter 4 2
Chapter 7 3

County Road 130
Chapter 1.....11, 12, 18
Chapter 2.....6, 17, 50–52, 55, 56, 55
Chapter 3.... 22, 35, 37–41, 44–46, 51, 53, 55, 57–61, 65, 71, 72, 75, 78, 84, 164

County Road 140
Chapter 1..... 11
Chapter 2..... 50
Chapter 3..... 37–39, 44–46, 51, 53, 55, 57, 71, 131, 164

Critical Habitat
Chapter 2..... 62
Chapter 3..... 153–157, 196–198

Critical Viewpoint
Chapter 2..... 54–56
Chapter 3.... 64, 65, 71, 72, 74, 76–78, 83–85

cultural resource
Chapter 1..... 12
Chapter 2..... 18, 56
Chapter 3.....91, 92, 95

D

density
Chapter 2..... 17, 26, 32, 37, 48, 49
Chapter 3.....4, 8–10, 18–20, 26, 27, 76, 83, 141, 162, 177, 183, 186, 189, 201, 209, 210, 226, 234, 262, 293, 298, 333
Chapter 7.....3, 12, 13

Design Day
Chapter 2..... 50, 51
Chapter 3..... 44, 46

E

egress
Chapter 2..... 41, 49
Chapter 3..... 8, 10

elk
Chapter 2 63
Chapter 3 ..... 70, 175, 180, 185–187, 189, 198, 216–218, 240–242, 255

Environmental Protection Agency
Chapter 3 ..... 38, 43, 44, 51, 247, 284, 294
Chapter 4 3
Chapter 7 .....6, 14

endangered species
Chapter 2 67
Chapter 3 ..... 150, 158, 167, 169, 183, 197
Chapter 7 .....5, 12

erosion
Chapter 1 .....15, 16
Chapter 2 .....20, 22–31, 33–38, 67, 69, 70, 77
Chapter 3 ..... 271, 292, 296, 298–303, 311–319, 325, 327, 329, 330, 332–336
Chapter 7 .....6, 13

F

Fen
Chapter 2 74
Chapter 3 .....259, 294, 295, 297

Forest Health
Chapter 1 .....6, 14
Chapter 2 .....20, 60
Chapter 3 .....133, 257, 278, 331

Forest Plan Amendment
Chapter 1 2
Chapter 2 ..... 3, 5, 11, 15
Chapter 3 ..... 22, 29, 72, 80, 86, 275, 277

Full-time-equivalent
Chapter 2 57
Chapter 3 ..... 96, 104, 107, 110, 114
Chapter 7 7

G

groundwater
Chapter 1 16
Chapter 2 71
Chapter 3.....196, 204, 212, 229, 237, 281, 286, 295, 296, 303, 305, 307, 313, 319, 320, 322, 327

H

Hessie Townsite
Chapter 1 13
Chapter 2 ..... 58, 59
Chapter 3.....119, 121, 122, 125, 126, 128–132,176, 187, 189, 220

Hessie/Fourth of July Road Trailhead
Chapter 1 ..... 12, 13
Chapter 2 ..... 44, 50, 52, 54, 55, 58, 59, 58, 59
Chapter 3 ..... 11, 15, 21, 22, 28–30, 32–36, 54, 59, 61, 62, 64, 71, 72, 76, 77, 83, 84, 89, 92–94, 119, 121, 122, 125, 126, 128–132, 290, 293, 302, 334

I

IMPLAN3
Chapter 1 13
Chapter 2 57
Chapter 3 ..... 96, 103, 106–108, 110, 112, 114

J

Jenny Creek
Chapter 2 ..... 17, 28, 34, 35, 43, 44, 50, 66, 69, 70–73
Chapter 3 .... 11, 15, 21, 28, 30–34, 36, 42, 72, 74, 79, 81, 85, 86, 146, 147, 150, 156, 170, 174, 176, 183–186, 193, 196, 198, 204, 212, 229, 237, 238, 244, 246, 247–254, 272, 276, 280–287, 291–295, 302, 304–306, 308, 311, 312, 320–323, 325, 326, 330, 331, 334

Jenny Creek Trail
Chapter 2 .....17, 43, 44, 50
Chapter 3 .... 11, 15, 21, 28, 31, 32, 34, 36, 72, 74, 79, 85, 86, 334

L

landslide
Chapter 2 77
Chapter 3 ... 298–300, 315, 318, 319, 329, 330

lift line wait times
Chapter 2 ..... 41, 55, 56
Chapter 3 ..... 6, 8, 73, 74, 77, 78, 81

Lynx Analysis Unit
Chapter 1 14
Chapter 2 66
Chapter 3 ..... 149, 151, 162–166, 201, 202, 226, 227

Lynx, Canada
Chapter 1 14
Chapter 2 .....19, 40, 61, 62, 65, 66, 149, 151–153, 157–166, 193, 195, 196, 199–203, 223–228, 246, 247

M

Management Area 8.22
Chapter 1 20
Chapter 2 ..... 3, 11, 15, 54
Chapter 3 ..... 3, 22, 29, 68, 70–73, 80, 86, 133, 147, 275, 277

Management Indicator Species
Chapter 1 14
Chapter 2 ..... 61, 63–65
Chapter 3 ..... 148, 167, 169, 180, 181, 183, 184, 190, 192, 194, 212, 237, 253
Chapter 7 8

Master Plan
Chapter 1 ..... 2, 3, 5, 8, 9, 18
Chapter 2 ..... 3, 8, 39, 40, 49
Chapter 3 .....5, 7, 8, 11, 20, 30, 33, 35, 57–59, 61, 87–89, 116, 117, 132, 133, 245, 258, 278, 331, 333
Chapter 8

Memorandum of Understanding
Chapter 3 190

Middle Boulder Creek
Chapter 1 .....10, 11, 15, 17, 18
Chapter 2 .....1, 6, 10, 11, 19, 24, 26, 32, 38–42, 45, 49, 51, 52, 55, 66, 70–74, 77, 78
Chapter 3.....10, 20, 22, 28, 35, 38, 42, 61, 75, 77, 79, 91, 121, 122, 125, 129, 148, 150, 154, 162, 170, 173, 174, 176–178, 183, 184, 186, 188, 189, 193, 194, 197, 199, 204, 205, 210, 212–214, 217, 219–222, 228, 237, 242, 253, 273, 274, 280–284, 288–300, 302, 305, 306, 308–310, 312, 314, 318, 321–324, 327, 330, 332, 334
Chapter 4.....4

mitigation
Chapter 1.....10
Chapter 2.....21
Chapter 3.....95, 123, 128, 215, 216, 219, 240, 243, 312, 319, 326, 330, 333–335

Mountain Pine Beetle
Chapter 1..... 6, 14
Chapter 2.....8, 9, 19, 60
Chapter 3.....133, 135, 136, 138–142, 144–146, 161, 163, 165, 166, 177, 179, 185, 194, 208–210, 232–235, 245, 247, 248, 251, 252, 268–270, 275, 277, 278, 303, 331

P

parking
Chapter 1.....3, 11, 12, 18
Chapter 2.....3, 7, 8, 17, 27, 33, 44, 52, 59, 70, 76
Chapter 3..... 7, 16, 23, 37, 38, 41, 42, 44, 46, 47, 52, 54, 56–64, 73, 74, 81, 92, 94, 122, 125, 126, 128–130, 172, 176, 205, 230, 257, 269, 284, 292, 293, 299, 302, 310, 311, 314, 317, 319, 325, 329, 330, 333, 336

project design criteria
Chapter 1..... 1, 10, 15, 18–20
Chapter 2.....1, 8, 15, 16, 19, 22–28, 30–37, 56, 62–64, 66, 67, 68, 72, 73
Chapter 3..... 21, 28, 72, 73, 75, 79, 81, 82, 94, 95, 190, 203–215, 219, 221, 228–239, 243, 244, 256, 258, 270, 272–277, 279, 291, 294, 300, 308–319, 324–327, 329–336
Chapter 7.....10

R

riparian habitat
Chapter 3 .....193, 194, 213, 237, 260, 269, 298, 303, 314, 327, 333, 335

S

Scenic Integrity Objective
Chapter 1 .....7, 12
Chapter 2 ..... 11, 54, 56
Chapter 3 .... 65–68, 70–74, 76, 77–80, 83–90
Chapter 7 10

Section 106
Chapter 3 91
Chapter 7 9

sediment
Chapter 1 15
Chapter 2 ..... 22–36, 38, 66, 70, 74, 75
Chapter 3 .....172, 204, 213, 228, 237, 289, 291, 292, 294, 296, 299, 301, 303, 308, 311, 312, 316, 318, 323, 325, 326, 332, 333, 335
Chapter 7 8

sensitive species
Chapter 2 61
Chapter 3 ..167, 184, 192, 194, 203, 213, 228, 238, 253, 267, 269, 272, 276

Skier circulation
Chapter 3 4
Chapter 7 11

skier visit
Chapter 1 17
Chapter 3 ..... 5, 12, 13, 15, 23, 52, 54, 100, 102, 109, 113
Chapter 7 .....9, 11

Snowmaking
Chapter 1 13
Chapter 2 .....2, 7, 13, 47, 58, 59
Chapter 3 .....120–124, 126, 128–130, 269, 285, 286, 304, 321, 325

Special Use Permit
Chapter 1 ..... 2, 7, 8, 10–12, 14, 15, 17, 20
Chapter 2.... 2–5, 8, 11, 12, 15, 16, 21, 39–41, 43, 45, 48, 50, 54, 56, 60
Chapter 3.....3, 10, 11, 15, 20, 22, 23, 29, 31, 37, 58, 64, 66, 67, 70–73, 75, 78, 79, 80, 82, 83, 85, 86–91, 95, 119, 131, 133, 134, 139, 146–148, 162, 174–179, 184–186, 188, 193, 197, 199, 208, 212, 217, 219–221, 229, 232, 236, 242, 247, 252, 253, 272, 278–280, 320, 331, 333, 335
Chapter 7..... 11, 12

State Highway 119
Chapter 1.....2
Chapter 2..... 50, 51
Chapter 3..... 38–41, 44–46, 51, 53, 55, 57, 58, 60, 61, 63

State Historic Preservation Office
Chapter 3.....91, 94, 95

stream health
Chapter 1..... 14–16
Chapter 2..... 22, 23, 27, 33, 35, 41, 66, 70–73
Chapter 3..... 287–291, 293, 294, 302, 308–311, 319, 323–326, 332–336

SUP Boundary Adjustment
Chapter 2.....45

T

terrain distribution
Chapter 1.....5
Chapter 3.....3, 16, 17, 24, 25

threatened species
Chapter 3... 154, 156, 183, 192, 197, 212, 237
Chapter 7..... 11, 12

Town of Eldora
Chapter 1..... 11, 13
Chapter 2..... 17, 18, 50, 51, 58, 59
Chapter 3..... 22, 35, 38, 39, 49, 54, 58, 59, 60–62, 71, 94, 116, 119, 121, 122, 125–132, 220, 221, 246, 249, 252–254

Trail Density
Chapter 3.....4

transportation
Chapter 2 .....17, 38
Chapter 3 ..... 22, 38, 52, 63, 98, 165, 198
Chapter 7 3

U

U.S. Army Corps of Engineers
Chapter 1 21
Chapter 3 280
Chapter 4 3
Chapter 7 1

U.S. Fish and Wildlife Service
Chapter 1 21
Chapter 2 19
Chapter 3 ..... 149, 150, 152–157, 163, 165, 167, 171, 190–192, 194, 196, 197, 198, 199, 224, 227, 257, 258, 260–262
Chapter 4 3
Chapter 7 .....2, 12

V

Vegetation Management Plan
Chapter 1 6
Chapter 2 ..... 3, 8, 19, 60, 67
Chapter 3 ..... 133, 134, 140, 141, 144, 146, 147, 199–201, 205–211, 213, 214, 217, 224–226, 229, 230, 232–235, 238, 241, 258, 269, 272–277, 279

W

Water Influence Zone
Chapter 1 15
Chapter 2 ....22, 23, 26, 27, 29, 30, 32, 33, 70, 71, 73
Chapter 3 ..... 213, 237, 290, 293, 302, 308–311, 323–325, 335
Chapter 7 14

water rights
Chapter 1 17
Chapter 2 78
Chapter 3 ..... 170, 196, 198, 282, 334

water yield
Chapter 1 17
Chapter 2 78
Chapter 3.....284, 286, 293, 303, 305, 321–323, 325, 329, 336

Watershed Conservation Practices
Chapter 1 16
Chapter 2 72
Chapter 3 280
Chapter 7 13

Watershed Conservation Practices Handbook
Chapter 1 16
Chapter 2 ..... 30, 33, 70, 72, 73
Chapter 3 ..... 280, 288–291, 293, 308–312, 319, 323–325, 326, 329, 335
Chapter 7 13

Wetland
Chapter 2 ..... 45, 75
Chapter 3.....264, 267, 294, 296–298, 327, 333, 334

winter range
Chapter 3.....175, 176, 186, 187, 189, 198, 216, 221, 240, 244, 255

wilderness
Chapter 3 ..... 32, 66
Chapter 7 14

Wind Closure
Chapter 1 4
Chapter 3 8

Appendices

APPENDIX A: CUMULATIVE EFFECTS PROJECTS

The following past, present, and reasonably foreseeable future projects have been identified by the Forest Service as relevant for analysis in Alternatives 1, 2, and 3 from a cumulative effects context. Basic information provided here for each project is complimented in corresponding analyses in Chapter 3. Not all resources will be affected by all of these projects. More detailed project descriptions follow Table A-1. Cumulative effects analyses presented in Chapter 3 resource sections are based on these descriptions and the best available information for each project. Projects are located on NFS lands, unless otherwise noted.

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
ELDORA MOUNTAIN RESORT PROJECTS						
2011 Master Plan	Within EMR SUP and on adjacent private lands within ski area operational boundary	EMR prepared a Master Plan, which was accepted by the Forest Service in February 2011. The projects in the Master Plan that are not part of this Proposed Action and/or Alternatives 3 would require their own site specific NEPA analysis prior to implementation but are considered reasonably foreseeable future actions.	Accepted: 2011	N/A	Boulder	Fish and Wildlife Watershed Wetlands Scenery Socio-econ Recreation Plants Traffic/Parking Noise

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
2012 Summer Operating Plan	EMR SUP	Replace snowmaking pipe on Around the Horn trail; widen Cascade trail by removing approximately 90 trees; clean up downed trees in gladed areas in Corona and Indian Peaks pods; glade maintenance between Salto Glades and the Corona trail along with the area between Muleshoe and Bryan Glades; road maintenance including grading, cleaning culverts, and maintaining ditches; corona grading project; and mountain pine beetle (MPB) mitigation, including spraying.	2012	20 acres/misc.	Boulder	Scenery Plants Fish and Wildlife Forest Health Recreation Watershed Soils
2011 Summer Operating Plan	EMR SUP	Replace snowmaking pipe on Around the Horn trail; brush, stump, and deadfall removal in Corona and Indian Peaks pods; glade maintenance between Muleshoe and Bryan Glades; clear 20’x20’ area at top/left of Labelle trail for ski racing start shack; construction of five winch cat pick points on the following trails: Powderhorn, Ambush, Muleshoe, Corona, and Cascade; road maintenance including grading, cleaning culverts, and maintaining ditches; and MPB mitigation, including tree removal and spraying.	2011	20 acres/misc.	Boulder	Plants Fish and Wildlife Forest Health Recreation Watershed Soils

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
2009 Summer Operating Plan[a]	EMR SUP	Normal snowmaking infrastructure and trail maintenance; clean up Corona Pod Glades; slope doze and grade section of Corona trail; and MPB mitigation on private land and infected areas adjacent to Hornblower, Around The Horn, Wayback, LaBelle, Windmill, Corona, and Muleshoe trails.	2009	20 acres/misc.	Boulder	Plants Fish and Wildlife Forest Health Recreation Watershed Soils
2008 Summer Operating Plan	EMR SUP	Normal snowmaking infrastructure and trail maintenance; clean up Corona Pod Glades; slope doze and grade section of Corona trail; and MPB mitigation on private land and infected areas adjacent to Hornblower, Ambush, and Around The Horn trails.	2008	20 acres/misc.	Boulder	Plants Fish and Wildlife Forest Health Recreation Watershed Soils
2007 Summer Operating Plan	EMR SUP	Normal snowmaking infrastructure and trail maintenance; tower snow gun installations on Lower Ambush, Lower Diamondback, and Hornblower; clean up Corona Pod Glades; and mitigation of MPB.	2007	20 acres/misc.	Boulder	Plants Forest Health Fish and Wildlife Recreation Noise
2006 Summer Operating Plan	EMR SUP	Normal snowmaking infrastructure and trail maintenance; clean up Corona Pod Glades; ongoing chairlift and electrical maintenance; painting Cannonball chairlift; and ongoing chairlift and electrical maintenance.	2006	5 acres/misc.	Boulder	Scenery Plants

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
2005 Summer Operating Plan	EMR SUP	Normal snowmaking infrastructure and trail maintenance; clean up Corona Pod Glades; ongoing chairlift and electrical maintenance; and ongoing chairlift and electrical maintenance.	2005	5 acres/misc.	Boulder	Plants
2004 Summer Operating Plan	EMR SUP	Normal snowmaking infrastructure and trail maintenance; touch up painting on various chairlifts; ongoing chairlift and electrical maintenance; private property improvements to water treatment facility; and ongoing chairlift and electrical maintenance.	2004	5 acres/misc.	Boulder	Scenery Plants Watershed
2003 Summer Operating Plan	EMR SUP	Normal snowmaking infrastructure and trail maintenance; touch up painting on various chairlifts; ongoing chairlift and electrical maintenance; retro-fitting of water treatment facility to single point filtration; and ongoing chairlift and electrical maintenance.	2003	5 acres/misc.	Boulder	Scenery Plants Watershed
2002 Summer Operating Plan	EMR SUP	Replace snowmaking lines on Jolly Jug and Windmill, Sunset, International, Corkscrew, and Chute; reposition pipe on Westridge; trail maintenance and deadfall removal in Salto and Bryan Glades and Jolly Jug Road; touch up painting on various chairlifts; ongoing chairlift and electrical maintenance; and initiate discussion about backcountry gate/Lost Lake area.	2002	20 acres/misc.	Boulder	Scenery Plants Forest Health Fish and Wildlife Recreation Watershed

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
2001 Summer Operating Plan	EMR SUP	Transport snowmaking pipe to Westridge construction area prior to snow melting; install tower guns on Little Hawk Mountain, Challenge Mountain, and Corona Bowl pods; ongoing snowmaking infrastructure and trail maintenance; minor tree cutting on Jolly Jug Road; touch up painting on various chairlifts; ongoing chairlift and electrical maintenance; ongoing maintenance of mountain roads; redefinition of water bars on certain trails; reseeding of disturbed areas; and construction of new skier services building.	2001	25 acres/misc.	Boulder	Scenery Plants Fish and Wildlife Recreation Watershed Soils Noise
2000 Summer Operating Plan	EMR SUP	Snowmaking projects on Westridge, Corona Tower 7 Cut, and Muleshoe; tower gun installations on all three pods; ongoing snowmaking infrastructure and trail maintenance; glading of Salto Glades and Bryan Glades; minor tree cutting on Jolly Jug Road; touch up painting on various chairlifts; reseeding disturbed areas; and construction of a new skier services building.	2000	25 acres/misc.	Boulder	Scenery Plants Fish and Wildlife Recreation Watershed Soils Noise

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
Winter Operating Plans	EMR SUP	2000–2013: No construction projects on NFS land planned. Normal operations of the ski area continue.	2000–2012	SUP area	Boulder	Recreation Scenery Fish and Wildlife Watershed Soils Noise Socio-econ Traffic/Parking Air Quality
Direct Control Efforts for Mountain Pine Beetle at Eldora Mountain Resort	EMR SUP	Felling MPB infested trees and spraying unaffected trees with carbaryl.	2007	SUP area	Boulder	Watershed Soils Forest Health Fish and Wildlife Plants
Past Ski Area Projects	EMR SUP	Ski area infrastructure and terrain projects.	1961–present	SUP area	Boulder	Recreation Scenery Fish and Wildlife Watershed Soils Noise Socio-econ Traffic/Parking Air Quality

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
Corona Trail Grading EA	EMR SUP	Grading of the Corona Trail at EMR.	2011/not yet implemented	0.77 acre on NFS land	Boulder	Watershed Plants Soils Recreation Fish and Wildlife Noise
RESIDENTIAL/COMMERCIAL DEVELOPMENT PROJECTS						
Continued Nederland and Eldora Residential Build-out	< 10 miles	Potential future development in adjacent towns.	N/A	N/A	Boulder	Socio-Econ Traffic/Parking Air Quality Fish and Wildlife Watershed Plants Noise
LAND STATUS PROJECTS						
Forest Legacy Conservation Easement	Adjacent to EMR SUP	Application of a conservation easement to private property adjacent to EMR.	Projected 2014	3,600 acres	Boulder	Recreation Forest Health Fish and Wildlife Plants Watershed/ Wetlands/Soils
Peper Private Property Access	East of Lost Lake, Eldora	Private property owner proposal to build an access road to property surrounded by NFS lands.	2007	5,170 feet	Boulder	Watershed/Soils Fish and Wildlife Plants

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
FOREST HEALTH AND FUELS PROJECTS						
Lump Gulch Fuels Treatment Project	Nederland	Vegetation management projects to reduce fuel load.	2009	1,642 acres	Boulder	Recreation Forest Health/Fuels Fish and Wildlife Plants Air Quality Soils Watershed
Forsythe Fuels Reduction Project	Nederland	Vegetation management projects to reduce fuel load.	2012	5,214 acres	Boulder	Recreation Forest Health/Fuels Plants Fish and Wildlife Air Quality Watershed/ Wetlands/Soils
Nederland Water Treatment Plant Fuels Reduction Project	Nederland	Vegetation management project to reduce fuel loads.	2012	5 acres	Boulder	Recreation Forest Health/Fuels Plants Fish and Wildlife Air Quality Watershed/ Wetlands/Soils

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
WATER PROJECTS						
Moffat Collection System EIS	10.5 miles	The Moffat Collection System Project proposes to enlarge Gross Dam's height from its current 340 feet to approximately 465 feet to increase the reservoir's capacity.	Unknown	N/A	N/A	Watershed/ Wetlands Fish and Wildlife Plants Forest Health/Fuels
Jenny Creek Restoration and Reroute of Motorized Trail	2 miles	Reroute 0.75 mile of four-wheeled drive road out of Jenny Creek creek bed and revegetate old route.	2013	0.75 mile	Boulder	Recreation Watershed/ Wetlands/Soils Fish and Wildlife Plants Forest Health/Fuels
NON-SKI-BASED RECREATION						
Recreational Use Outside of the Ski Area	< 10 miles	Fourth of July Road trailhead, West Magnolia (West Magnolia is west of Hwy 119 and south of Nederland, is popular for OHV and mtn. biking)	N/A	N/A	Boulder	Recreation Fish and Wildlife Plants Wetlands/Soils Traffic/Parking
HISTORIC DEVELOPMENT						
Mining Activities	< 10 miles	The area surrounding Eldora and Nederland has been mined since the mid-19th century.	N/A	N/A	Boulder	Watershed/Soils Fish and Wildlife Plants Socio-econ

Table A-1:
Cumulative Effects Matrix

Project (Project Status)	Project Location (Straight Line Distance to EMR SUP)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	Lynx Analysis Unit where the Project is Located	Resources Potentially Affected
OTHER						
Communications Tower	Within EMR SUP	Boulder County proposes to construct a 60-foot tall communications tower near the Lookout at EMR.	March 2014	312 sq. ft. building footprint	Boulder	Scenery
Public and Private Road Infrastructure	N/A	Roads, including Forest, State, County, and private (e.g., Eldora Road, Lake Eldora Ski Road, Fourth of July Road, Sections of Colorado Hwy 72 and 119, and others)	N/A	N/A	Boulder	Recreation Watershed/Soils Fish and Wildlife Plants

[a] A Summer Operating Plan for 2010 was not approved by ARP

A. ELDORA MOUNTAIN RESORT PROJECTS

MASTER PLAN

EMR prepared a Master Plan, which was accepted by the Forest Service in February, 2011. The projects in the Master Plan, listed below, that are not part of the Proposed Action and/or Alternative 3 are considered reasonably foreseeable future actions. The Master Plan includes (previously-approved projects are presented under a subsequent heading):

Chairlift Additions

- Construction of a new dual-purpose, out-of-base, fixed-grip quad chairlift to access novice terrain on lower *Four O'Clock* trail, as well as to provide access to the Indian Peaks/Corona Bowl areas during wind events when access to the summit, is not an option (private lands)
- Construction of the new Moose Glade detachable chairlift and advanced trail pod on the northwestern portion of the SUP boundary. Requires SUP boundary adjustment

Terrain Improvements

- Approximately 7 acres of trail grading within the Little Hawk and EZ pods (private lands)
- Additional advanced terrain in the Moose Glade chairlift/terrain pod

Guest Services

- Expand and renovate the Indian Peaks Lodge (private lands)

Snowmaking

- Construction of an additional snowmaking reservoir (private lands)
- Provide snowmaking coverage on all new trails

Operations

- Construction of a new ski patrol duty station at the summit of Challenge Mountain

OPERATING PLANS

EMR has produced operating plans annually since 2000. These operating plans are approved by the Forest Service and contain projects such as chairlift, trail, and other infrastructural maintenance.

DIRECT CONTROL EFFORTS FOR MOUNTAIN PINE BEETLE CE

In 2007 the ARP approved a proposal by EMR to initiate direct control methods against Mountain Pine Beetle (MPB) at the resort. The proposal included felling infested trees, spraying unaffected trees with Carbaryl, and identifying areas for future treatment within the SUP.

PAST SKI AREA PROJECTS

EMR first opened for skiing in 1961 with two T-bar chairlifts to serve visitors. A base lodge was constructed for the 1963/64 season on private lands at the base of the mountain. In the 1973 the owners invested in significant upgrades to infrastructure, replacing one T-bar with the Cannonball chairlift up the front-side of the area, and constructing the Corona double up the back-side. The Sundance chairlift was added in 1975 and the Caribou chairlift in 1980. During the 1980s, development at EMR was relatively stagnant. In the 1990s a number of projects were executed: the Challenge chairlift was installed on the front-side of the area; the Corona Bowl was reopened with 85 acres of new terrain; the Indian Peaks chairlift was installed on the back-side of the area; and an additional parking lot was constructed. Since the 1990s, the Corona chairlift was replaced, another beginner chairlift was installed, the Indian Peaks lodge was constructed, and a snowmaking reservoir was built.

PREVIOUSLY-APPROVED, NOT YET IMPLEMENTED PROJECTS

Corona Trail Grading Environmental Assessment

As part of the 2011 DN/FONSI, the Forest Service approved the reconstruction of a portion of the Corona Trail. The trail will be re-graded to widen the skiable terrain along a steep segment of the trail where there is currently a dangerous “pinch-point.” The skiable width at this point will be increased by 72 feet, for a total skiable width of 90 feet. Ground disturbance for this project is 0.77 acre and 0.46 acre on NFS lands and private lands, respectively, for a total of approximately 1.23 acres. It will involve the relocation of approximately 2,850 cubic yards of earth material from the western side of the trail to the gully on the eastern side of the trail, filling in a portion of the existing gully to create a more consistent grade across the entire trial width. The project includes limited overstory removal of mixed-conifer vegetation along the skier’s left (western) trail edge, ranging from 0 to 40 feet in width; approximately 0.30 acre on NFS lands and 0.03 acre on private lands.

B. RESORT AND RESIDENTIAL/COMMERICAL DEVELOPMENT PROJECTS

CONTINUED NEDERLAND, ELDORA, AND HESSIE TOWNSITE BUILDOUT

It is reasonably foreseeable that the towns of Nederland, Eldora and the Hessie Townsite could experience future growth and development. These areas could see both increased residential and commercial development in the future.

C. LAND STATUS PROJECTS

FOREST LEGACY CONSERVATION EASEMENT

The Conservation Fund has entered into negotiations with property owners of private land adjacent to EMR (the Toll family) to apply a conservation easement to a land parcel adjacent to the resort. The

conservation easement would include approximately 3,600 acres of property currently owned by the Toll family. The easement would allow for the continuation of current EMR operations on this property (e.g., Nordic Center trails). The easement would also allow for future expansion of the Jolly Jug chairlift by EMR, should EMR obtain all necessary governmental approvals and landowner agreements for the expansion. The easement would also include a Forest Stewardship Plan to provide for the long-term management of natural resources on the property.

PEPER PRIVATE PROPERTY ACCESS

In 2001, the Forest Service was approached by a landowner seeking access to two privately owned mining claims located east of Lost Lake. In a 2007 decision, Mr. Kenneth E. Peper was granted access to the property via Forest and Private Road Easements. The Forest Road Easement begins at the intersection of Boulder County Roads 130 and 111 and ends at the North Fork of Middle Boulder Creek. The Private Road Easement begins at the North Fork of Middle Boulder Creek, ending at the property boundary of the private property owned by Mr. Peper. This access includes a bridge across the South Fork of Middle Boulder Creek and a low-water crossing of the North Fork of Middle Boulder Creek. The Forest Road Easement is approximately 2,640 feet long and the Private Road Easement is approximately 2,530 feet long. The easement corridor for the Forest Road Easement and the Private Road Easement is 20 feet wide and suitable for medium clearance four-wheeled drive vehicles. The driving surface is 12 feet wide, up to 16 feet where necessary for curves. On the Private Road Easement, approximately 550 feet is along Forest Service trail 902, a non-motorized trail. Then approximately 1,310 feet is along Forest Service trail 902.2, a non-motorized trail. Finally, approximately 680 feet of new construction is required to reach the property.

D. FOREST HEALTH AND FUELS PROJECTS

LUMP GULCH FUELS TREATMENT PROJECT

The Lump Gulch Fuels Treatment Project is intended to reduce the fuel load through mechanical treatments (thinning, patchcuts, clearcuts), manual thinning with chainsaws, chipping, lopping and scattering, and pile burning of slash fuel reduction treatments. The Decision Notice was signed in 2009. The Lump Gulch project includes treatments across an 11,787-acre project area in the vicinity of Rollinsville and Nederland. Treatments are applied on approximately 1,642 acres of NFS lands. Project implementation has occurred on the Lump Gulch project near Nederland and will soon occur on the Lumpy-Tung project southeast of Nederland and in the Lump Gulch area. Projects to be implemented after 2014 include Thorn near Rollinsville and fuel breaks adjacent to private property and roads.

FORSYTHE FUELS REDUCTION PROJECT

The Forsythe Fuels Reduction Project is intended to reduce the fuel load through mechanical treatments with logging equipment and manual treatments with chainsaws (thinning, patchcuts, sanitation/salvage),

chipping, lopping and scattering, and pile burning of slash. Prescribed broadcast burning is also authorized on the south slope of Winiger Ridge near Gross Reservoir. The Decision Notice was signed in 2012. The Forsythe project includes treatments across an 18,120-acre project area in the vicinity of Gross Reservoir, Wondervu, Pinecliffe, and Nederland. Project implementation has occurred on the South Winiger project near Gross Reservoir and will soon occur on the Lazy Z project also near Gross Reservoir. Projects to be implemented in 2014 or later include Scouts near the Front Range Trailhead, Boiler and North Pinecliffe near Pinecliffe, and sanitation/salvage activities throughout authorized portions of the project area.

NEDERLAND WATER PLANT FUELS REDUCTION PROJECT

The Nederland Water Plant Fuels Reduction Project authorized the City of Nederland to complete fuel reduction activities within the project area and is intended to reduce the fuel load through thinning and sanitation/salvage treatment by mechanical or manual means. The Decision Memo was signed in 2012. The Nederland Water Plant Fuels Reduction Project includes treatments across a 5-acre treatment area in the vicinity of Nederland near the Nederland Water Treatment Plant and the Nederland High School. Project implementation will occur in the within the next two to three years.

E. WATER PROJECTS

MOFFAT COLLECTION SYSTEM EIS

The Moffat Collection System Project will provide 18,000 acre feet of annual supply by enlarging Gross Reservoir, an existing reservoir. The current dam height will increase by approximately 130 feet, nearly tripling the reservoir's capacity. The project will increase the reservoir's current storage capacity of 41,811 acre feet to approximately 119,000 acre feet, which includes a 5,000-acre foot environmental pool. The environmental pool will be used to enhance streamflows in South Boulder Creek below Gross Reservoir. Water supplied to the Moffat Collection System is proposed to be diverted from either Colorado West Slope tributaries of the Colorado River or from the South Platte River in the Colorado Front Range. These diversions could affect the watershed and aquatic species in the study area.

JENNY CREEK RESTORATION AND REROUTE OF MOTORIZED TRAIL

A 2013 decision approved a proposal to reroute approximately three-quarter of a mile of a four-wheeled drive motorized trail out of the Jenny Creek streambed and restore the current/old route to a natural condition. The location of this project is approximately 1 mile southeast of Yankee Doodle Lake.

F. NON-SKI-BASED RECREATION

RECREATIONAL USE OUTSIDE OF THE SKI AREA

Within the Boulder Ranger District of the ARP there are numerous areas that experience heavy recreational use. Nearest to EMR are the Hessie and Fourth of July Road trailheads. These trailheads

provide access to the Indian Peaks Wilderness. Most recreation in this area is dispersed, and no mountain biking is allowed in the Wilderness.

West Magnolia is a popular recreation area south of Nederland. There are numerous trails here open to off-highway vehicles and mountain bikes.

G. HISTORIC DEVELOPMENT ACTIVITIES

MINING ACTIVITIES

The first development of Eldora area occurred in the mid-19th century when mining activities began. The Caribou silver mine was a productive mine located near Nederland. The area then transitioned to tungsten mining found to the northeast of Nederland early in the 20th century. This historic activity has affected soils and watershed in the vicinity of EMR.

H. OTHER

COMMUNICATIONS TOWER

In 2013, the Boulder County Sheriff's Office issued a proposal to construct a 60-foot tall communications tower on Forest Service lands near the Lookout Restaurant at the EMR. There would also be a one-story 12 foot by 26 foot communication building for electronics, a backup generator and a 500-gallon propane tank. In addition, a 400-foot long buried utility line would be installed from an existing electrical transformer to the tower site. Approval and implementation is expected in March 2014.

PUBLIC AND PRIVATE ROAD INFRASTRUCTURE

The development of road infrastructure in the area surrounding EMR has effects on soil and watershed resources, plants, and wildlife. Connected roads increase the intensity of surface runoff and constitute a source of sediment input into the stream system. Road infrastructure can facilitate the spread of noxious weeds and can impact wildlife habitat. The total length of existing roads within the spatial extent of the cumulative effects analysis is approximately 40 miles, with a corresponding road density of 0.9 mile per square mile.

APPENDIX B: PROPOSED FOREST PLAN AMENDMENTS

A. FOREST SERVICE DIRECTION FOR AMENDING FOREST PLANS

Forest Service requirements for amending forest plans are included in agency regulations and policies. These require that proposed activities be consistent with forest plans and that proposed activities which may be in conflict with the Forest Plan either be denied, modified (so as to be consistent), or that the Forest Plan be amended. The Forest Service is authorized to implement amendments to forest plans in response to changing needs and opportunities, information identified during project analysis, or the results of monitoring and evaluation. The process to consider Forest Plan amendments, review them for significance, document results, and reach a decision is contained in 36 CFR 219.13 and Forest Service Manual (FSM) 1926.5.

If the responsible official determines that a Forest Plan amendment is appropriate and necessary, regulations at 36 CFR 219.13(a) directs the Forest Service to consider whether a proposed amendment to a forest plan would be considered a significant change.

The Forest Service is authorized to implement amendments to forest plans in response to changing needs and opportunities, information identified during project analysis, or the results of monitoring and evaluation. The process to consider Forest Plan amendments, review them for significance, document results, and reach a decision is contained in FSM 1926. An assessment of a proposed amendment's significance in the context of the larger Forest Plan is a crucial part to the process. It is important to note that the definition of significance for amending a forest plan (36 CFR 219.13(a) and FSM 1926.5) is not the same significance as defined by NEPA. Under NEPA, significance is determined by whether a proposal is considered to be a "major federal action significantly affecting the quality of the human environment," or whether the relative severity of the environmental impacts would be significant based on their context and intensity.[1]

In contrast, the National Forest Management Act (NFMA) requires that proposed Forest Plan amendments be evaluated for whether they would constitute a significant change in the long-term goods, outputs, and services projected for an entire National Forest. Amendments that are not significant may be adopted following disclosure and notification in an environmental document, such as an EA, EIS, or a supplement to one of these documents.

The criteria to analyze the significance of a Forest Plan amendment are summarized below.[2] Each of the four criteria for determining significance of the proposed amendment is responded to directly later.

[1] 40 CFR 1502.3; 40 CFR 1508.27
[2] USDA Forest Service, 1994 (FSH 1909.12)

1. Timing. When the change in the Forest Plan would take place relative to the planning period and scheduled revisions of the plan.

2. Location and size. Location and size of the area affected compared to the size for the overall planning area.

3. Goals, Objectives, and Outputs. How, or to what degree, the amendment would affect the long-term relationship between levels of goods and services projected by the Forest Plan.

4. Management Prescription. Whether the change would apply only to a specific situation, or to future situations across the planning area.

B. PROPOSED AMENDMENT TO THE ARP LAND AND RESOURCE MANAGEMENT PLAN

In February 2011, the ARP accepted the EMR 2011 Master Plan. The 2011 Master Plan identified upgrade projects located outside of the existing SUP area boundary including the Jolly Jug chairlift, Placer chairlift, Moose Glade chairlift and associated trails. The Upgrade Plan contained in the 2011 Master Plan anticipated a need for a SUP boundary adjustment in order to complete the three planned projects. The 2011 Master Plan was accepted by the ARP with the following expectation:

> *It is anticipated that a future site-specific NEPA process would analyze the planned SUP boundary adjustment and potentially the reallocation of management areas to Management Area 8.22 within the planned SUP Boundary.*[3]

A Forest Plan amendment is proposed for Alternatives 2 and 3 to assign and change the Forest Plan management area allocations within the existing SUP boundary and for areas of the proposed SUP boundary adjustments (the SUP boundary adjustments are depicted in Figure 11). Currently there are several NFS lands within the existing SUP boundary that have not been officially designated with a management area. In addition, the SUP boundary adjustment areas associated with the proposed projects are allocated as Management Area 1.3 – Backcountry Recreation, Management Area 4.3 – Dispersed Recreation, Management Area 7.1 – Residential-National Forest Intermix, and a portion of the area has not been officially designated with a management area. Refer to Section C of this appendix for relevant Forest Plan management area descriptions.

Through this Forest Plan amendment process, Forest Plan standards and guidelines, the Scenic Integrity Objective (SIO), and the Recreation Opportunity Spectrum (ROS) would be amended to more accurately

[3] Eldora Mountain Resort, 2011

correspond with Management Area 8.22 – Ski-Based Resorts (refer to Figure 11 for the management area boundaries and SIO designations).[4]

ALTERNATIVE 1 – NO ACTION

No changes or modifications would be approved that would affect the SUP boundary, SIOs or the ROS within the SUP area.

ALTERNATIVE 2 – PROPOSED ACTION

Table B-1 summarizes the management area amendment and the proposed ROS, SIO and acres. Refer to Section D in this appendix for a description of ROS classifications.

Table B-1:
Forest Plan Amendment Summary – Alternative 2

Location	Management Area	ROS	SIO	Acres
Within Existing SUP Boundary	Existing: Not Officially Designated	None	None	11
	Proposed: 8.22 – Ski-Based Resorts	Rural	Low	
Placer Express Chairlift and Terrain Area	Existing: Not Officially Designated	None	None	21
	Proposed: 8.22 – Ski-Based Resorts	Rural	Low	
Placer Express Chairlift and Terrain Area	Existing: 7.1 – Residential-National Forest Intermix	Rural	Moderate	10
	Proposed: 8.22 – Ski-Based Resorts	Rural	Low	
Jolly Jug Chairlift and Terrain Area	Existing: 1.3 – Backcountry Recreation	Semiprimitive Non-Motorized	High	11
	Proposed: 8.22 – Ski-Based Resorts	Rural	Low	

The Proposed Action would amend the Forest Plan to assign and change management areas near Middle Boulder Creek and change the management area near the proposed Jolly Jug project area. These Forest Plan changes would allocate the NFS lands within the existing SUP boundary and the proposed SUP boundary as Management Area 8.22 – Ski-Based Resorts. The proposed SUP boundary adjustment is associated with Management Area 7.1 – Residential-National Forest Intermix and Management Area 1.3 – Backcountry Recreation, as well as a portion of NFS lands that currently do not have an official management area allocation (refer to Figure 11). *Note: the Forest Plan was not formally amended subsequent to the acquisition of the lands near Middle Boulder Creek (within and beyond the current SUP boundary) by the ARP, so the lands do not include an official management area allocation.*

[4] Note: Through this DEIS analysis process, the Forest Service identified mapping errors in two areas of the southern part of the SUP area: 1) near the existing Jolly Jug Glades, and 2) just south of the existing Lookout facility. The 1997 Forest Plan, as amended, erroneously designated these two areas within the existing SUP boundary as Management Area 1.3 – Backcountry Recreation; therefore, this correction has been made to the mapping for this EIS process. The record for the mapping changes can be found in the project file for the Forest Plan.

- Within the existing SUP boundary, the Forest Plan amendment would assign 11 acres of lands that are not officially designated in the Forest Plan as Management Area 8.22 – Ski-Based Resorts.
- In the Middle Boulder Creek area associated with the proposed Placer chairlift and terrain, the Forest Plan amendment would assign 21 acres of lands that are not officially designated in the Forest Plan as Management Area 8.22 – Ski-Based Resorts.
- In the Middle Boulder Creek area associated with the proposed Placer chairlift and terrain, the Forest Plan amendment would change 10 acres of Management Area 7.1 – Residential-National Forest Intermix to Management Area 8.22 – Ski-Based Resorts.
- In the Jolly Jug area, the Forest Plan amendment would change 11 acres of Management Area 1.3 – Backcountry Recreation to Management Area 8.22 – Ski-Based Resorts.

  Note: There are currently approximately 44 acres of Management Area 8.22 that is located beyond the current SUP boundary and is within the proposed SUP boundary adjustment.

The aforementioned 42 acres (31 + 11 acres) beyond the current SUP boundary would be amended to Management Area 8.22 – Ski-Based Resorts, incorporated into the SUP area, and would also be assigned the SIO of *Low*. Additionally, the 44 acres that is currently Management Area 8.22 – Ski-Based Resorts would also be included in the proposed SUP boundary for a total SUP boundary change of 86 acres (42 + 44 acres).

ALTERNATIVE 3

Table B-2 summarizes the management area amendment and the proposed ROS, SIO and acres.

Table B-2:
Forest Plan Amendment Summary – Alternative 3

Location	Management Area	ROS	SIO	Acres
Within Existing SUP Boundary	Existing: Not Officially Designated	None	None	11
	Proposed: 8.22 – Ski-Based Resorts	Rural	Low	
Jolly Jug Chairlift and Terrain Area	Existing: 1.3 – Backcountry Recreation	Semiprimitive Non-Motorized	High	10
	Proposed: 8.22 – Ski-Based Resorts	Rural	Low	
Jolly Jug Chairlift and Terrain Area	Existing: 4.3 – Dispersed Recreation	Roaded Natural	Moderate	0.5
	Proposed: 8.22 – Ski-Based Resorts	Rural	Low	

Alternative 3 would amend the Forest Plan to assign a management area within the existing SUP area on the northern side of the SUP boundary and change the management area near the proposed Jolly Jug project. These Forest Plan changes would allocate the NFS lands within the existing SUP boundary and the proposed SUP boundary as Management Area 8.22 – Ski-Based Resorts. The proposed SUP boundary adjustment is associated with Management Area 1.3 – Backcountry Recreation, Management Area 4.3 –

Dispersed Recreation, as well as a portion of NFS lands that currently do not have an official management area allocation (refer to Figure 11). *Note: the Forest Plan was not formally amended subsequent to the acquisition of the lands near Middle Boulder Creek (within the current SUP boundary) by the ARP, so the lands do not include an official management area allocation.*

- Within the existing SUP boundary, the Forest Plan amendment would assign 11 acres of lands that are not officially designated in the Forest Plan as Management Area 8.22 – Ski-Based Resorts.
- In the Jolly Jug project area, the Forest Plan amendment would change 10 acres of Management Area 1.3 – Backcountry Recreation to Management Area 8.22 – Ski-Based Resorts.
- In the Jolly Jug project area, the Forest Plan amendment would change approximately 0.5 acre of Management Area 4.3 – Dispersed Recreation to Management Area 8.22 – Ski-Based Resorts.

  Note: There are currently approximately 7 acres of Management Area 8.22 – Ski-Based Resorts that is located beyond the current SUP boundary and is within the proposed SUP boundary adjustment.

The aforementioned approximately 11 acres (10 + 0.5 acres) beyond the current SUP boundary would be amended to Management Area 8.22 – Ski-Based Resorts, incorporated into the SUP area, and would also be assigned the SIO of *Low*. Additionally, the 7 acres that is currently Management Area 8.22 – Ski-Based Resorts would also be included the proposed SUP boundary for a total SUP boundary change of 18 acres (11 + 7 acres).

RATIONALE

The 1997 Forest Plan states:

> *The amendment process changes a discrete component of management direction in a forest plan. Unless circumstances warrant a revision, the amendment process should generally be initiated whenever the Forest Supervisor determines through monitoring and evaluation that achievement of a forest-wide objective is unduly constrained by conflicting Forest Plan direction or that adequate progress toward achieving the desired future condition is not being made.*
>
> *Other needs for amendments may arise-from agency-initiated projects or external proposals. An environmental assessment or environmental impact statement prepared for the project or proposal evaluates the consequences of the proposed amendment and alternatives to it.*

> *Significant and non-significant amendments are defined in 36 CFR 219.10(f). Generally speaking, significant amendments are those that affect the long-term balance of goods and services produced on the forest.*[5]

The alternatives were reviewed for consistency with Forest Plan standards and guidelines, as well the criteria to analyze the significance of a Forest Plan amendment.[6]

Alternative 1 – No Action

Under the No Action Alternative, no changes or modifications would be approved and no SUP boundary adjustments would be necessary. EMR's SUP boundary would continue to occupy 524 acres of NFS lands. No changes to surrounding management area prescriptions are proposed. Alternative 1 is consistent with Forest Plan standards and guidelines.

Alternative 2 – Proposed Action

Alternative 2 would allocate lands within and adjacent to the existing SUP boundary as Management Area 8.22 – Ski-Based Resorts and permit the lands to be utilized for ski area activities resulting in an SUP area encompassing 610 acres of NFS lands. Within the existing SUP boundary, the Forest Plan amendment would assign 11 acres of lands that are not officially designated in the Forest Plan as Management Area 8.22 – Ski-Based Resorts. The current management area allocations for those lands that would be incorporated into the proposed SUP boundary include: lands that are not officially designated in the Forest Plan as Management Area 8.22 – Ski-Based Resorts (21 acres), Management Area 7.1 – Residential-National Forest Intermix (10 acres), and Management Area 1.3 – Backcountry Recreation (11 acres). The Forest Service has reviewed the Forest Plan standards and guidelines for these areas, as well as their proximity to the existing SUP boundary, to assess compatibility with Management Area 8.22 – Ski-Based Resorts.

The NFS lands that do not currently include a Forest Plan management area allocation are adjacent to lands currently allocated as Management Area 8.22 – Ski-Based Resorts. These lands would be managed as Management Area 8.22 – Ski-Based Resorts and would include specific standards and guidelines, SIO designation and ROS designation (refer to section C below for a description of management area direction).

Management Area 7.1 – Residential-National Forest Intermix does not include management area-specific standards and guidelines. Management Area 8.22 – Ski-Based Resorts standards and guidelines would apply to the 10 acres of the ARP that would be incorporated into Management Area 8.22 – Ski-Based Resorts. The ROS would not change and would continue to be *Rural*. In addition, the SIO would decrease in scenic integrity from *Moderate* to *Low*. By incorporating 10 acres of Management Area 7.1 –

[5] USDA Forest Service, 1997a p. v–vi
[6] USDA Forest Service, 1994 (FSH 1909.12)

Residential-National Forest Intermix into Management Area 8.22 – Ski-Based Resorts, this Forest Plan amendment would change the desired conditions of these lands to ski-based activities and would include additional management area standards and guidelines.

Management Area 1.3 – Backcountry Recreation includes one guideline, "1. (GL) Do not construct new roads," which would no longer apply, and Management Area 8.22 – Ski-Based Resorts standards and guidelines would apply to the 11 acres of the ARP that would be incorporated into Management Area 8.22 – Ski-Based Resorts. Alternative 2 would replace the one guideline in Management Area 1.3 – Backcountry Recreation that discourages the construction of new roads. Management Area 8.22 – Ski-Based Resorts allows for the construction of roads for ski area operations. Within the area currently allocated as Management Area 1.3 (11 acres), the Proposed Action does not propose the construction of roads; however, if conditions necessitate in the future, EMR could propose a road(s) within this area. This would require additional environmental review in accordance with NEPA. The ROS would change from *Semiprimitive Non-Motorized* to *Rural*. This change would reflect an experience that would be considered more developed in terms of infrastructure and interaction with people. In addition, the SIO would decrease in scenic integrity from *High* to *Low*.

As per FSH 1909.12, the four criteria for determining significance of the proposed amendment are responded to directly.

1. **<u>Timing</u>. When the change in the Forest Plan would take place relative to the planning period and scheduled revisions of the plan.**

   The ARP is currently not undertaking a formal Forest Plan revision process. Because the completion of the Forest Plan revision process is not imminent and the last Forest Plan revision was approximately 16 years ago, this non-significant Forest Plan amendment is being proposed at an appropriate time. In addition, guidance states that in most cases, the later the change, the less likely it is to be significant to the current forest plan.[7] The current Forest Plan was authorized in 1997; this amendment would help keep management within the plan consistent with current planning in this area. The change would take place during this planning period.

2. **<u>Location and Size</u>. Location and size of the area affected compared to the size for the overall planning area.**

   The ARP includes approximately 1.5 million acres of forests and grassland in north central Colorado. This proposed Forest Plan amendment would pertain to the assignment and change of management areas on NFS lands beyond the existing 524-acre SUP boundary. The amended land allocations would be contiguous with existing lands allocated as Management Area 8.22 – Ski-Based Resorts. The management area assignment and change would apply to 53 acres. This

[7] Ibid. Section 5.32(3)(a)

Forest Plan amendment does not apply to other lands across the ARP. Alternative 2 would increase the acreage of existing Management Area 8.22 – Ski-Based Resorts on the ARP from 16,752 acres to 16,805 acres, an increase of 0.3 percent.

Under Alternative 2, 11 acres of Management Area 1.3 – Backcountry Recreation would change to Management Area 8.22 – Ski-Based Resorts. Currently, there are 172,442 acres of Management Area 1.3 on the ARP, and Alternative 2 would result in 172,431 acres of Management Area 1.3 on the ARP; a reduction of approximately 0.006 percent. Backcountry recreation does occur within other management areas on the ARP.

Under Alternative 2, 10 acres of Management Area 7.1 – Residential-National Forest Intermix would change to Management Area 8.22 – Ski-Based Resorts. Currently, there are 128,780 acres of Management Area 7.1 – Residential-National Forest Intermix on the ARP, and Alternative 2 would result in 128,770 of Management Area 7.1 – Residential-National Forest Intermix on the ARP; a reduction of approximately 0.008 percent.

3. **Goals, Objectives, and Outputs. How, or to what degree, the amendment would affect the long-term relationship between levels of goods and services projected by the Forest Plan.**

   Development and utilization of the ARP within the EMR SUP was anticipated in the 1997 Forest Plan. In general the Boulder Creek Geographic Area is meant to be managed for year-round recreational use. An emphasis was placed on working and cooperating with the EMR to develop a sustainable vegetation management plan for EMR and to formalize access through the ski area for the Jenny Creek Trail.

   The proposed amendment is site-specific. Long-term goods and services within the management area and adjusted SUP boundary would meet the goals, objectives, and outputs of Management Area 8.22 – Ski-Based Resorts in accordance with the 1997 Forest Plan. Due to the size and specificity of this amendment, this amendment would not alter the long-term relationship between levels of goods and services projected by the Forest Plan.

4. **Management Prescription. Whether the change would apply only to a specific situation, or to future situations across the planning area.**

   The proposed Forest Plan amendment is specific to 53 acres.This amendment would not apply to Management Area 8.22 – Ski-Based Resorts, Management Area 1.3 – Backcountry Recreation or Management Area 7.1 – Residential-National Forest Intermix in their entirety across the ARP or any other current or future situations on the ARP.

For these reasons, the proposed Forest Plan amendment is a non-significant amendment to the Forest Plan.

Any future ski area projects within Management Area 8.22 – Ski-Based Resorts (at EMR or other developed winter sports permittees) will be evaluated within separate, project specific NEPA analysis for compliance with Forest Plan direction. The proposed Forest Plan amendment and management area allocation change would take effect following issuance of a Record of Decision for this EIS. In addition, an amendment to EMR's SUP would occur subsequent to the Record of Decision.

Alternative 3

Alternative 3 would allocate lands within and adjacent to the existing SUP boundary as Management Area 8.22 – Ski-Based Resorts and permit the lands to be utilized for ski area activities resulting in an SUP area encompassing 542 acres of NFS lands. Within the existing SUP boundary, the Forest Plan amendment would assign 11 acres of lands that are not officially designated in the Forest Plan as Management Area 8.22 – Ski-Based Resorts. The current management area allocations for those lands that would be incorporated into the proposed SUP boundary include: Management Area 1.3 – Backcountry Recreation (10 acres), and Management Area 4.3 – Dispersed Recreation (0.5 acre). The Forest Service has reviewed the Forest Plan standards and guidelines for these areas, as well as their proximity to the existing SUP boundary, to assess compatibility with Management Area 8.22 – Ski-Based Resorts.

The NFS lands that do not currently include a Forest Plan management area allocation are adjacent to lands currently allocated as Management Area 8.22 – Ski-Based Resorts and within the existing SUP boundary. These lands would be managed as Management Area 8.22 – Ski-Based Resorts and would include specific standards and guidelines, SIO designation and ROS designation (refer to section C below for a description of management area direction).

Management Area 1.3 – Backcountry Recreation includes one guideline, "1. (GL) Do not construct new roads," which would no longer apply, and Management Area 8.22 – Ski-Based Resorts standards and guidelines would apply to the 10 acres of the ARP that would be incorporated into Management Area 8.22 – Ski-Based Resorts. Alternative 2 would replace the one guideline in Management Area 1.3 – Backcountry Recreation that discourages the construction of new roads. Management Area 8.22 – Ski-Based Resorts allows for the construction of roads for ski area operations. Within the area currently allocated as Management Area 1.3 (10 acres), the Proposed Action does not propose the construction of roads; however, if conditions necessitate in the future, EMR could propose a road(s) within this area. This would require additional environmental review in accordance with NEPA. The ROS would change from *Semiprimitive Non-Motorized* to *Rural*. This change would reflect an experience that would be considered more developed in terms of infrastructure and interaction with people. In addition, the SIO would decrease in scenic integrity from *High* to *Low*.

Management Area 4.3 includes one guideline, "1. (GL) Restrict vegetation management operations during periods of high recreational use (weekends, holidays, high-use seasons, etc.) as needed, to maintain the

desired recreational setting or to reduce interference with the recreational activities." This guideline would be replaced with Management Area 8.22 – Ski-Based Resorts standards and guidelines would apply to the approximately 0.5 acre of the ARP that would be incorporated into Management Area 8.22 – Ski-Based Resorts. The ROS would change from *Roaded Natural* to *Rural*. This change would reflect an experience that would be considered more developed in terms of infrastructure and interaction with people. In addition, the SIO would decrease in scenic integrity from *Moderate* to *Low*.

As per FSH 1909.12, the four criteria for determining significance of the proposed amendment are responded to directly.

1. **Timing. When the change in the Forest Plan would take place relative to the planning period and scheduled revisions of the plan.**

   The ARP is currently not undertaking a formal Forest Plan revision process. Because the completion of the Forest Plan revision process is not imminent, and the last Forest Plan revision was approximately 16 years ago, this non-significant Forest Plan amendment is being proposed at an appropriate time. In addition, guidance states that in most cases, the later the change, the less likely it is to be significant to the current forest plan.[8] The current Forest Plan was authorized in 1997; this amendment would help keep management within the plan consistent with current planning in this area. The change would take place during this planning period.

2. **Location and Size. Location and size of the area affected compared to the size for the overall planning area.**

   The ARP includes approximately 1.5 million acres of forests and grassland in north central Colorado. This proposed Forest Plan amendment would pertain to the adjustment of EMR's SUP boundary within NFS lands beyond the existing 524 acres. The amended land allocations would be contiguous with existing lands allocated as Management Area 8.22 – Ski-Based Resorts. The management area change would apply to approximately 22 acres. This Forest Plan amendment does not apply to other lands across the ARP. Alternative 3 would increase the acreage of existing Management Area 8.22 – Ski-Based Resorts on the ARP from 16,752 acres to 16,774 acres, an increase of 0.1 percent.

   Under Alternative 3, 10 acres of Management Area 1.3 – Backcountry Recreation would change to Management Area 8.22 – Ski-Based Resorts. Currently, there are 172,442 acres of Management Area 1.3 – Backcountry Recreation on the ARP, and Alternative 3 would result in 172,431 acres of Management Area 1.3 – Backcountry Recreation on the ARP; a reduction of 0.0006 percent. Backcountry recreation does occur within other management areas on the ARP.

[8] Ibid.

Under Alternative 3, 0.5 acre of Management Area 4.3 – Dispersed Recreation would change to Management Area 8.22 – Ski-Based Resorts. Currently, there are 143,741 acres of Management Area 4.3 – Dispersed Recreation on the ARP, and Alternative 3 would result in 143,740 acres of Management Area 4.3 – Dispersed Recreation; a reduction of 0.0003 percent.

3. **Goals, Objectives, and Outputs. How, or to what degree, the amendment would affect the long-term relationship between levels of goods and services projected by the Forest Plan.**

   Development and utilization of the ARP within the EMR SUP was anticipated in the 1997 Forest Plan. In general the Boulder Creek Geographic Area is meant to be managed for year-round recreational use. An emphasis was placed on working and cooperating with the EMR to develop a sustainable vegetation management plan for EMR and to formalize access through the ski area for the Jenny Creek Trail.

   The proposed amendment is site-specific. Long-term goods and services within the changed management areas and adjusted SUP boundary would meet the goals, objectives, and outputs of Management Area 8.22 – Ski-Based Resorts in accordance with the 1997 Forest Plan. Due to the size and specificity of this amendment, this amendment would not alter the long-term relationship between levels of goods and services projected by the Forest Plan.

4. **Management Prescription. Whether the change would apply only to a specific situation, or to future situations across the planning area.**

   The proposed Forest Plan amendment is specific to 17 acres. This amendment would not apply to Management Area 8.22 – Ski-Based Resorts, Management Area 1.3 – Backcountry Recreation or Management Area 4.3 – Dispersed Recreation in their entirety across the ARP or any other current or future situations on the ARP.

For these reasons, the Alternative 3 Forest Plan amendment is a non-significant amendment to the Forest Plan.

Any future ski area projects within Management Area 8.22 – Ski-Based Resorts (at EMR or other developed winter sports permittees) will be evaluated within separate, project specific NEPA analysis for compliance with Forest Plan direction. The proposed Forest Plan amendment and management area allocation change would take effect following issuance of a Record of Decision for this EIS. In addition, an amendment to EMR's SUP would occur subsequent to the Record of Decision.

C. FOREST PLAN MANAGEMENT AREA DIRECTION

1.3 BACKCOUNTRY RECREATION

Theme: Backcountry areas are managed to provide nonmotorized recreational opportunities in a natural appearing landscape.

Desired Condition

Physical/Biological

A variety of plant communities, structural stages, and associated wildlife occur in patterns maintained primarily through ecological processes. The variety and arrangement depends on the timing of natural disturbances (fire, insects and diseases, and storms) and prescribed fire. The amount and arrangement of successional stages varies greatly depending on the amount and timing of disturbances and how openings revegetate.

Openings vary in size and are generally the result of the natural disturbances described above. Openings may be utilized to provide scenic views and add to the diversity of the landscape. New human-caused changes to vegetation that may occur are limited in scale and are not visually evident. For short time periods in small areas, some vegetation manipulation may occur that is noticeable; however, it resembles natural patterns.

Social

Provide a variety of nonmotorized recreational opportunities. Unique nonmotorized hunting, fishing, and wildlife-viewing opportunities may exist in these areas that are away from major travelways where seclusion and cover areas exist. Other compatible activities may occur in the area.

Encounters between individuals or parties are most common on travelways. Seasonal restrictions for resource protection may occur. Fewer contacts and improved opportunities for solitude occur away from trails. Sounds from people may be common near travelways. Sounds from outside the area may be common near the area's edge. Farther away from travelways or the area's edges, sounds diminish into the background.

Use subtle on-site regulations and controls. Prohibit motorized travel, including over-snow use except as shown on the Winter Travel Strategy Map endorsed with this document. Limit directional, regulatory, and informational signs to those necessary to foster safe use and resource protection. Contacts with Forest Service personnel are generally initiated by visitors.

Administrative

Limit facilities to those necessary to protect resources, provide for safety, or to enhance recreational experiences. Existing improvements such as trails, bridges, fences, shelters, signs or water diversions

blend into the landscape where feasible or are removed if no longer needed. Existing primitive roads will be converted to trails or obliterated. New trails may be constructed to enhance recreational experiences, prevent damage to resources or provide access. Managed trails provide for a variety of use and challenge levels. Most routes are designed for a variety of uses and will loop, run point-to-point, or seek to link with other management areas or developed sites.

Acquire inholdings or adjacent lands as opportunities arise to maintain or improve backcountry nonmotorized recreational opportunities or to prevent development that would diminish experience levels on National Forest System (NFS) lands. Retain all NFS lands in the management area. Acquire rights-of-way where needed to meet resource goals and objectives and enhance recreational opportunities. Allow compatible special uses.

Standards and Guidelines

1. (GL) Do not construct new roads.

4.3 DISPERSED RECREATION

Theme: Dispersed recreation areas are managed to provide recreational opportunities in natural or nearly natural-appearing landscapes.

Desired Condition

Physical/Biological

Maintain or improve biological communities to provide a pleasing appearance for visitors; complement the recreational values; and provide varied plant communities, structural stages, and associated wildlife. Emphasize the health and appearance of these communities to maintain their desirability for recreational use. Maintain insect and disease populations at endemic levels. Accomplish vegetation management through a combination of human manipulation and natural processes. Harvest units and areas affected by fire, insects, and disease may be evident in the landscape.

Social

This is an area where forest visitors can recreate in a relatively natural forest environment These areas are characterized by relatively easy access and heavy use which may be motorized, nonmotorized, or both. Frequent contact between individuals or parties is acceptable and sounds from people and motorized equipment are common. Opportunities for solitude or isolation are limited.

Undeveloped areas appear to be relatively natural. Blend existing improvements such as improved roads, primitive roads, trails, bridges, fences, shelters, signs or water diversions into the landscape where feasible or remove them if no longer needed. Design new improvements to resemble natural patterns.

Onsite regimentation and controls are noticeable, but harmonize with the natural environment Provide simple information facilities. Directional, regulatory and informational signs are present and foster safe use, identify requirements for use of the area, and provide route information.

Administrative

Provide facilities to meet dispersed recreational needs; facilities may include hardened sites with fire rings and tables. Developed facilities, including campgrounds, picnic areas, and trailheads, may be provided to meet recreational demands within the area's resource capacity.

A wide spectrum of travelways exist from primary highways to primitive roads and trails that serve as recreational features themselves. Travelway densities may remain fairly constant. Open roads provide motorized recreational opportunities and restricted roads provide nonmotorized opportunities. Provide access to natural attractions, water features, and other areas that provide desired recreational opportunities.

Acquire inholdings and adjacent parcels to improve and maintain recreational opportunities or to provide access. Acquire lands on which development would diminish the recreational experience of NFS lands. Retain parcels with critical or unique resources or lands where development would be incompatible with achieving dispersed recreational experiences on the remaining NFS lands. Dispose of parcels where a dispersed recreational experience can no longer be provided because of development on private land. Acquire rights-of-way that are needed to meet resource goals and objectives. Allow compatible special uses.

Standards and Guidelines

1. (GL) Restrict vegetation management operations during periods of high recreational use (weekends, holidays, high-use seasons, etc.) as needed, to maintain the desired recreational setting or to reduce interference with the recreational activities.

7.1 RESIDENTIAL-FOREST INTERMIX

Theme: Areas characterized by an interface between residential private lands and National Forest System lands are managed to protect natural resources, provide compatible multiple uses, and maintain cooperative relationships between the landowners and other levels of governmental jurisdiction. Opportunities to consolidate landownership patterns are pursued.

Desired Condition

Physical/Biological

Provide a variety of plant communities, structural stages, and associated wildlife through vegetation manipulation and natural processes. Manage forested areas to attain a natural appearance and minimize the risks of catastrophic fires and epidemic levels of insects and diseases. Maintain natural openings,

meadows, and other plant communities to protect soil and water resources and key wildlife habitat areas. Maintain insect and disease populations at endemic levels where damage would only be evident in small patches across the landscape, if at all.

Social

This is an area where developed residential use blends into relatively undeveloped natural environments. Dispersed recreation is not encouraged but access to existing areas of high use is provided. Visitors expect to encounter residential developments on intermingled private lands, and residents may encounter National Forest visitors and management activities. Consequently, recreational use of these areas may be limited to the extent necessary to reduce conflicts between landowners and visitors.

Undeveloped areas appear to be in a relatively natural state. Blend existing improvements such as improved roads, primitive roads, trails, bridges, fences, shelters, signs, recreational sites, or water diversions into the landscape where feasible or remove them if no longer needed. New improvements are designed to resemble natural patterns and to be less intrusive into the landscape.

Administrative

Manage fire and hazardous fuels in close cooperation with state and county agencies, local fire protection districts and organized homeowners' groups. Aggressively suppress wildfires that threaten life and property. Actively pursue opportunities for land exchange and sales. Retain or acquire lands containing key or essential habitat, unique or critical ecosystems, important recreational values or important access routes to National Forest System lands. Dispose of or acquire parcels to consolidate landownership and to reduce need to authorize occupancy of National Forest System lands. Pursue rights-of-way needed for management purposes.

Manage the minimum road system needed to provide access for management activities, recreational use and fire protection. Coordinate trail systems with other local agencies. Attempt to link trails to other management areas, developed sites and other nearby trails. Locate new facilities (trailheads, parking areas, designated sites, developed sites, etc.) in areas to help minimize conflicts. Boundaries in the vicinity of management activities and along public access routes are identified, well marked and maintained over time. Permit compatible special uses on lands identified for retention. Do not approve land-use authorizations on National Forest System lands identified for disposal if that occupancy may affect disposal action. Bring existing land use authorizations into compliance on an opportunity basis.

8.22 SKI-BASED RESORTS (BOTH EXISTING AND POTENTIAL)

Theme: Areas with ski-based resorts or potential for ski-based resorts are managed to provide for skiing and related recreational uses.

Desired Condition

Physical/Biological

Maintain or improve vegetation composition and structure to provide a pleasing appearance, maintain scenic views from the site and provide for sustainable vegetation cover. A variety of tree and associated plant species are present. Arrangement of vegetation and featured species complement the area's appearance, provide for user safety, and minimize maintenance costs.

Manage scenic resources so that the character is one of forested areas interspersed with openings of varying widths and shapes. Manage tree stands and islands to provide a variety of species and size classes, stability, longevity, esthetics, and wind firmness to sustain forest cover and complement recreational values. Ski operations that affect water, including snowmaking and other water-depleting activities, will be compatible with maintenance of healthy aquatic ecosystems.

Social

Design new human modifications to vegetation to resemble natural patterns or patterns typical of the particular area. Other ecological changes may affect the appearance.

Encounters between individuals or parties are frequent during winter-use seasons and vary from infrequent to frequent during summer-use seasons. Sounds from people or motorized recreational activities are common and limit opportunities for solitude or isolation.

Recreational opportunities are primarily those at the developed level. The base area is often an urban setting. Views and vistas outside the area, but visible from within, may be featured. Wildlife-viewing opportunities may be available.

Evidence of past human activities or habitation due to mining, milling, or grazing may be present. Blend existing improvements such as improved roads, primitive roads, trails, bridges, fences, shelters, signs or water diversions into the landscape where feasible or remove them if no longer needed. Design new improvements to be minimally intrusive into the landscape.

Administrative

Facilities provided on site vary from rustic to highly developed, depending on the individual site. Directional, regulatory, and informational signs are common to foster safe use, identify requirements for use of the area, and to provide route information. Personal contacts by Forest Service personnel are common and are generally for the purpose of providing information and administering permits.

Improve areas to restore the desired appearance. Improvements are owned by permittee. Master plans for special-use permits ensure that facilities harmonize and blend with the natural setting. Travelways

constructed and maintained under terms of the permit will meet Forest Service standards. Design ski runs to avoid snow scour and to favor snow deposition.

Assess land-adjustment strategies on a case-by-case basis. Allow only special uses that do not interfere with the permittee's business operations of the ski area.

Standards and Guidelines

1. (ST) Withdraw the area from locatable mineral entry.

2. (GL) Retain vegetation for screening around structures where vegetation recovery will be slow.

3. (GL) Prohibit cutting trees or locating structures in areas that promote snow loading in avalanche starting zones.

D. RECREATION OPPORTUNITY SPECTRUM CLASSES

Recreation Opportunity Spectrum (ROS) is a system for planning and managing recreational resources. ROS categorizes recreation opportunities into classes. Each class is defined in terms of the degree to which it satisfies certain recreational experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area and the relative density of recreation use. The classes are:

Primitive – Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

Semiprimitive Non-motorized – Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted, but temporary primitive roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on nonmotorized recreational experience opportunities.

Semiprimitive Motorized – Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Primitive roads and trails are designated for OHV use.

Roaded Natural – Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of people. Such evidence usually harmonizes with the natural

environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

Roaded Modified – Area is characterized by a mixture of natural appearing and substantially modified environments. The impacts of resource management activities such as timber harvest and prescribed fire are obvious and dominate portions of the area. There are opportunities to get away from others but with easy access providing a feeling of independence and freedom with little challenge and risk. Conventional motorized access is common and is incorporated into road design and maintenance.

Rural – Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities.

Urban – Characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreational activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant on the site. Large numbers of users can be expected both on the site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.