

SNOWMASS MULTI-SEASON RECREATION PROJECTS DRAFT ENVIRONMENTAL IMPACT STATEMENT



NOVEMBER 2016

USDA Forest Service
White River National Forest
Aspen-Sopris Ranger District



In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, sex, religious creed, disability, age, political beliefs, or reprisal or retaliation for prior civil rights activity in any program or activity conducted or funded by USDA.

Persons with disabilities who require alternative means of communication for program information (e.g. Braille, large print, audiotape, American Sign Language, etc.), should contact the Agency (State or local) where they applied for benefits. Individuals who are deaf, hard of hearing or have speech disabilities may contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, (AD-3027) found online at: http://www.ascr.usda.gov/complaint_filing_cust.html, and at any USDA office, or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) Mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) Fax: (202) 690-7442; or (3) Email: program.intake@usda.gov.

This institution is an equal opportunity provider.

ABSTRACT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR THE

SNOWMASS MULTI-SEASON RECREATION PROJECTS

WHITE RIVER NATIONAL FOREST
ASPEN-SOPRIS RANGER DISTRICT
PITKIN COUNTY, COLORADO

NOVEMBER 2016

Lead Agency: USDA Forest Service

Responsible Official: Scott Fitzwilliams, Forest Supervisor
White River National Forest

For Information Contact: Roger Poirier, Project Leader
White River National Forest
900 Grand Avenue
Glenwood Springs, CO 81601
rogerepoirier@fs.fed.us

Abstract: This Draft Environmental Impact Statement (DEIS) has been prepared to analyze and disclose the estimated environmental effects of Snowmass Multi-Season Recreation Projects. Snowmass Ski Area is located on the White River National Forest in Pitkin County, Colorado and operates in accordance with the terms and conditions of a special use permit, which is administered by the United States Forest Service. The Proposed Action includes the following elements: new and realigned mountain biking trails; realigned hiking trails; a mountain coaster; a zip line canopy tour; a zip line; a ropes challenge course; a climbing wall; and three multi-purpose activity areas.

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); 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.

Important Notice: Only those who submit timely and specific written comments will have eligibility to file an objection under 36 CFR §218.8. For objection eligibility, each individual or representative from each entity submitting timely and specific written comments must either sign the comment or verify identity upon request. Individuals and organizations wishing to be eligible to object must meet the information requirements in 36 CFR §218.25(a)(3). Comments received, including the names and addresses of those who comment, will become part of the public record for this project and will be subject to review pursuant to the Freedom of Information Act.

Executive Summary

This page intentionally left blank.

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 United States Forest Service (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 another action alternative. Additionally, it is intended to ensure that planning considers the environmental and social values of the study area and that potential resource conflicts are minimized or avoided.

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

The overall purpose of the proposed projects at Snowmass Ski Area (Snowmass) is to offer more developed recreational opportunities that do not require a special level of skills or experience, which would enable a wider spectrum of guests to engage in adventure-based experiences, as well as encourage new users to visit and experience National Forest Service lands.

Currently, there is a lack of recreational opportunities at Snowmass that provide:

- Adventure-based experiences that require little specialized knowledge, skills, equipment or familiarity with the mountain environment—elements which can be a barrier for visitors (e.g., families, the elderly/aging, or those with disabilities) desiring to engage in outdoor activities;
- Sufficient supply and variety of mountain biking trails serving a wide range of ability levels;
- Developed settings for educational and interpretive programs and events; and
- Activity-based interaction with a forested, mountain environment in a controlled setting, offering an opportunity for users to learn about nature.

There is a need for a broad and diverse mix of multi-season recreational activities that collectively provide the public with a range of outdoor experiences from passive to active, intimate to interactive, and serve a range of personal interests, skills and abilities among guests. The full text of the Purpose and Need is stated in Chapter 1.

B. SUMMARY OF THE ALTERNATIVES ANALYZED IN THIS DEIS

In addition to the Proposed Action, a second action alternative (Alternative 3) and the required No Action Alternative are analyzed in detail within this DEIS. Refer to Chapter 2 for a full description of alternatives and Chapter 6 for figures.

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 as a result of this NEPA analysis.

ALTERNATIVE 2 – PROPOSED ACTION

These projects are designed to offer guests a diversified, appealing, and high-quality multi-season recreational experience that is consistent with the Forest Service direction of providing natural resource-based recreation. Providing these opportunities would encourage guests, families and youth to learn about the natural world and their National Forests.

The Proposed Action includes the following elements, each of which is further defined in Chapter 2. All components of the Proposed Action are depicted in Figure 2.

Mountain Biking and Hiking Trails

- Ten new mountain biking trails (approximately 12.9 miles) and a skills park that includes three new mountain biking trails (approximately 1.2 miles) would be constructed in the Elk Camp area.
- The existing *Vista*, *Sierra Loop* and *Rabbit Run* hiking trails (approximately 2.4 miles) and the existing *Vapor* biking trail (approximately 0.1 mile) would be re-routed to improve user experiences and avoid potential conflicts with other multi-season activities.

Mountain Coaster

- A mountain coaster would be constructed in the forested area between *Gunner's View* and *Sandy Park* ski trails near Elk Camp.

Zip Line Canopy Tour

- A zip line canopy tour would span from Elk Camp Meadows down to the *Slider* ski trail near the Elk Camp service road. It would be built within the canopy of an intact tree island.

Zip Line

- A zip line would be constructed parallel to the Elk Camp Gondola and descend down the edge of the *Funnel* ski trail.

Ropes Challenge Course

- A ropes challenge course would be added to the Elk Camp Meadows area, just uphill of the lower Magic Carpet in a forested area that is not currently skied.

Climbing Wall

- A climbing wall would be built on the skier's right side of the *Bull Run* ski trail, across the slope from the Elk Camp Restaurant within the former Café Suzanne Restaurant site.

Multi-Purpose Activity Areas

- Three multi-purpose activity areas would be designed and landscaped to provide areas for guests to meet for special events, temporary activities, and scenic viewing. The proposed locations of the multi-purpose activity areas are Elk Camp Summit, Rayburn's Pond, and Elk Camp Meadows.

Elk Camp Site Improvements

- The areas surrounding the top of the Elk Camp Gondola and the Elk Camp Restaurant would be improved by developing and defining access pathways and rest areas, rehabilitating disturbed areas, incorporating signage, increasing vegetative growth, and adding landscaping features.

ALTERNATIVE 3

Alternative 3 was developed to respond to wildlife, recreation and scenery issues with Alternative 2. Alternative 3 includes all projects identified in the Proposed Action, with the following exceptions and modifications. All components of Alternative 3 are depicted in Figure 3.

Mountain Biking and Hiking Trails

- To reduce impacts to wildlife, Trail 21 of the Proposed Action is replaced with Trail 16 (also known as *Grey Wolf*) of the Snowmass Mountain Master Development Plan.
 - Trail 16 would be a 1.5-mile singletrack trail paralleling the Elk Camp Chairlift alignment down the *Grey Wolf* ski trail.
- Trail 17 and the beginner skills park area are also removed from Alternative 3 due to redundancy of similar ability level trails in the trail system and the presence of an existing, smaller skills park area on private lands.
- With the replacement of Trail 21 with Trail 16 and the elimination of Trail 17, the overall trail length in Alternative 3 would be approximately 15.1 miles.

Multi-Purpose Activity Areas

- In response to scenery concerns, the Elk Camp Meadows multi-purpose activity area is removed from Alternative 3.
 - The two remaining multi-purpose activity areas—Elk Camp Summit and Rayburn’s Pond—are as described in the Alternative 2 description.

C. PUBLIC INVOLVEMENT

A scoping notice, dated March 25, 2016, was mailed to 81 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 two illustrative maps. This notice was specifically designed to elicit comments, concerns, and issues pertaining to the proposal. A Notice of Intent to prepare an EIS was published in the Federal Register on April 1, 2016. Comments were accepted from the following sources: email, web submission, letter, public meetings, fax, and phone. During the scoping period, the WRNF received 18 comment submittals.

All of the submittals were reviewed and comments were extracted and categorized by resource or topic. These comments were reviewed by the WRNF Interdisciplinary Team (ID Team) during and subsequent to the post-scoping ID Team meeting in July 2016. 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 (WRNF) concerns. The issues are addressed in Chapter 3 – Affected Environment and Environmental Consequences.

D. SUMMARY OF RESOURCE ISSUES ADDRESSED

Based on the results of public scoping, the Forest Service identified specific areas of public concern. Each of the following issue statements includes a list of indicators (see Chapter 1) which were identified as a means of measuring or quantifying the anticipated level of impact on a particular resource.

HUMAN ENVIRONMENT

Recreation

- Proposed projects would impact recreational opportunities within the Snowmass special use permit (SUP) area. Additional trails and recreation opportunities should offer experiences that address the stated Purpose and Need, providing previously unavailable opportunities to meet guest expectations.

Scenery

- Proposed projects within the Snowmass SUP area may be visible from the Town of Snowmass Village and/or within the existing ski area. In particular, the proposed zip line bottom station on

private lands may create scenery impacts to adjacent landowners by detracting from the existing scenic values.

Noise

- Construction of the proposed projects, including timber removal, would affect noise levels in the Snowmass SUP and adjacent areas. Additionally, operation and utilization of the zip line, multi-purpose activity areas (e.g., concerts and special events), and other proposed projects would contribute incrementally to noise levels in the in the Snowmass SUP and adjacent areas.

Social and Economic

- Implementation of the proposed projects could potentially alter certain socioeconomic characteristics of Pitkin County or the Town of Snowmass Village due to additional employees and visitors, and associated impacts within the community.

Cultural

- Implementation of proposed projects and associated ground disturbance may affect previously unidentified cultural and heritage resources.

Traffic

- Proposed projects may generate measurable increases in daily/seasonal visitation, thereby affecting traffic movement and volumes within the Town of Snowmass Village, on Highway 82 and on construction/maintenance access roads proximate to the ski area.

BIOLOGICAL ENVIRONMENT

Air Quality

- Construction and operation of the proposed projects (including short-term construction-related activity, burning, and transportation related to timber removal) could result in localized impacts to air quality.

Climate Change

- Climate change has potential to affect, and be affected by, the proposed projects. Construction and operation of the proposed projects (including short-term construction-related activity, burning, and transportation related to timber removal) could result in greenhouse gas emissions and other contributions to climate change.

Botany

- Ground disturbance associated with construction and operation of the proposed projects could affect plant communities, including threatened, endangered, and sensitive species, WRNF species of local concern (SOLC), and invasive plant species.

Forest Health

- Overstory vegetation would be altered as a result of the proposed projects. Additionally, construction and operation of the proposed projects has the potential to affect the presence of weeds.

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 Region 2 sensitive fish and wildlife species, migratory birds, and SOLC. In particular, the proposed mountain biking trails within the relatively undisturbed forested block adjacent the Elk Camp area could impact habitat values and connectivity for species utilizing this area.

Soils and Geology

- Ground disturbance, including tree clearing and grading, associated with construction and operation of proposed projects has potential to increase erosion and soil compaction, and lead to a loss of soil organic matter. Proposed project components that could result in unnecessary or excessive ground disturbance should be avoided.

Watershed

- Implementation of proposed projects has the potential to affect stream and riparian health. In particular, stream crossings by mountain biking and hiking trails may have an increased potential to affect stream and riparian health and should be minimized.

Wetlands

- Proposed ground disturbance and overstory vegetation removal has potential to affect wetland function and values in the analysis area. Minimization of wetland crossings should be considered for mountain biking and hiking trails.

E. SUMMARY COMPARISON OF DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Table 2-4 found 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

This page intentionally left blank.

TABLE OF CONTENTS

1. INTRODUCTION.....	1-1
A. BACKGROUND.....	1-2
B. RELATIONSHIP TO PREVIOUS ANALYSES AND APPROVALS	1-3
C. PURPOSE AND NEED FOR THE PROPOSED ACTION	1-3
<i>Purpose and Need</i>	1-3
D. SUMMARY OF THE PROPOSED ACTION	1-4
<i>Alternative 2 – Proposed Action</i>	1-4
E. INTERAGENCY COORDINATION	1-5
F. PUBLIC INVOLVEMENT.....	1-5
G. RELEVANT CHANGES TO THE PROPOSED ACTION SINCE PROJECT SCOPING	1-6
H. ISSUES ANALYZED AND ISSUES NOT WARRANTING FURTHER DOCUMENTATION.....	1-6
<i>Issues Analyzed</i>	1-6
<i>Issues not Warranting Further Documentation</i>	1-14
<i>Scope of the Analysis</i>	1-15
<i>Actions</i>	1-15
<i>Alternatives</i>	1-16
<i>Impacts</i>	1-16
I. CONSISTENCY WITH FOREST SERVICE POLICY	1-16
<i>WRNF Land and Resource Management Plan</i>	1-16
<i>2011 Ski Area Recreational Opportunity Enhancement Act</i>	1-17
<i>Forest Service Manual 2343.14</i>	1-19
J. DECISION TO BE MADE.....	1-19
K. OTHER NECESSARY PERMITS, LICENSES, ENTITLEMENTS AND/OR CONSULTATION.....	1-20
2. DESCRIPTION OF ALTERNATIVES.....	2-1
A. INTRODUCTION	2-1
B. ALTERNATIVES CONSIDERED IN DETAIL.....	2-1
<i>Alternative 1 – No Action</i>	2-1
<i>Alternative 2 – Proposed Action</i>	2-2
<i>Alternative 3</i>	2-7
C. PROJECT DESIGN CRITERIA INCORPORATED INTO ACTION ALTERNATIVES	2-8
D. ALTERNATIVES AND DESIGN COMPONENTS CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS	2-14
<i>Alternative Zip Line Alignment</i>	2-14
<i>Trail 14 Removal for Wildlife Habitat Reasons</i>	2-14
<i>Trail 14 Adjusted Alignment to Minimize Stream Crossings</i>	2-14
<i>Trail 3 Removal for Wetland Reasons</i>	2-14
<i>Trail 6 Removal for Potential Redundancy</i>	2-14
E. COMPARISON OF ALTERNATIVES	2-15
F. SUMMARY COMPARISON OF DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES	2-16
G. IDENTIFICATION OF THE PREFERRED ALTERNATIVE.....	2-50
3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES.....	3-1
A. RECREATION	3-2
<i>Scope of the Analysis</i>	3-2
<i>Affected Environment</i>	3-2
<i>Direct and Indirect Environmental Consequences</i>	3-11
<i>Cumulative Effects</i>	3-30
<i>Irreversible and Irrecoverable Commitments of Resources</i>	3-32
B. SCENERY	3-32
<i>Scope of the Analysis</i>	3-32
<i>Forest Service Scenery Management System</i>	3-33
<i>Affected Environment</i>	3-36

Table of Contents

Direct and Indirect Environmental Consequences..... 3-39
Cumulative Effects..... 3-49
Irreversible and Irretrievable Commitments of Resources..... 3-50

C. NOISE..... 3-50
Scope of the Analysis..... 3-50
Affected Environment..... 3-51
Direct and Indirect Environmental Consequences..... 3-52
Cumulative Effects..... 3-55
Irreversible and Irretrievable Commitments of Resources..... 3-56

D. SOCIAL AND ECONOMIC RESOURCES 3-56
Scope of the Analysis..... 3-56
Affected Environment..... 3-58
Direct and Indirect Environmental Consequences..... 3-65
Cumulative Effects..... 3-70
Irreversible and Irretrievable Commitments of Resources..... 3-71

E. CULTURAL RESOURCES..... 3-71
Scope of the Analysis..... 3-71
Affected Environment..... 3-72
Direct and Indirect Environmental Consequences..... 3-76
Cumulative Effects..... 3-77
Irreversible and Irretrievable Commitments of Resources..... 3-77

F. TRAFFIC 3-78
Scope of the Analysis..... 3-78
Affected Environment..... 3-78
Direct and Indirect Environmental Consequences..... 3-84
Cumulative Effects..... 3-88
Irreversible and Irretrievable Commitments of Resources..... 3-89

G. AIR QUALITY 3-90
Scope of the Analysis..... 3-90
Regulatory Direction..... 3-90
Affected Environment..... 3-92
Direct and Indirect Environmental Consequences..... 3-95
Cumulative Effects..... 3-97
Irreversible and Irretrievable Commitments of Resources..... 3-98

H. CLIMATE CHANGE 3-98
Scope of the Analysis..... 3-98
Affected Environment..... 3-99
Direct and Indirect Environmental Consequences..... 3-100
Cumulative Effects..... 3-102
Irreversible and Irretrievable Commitments of Resources..... 3-102

I. BOTANY 3-103
Scope of the Analysis..... 3-103
Affected Environment..... 3-103
Direct and Indirect Environmental Consequences..... 3-110
Cumulative Effects..... 3-115
Irreversible and Irretrievable Commitments of Resources..... 3-116

J. FOREST HEALTH 3-116
Scope of the Analysis..... 3-116
Affected Environment..... 3-116
Direct and Indirect Environmental Consequences..... 3-121
Cumulative Effects..... 3-123
Irreversible and Irretrievable Commitments of Resources..... 3-124

K. FISH AND WILDLIFE 3-125
Scope of the Analysis..... 3-125
Affected Environment..... 3-125

	<i>Direct and Indirect Environmental Consequences</i>	3-138
	<i>Cumulative Effects</i>	3-151
	<i>Irreversible and Irretrievable Commitments of Resources</i>	3-153
L.	SOILS AND GEOLOGY	3-153
	<i>Scope of the Analysis</i>	3-153
	<i>Forest Plan Direction</i>	3-153
	<i>Affected Environment</i>	3-154
	<i>Direct and Indirect Environmental Consequences</i>	3-158
	<i>Cumulative Effects</i>	3-166
	<i>Irreversible and Irretrievable Commitments of Resources</i>	3-168
M.	WATERSHED	3-169
	<i>Scope of the Analysis</i>	3-169
	<i>Forest Plan Direction</i>	3-169
	<i>Affected Environment</i>	3-171
	<i>Direct and Indirect Environmental Consequences</i>	3-181
	<i>Cumulative Effects</i>	3-189
	<i>Irreversible and Irretrievable Commitments of Resources</i>	3-192
N.	WETLANDS	3-192
	<i>Scope of the Analysis</i>	3-192
	<i>Forest Plan Direction</i>	3-193
	<i>Executive Order 11990</i>	3-193
	<i>Affected Environment</i>	3-194
	<i>Direct and Indirect Environmental Consequences</i>	3-196
	<i>Cumulative Effects</i>	3-197
	<i>Irreversible and Irretrievable Commitments of Resources</i>	3-198
4.	CONSULTATION AND COORDINATION	4-1
A.	PREPARERS	4-1
	<i>Forest Service Team</i>	4-1
	<i>Consultant Team</i>	4-1
B.	AGENCIES, ORGANIZATIONS, TRIBAL GOVERNMENTS, AND PERSONS CONTACTED.....	4-3
	<i>Federal Government</i>	4-3
	<i>Tribal Government</i>	4-3
	<i>State Government</i>	4-3
	<i>Local Government</i>	4-3
	<i>Local Media</i>	4-3
	<i>Other Organizations</i>	4-4
	<i>Individuals Who Commented During Scoping or Who Have Participated in the NEPA Process</i>	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 3	
7.	GLOSSARY	7-1
8.	INDEX	8-1
APPENDICES		
	Appendix A: Cumulative Effects Projects	
	Appendix B: Forest Service Manual 2343 Screening Report	

LIST OF TABLES

Table 2-1: Proposed Trail Specifications.....	2-3
Table 2-2: Project Design Criteria.....	2-9
Table 2-3: Comparison of Alternatives.....	2-15
Table 2-4: Summary Comparison of Direct and Indirect Environmental Consequences.....	2-16
Table 3A-1: Existing Mountain Biking Trail Specifications.....	3-5
Table 3A-2: Mountain Biking Trails/Ability Level Distribution – Existing Conditions.....	3-6
Table 3A-3: Existing Hiking Trail Specifications.....	3-7
Table 3A-4: Hiking Trails/Ability Level Distribution – Existing Conditions.....	3-8
Table 3A-5: Season and Hours of Operation – Alternative 2.....	3-13
Table 3A-6: Trail Specifications – Alternative 2.....	3-14
Table 3A-7: Mountain Biking Trails/Ability Level Distribution – Alternative 2.....	3-15
Table 3A-8: Hiking Trail Specifications – Alternative 2.....	3-16
Table 3A-9: Guest Distribution – Alternative 2.....	3-24
Table 3A-10: Season and Hours of Operation – Alternative 3.....	3-27
Table 3D-1: Snowmass Baseline Employment.....	3-59
Table 3D-2: Snowmass Baseline Employment By Season.....	3-59
Table 3D-3: Baseline Impact of Winter Visitation at Snowmass.....	3-60
Table 3D-4: Baseline Impact of Summer Visitation at Snowmass.....	3-61
Table 3D-5: Race Within Pitkin County (2014).....	3-62
Table 3D-6: Pitkin County Labor Force, 2011–2016.....	3-63
Table 3D-7: Pitkin County Median Household Income and Percentage of Population below the Poverty Level...	3-64
Table 3D-8: Impact of Summer Visitation at Snowmass– Alternative 2.....	3-68
Table 3D-9: Impact of Construction – Alternative 2.....	3-68
Table 3D-10: Impact of Summer Visitation at Snowmass– Alternative 3.....	3-69
Table 3D-11: Impact of Construction – Alternative 3.....	3-70
Table 3F-1: Peak Hours.....	3-81
Table 3F-2: ADT on Brush Creek and Owl Creek Roads.....	3-82
Table 3F-3: Existing Vehicle Trips Due to Summer Visitation.....	3-83
Table 3F-4: Existing Vehicle Trips Due to Summer Employees.....	3-83
Table 3F-5: Vehicle Trips – Alternative 1.....	3-84
Table 3F-6: Vehicle Trips Due to Summer Visitation – Alternative 2.....	3-85
Table 3F-7: Employee Vehicle Trips – Alternative 2.....	3-85
Table 3F-8: Construction Trips for Tree and Debris Removal – Alternatives 2 and 3.....	3-87
Table 3G-1: Primary Forms of the NAAQS for Selected Criteria Pollutants.....	3-94
Table 3G-2: On-Road and Non-Road Mobile Emission Sources in Tons Per Day.....	3-96
Table 3I-1: Federally Listed Plants Considered in Analysis.....	3-104
Table 3I-2: WRNF Region 2 Sensitive Plant Species.....	3-105
Table 3I-3: Summary of Determinations for TES Plant Species.....	3-112
Table 3I-4: Impact Summary for SOLC – Alternative 2.....	3-113
Table 3I-5: Impact Summary for SOLC – Alternative 3.....	3-114
Table 3J-1: Non-Native Plants and Invasive Weeds.....	3-119
Table 3J-2: Disturbance by Vegetation Type – Alternative 2.....	3-122
Table 3J-3: Disturbance by Vegetation Type – Alternative 3.....	3-123
Table 3K-1: Threatened, Endangered, and Proposed Wildlife Species.....	3-126
Table 3K-2: Region 2 Sensitive Wildlife Species.....	3-130
Table 3K-3: USFWS Birds of Conservation Concern.....	3-135
Table 3K-4: Snowmass Water Depletion.....	3-141
Table 3K-5: Region 2 Sensitive Wildlife Species and Determination Summary.....	3-143
Table 3L-1: Soils Guideline 1 – Ground Cover Requirements.....	3-153
Table 3L-2: General Characteristics of Mapped Soil Units.....	3-156
Table 3L-3: Project Disturbance by Soil Map Unit.....	3-161
Table 3L-4: Permanent Disturbances by Project Component.....	3-164
Table 3M-1: Study Watersheds – Comparison of Baseline and Existing Conditions.....	3-174

Table 3M-2: WRENSS Model Output for Baseline and Existing Conditions – Average Precipitation and Temperature	3-175
Table 3M-3: Stream Health Classes for Attainment of Forest Plan Standards (WCPH).....	3-176
Table 3M-4: WIZ Forested Areas – Baseline vs. Existing Conditions.....	3-179
Table 3M-5: Connected Roads within the Study Watersheds – Existing Conditions.....	3-180
Table 3M-6: Connected Disturbed Areas within the Study Watersheds – Existing Conditions.....	3-180
Table 3M-7: Projects per Watershed – Alternative 2	3-182
Table 3M-8: Comparison of Forested Areas – Existing vs. Alternative 2 Conditions	3-182
Table 3M-9: Estimated Changes to Annual Yield – Alternative 2	3-183
Table 3M-10: Estimated Changes to Peak Runoff – Alternative 2.....	3-183
Table 3M-11: Alternative 3 Projects per Watershed	3-186
Table 3M-12: Comparison of Forested Areas – Existing vs. Alternative 3 Conditions	3-186
Table 3M-13: Comparison of Potential Tree Removal and Terrain Grading – Alternative 2 vs. Alternative 3	3-187
Table 3M-14: Estimated Changes to Annual Yield – Alternative 3	3-187
Table 3M-15: Estimated Changes to Peak Runoff – Alternative 3.....	3-188
Table 3M-16: Watershed Condition Indicators	3-191

LIST OF ILLUSTRATIONS

Figure 3F-1: Snowmass Road Network.....	3-79
Figure 3K-1: Vegetation Cover Types.....	3-129
Figure 3L-1: WRNF Forest Service Stability and Map Units	3-160
Figure 3M-1: Water Resources.....	3-173

LIST OF ACRONYMS

AADT	Average Annual Daily Traffic	MOVES	Motor Vehicle Emission Simulator
ADT	Average Daily Traffic	NAAQS	National Ambient Air Quality Standards
APCHA	Aspen/Pitkin County Housing Authority	NEPA	National Environmental Policy Act
APE	Area of Potential Effect	NFS	National Forest System
AQRV	Air Quality Related Value	NHPA	National Historic Preservation Act
ASC	Aspen Skiing Company	NRHP	National Register of Historic Places
AVO	Average Vehicle Occupancy	NOI	Notice of Intent
BEIG	Built Environment Image Guide	OAHP	Office of Archaeology and Historic Preservation
BMP	Best Management Practice	PDC	Project Design Criteria
CAA	Clean Air Act	PEM	Palustrine Emergent
CDA	Connected Disturbed Area	PSD	Prevention of Significant Deterioration
CDOT	Colorado Department of Transportation	PSS	Palustrine Scrub-Shrub
CDPHE	Colorado Department of Public Health and Environment	PTES	Proposed, Threatened or Endangered and/or Sensitive
CEQ	Council on Environmental Quality	PUD	Planned Unit Development
CFR	Code of Federal Regulations	RFTA	Roaring Fork Transportation Authority
CFS	Cubic Feet per Second	ROD	Record of Decision
CO ₂	Carbon Dioxide	SAROEAA	Ski Area Recreational Opportunity Enhancement Act of 2011
CPW	Colorado Parks and Wildlife	SHPO	State Historic Preservation Officer
CRA	Colorado Roadless Area	SIO	Scenic Integrity Objective
CSCUSA	Colorado Ski Country USA	SMMPD	Snowmass Mountain Master Development Plan
CWA	Clean Water Act	SMS	Scenery Management System
DAU	Data Analysis Unit	SOLC	Species of Local Concern
DEIS	Draft Environmental Impact Statement	SUP	Special Use Permit
EA	Environmental Assessment	SVC	Species of Viability Concern
EIS	Environmental Impact Statement	TES	Threatened, Endangered, and Sensitive
EPA	Environmental Protection Agency	TMC	Turning Movement Counts
EO	Executive Order	TTF	Technical Trail Feature
ESA	Endangered Species Act	U.S.	United States
FACWet	Functional Assessment of Colorado Wetlands	USACE	U.S. Army Corps of Engineers
FEIS	Final Environmental Impact Statement	USDA	United States Department of Agriculture
FSH	Forest Service Handbook	USDOT	U.S. Department of Transportation
FSM	Forest Service Manual	USFWS	U.S. Fish and Wildlife Service
FTE	Full-Time-Equivalent	VMS	Visual Management System
GHG	Greenhouse Gas	VMT	Vehicle Miles Traveled
GIS	Geographic Information System	VPH	Vehicles per Hour
GRP	Gross Regional Product	WCPH	Watershed Conservation Practices Handbook
ID Team	Interdisciplinary Team	WIZ	Water Influence Zone
IMPROVE	Interagency Monitoring of Protected Visual Environments	WRENSS	Water Resources Evaluation of Non-Point Silvicultural Sources
IPaC	Information, Planning, and Conservation	WRNF	White River National Forest
LAU	Lynx Analysis Unit	XC	Cross-Country
LOS	Level of Service		
LWD	Large Woody Debris		
MAII	May Adversely Impact Individuals		
MDP	Master Development Plan		
MOU	Memorandum of Understanding		

Chapter 1

Introduction

This page intentionally left blank.

1. 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 United States Forest Service (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 another action alternative.

Additionally, it is intended to ensure that planning considers the environmental and social values of the study area and that potential resource conflicts are minimized or avoided. The document is organized into eight chapters, plus two appendices:

- **Chapter 1 – Introduction:** 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 (Alternative 1), the Proposed Action (Alternative 2), and Alternative 3 that are analyzed in detail in this document. 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, 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 and (B) Forest Service Screening Report.

Additional documentation, including more detailed analyses of study area resources, may be found in the project file located at the Aspen-Sopris Ranger District office of the White River National Forest (WRNF).

A. BACKGROUND

Snowmass Ski Area (Snowmass) is located on the WRNF, approximately 5 miles west-northwest of Aspen, Colorado (refer to the Vicinity Map). Snowmass operates under a special use permit (SUP) administered by the Aspen-Sopris Ranger District of the WRNF. The *2002 White River National Forest Land and Resource Management Plan* (Forest Plan) provides general standards and guidelines for the operation of Snowmass regarding its activities and operations on National Forest System (NFS) lands. The ski area's special use permit (SUP) and associated summer and winter operating plans, as well as other resource management documents, provide more specific guidance for annual winter and summer ski area operations and projects.

According to the terms of its SUP, Aspen Skiing Company (ASC) is required to prepare a Master Development Plan (MDP) to identify management direction and opportunities for future four-season management of the resort on NFS lands. The current Master Development Plan—the *2015 Snowmass Mountain Master Development Plan* (2015 SMMDP)—was accepted by the Forest Service in August 2015. Forest Service acceptance of the 2015 SMMDP does not constitute approval for individual projects. The implementation of individual projects identified in the 2015 SMMDP is contingent upon subsequent site-specific analysis/approval in accordance with the NEPA process.

This DEIS analyzes several projects identified under the *Summer and Multi-Season Activities and Facilities Upgrade Plan* of the 2015 SMMDP, including: the addition of mountain biking and hiking trails located primarily in the Elk Camp and lower Alpine Springs areas; a mountain coaster in the Elk Camp area; a zip line canopy tour starting in the Elk Camp Meadows area; a zip line proposed to begin under the Elk Camp Gondola across the *Funnel* ski trail; a ropes challenge course in the vicinity of Elk Camp Meadows; a climbing wall adjacent to the Elk Camp Restaurant complex; and multi-purpose gathering sites in and around the Elk Camp area. Section B – Alternatives Considered in Detail in Chapter 2 provides a full description of this project (refer to Alternative 2 – Proposed Action). Contingent upon the NEPA process, implementation of any approved projects could potentially begin as early as summer 2017.

B. RELATIONSHIP TO PREVIOUS ANALYSES AND APPROVALS

This DEIS is consistent with and incorporates by reference several documents that are related to the management of Snowmass on NFS lands, including:¹

- 2002 White River Land and Resource Management Plan Final Environmental Impact Statement and Record of Decision
- 2015 Snowmass Mountain Master Development Plan
- 2014 Snowmass Ski Trail Enhancement and High Alpine Lift Replacement Environmental Assessment
- 2014 Snowmass Ski Area Winter Evening Activities Project Decision Memo
- 2012 Snowmass Mountain Biking Master Development Plan
- 2011 Snowmass Summer Trails Environmental Assessment

C. PURPOSE AND NEED FOR THE PROPOSED ACTION

The WRNF has prepared this DEIS in response to ASC's request to implement projects from their accepted 2015 SMMDP, which extensively details a strategy to expand the multi-season recreation opportunities at Snowmass. The Purpose and Need is described in the following text.

PURPOSE AND NEED

Interest in summer outdoor recreation at ski areas has grown nationwide in recent years, and is particularly visible in Colorado. Summer recreation activities have evolved to include a significant variety of opportunities and user experiences. Likewise, recreational use in the National Forests has evolved beyond the traditional activities and solitude-seeking experiences such as hunting, fishing, camping, or hiking.

Snowmass has been offering summer recreation opportunities since the 1990s and has utilized the Elk Camp area as the designated hub for these activities since 2009. These opportunities primarily include dispersed activities; specifically lift-served hiking and mountain biking via the Elk Camp Gondola and Chairlift, as well as activities on multiple-use trails on the western side of the ski area. While these programs have proven to be popular and well received by guests, the activities at Snowmass are limited to visitors who have the physical ability and skill set that allows them to participate.

Snowmass desires to offer more developed recreational opportunities that do not require a special level of skills or experience, which would enable a wider spectrum of guests to engage in adventure-based experiences, as well as encourage new users to visit and experience NFS lands.

¹ These documents are part of the project file for this DEIS and are available for review at the Aspen-Sopris Ranger District.

Currently, there is a lack of recreational opportunities at Snowmass that provide:

- Adventure-based experiences that require little specialized knowledge, skills, equipment or familiarity with the mountain environment—elements which can be a barrier for visitors (e.g., families, the elderly/aging, or those with disabilities) desiring to engage in outdoor activities;
- Sufficient supply and variety of mountain biking trails serving a wide range of ability levels;
- Developed settings for educational and interpretive programs and events; and
- Activity-based interaction with a forested, mountain environment in a controlled setting, offering an opportunity for users to learn about nature.

There is a need for a broad and diverse mix of multi-season recreational activities that collectively provide the public with a range of outdoor experiences from passive to active, intimate to interactive, and serve a range of personal interests, skills and abilities among guests.

D. SUMMARY OF THE PROPOSED ACTION

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 all, portions of, or alternatives to the Proposed Action will be approved for implementation on NFS lands within the Snowmass SUP area.

A summary of the Proposed Action is provided here, with a detailed description presented in Chapter 2. Project components are also detailed on Figure 2: Alternative 2 – Proposed Action.

ALTERNATIVE 2 – PROPOSED ACTION

The Proposed Action includes the addition of the following multi-season recreation opportunities:

- Ten new mountain biking trails (approximately 12.9 miles) and a skills park that includes three new mountain biking trails (approximately 1.2 miles);
- Re-routing of the existing *Vista*, *Sierra Loop* and *Rabbit Run* hiking trails (approximately 2.4 miles) and re-routing of the existing *Vapor* biking trail (approximately 0.1 mile);
- A mountain coaster in the forested area between *Gunner's View* and *Sandy Park* ski trails near Elk Camp;
- A zip line canopy tour spanning from Elk Camp Meadows down to the *Slider* ski trail near the Elk Camp service road;
- A zip line beginning under the Elk Camp Gondola across the *Funnel* ski trail from the zip line canopy tour's point of termination and ending near the Gondola Turn Station;

- A ropes challenge course in the Elk Camp Meadows area, just uphill of the lower Magic Carpet in a forested area that is not currently skied;
- A climbing wall on the skier's right side of the *Bull Run* ski trail, across the slope from the Elk Camp Restaurant within the former Café Suzanne Restaurant site; and
- Three multi-purpose activity areas that would be designated, landscaped and utilized to provide areas for guests to meet for special events, temporary activities, and scenic viewing. The proposed locations of the multi-purpose activity areas are Elk Camp Summit, Rayburn's Pond, and Elk Camp Meadows.
- The areas surrounding the top of the Elk Camp Gondola and the Elk Camp Restaurant would be improved by developing and defining access pathways and rest areas, rehabilitating disturbed areas, incorporating signage, increasing vegetative growth, and adding landscaping features.

E. 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, environmental impact statement (EIS) materials, and/or consulted prior to and throughout the NEPA process.

F. PUBLIC INVOLVEMENT

A scoping notice, dated March 25, 2016, was mailed to 81 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 two illustrative maps. This notice was specifically designed to elicit comments, concerns, and issues pertaining to the proposal. A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on April 1, 2016. Comments were accepted from the following sources: email, web submission, letter, public meetings, fax, and phone. During the scoping period, the WRNF received 18 comment submittals.

All of the submittals were reviewed and comments were extracted and categorized by resource or topic. These comments were reviewed by the WRNF Interdisciplinary Team (ID Team) during and subsequent to the post-scoping ID Team meeting in July 2016. 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 (WRNF) concerns. Resource issues and indicators are identified herein.²

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

G. RELEVANT CHANGES TO THE PROPOSED ACTION SINCE PROJECT SCOPING

As stated above, the project was originally scoped, internally and externally, in 2016. 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 this DEIS and the analysis.

Modification to the Proposed Action: The Proposed Action described below differs from the WRNF's Proposed Action as identified in the Scoping Notice, dated March 25, 2016. Adjustments were made to the proposed projects in response to information gained during field visits to the study area. After further analysis of current and future operations, an alternate alignment was proposed for the zip line canopy tour that includes fewer towers and a shorter overall length than the original alignment depicted in the scoping notice. Modifications were also made to mountain biking and hiking trail alignments as newly available information required adjustments to trails in areas that were in close proximity to wetlands or streams. Modifications to alternatives that would reduce impacts are permitted per the United States Department of Agriculture (USDA) Forest Service Handbook (FSH).³ All changes in the Proposed Action are reflected in all resource analyses within this DEIS.

H. ISSUES ANALYZED AND ISSUES NOT WARRANTING FURTHER DOCUMENTATION

Based on the results of Forest Service specialist review and public scoping, the Forest Service identified specific areas of concern regarding proposed projects and classified them as either “*Issues Analyzed*” or “*Issues Not Warranting Further Documentation.*” *Issues Analyzed* may or may not warrant the generation of an alternative and will be analyzed in detail in this DEIS. *Issues Analyzed* in some cases can be addressed by PDC. *Issues Not Warranting Further Documentation* do not require further analysis for various reasons, and may be addressed through the application of PDC or mitigation measures.

Each issue below represents a concern expressed by Forest Service specialists, agencies, or members of the public.

ISSUES ANALYZED

Each of the following issue statements includes a list of indicators that 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.

³ USDA Forest Service, 2012b

Human Environment

Recreation

Proposed projects would impact recreational opportunities within the Snowmass SUP area. Additional trails and recreation opportunities should offer experiences that address the stated Purpose and Need, providing previously unavailable opportunities to meet guest expectations.

Analysis Area: Snowmass SUP area

Indicators:

- Quantitative analysis of existing and proposed multi-season recreation activities, including mileage and acreage of mountain biking trails by ability level and anticipated activity use per day
- Discussion of user/guest demand that currently exists in the area for multi-season recreation activities
- Discussion of guest circulation across the SUP area, including how many guests, where they would be and when the guests would be in certain locations
- Discussion of potential conflict between current and new users, particularly hiking traffic as it relates to mountain biking traffic
- Quantitative analysis of existing guest service space and seating and proposed demand
- Discussion of season of use for each activity
- Discussion of how the proposed projects would incrementally add to the amount of developed multi-season recreation opportunities in the vicinity
- Discussion of the proposed projects' effect on existing recreation opportunities and disclosure of any conflicts
- Discussion of the proposed projects' consistency with the Ski Area Recreational Opportunity Enhancement Act of 2011 (SAROE)

Scenery

Proposed projects within the Snowmass SUP area may be visible from the Town of Snowmass Village and/or within the existing ski area. In particular, the proposed zip line bottom station on private lands may create scenery impacts to adjacent landowners by detracting from the existing scenic values.

Analysis Area: Snowmass SUP area and adjacent NFS and private lands

Indicators:

- Discussion of the existing scenic integrity in and around the Snowmass SUP area and potential changes to this condition
- Discussion of potential impacts of lights during nighttime events and activities

- Compliance with Forest Plan standards and guidelines for scenery management within the SUP area by meeting Scenic Integrity Objectives (SIO)
- Compliance with Built Environment Image Guide (BEIG) guidance and with Forest Plan scenery guidance for materials, colors and reflectivity
- Narrative description of how proposed projects imitate landscape character
- Compliance with the Town of Snowmass Village scenery and building code regulations for projects located on private lands

Noise

Construction of the proposed projects, including timber removal, would affect noise levels in the Snowmass SUP area and adjacent areas. Additionally, operation and utilization of the zip line, multi-use activity areas (e.g., concerts and special events), and other proposed projects would contribute incrementally to noise levels in the in the Snowmass SUP area and adjacent areas.

Analysis Area: Snowmass SUP area and adjacent NFS and private lands

Indicators:

- Narrative discussion of existing noise levels
- Narrative description of potential noise-related impacts associated with construction, operation and utilization of the zip line, multi-use activity areas (e.g., concerts and special events) and other proposed projects

Social and Economic Resources

Implementation of the proposed projects could potentially alter certain socioeconomic characteristics of Pitkin County or the Town of Snowmass Village due to additional employees and associated impacts within the community.

Analysis Area: Pitkin County, Colorado

Indicators:

- Potential effects to socioeconomic indicators in Pitkin County, including: population, employment (part-time seasonal employment versus full-time equivalents), Town/County tax revenue, housing, affordable housing, public transportation and visitor spending
- Narrative discussion of existing summer tourism levels and potential increases as a result of the proposed projects
- Qualitative and quantitative discussion of available housing, including designated employee housing, in Pitkin County during both summer and winter seasons
- Disclosure of compliance with Executive Order (EO) 12898, Environmental Justice

Cultural Resources

Implementation of proposed projects and associated ground disturbance may affect previously unidentified cultural and heritage resources.

Analysis Area: Snowmass SUP area (Area of Potential Effect)

Indicators

- Survey and document presence or absence of identified cultural resources
- Documentation of impacts to any sites that are potentially-eligible for listing on the National Register of Historic Places (NRHP)

Traffic

Proposed projects may generate measurable increases in daily/seasonal visitation, thereby affecting traffic movement and volumes within the Town of Snowmass Village, on Highway 82 and on construction/maintenance access roads proximate to the ski area.

Analysis Area: Primary roadway networks accessing Snowmass and parking areas

Indicators:

- Historic and projected traffic counts for roadway networks accessing Snowmass for the summer operating season (e.g., Highway 82 between Glenwood Springs and Snowmass from commuting summer employees and between Aspen and Snowmass from summer visitation)
- Comparison of anticipated traffic volumes with existing traffic volumes and the design capacities of roadway networks accessing Snowmass
- Quantification of existing and proposed parking capacity for day and destination visitors within Snowmass parking lots
- Discussion of potential impacts from construction traffic and construction access routes

Biological Environment

Air Quality

Construction and operation of the proposed projects (including short-term construction-related activity, burning, and transportation related to timber removal) could result in localized impacts to air quality.

Analysis Area: Pitkin County, Colorado

Indicators:

- Narrative description of existing air quality, including population centers and Class I and Class II airsheds in the vicinity
- Compliance with local, state and federal regulations regarding air quality

- Qualitative discussion of potential impacts to National Ambient Air Quality Standards (NAAQS) and air quality related values (AQRVs)
- Estimated daily increase in number of vehicles associated with the increased annual visitation
- Estimated traffic and emissions associated with construction of the proposed project, including timber removal
- Narrative discussion of timber removal techniques (e.g., burning) and their potential effect on air quality in the region

Climate Change

Climate change has potential to affect, and be affected by, the proposed projects. Construction and operation of the proposed projects (including short-term construction-related activity, burning, and transportation related to timber removal) could result in greenhouse gas (GHG) emissions and other contributions to climate change.

Analysis Area: Pitkin County, Colorado

Indicators:

- Discussion of the impact of climate change on the operations of Snowmass and the proposed projects
- Qualitative discussion of potential GHG emissions associated with the proposed projects, during both construction and operation, and potential contributions to climate change
- Discussion of climate change and ongoing and reasonably foreseeable climate change impacts relevant to Snowmass SUP area, based on United States (U.S.) Global Change Research Program assessments

Botany

Ground disturbance associated with construction and operation of the proposed projects could affect plant communities, including threatened, endangered, and sensitive (TES) species, WRNF species of local concern (SOLC), and invasive plant species.

Analysis Area: Snowmass SUP area

Indicators:

- Identification and disclosure of impacts to any federally listed threatened and endangered species, Forest Service Region 2 sensitive species, and WRNF SOLC

Forest Health

Overstory vegetation would be altered as a result of the proposed projects. Additionally, construction and operation of the proposed projects has the potential to affect the presence of weeds.

Analysis Area: Snowmass SUP area

Indicators:

- Quantification (acreage) of proposed ground disturbance and overstory vegetation removal effects by species/vegetation type
- Identify PDC and Best Management Practices (BMPs) to avoid the spread of noxious or other undesirable weed species and to manage existing populations toward eradication or acceptable levels when eradication is not realistic
- Disclosure and analysis of WRNF noxious weed design features

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 Region 2 sensitive (PTES) fish and wildlife species, migratory birds, and SOLC. In particular, the proposed mountain biking trails within the relatively undisturbed forested block adjacent the Elk Camp area could impact habitat values and connectivity for species utilizing this area.

Analysis Area: Snowmass SUP area and adjacent NFS lands

Indicators:

- Identify federally listed, Forest Service sensitive wildlife species, and migratory birds potentially present in the analysis area and disclose the presence or absence of these species through field studies
- 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
- Describe the existing environmental baseline of human use by quantifying current use (operating lifts, mountain biking and hiking trails, horseback riding trails, etc.) and compare to proposed conditions
- Disclosure of effects to terrestrial PTES and migratory birds
- Identification of and effects within immediate and adjacent Lynx Analysis Units (LAUs)
- Quantification and qualification of compensatory mitigation for impacts to lynx or other relevant species habitat, if necessary

- Identification of impacts to elk and mule deer summer range habitat with particular focus on the impacts to reproductive habitat. Describe the possible timing conflicts between deer/elk movement corridors/summer concentration areas with summer operating season. Specifically outline seasonal timing restrictions for affected species with listed status.
- Identification of impacts to avian species, in particular to the construction and operation of the zip line canopy tour and zip line
- Discussion of the proposed projects' potential to cumulatively impact habitat connectivity within the Snowmass SUP and surrounding areas
- Identification of impacts to aquatic species from effects to water quality and stream health
- Discussion of the operational season for the proposed projects
- Identification of potential impacts from proposed nighttime activities

Soils and Geology

Ground disturbance, including tree clearing and grading, associated with construction and operation of proposed projects has potential to increase erosion/soil compaction and lead to a loss of soil organic matter. Proposed project components that could result in unnecessary or excessive ground disturbance should be avoided.

Analysis Area: Snowmass SUP area

Indicators:

- Identification and estimated quantification (acres) of temporary and permanent ground disturbance according to high/moderate/low erodibility soils classes and slope stability concerns, in particular to the cut and fill process needed for the mountain biking trails
- Discussion of soil conditions and baseline inventory of soil organic matter
- Analysis of increased erosion hazard due to temporary and permanent ground disturbance
- Inventory of erodible soils by soil map unit
- Digitization of bare ground/low vegetation cover areas within SUP boundary

Watershed

Implementation of proposed projects has the potential to affect stream and riparian health. In particular, stream crossings by mountain biking and hiking trails may have an increased potential to affect stream and riparian health and should be minimized.

Analysis Area: Snowmass SUP area, including streams tributary to Brush Creek in the Roaring Fork River Basin

Indicators:

- Anticipated temporary and permanent changes in water yield (acre feet) and peak flows (cubic feet per second [cfs]), and subsequent watershed effects
- Discussion of existing stream health conditions and watershed influence zone (WIZ) impacts, within the context of the following stream health metrics: bank stability, fine sediment, residual pool depth, wood frequency, and macroinvertebrates. Evaluation of compliance with Watershed Conservation Practices Handbook (WCPH) and Forest Plan requirements
- Quantification of stream health through surveys that classify each channel and channel sensitivity to disturbance
- Qualitative and quantitative discussion of existing surface drainage conditions within the context of Forest Plan Standards for Management Area 8.25
- Quantification and discussion of existing drainage concerns and treatment areas, including areas of rilling and gullying
- Development and analysis of drainage management measures to maintain or improve stream health
- Quantity (acres) of impacts to the WIZ
- Quantity (acres) of Connected Disturbed Area (CDA)
- Quantification of channel network extension (length of connected channel)
- Quantification (acres) of ground disturbing activities located on highly erodible soils as it pertains to stream health
- Identification of any Clean Water Act (CWA) §303(d) impaired or threatened waterbody segments

Wetlands

Identified wetlands and other waters of the U.S. could be temporarily and/or permanently affected by construction and implementation of proposed projects. Minimization of wetland crossings should be considered for mountain biking and hiking trails.

Study Area: Snowmass SUP area in areas proximate to proposed projects

Indicators:

- Quantification of wetlands and other waters of the U.S. proximate to proposed projects (acres/linear feet)
- Disclosure of wetland functions and values
- Narrative description of wetland communities, classifications (using the Cowardin System) and disclosure of anticipated temporary and/or permanent impacts (acres/linear feet)
- Quantify number of stream and wetland crossings from proposed projects and estimate length of boardwalk needed to span streams and wetlands
- Description of compliance with EO 11990, Protection of Wetlands

ISSUES NOT WARRANTING FURTHER DOCUMENTATION

Special Designations

Roadless Areas

The 2012 Colorado Roadless Rule eliminated the roadless designation for 8,300 acres inside ski area SUP boundaries or lands allocated in forest plans to ski area development across the state. As a result, there is no roadless designation for land inside the existing Snowmass SUP area, which is adjacent the Burnt Mountain Colorado Roadless Area (CRA). As discussed in Chapter 2, all of the proposed projects are contained within the existing SUP area and would not extend into or affect the designation of adjacent lands. Therefore, the proposed projects would not impact the Burnt Mountain CRA, as there is no expansion beyond the existing SUP boundary, and a detailed analysis in this DEIS is not necessary.

Wilderness Areas

The Maroon Bells-Snowmass Wilderness area abuts the south side of the Snowmass SUP area. All of the proposed projects are contained within the existing SUP boundary and would not extend into the designated wilderness area. Furthermore, the projects contained within the SUP area would not impact the current designation of the Maroon Bells-Snowmass Wilderness. Project components capable of impacting the status of the Maroon Bells-Snowmass Wilderness area will be reconfigured to avoid such impacts. Thus, the proposed projects would not affect the Maroon Bells-Snowmass Wilderness area and a detailed analysis in this DEIS is not necessary.

Environmental Justice

In 1994 President Clinton issued EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, to ensure such populations are not subject to disproportionately high levels of environmental risk. EO 12898 provides that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” Further, EO 12898 makes it clear that its provisions apply fully to programs involving Native Americans.

The 2015 census data was reviewed for Pitkin County. Racial diversity in the community is approximately 87 percent white and 10 percent Hispanic or Latino. Other races contributing approximately 3 percent or less are American Indian and Alaska Native, Black or African American, Native Hawaiian and Other Pacific Islander, and Asian. No disproportionately high or adverse human health or environmental effects on minority and low-income populations from the proposed projects are anticipated.

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. 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 analysis area is spatially different from the Wildlife analysis area). The project area is specific to the project location and is related to area of direct impacts. Contingent upon approval, construction of proposed projects could begin as early as 2017. It is important to note that implementation of the projects could occur jointly, individually, and/or at different points in time.

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.⁴

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.

⁴ 40 CFR 1508.25

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. Mitigation measures (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.

I. CONSISTENCY WITH FOREST SERVICE POLICY

WRNF LAND AND RESOURCE MANAGEMENT PLAN

Snowmass' operations carried out on NFS lands must comply with management direction provided in the Forest Plan. The Forest Plan includes 33 separate Management Areas for different portions of the Forest based on ecological conditions, historic development and anticipated future conditions. All components of the alternatives fall within the 8.25 Management Area – Ski Areas (Existing and Potential), which directs:

“Facilities may be intensively used throughout the year to satisfy a variety of seasonal recreational demands...Protection of scenic values is emphasized through application of basic landscape aesthetics and design principles, integrated with forest management and development objectives...Transportation systems provide convenient access to National Forest System lands in key portal locations with adequate public parking, base facilities, and community infrastructure. Base areas that serve as entrance portals are designed as gateways to public lands. They are architecturally designed to blend with the forest setting and contain convenient facilities and services that provide for the needs of forest visitors.”⁵

⁵ USDA Forest Service, 2002a

As part of this analysis, the alternatives and Purpose and Need were reviewed to determine consistency with the forest-wide goals and objectives, as well as the specific standards and guidelines for Management Area 8.25. The action alternatives were compared against pertinent forest-wide and Management Area standards and guidelines. The standards and guidelines are analyzed in Chapter 3.

The Purpose and Need is consistent with the Forest Plan General Recreation Standards and Guidelines. The Forest Plan acknowledges an increasing demand for recreation on the WRNF, and states:

“Satisfy demand for recreation services that are supplied by private-sector permittees at authorized sites or areas before new sites or areas are permitted.”⁶

The theme of Management Area 8.25 is discussed in the Forest Plan and states:

“Ski areas are developed and operated by the private sector to provide opportunities for intensively managed outdoor recreation activities during all seasons of the year. This management area also includes areas with potential for future development.”⁷

2011 SKI AREA RECREATIONAL OPPORTUNITY ENHANCEMENT ACT

Most of the 122 ski areas operating on NFS lands in the U.S. are authorized under special use permits per the National Forest Ski Area Permit Act of 1986 (the 1986 Act).⁸ As originally enacted, the 1986 Act authorized Nordic and alpine skiing at ski areas on NFS lands. In November 2011 Congress enacted SAROEA, which amended the 1986 Act to clarify the authority of the Secretary of Agriculture regarding additional recreational uses of NFS lands subject to ski area permits, and for other purposes.

The purpose of SAROEA was to amend the 1986 Act in two ways:

1. To enable snow sports (other than Nordic and alpine skiing) to be permitted on NFS lands subject to ski area permits issued by the Secretary of Agriculture under section 3 of the 1986 Act; and
2. To clarify the authority of the Secretary of Agriculture to permit appropriate additional seasonal or year-round recreational activities and facilities on NFS lands subject to ski area permits issued by the Secretary of Agriculture under section 3 of the 1986 Act.

SAROEA amended the 1986 Act by *striking* specific references to “Nordic and alpine” ski areas, facilities, operations and purposes and *inserting* more general language regarding “ski areas and associated facilities” and “skiing and other snow sports and recreational uses authorized by this Act.” However, for the purposes of this analysis, the most important amendment to the 1986 Act is an insertion to section 3 regarding “Other Recreational Uses.”

⁶ Ibid.

⁷ Ibid.

⁸ 16 USC 497

Per SAROEA, subject to the terms of a ski area permit, the Secretary may authorize a ski area permittee to provide such other seasonal or year-round natural resource-based recreational activities and associated facilities (in addition to skiing and other snow sports) on NFS lands subject to a ski area permit as the Secretary determines to be appropriate.

Importantly, each activity and facility authorized by the Secretary shall:

- Encourage outdoor recreation and enjoyment of nature;
- To the extent practicable:
 - Harmonize with the natural environment of the NFS lands on which the activity or facility is located; and
 - Be located within the developed portions of the ski area;
- Be subject to such terms and conditions as the Secretary determines to be appropriate; and
- Be authorized in accordance with:
 - The applicable land and resource management plan; and
 - Applicable laws (including regulations).

Inclusions identified in SAROEA:

Activities and facilities that may, in appropriate circumstances, be authorized include:

- Zip lines;
- Mountain biking terrain parks and trails;
- Frisbee golf courses; and
- Ropes courses.

Exclusions identified in SAROEA:

Activities and facilities that are prohibited include:

- Tennis courts;
- Water slides and water parks;
- Swimming pools;
- Golf courses; and
- Amusement parks.

The Secretary may not authorize any activity or facility if the Secretary determines that the authorization would result in the primary recreational purpose of the ski area permit to be a purpose other than skiing and other snow sports.

FOREST SERVICE MANUAL 2343.14

On April 17, 2014, the Forest Service released its Final Directives for Additional Seasonal and Year-Round Recreation Activities at Ski Areas. Forest Service Manual (FSM) 2343.14 includes this final direction and criteria to help authorized officers determine whether proposals for these activities are consistent with SAROEA. FSM 2343.14(1) includes criteria for evaluating additional seasonal and year-round recreation activities and associated facilities that may be authorized at ski areas. These activities and associated facilities must:

- Not change the primary purpose of the ski area to other than snow sports;
- Encourage outdoor recreation and enjoyment of nature and provide natural resource-based recreation opportunities;
- To the extent practicable, be located within the portions of the ski area that are developed or that will be developed pursuant to the master development plan;
- Not exceed the level of development for snow sports and be consistent with the zoning established in the applicable master development plan;
- To the extent practicable, harmonize with the natural environment of the site where they would be located by:
 - Being visually consistent with or subordinate to the ski area's existing facilities, vegetation and landscape; and
 - Not requiring significant modifications to topography to facilitate construction or operations;
- Not compromise snow sports operations or functions; and
- Increase utilization of snow sports facilities and not require extensive new support facilities, such as parking lots, restaurants, and chairlifts.

FSM 2343.14(2) identifies seasonal or year-round recreation activities and associated facilities that may meet these criteria. FSM 2343.14(3) identifies seasonal or year-round recreation activities and associated facilities that may not be authorized. Additional seasonal and year-round recreation activities and associated facilities that are not specifically precluded in FSM 2343.14(3) will be evaluated case-by-case based on applicable regulations and directives. Appendix B of this DEIS analyzes the consistency of project elements with criteria outlined in FSM 2343.14 regarding the appropriateness of the multi-season recreation activities proposed at Snowmass.

J. DECISION TO BE MADE

Based on Forest Service and external public scoping, and evaluation of the context and intensity factors contained in 40 Code of Federal Regulations (CFR) 1508.27, the Forest Service determined that an EIS

would 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 final EIS, the Responsible Official, the Forest Supervisor for the WRNF, 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.

In compliance with FSH 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.

K. OTHER NECESSARY PERMITS, LICENSES, ENTITLEMENTS AND/OR CONSULTATION⁹

The Forest Service decision would apply only to NFS lands analyzed within this DEIS and would not apply to private property surrounding the SUP area or inholdings within SUP area. 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:

- U.S. Fish and Wildlife Service (USFWS), Endangered Species Act (ESA) Section 7 Consultation
- U.S. Army Corps of Engineers (USACE), CWA Section 404
- State of Colorado, Stormwater Management Plan
- State of Colorado, Burn Permit
- Town of Snowmass Village, Planned Unit Development (PUD) Amendment

⁹ Per 40 CFR 1502.25(b)

Chapter 2

Description of Alternatives

This page intentionally left blank.

2. DESCRIPTION OF ALTERNATIVES

A. INTRODUCTION

Chapter 2 describes the alternatives considered within this environmental analysis and briefly summarizes the environmental consequences anticipated to result with the implementation of each. As required by the CEQ, the alternatives considered are presented in comparative form.¹⁰ PDC and 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.¹¹ Both CEQ Regulations and FSH 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.¹²

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.

B. ALTERNATIVES CONSIDERED IN DETAIL

In addition to the Proposed Action, a second action alternative (Alternative 3) and the required No Action Alternative are analyzed in detail within this DEIS.

Subsequent to scoping, the Proposed Action was modified in relation to issues raised internally by the WRNF and externally by the public during the scoping process. Specifically, the alignments of the zip line canopy tour and various mountain biking and hiking trails were altered. Refer to Chapter 3, Section A – Recreation for more information.

ALTERNATIVE 1 – NO ACTION

As required by NEPA, a No Action Alternative has been included in this analysis for review alongside the action alternatives.¹³ By definition, the No Action Alternative represents a continuation of existing management practices without changes, additions, or upgrades to existing conditions as a result of this NEPA analysis.

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

¹⁰ 40 CFR 1502.14

¹¹ USDA Forest Service, 2012, Chapter 10, Section 12.33

¹² 40 CFR 1502.14(a)

¹³ 40 CFR 1502.14(d)

at Snowmass that have been previously-approved, but not yet implemented are analyzed in the Cumulative Effects sections of Chapter 3 and are detailed in Appendix A. The No Action Alternative is depicted in Figure 1.

ALTERNATIVE 2 – PROPOSED ACTION

These projects are designed to offer guests a diversified, appealing, and high-quality multi-season recreational experience that is consistent with the Forest Service direction of providing natural resource-based recreation. Providing these opportunities would encourage guests, families and youth to learn about the natural world and their National Forests. All components of the Proposed Action are depicted in Figure 2.

The proposal contains the following project elements:

- Mountain biking and hiking trails
- Mountain coaster
- Zip line canopy tour
- Zip line
- Ropes challenge course
- Climbing wall
- Multi-purpose activity areas
- Elk Camp site improvements

Operating Hours and Season

In addition to normal daily daytime operations, nighttime (after sunset) use would occur in both the summer and winter season. The mountain coaster is the only proposed activity that would include a lighting component for nighttime use.

Mountain Biking and Hiking Trails

Ten new mountain biking trails (approximately 12.9 miles) and a skills park including three new mountain biking trails (approximately 1.2 miles) would be constructed. Additionally, approximately 2.4 miles of the existing *Vista*, *Sierra Loop* and *Rabbit Run* hiking trails and approximately 0.1 mile of existing *Vapor* biking trail would be re-routed. A new pedestrian and cyclist bridge would be constructed between the Elk Camp Restaurant and Rayburn's Pond area to facilitate movement in the area. The bridge would be approximately 115 feet long and 30 feet wide, and would promote safe and direct passage in the Elk Camp area. The proposed projects would result in a total of approximately 16.6 miles of new mountain biking and hiking opportunities for visitors. Trails would be accessed primarily via the Elk Camp Gondola but can also be accessed via biking and hiking from the base area.

The proposed trails would include a variety of trail styles characterized as flow, singletrack, or hybrid. Flow trails are wider (approximately 6 feet wide) and incorporate features that allow riders to develop a consistent speed and rhythm with little pedaling or braking. Singletracks are often narrower (approximately 4 feet wide) trails and exhibit sections where braking and pedaling are necessary. The hybrid trail designation refers to trails that are a combination of a flow and singletrack configuration, with segments of each style.

Technical Trail Features (TTFs) would be constructed on some proposed trails at a degree of difficulty appropriate to the overall trail rating. These TTFs would include wooden or dirt features that could range from 1 foot to 7 feet above grade.

The proposed skills park would provide guests an opportunity to learn essential bike handling skills. These trails would be located within the beginner skills park that is accessed by the Elk Camp Gondola. The skills park would include jumps, drops, berms, and other features that can be quickly repeated, preparing riders for the main trails.

Included in the proposed trail projects are 2.4 miles of re-routes of the existing *Vista*, *Sierra Loop* and *Rabbit Run* hiking trails, and 0.1 mile for the *Vapor* mountain biking trail re-route. In its current state the *Vista* trail is intersected by multiple downhill mountain biking trails that negatively impact the quality of the hiking experience on this trail. With several more trails planned for this area, the proposed re-route would help provide a better recreational experience for hikers and bikers. The other trails would be re-routed around the proposed mountain coaster alignment.

The proposed trail specifications are shown in Table 2-1 (note: *Trail Name* corresponds with Figure 2).

**Table 2-1:
Proposed Trail Specifications**

Trail Type/ Ability Level	Trail Name	Trail Style	TTFs	Average Width (feet)	Length (miles)
MOUNTAIN BIKING					
Easier	Trail 3	flow	yes	6	0.6
More Difficult	Trail 6	flow	yes	6	1.0
	Trail 8	singletrack	no	4	0.7
	Trail 14	hybrid	no	4	4.8
	Trail 15	hybrid	no	4	0.5
Most Difficult	Trail 4	flow	yes	6	0.7
	Trail 9	hybrid	no	4	1.1
	Trail 17	hybrid	no	4	2.0
	Trail 18	hybrid	no	4	0.9
	Trail 21	singletrack	no	4	0.6
<i>Vapor</i> Trail Re-Route					0.1
Total					13.0

**Table 2-1:
Proposed Trail Specifications**

Trail Type/ Ability Level	Trail Name	Trail Style	TTFs	Average Width (feet)	Length (miles)
MOUNTAIN BIKING SKILLS PARK					
Easier	Meadows 1	skills park	no	6	0.5
More Difficult	Meadows 2	skills park	yes	6	0.4
	Meadows 3	skills park	yes	6	0.3
Total					1.2
HIKING					
<i>Vista</i> Trail Re-Route		hiking		n/a	1.4
<i>Sierra Loop</i> Trail Re-Route		hiking		n/a	0.9
<i>Rabbit Run</i> Trail Re-Route		hiking		n/a	0.1
Total					2.4
Total Trails					16.6

Mountain Coaster

A mountain coaster would be constructed at Elk Camp in the timbered area between *Gunner's View* and *Sandy Park* ski trails. This area is seldom skied as dense vegetation and varying topography are not conducive to skiing. The downhill track would be approximately 3,300-foot-long and the uphill lift track would be approximately 2,300 feet long. The track would be a closed-loop system with a vertical rise/descent of approximately 400 feet and a seven-to-nine minute round-trip ride. The mountain coaster would offer the riders control over their speed and provide an experience that would be appropriate for a wide range of guests.¹⁴ The coaster is proposed to be operated during both summer and winter. The mountain coaster would be permitted to operate during nighttime hours throughout both the summer and winter seasons.

The coaster tracks would be tubular rails on which a bobsled-type car rolls. Construction of the coaster track would require installation of concrete pads at the base station, top station and on the looping sections of the downhill track. The track foundation would be constructed on top of the ground and concrete pads. The track would be generally near ground level and incorporate natural terrain elements into the activity. The track would cross an existing mountain biking trail, requiring the track to be elevated and fenced as necessary. To avoid the track, the *Sierra Loop* hiking trail and *Vapor* mountain biking trail would be re-routed 2,000 feet and 250 feet, respectively. Electricity would be installed to the top station on the existing *Gunner's View* ski trail. In addition, a loading station building at the bottom of the mountain coaster, including passenger loading/unloading platforms and equipment storage (approximately 1,500 square feet), and a top station for an attendant (approximately 400 square feet) would be constructed.

¹⁴ An automatic braking system ensures that guests do not exceed the top speed designed for the track.

Zip Line Canopy Tour

A zip line canopy tour would be located from Elk Camp Meadows down to the *Slider* ski trail near the Elk Camp service road.

The zip line canopy tour would include nine sequential segments with some of the platforms being connected with sky bridges and/or pedestrian trails on the ground to connect zip line stations. For most stations, platforms would be attached to trees. Platform trees would be tethered to other trees and/or the ground to provide appropriate stability. Some locations may require steel towers in lieu of trees for zip line cable anchoring.

An access trail would be constructed from the top of the Elk Camp Gondola across the proposed pedestrian and cyclist bridge to the area behind Rayburn's Pond. The zip line canopy tour would traverse the forested area generally between *Funnel* and *Slider* ski trails via zip lines between platforms that would be integrated into the canopy. The zip line canopy tour would rely almost entirely on existing trees to accommodate the proposed platforms; however, in some locations towers may be constructed to support platforms and zip lines. The final segment of the zip line canopy tour would terminate on the *Slider* ski trail near the Elk Camp service road. Groups of up to eight participants would be accompanied by guides continuously throughout the tour. Construction access would utilize mountain biking trails where possible.

A rest shelter (approximately 500 to 1,500 square feet) is proposed in the trees on the skier's right side of the *Slider* ski trail near the Elk Camp service road and positioned between the zip line canopy tour and zip line. The rest facility would include potable water and vault toilets. At the end of the zip line canopy tour, guests can walk to their final destination or would be shuttled via open air shuttles on the Elk Camp service road back to the Elk Camp complex. The duration of these activities would vary based on the guest's desire to participate in the zip line canopy tour, zip line, or both. The entire tour (zip line canopy tour and zip line) would last three to four hours.

Zip Line

A zip line is proposed to begin under the Elk Camp Gondola across the *Funnel* ski trail from the zip line canopy tour's point of termination and end near the Elk Camp Gondola Turn Station. Guests participating in both the zip line canopy tour and zip line as a continuous activity would walk across the *Funnel* ski trail, under the Elk Camp Gondola, to the zip line start. The zip line would be approximately 3,000 feet long.

Guest access to and from the zip line would be provided via open air shuttles as necessary on the Elk Camp service road to accommodate varying guest needs and to continue the educational messaging program. The duration of these activities would vary based on the guest's desire to participate in the zip line canopy tour, zip line, or both.

Ropes Challenge Course

A ropes challenge course is proposed in the Elk Camp Meadows area, just uphill of the lower Magic Carpet, where it would be integrated into the forest setting in an area that is currently not skied. The overall goal of the ropes challenge course is to provide a self-paced, family-friendly, teambuilding, and multigenerational challenge experience.

The ropes challenge course would be constructed using large trees as anchors for all platforms and course elements. The existing *Rabbit Run* hiking trail would be re-routed 500 feet around the proposed ropes challenge course location.

The ropes challenge course would include the following course components:

- Thirty to forty individual challenge elements
- Two to five ground access points (entry and egress capable)
- Course completion zip line

Climbing Wall

A climbing wall is proposed for the skier's right side of the *Bull Run* ski trail, across the slope from the Elk Camp Restaurant within the former Café Suzanne restaurant site. The custom climbing wall would be 50 to 70 feet wide, up to 40 feet high and would use materials that would mimic a natural rock wall. It would be designed to suit a range of ability levels and would incorporate a variety of natural features including freestanding boulders, pinnacles, cracks, arêtes, archways, overhangs, dihedrals and more. This site was selected due to its proximity to the Elk Camp area and the nature of its surroundings.

Multi-Purpose Activity Areas

Three areas would be designated, landscaped and utilized to provide areas for guests to meet for special events, temporary activities, and scenic viewing. Several types of activities would be programmed for these sites and could include weddings; outdoor naturalist presentations; educational and training presentations; music concerts, dance, yoga, and other artistic/fitness activities; and special events. The proposed areas include:

- Elk Camp Summit – Accessible to visitors via the Elk Camp Chairlift, this area would offer a unique scenic vista into the Maroon Bells-Snowmass Wilderness. This project would include landscaping and grading within an approximately 4,000-square foot area, installing benches, and constructing hardened platforms for gathering areas. The area would accommodate approximately 250 people.
- Rayburn's Pond – Located near the top of the Elk Camp Gondola this project would include landscaping and grading within an approximately 4,000 square foot area, and would accommodate approximately 250 people.

- Elk Camp Meadows/Restaurant Vicinity – In closer proximity to the Elk Camp Restaurant and the activities of Elk Camp Meadows, this project would include landscaping and grading within an approximately 4,000 square foot area. The area would accommodate approximately 250 people and would serve as a gathering hub for assemblies and a setting for presentations, activities and ceremonies of all types.

Elk Camp Site Improvements

The area surrounding the top of the Elk Camp Gondola and the Elk Camp Restaurant would be improved by developing and defining access pathways and rest areas, rehabilitating disturbed areas, incorporating signage, increasing vegetative growth, and adding landscaping features.

ALTERNATIVE 3

Alternative 3 was developed to respond to wildlife, recreation and scenery issues with Alternative 2. Alternative 3 includes all projects identified in the Proposed Action, with the following exceptions and modifications. All components of Alternative 3 are depicted in Figure 3.

Operating Hours and Season

Under Alternative 3, there would be no additional guest access to the Elk Camp area during nighttime (approximately thirty minutes after sunset and thirty minutes before sunrise) hours in either the summer or winter seasons. For example, the mountain coaster would be permitted to operate during *Ullr Nights* (an existing regularly occurring winter event). All new nighttime uses in either the summer or winter season would require WRNF approval and would not exceed the existing frequency of guest presence in the Elk Camp area vicinity.

Mountain Biking and Hiking Trails

To reduce impacts to wildlife, Trail 21 of the Proposed Action is replaced with Trail 16 (also known as *Grey Wolf*) of the SMMDP. Trail 16 would be a 1.5-mile singletrack trail paralleling the Elk Camp Chairlift alignment down the *Grey Wolf* ski trail.

Trail 17 and the beginner skills park area are also removed from Alternative 3 due to redundancy of similar ability level trails in the trail system and the presence of an existing, smaller skills park area on private lands.

With the replacement of Trail 21 with Trail 16 and the elimination of Trail 17, the overall trail length in Alternative 3 would be approximately 15.1 miles.

Multi-Purpose Activity Areas

In response to scenery concerns, the Elk Camp Meadows multi-purpose activity area is removed from Alternative 3. The two remaining multi-purpose activity areas—Elk Camp Summit and Rayburn’s Pond—are as described in the Alternative 2 description.

C. PROJECT DESIGN CRITERIA INCORPORATED INTO ACTION ALTERNATIVES

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 2-2).

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, 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 PDC 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 PDC conservation measures are implemented rests with ASC and the Forest Service. In all cases, the ultimate enforcement mechanism for implementation of the specified PDC and conservation measures would be the ROD for the final EIS (FEIS), and would extend to the Forest Service SUP Administrator, the District Ranger, and the Forest Supervisor.

**Table 2-2:
Project Design Criteria**

RECREATION
Where appropriate, fencing, flagging, signage and other safety mechanisms shall be used to alert winter and summer visitors to the location of activities and infrastructure.
All mountain biking and hiking trails shall have appropriate signage to direct uphill and downhill traffic and prevent user conflict. Snowmass and WRNF will develop a trails Master Plan, which would include travel direction for trails.
Unauthorized biking and hiking trails developed by third parties shall be promptly deconstructed and reclaimed as they are discovered.
SCENERY
Design plans for all above ground structures and improvements including infrastructure, facilities, and buildings shall be reviewed and authorized through the White River Building Design Review process. Structures should follow BEIG guidance, color and reflectivity guidelines, and meet SIOs for the project area.
Facilities, including trails and signs, shall meet Forest Service Accessibility Guidelines.
Stumps should be cut as low as possible to the ground to avoid safety hazard and reduce scenery impacts.
Trees shall be retained, where possible, to provide species and size diversity, maintain forest cover, and screen facilities.
Straight edges shall be avoided where possible when removing trees. Variable density cutting (feathering) and age and size class selection should be utilized to create a more natural edge that blends into the existing vegetative structure.
Utilities shall be buried as per Forest Plan standard.
CULTURAL RESOURCES
If undocumented historic and/or prehistoric properties are located during ground disturbing activities or planning activities associated with approved construction activities, all construction in the immediate vicinity would cease and would be treated as specified in 36 CFR §800.11. In addition, if there are resources determined eligible to the NRHP, the WRNF will consult with the State Historic Preservation Officer (SHPO) and Tribal entities regarding mitigation of adverse effects to historic properties as outlined in 36 CFR 800.4 and 36 CFR 800.5.
BOTANY AND FOREST HEALTH
Before implementing any approved project activities not included in the 2016 botanical survey area, the specific project areas shall be surveyed using established protocol. Surveys would be conducted for threatened, endangered, proposed and candidate species, Region 2 sensitive species, SOLC, and species of viability concern (SVC).
If any previously undocumented or unknown occurrences of Forest Service Region 2 sensitive species, SOLC or SVC plants are encountered within the project area prior to or during project implementation, the WRNF shall be notified. WRNF shall develop suitable mitigation measures to avoid or minimize impacts as appropriate.
Impacts to habitat occupied by relatively common <i>Botrychium</i> spp. (SOLC) shall be avoided or minimized, as these areas can provide habitat for Region 2 sensitive moonworts. Construction fencing and other barriers should be identified and used to delineate occupied moonwort habitat and prevent impacts to these areas.
Wood straw, coconut husk products, Excelsior products (shredded aspen), bonded fiber matrix (hydromulch), and other materials not containing seeds should be used for erosion control.

**Table 2-2:
Project Design Criteria**

Impacts to habitat occupied by <i>Listera borealis</i> (SOLC) and <i>Lycopodium annotinum</i> (SOLC) shall be avoided or minimized. Trails should be re-routed around known locations. Fencing and/or other barriers should be used to delineate occupied habitat near any proposed trails to prevent inadvertent impacts.
Construction practices and operations should avoid impacting native plant communities through designation of formal access paths in heavy use areas and other appropriate means.
A noxious weeds and non-native plant risk assessment and treatment plan should be completed by the resort and approved by WRNF staff prior to implementation of any authorized ground disturbing activities.
Pretreatment of existing infestations with approved herbicides within the project area shall occur prior to project implementation when possible.
All off-road equipment shall be cleaned prior to entering NFS lands to ensure machinery is free of soil, seeds, vegetative matter, or other debris that could contain or hold noxious weed seeds. "Off-road equipment" includes all construction machinery or off-highway vehicles, except for trucks, service vehicles, water trucks, pickup trucks, cars, and similar vehicles.
All disturbed ground from construction shall be re-vegetated with native tree/plant species and WRNF-approved seed mix free of weed species, and meet Forest Plan Management Area 8.25 ground cover standards within three years after completion of project construction.
Noxious weed and other non-native plant infestations shall be monitored and treated for three years after project completion or until weed populations are eliminated.
Any Engelmann spruce that is felled shall be either removed from the area or treated within one year after felling to reduce attack by spruce bark beetle. Treatments include burning, burying or peeling bark.
FISH AND WILDLIFE
If construction activities are proposed prior to July 15, surveys for denning and nesting of TES species shall be conducted by a qualified biologist prior to construction. Construction of approved projects should occur outside the active denning and nesting period or as otherwise approved by the Forest Service Responsible Official.
If tree cutting activities are proposed prior to July 15, surveys for active migratory bird nests shall be conducted by a qualified biologist prior to tree cutting. Trees with active nests and snags providing cavity nesting habitat should be retained when practicable.
If flammulated or boreal owl nests are located within project areas, tree removal in nesting areas should be avoided during the May 21 to July 15 nesting period.
If olive-sided flycatcher nests are located within project areas, tree removal in nesting areas should be avoided during the June 1 to July 15 nesting period.
If construction activities are proposed prior to July 31, surveys for active raptor nests and cavities shall be conducted by a qualified biologist. No ground disturbing activities or tree cutting should occur within 0.25 mile of active raptor nests/cavities until August 1, or until fledging occurs, or as otherwise approved by the Forest Service Responsible Official.
All trash containers shall be bear proof and any locations that have food products stored outside of a building shall utilize bear proof food containers.
No food products or food containers should be disposed of in larger roll-off type dumpsters. Food and drink shall be stored in construction vehicles or bear proof containers. All vehicular windows shall be kept closed and doors locked to prevent bear entry.
All construction activities shall be confined to daylight hours unless authorized by the agency Responsible Official.
Resort employees and contractors shall not bring dogs to construction areas on NFS lands while on duty.

**Table 2-2:
Project Design Criteria**

Artificial lighting shall be minimized. Lighting should be shielded and angled downward to minimize impacts to nocturnal species.
Trails around the Elk Camp area should remain closed and gated until after June 21 to align with the existing Burnt Mountain spring wildlife closure.
Construction should not occur between May 15 to June 30 to protect the calving and fawning season.
SOILS AND WATERSHED
Prior to implementation, Snowmass shall submit grading plans for (1) projects greater than 1 acre, and (2) all new temporary and permanent paths/roads for agency review and authorization. At a minimum, these documents should meet the basic requirements for stormwater permitting through the State of Colorado Stormwater Management Program.
A site visit and field-fitting of planned projects, paths and roads shall occur by forest personnel before construction may begin.
Prior to construction, a detailed site erosion control plan shall be submitted for agency review and authorization. This plan shall include the following components: (1) Silt fences, straw bales/wattles are sediment control BMPs to contain sediment on-site; (2) Jute-netting or appropriate erosion-control matting on steep fill slopes (areas with a slope angle of 35% or greater) to protect soils and enhance vegetation re-establishment; (3) Revegetation plans for disturbed areas; and (4) defined grading limits and physical barriers along the perimeter of graded areas.
Detailed site plans shall be prepared for concentrated use sites. Sites should be designed to be resilient to increased foot traffic and other visitor use.
Any site grading should blend disturbance areas into the existing topography to achieve a natural appearance. Cut and fill practices should be avoided near the transition of proposed grading and existing terrain.
Prior to construction, soil surveys should be completed within the construction area. In areas where grading or soil disturbance would occur, an assessment of the quantity (depths) of soil A and/or organic ground cover should be made. Upon completion of ground disturbing activities, soil depths shall meet at pre-treatment quantities to ensure no net loss of this material.
During construction, maintenance and operations, top soil should be stockpiled to retain organic matter. Excess native material should be incorporated into the disturbed area to maintain a natural appearance.
Vegetative buffers should be maintained adjacent to intermittent or perennial drainages and wetlands. Where avoidance of the vegetative buffer is not possible, disturbance shall be minimized.
Soil-disturbing activities should be avoided during periods of heavy rain or excessively wet soils.
For ground-disturbing activities near perennial and intermittent streams and ephemeral draws, CDA should be minimized by draining roads, road ditches, and other disturbed areas to undisturbed soils rather than directly to streams and ephemeral draws. Drainage from disturbed areas should be modified as necessary using natural topography, rolling dips, waterbars, ditch-relief culverts, etc., to disconnect disturbed areas from streams.
In the WIZ next to perennial and intermittent streams, lakes and wetlands, only those activities and practices that maintain or improve long-term stream health and riparian ecosystem condition should be authorized.
New concentrated-use sites should be located outside of the WIZ and outside riparian areas and wetlands. Existing sites in the WIZ should be hardened or reclaimed to prevent detrimental soil and bank erosion. WIZ boundaries adjacent to project areas shall be clearly demarcated on the ground to prevent infringement during construction and operations.

**Table 2-2:
Project Design Criteria**

All wetlands within the vicinity of any ground disturbing activities or tree felling should be clearly identified. Heavy equipment shall be kept out of streams, swales, and lakes. Exceptions include: (1) crossing at designated points; (2) constructing crossings; (3) performing restoration work; (4) if there is at least 1 foot of packed snow or 3 inches of frozen soil present; or (5) a single wetlands crossing where temporary construction mats are employed with limited use. Water supply or drainage patterns into wetlands shall not be disrupted.
Culverts should be designed and sized to easily pass sediment and debris transported by the stream to be crossed. Culverts less than 18 inches in diameter shall not be used to cross any stream channel.
Rocks, wood, or other material should not be added or moved in streams or lakes except if these actions maintain or improve stream health. Stream bed and banks should not be altered.
Culverts should not be installed and ground-disturbing activities should not be conducted near streams during spring runoff, or during periods of heavy precipitation.
Where appropriate, and approved by the Forest Service, trees should be felled into inter-trail islands to improve large woody debris density. In areas adjacent to a WIZ, trees should be felled in a manner that protects vegetation in the WIZ.
Excavated material should not be stored in the WIZ.
Construction practices and operations should not introduce soils or debris into streams, channels, swales, lakes, or wetlands. Sediment waddles, sediment fencing, retention basins, or other applications should be installed before ground-disturbing activities begin. If natural or biodegradable materials are not used and left on site, all non-natural and non-biodegradable materials should be removed at the end of construction.
For projects that involve logging operations, logging over the snow should be prioritized when possible. Ground skidding shall be avoided on slopes steeper than 40%.
If logging over the snow, snow should be a minimum of 1 foot, continuously packed (i.e., not patchy) and sufficient enough to prevent vehicles from breaking through. If logging over frozen ground, a minimum of 3 inches of continuous frozen ground should be present.
Areas compacted by construction activities should require mechanical subsoiling or scarification to the compacted depth to reduce bulk density and restore porosity.
Existing roads should be employed for construction access and operations unless other options would produce less long-term sediment. Where applicable, roads should be maintained or reconstructed for long-term soil and drainage stability.
Cross drains should be installed along roads to disperse ditch runoff into filter strips and minimize sediment delivery to streams.
Sediment traps along roads should be constructed where necessary. Sediment traps should be removed when traps are 80% full and sediment should be stockpiled in low-gradient upland sites.
Low standard roads should be out-sloped to shed water.
Roads, trails, or other disturbed areas should not be located on slopes that show signs of instability, such as slope failure, mass movement, or slumps.
For projects that increase road traffic or require road use by heavy construction equipment, road surfacing should be applied near stream crossings as needed to harden the road surface and minimize sediment delivery to streams.

**Table 2-2:
Project Design Criteria**

For the <i>Funnel</i> ski trail, approximately 1,000 feet down-slope from the Alpine Springs bottom terminal: (1) BMPs shall be designed and implemented for erosion control at a ski trail waterbar located on <i>Funnel</i> , just below from where a 200-foot construction access path is proposed; and (2) BMPs shall be designed and implemented for sediment control along the steep road on the <i>Funnel</i> ski trail which discharges into the waterbar described above.
For the road to Elk Camp, BMPs shall be designed and implemented to improve road drainage, correct slope failures, control flow velocities, minimize sediment recruitment and transport, and repair fill slopes.
WATERSHED – TRAILS SPECIFIC
Trail layout and design should use natural topography to create grade reversals or rolling dips to facilitate maintenance-free drainage. Waterbars, ditches and cross drains should only be employed when grade reversals and rolling dips are not practical. Waterbars, ditches and cross drains shall be maintained annually to maintain function.
Trails should not be routed directly down the fall line. Drainage structures should be located above steep stretches of trail to minimize the amount of water that gets routed onto steeps. Steep areas should have a higher frequency of drainage features.
Trails should not be routed down the bottom of ephemeral draws or other low spots to facilitate drainage.
Streams crossings shall be minimized. Where necessary, bridges, boardwalks, or other spanning structures shall be used to cross streams, wetlands and riparian areas. Crossings should be located where local topography, drainage and soil conditions allow impacts to be minimized. Rolling dips or grade reversals should be employed on the approach to streams to drain trail runoff into undisturbed soils rather than directly into streams.
Mountain biking trails should be closed as necessary to avoid the development of ruts when soils are saturated.
Specialized equipment should be used for trail building where construction requires berms, banks, or other specialized trail features. Trails shall be constructed to the minimum width consistent with the intended use.
All abandoned portions of trails should be marked on the ground and rehabilitated concurrent with the construction of trail re-routes. When rehabilitating abandoned trails, drainage features such as check dams, water-bars and sediment traps should be installed to address erosion problems. Slopes should be re-contoured where trails have become entrenched or where there are major erosion problems.
Trail alignments shall be marked on the ground for field review with Forest Service specialists prior to initiating construction.
Structural perimeter (except for ingress and egress) should be installed and maintained around each skills park to contain sediment and to confine the disturbance within the approved footprint.
Mountain biking trails should be designed and constructed to drain runoff away from wetlands and stream channels.
AIR QUALITY
Site improvements shall be installed promptly in order to reduce the potential for dust emissions.
Area disturbed by clearing, earth moving, or excavation activities should be kept to a minimum at all times.

D. ALTERNATIVES AND DESIGN COMPONENTS CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

ALTERNATIVE ZIP LINE ALIGNMENT

During the planning process, various alignments were considered for the proposed zip line. However, these alternative alignments were eliminated from further analysis as topography restrictions limit the capability of areas near the zip line canopy tour's point of termination to accommodate a zip line. Locating the zip line near the zip line canopy tour's point of termination is essential to provide the intended user experience.

TRAIL 14 REMOVAL FOR WILDLIFE HABITAT REASONS

Trail 14 is the western-most proposed mountain biking trail, spanning the length of the newly proposed trail network. Removing Trail 14 was considered in order to reduce potential wildlife impacts by centralizing the trail network and concentrating habitat disturbance. When resource specialists evaluated this consideration, the original alignment was ultimately kept as Trail 14 follows the *Expresso* trail, an existing human use corridor.

TRAIL 14 ADJUSTED ALIGNMENT TO MINIMIZE STREAM CROSSINGS

An alternate Trail 14 alignment that would remove two stream crossings was considered during the planning process. The elimination of stream crossings would be achieved by realigning the trail to follow the existing road for the segment of trail between the two stream crossings. Ultimately, this alignment was eliminated due to safety concerns associated with having users entering/exiting an access road and the lack of appropriate grades to provide the intended user experience for a downhill trail.

TRAIL 3 REMOVAL FOR WETLAND REASONS

Trail 3 crosses through wetlands, and as a result removal of this trail was considered in order to minimize wetland impacts. When resource impacts were considered with the Purpose and Need of the proposed project, the removal of Trail 3 was eliminated from detailed analysis as it is identified as key beginner trail. Adequate grades for a beginner trail near Elk Camp are sparse; thus, the Trail 3 remains with minor alignment modifications to avoid wetlands and boardwalks/bridges would be utilized to avoid impacts to wetlands.

TRAIL 6 REMOVAL FOR POTENTIAL REDUNDANCY

The removal of Trail 6 from the proposal was considered as it is in close proximity to another proposed trail of the same style and near other existing trails. Both Trails 4 and 6 occupy the same area and are flow trails. In order to minimize potential resource impacts, the removal of Trail 6 was considered for its potential redundancy. This consideration was ultimately eliminated from detailed analysis as Trail 6 was identified as an important progression trail. Despite being of the same style as Trail 4 (rated as "most

difficult”), Trail 6 is rated as “more difficult” and provides a necessary progression trail for users seeking to ride the “most difficult” trails of the existing and proposed trail network.

E. COMPARISON OF ALTERNATIVES

Table 2-3 provides a comparison of project elements associated with each alternative. Alternative 1 was not included in Table 2-3 because no project components would be implemented.

**Table 2-3:
Comparison of Alternatives**

	Alternative 2 – Proposed Action	Alternative 3
MOUNTAIN BIKING AND HIKING TRAILS		
New Mountain Biking Trails (miles)	12.9 (trails) + 1.2 (skills park trails) + 0.1 (re-route) = 14.2	12.6 (trails) + 0.1 (re-route) = 12.7
New Hiking Trails (miles)	2.4 (<i>Vista, Sierra Loop and Rabbit Run</i> re-routes)	2.4 (<i>Vista, Sierra Loop and Rabbit Run</i> re-routes)
Total Mountain Biking/ Hiking Trails (miles)	16.6	15.1
MOUNTAIN COASTER		
Length (feet)	3,300 (downhill) + 2,300 (uphill) = 5,600	3,300 (downhill) + 2,300 (uphill) = 5,600
Infrastructure (square feet)	1,500 (loading station/ equipment storage) + 400 (top station)	1,500 (loading station/ equipment storage) + 400 (top station)
ZIP LINE CANOPY TOUR		
Towers/Segments	10 towers, 9 segments	10 towers, 9 segments
Infrastructure (square feet)	500 to 1,500 (rest shelter)	500 to 1,500 (rest shelter)
ZIP LINE		
Towers/Segments	2 towers, 1 segment	2 towers, 1 segment
ROPES CHALLENGE COURSE		
Course Elements	30 to 40 challenge elements, 2 to 5 ground access points, and course completion zip line	30 to 40 challenge elements, 2 to 5 ground access points, and course completion zip line
CLIMBING WALL		
Dimensions (feet)	width = 50 to 70, height = ≤40	width = 50 to 70, height = ≤40
MULTI-PURPOSE ACTIVITY AREAS		
Multi-Purpose Activity Areas	3	2

F. SUMMARY COMPARISON OF DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Per direction provided in 40 CFR 1502.14, Table 2-4 provides a comparison of environmental impacts by alternative.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3															
RECREATION																	
Proposed projects would impact recreational opportunities within the Snowmass SUP area. Additional trails and recreation opportunities should offer experiences that address the stated Purpose and Need, providing previously unavailable opportunities to meet guest expectations.																	
<i>Indicator: Quantitative analysis of existing and proposed multi-season recreation activities, including mileage and acreage of mountain biking trails by ability level and anticipated activity use per day</i>																	
<p>The existing summer recreation opportunities at Snowmass can be characterized as providing a dispersed recreation experience. Specifically these activities include lift-served mountain biking and hiking via the Elk Camp Gondola and Chairlift, and dispersed activities along multiple-use trails on the western side of the mountain. Two 18-hole disc golf courses are open to the public at Snowmass. Two paintball venues, each capable of accommodating about 30 people at a time are available on private land. A climbing wall and “Eurobungy” are also offered on private lands in the Village Mall.</p> <p>Currently there are approximately 120 mountain bikers using the existing trails in the Elk Camp area per day.</p>	<p>Under Alternative 2, Snowmass would add additional mountain biking trails, a mountain coaster, zip line canopy tour, zip line, ropes challenge course, climbing wall, and three multi-purpose activity areas to its suite of multi-season recreation activities. Distribution of mountain biking trails by ability level would be as follows.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Ability Level</th> <th style="text-align: center;">Total Mileage</th> <th style="text-align: center;">Percent of Total</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Easier</td> <td style="text-align: center;">5.2</td> <td style="text-align: center;">9%</td> </tr> <tr> <td style="text-align: center;">More Difficult</td> <td style="text-align: center;">31</td> <td style="text-align: center;">52%</td> </tr> <tr> <td style="text-align: center;">Most Difficult</td> <td style="text-align: center;">23.2</td> <td style="text-align: center;">39%</td> </tr> <tr> <td style="text-align: center;">Total</td> <td style="text-align: center;">59.3</td> <td style="text-align: center;">100%</td> </tr> </tbody> </table>	Ability Level	Total Mileage	Percent of Total	Easier	5.2	9%	More Difficult	31	52%	Most Difficult	23.2	39%	Total	59.3	100%	<p>Under Alternative 3, Snowmass would add additional mountain biking trails, a mountain coaster, zip line canopy tour, zip line, ropes challenge course, climbing wall, and two multi-purpose activity areas to its suite of multi-season recreation activities. The proposed mountain biking trails would vary from Alternative 2 by including the replacement of Trail 21 with Trail 16, the elimination of Trail 17, and no beginner skills park located in the Elk Camp area. The overall mileage of mountain biking trails in Alternative 3 would be approximately 57.3 miles (12 miles of newly proposed trail). Anticipated activity use per day would be the same as Alternative 2.</p>
Ability Level	Total Mileage	Percent of Total															
Easier	5.2	9%															
More Difficult	31	52%															
Most Difficult	23.2	39%															
Total	59.3	100%															

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3																																			
<p>Distribution of mountain biking trails by ability level is as follows.</p> <table border="1"> <thead> <tr> <th>Ability Level</th> <th>Total Mileage</th> <th>Percent of Total</th> </tr> </thead> <tbody> <tr> <td>Easier</td> <td>4.1</td> <td>9%</td> </tr> <tr> <td>More Difficult</td> <td>23.3</td> <td>51%</td> </tr> <tr> <td>Most Difficult</td> <td>17.9</td> <td>40%</td> </tr> <tr> <td>Total</td> <td>45.3</td> <td>100%</td> </tr> </tbody> </table>	Ability Level	Total Mileage	Percent of Total	Easier	4.1	9%	More Difficult	23.3	51%	Most Difficult	17.9	40%	Total	45.3	100%	<p>Anticipated activity use per day is projected in the following table for each of the proposed activities in Alternative 2.</p> <table border="1"> <thead> <tr> <th>Activity</th> <th>Guests per Day</th> </tr> </thead> <tbody> <tr> <td>Mountain Coaster</td> <td>750</td> </tr> <tr> <td>Climbing Wall</td> <td>300</td> </tr> <tr> <td>Ropes Challenge Course</td> <td>250</td> </tr> <tr> <td>Multi-Purpose Activity Areas/ General/Milling</td> <td>230</td> </tr> <tr> <td>Zip Line</td> <td>150</td> </tr> <tr> <td>Biking</td> <td>120</td> </tr> <tr> <td>Hiking</td> <td>120</td> </tr> <tr> <td>Zip Line Canopy Tour</td> <td>80</td> </tr> <tr> <td>Total</td> <td>2,000</td> </tr> </tbody> </table>	Activity	Guests per Day	Mountain Coaster	750	Climbing Wall	300	Ropes Challenge Course	250	Multi-Purpose Activity Areas/ General/Milling	230	Zip Line	150	Biking	120	Hiking	120	Zip Line Canopy Tour	80	Total	2,000	
Ability Level	Total Mileage	Percent of Total																																			
Easier	4.1	9%																																			
More Difficult	23.3	51%																																			
Most Difficult	17.9	40%																																			
Total	45.3	100%																																			
Activity	Guests per Day																																				
Mountain Coaster	750																																				
Climbing Wall	300																																				
Ropes Challenge Course	250																																				
Multi-Purpose Activity Areas/ General/Milling	230																																				
Zip Line	150																																				
Biking	120																																				
Hiking	120																																				
Zip Line Canopy Tour	80																																				
Total	2,000																																				
<p><i>Indicator: Discussion of user/guest demand that currently exists in the area for multi-season recreation activities</i></p>																																					
<p>Demand for multi-season and summer recreation opportunities at ski areas and other NFS lands has grown nationwide in recent years, with a heightened effect in Colorado. This trend has manifested across the WRNF, and over the last two decades, multi-season recreation opportunities have evolved significantly.</p> <p>In general, there is a lack of adventurous, exploratory activities at Snowmass that do not require a significant learning curve or a high level of skill, in order to participate. Providing developed natural resource-based recreation opportunities is important, as not all visitors of the National Forest are comfortable in remote or unsupervised situations, which can hinder their ability to interact with the natural resources of Snowmass and the WRNF in a meaningful way.</p>	<p>Same as Alternative 1.</p>	<p>Same as Alternative 1.</p>																																			

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
In its existing state, and with the current capacity of recreation opportunities offered at Snowmass, summer visitation is expected to increase by 3% annually.		
<i>Indicator: Discussion of guest circulation across the SUP area, including how many guests, where they would be and when the guests would be in certain locations</i>		
Elk Camp is the on-mountain hub of existing summer and multi-season activity on NFS lands at Snowmass. It is estimated that of the 25,000 guests who ride the Elk Camp Gondola every summer, 25% are utilizing the gondola for mountain biking, 15% for hiking, and 60% for sightseeing. This translates to an average of approximately 230 general visitors, 120 mountain bikers, and 80 hikers, per day; on busy weekends, which reach 900 visitors per day, these numbers fluctuate and grow immensely. Almost every one of these visitors would ride the Elk Camp Gondola and disperse into the SUP area from the Elk Camp area.	<p>Refer to Table 3A-9 for a complete description of activity use per day.</p> <p>Under Alternative 2, 66% of users would be distributed in close proximity to Elk Camp, including the mountain coaster, climbing wall, and ropes challenge course. These three activities are the closest to Elk Camp and the gondola, which as the hub of summer recreation, would have the highest concentration of guests. By design, these activities also have the shortest durations, which corresponds to a much quicker throughput of guests. By placing the activities with the greatest capacity and throughput in closest proximity to the area of highest concentration, guests would be most efficiently distributed. Further, this pattern of distribution would prevent interference with activities that rely on a more secluded setting for their intended user experience.</p> <p>Guest distribution through the remaining activities is much lower, which correlates with the more secluded experience and longer durations that the zip line canopy tour and zip line, mountain biking, and hiking experiences provide. Of these four activities, the zip line would accommodate the largest number of users and is almost double that of the zip line canopy tour because it can be done on its own, in a much shorter amount of time. The zip line canopy tour, mountain biking, and hiking</p>	Same as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	<p>activities all rely on creating a user experience that is more natural resource based, and correspondingly is removed from the highest concentration of users. As such, these three activities would span the longest durations of time and are extend farthest from the Elk Camp hub.</p> <p>Each of the multi-purpose activity areas has a capacity of approximately 250 people; however, this capacity would only be met during specific programming and events. Due to the program-specific nature of visitor presence at the multi-purpose activity areas, there is not a projected distribution throughout these areas, which could be expected to operate on a self-regulating basis. These areas would accommodate guests moving between activities, but capacity would fluctuate based on various programming occurring at a given time or a guests' personal desire to occupy the area based on how many others are already in the vicinity.</p>	
<i>Indicator: Discussion of potential conflict between current and new users, particularly hiking traffic as it relates to mountain biking traffic</i>		
Under Alternative 1 there would be no new user conflicts.	Trail re-routes would occur on the existing <i>Vista</i> , <i>Sierra Loop</i> , and <i>Rabbit Run</i> hiking trails to ensure that the existing recreation experience is maintained for the hiking only trails provided by Snowmass while also promoting the range of hiking opportunities within the overall network of trails on NFS lands. All of the re-routes would occur on trails designated as hiking only, which as discussed in the Affected Environment are limited within the Snowmass SUP area.	Same as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	<p>The <i>Vista</i> trail is currently intersected by multiple downhill mountain biking trails that negatively impact the quality of the hiking experience on this trail. With several more trails planned for this area, the proposed re-route would help provide a better recreational experience for both hikers and bikers. <i>Sierra Loop</i> and <i>Rabbit Run</i> would be re-routed around the proposed mountain coaster and ropes challenge course, respectively. Additionally, the existing <i>Vapor</i> mountain biking trail would be re-routed to avoid conflict with the coaster’s alignment.</p> <p>Approximately one to two shuttle trips per hour would transport guests to the zip line canopy tour/ zip line rest shelter along the Elk Camp service road. There would be no new user conflicts between existing recreationists, particularly mountain bikers, and the open-air shuttles as adequate signage would be used for all trail and road intersections. Additionally, the Elk Camp service road accommodates regular operations traffic and has not resulted in issues for recreationists in the past.</p>	
<p><i>Indicator: Quantitative analysis of existing guest service space and seating and proposed demand</i></p>		
<p>It is estimated that 50% of the summer visitors currently utilize the services of the Elk Camp Restaurant. The Elk Camp Restaurant has an existing lunchtime capacity of 1,749 guests and includes 545 seats. Furthermore, the Elk Camp Restaurant includes 395 indoor seats, 150 outdoor seats, and is well equipped to handle existing summer visitation as it designed to meet the much larger winter visitation trends.</p>	<p>The existing capacity and seating of the Elk Camp Restaurant would be fully capable of accommodating the increased summer visitation associated with Alternative 2.</p>	<p>Same as Alternative 2.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3																																																				
<i>Indicator: Discussion of season of use for each activity</i>																																																						
<p>There are no proposed activities under Alternative 1.</p>	<table border="1"> <thead> <tr> <th rowspan="2">Proposed Activity</th> <th colspan="2">Season and Duration of Use</th> </tr> <tr> <th>Summer</th> <th>Winter</th> </tr> </thead> <tbody> <tr> <td>Mountain Biking and Hiking Trails</td> <td>Daytime only</td> <td>No Use</td> </tr> <tr> <td>Mountain Coaster</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Zip Line Canopy Tour</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Zip Line</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Ropes Challenge Course</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Climbing Wall</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Multi-Purpose Activity Areas</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> </tbody> </table>	Proposed Activity	Season and Duration of Use		Summer	Winter	Mountain Biking and Hiking Trails	Daytime only	No Use	Mountain Coaster	Daytime and Nighttime	Daytime and Nighttime	Zip Line Canopy Tour	Daytime and Nighttime	Daytime and Nighttime	Zip Line	Daytime and Nighttime	Daytime and Nighttime	Ropes Challenge Course	Daytime and Nighttime	Daytime and Nighttime	Climbing Wall	Daytime and Nighttime	Daytime and Nighttime	Multi-Purpose Activity Areas	Daytime and Nighttime	Daytime and Nighttime	<table border="1"> <thead> <tr> <th rowspan="2">Proposed Activity</th> <th colspan="2">Season and Duration of Use</th> </tr> <tr> <th>Summer</th> <th>Winter</th> </tr> </thead> <tbody> <tr> <td>Mountain Biking and Hiking Trails</td> <td>Daytime only</td> <td>No Use</td> </tr> <tr> <td>Mountain Coaster</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Zip Line Canopy Tour</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Zip Line</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Ropes Challenge Course</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Climbing Wall</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Multi-Purpose Activity Areas</td> <td>Daytime only</td> <td>Daytime only</td> </tr> </tbody> </table>	Proposed Activity	Season and Duration of Use		Summer	Winter	Mountain Biking and Hiking Trails	Daytime only	No Use	Mountain Coaster	Daytime only	Daytime only	Zip Line Canopy Tour	Daytime only	Daytime only	Zip Line	Daytime only	Daytime only	Ropes Challenge Course	Daytime only	Daytime only	Climbing Wall	Daytime only	Daytime only	Multi-Purpose Activity Areas	Daytime only	Daytime only
Proposed Activity	Season and Duration of Use																																																					
	Summer	Winter																																																				
Mountain Biking and Hiking Trails	Daytime only	No Use																																																				
Mountain Coaster	Daytime and Nighttime	Daytime and Nighttime																																																				
Zip Line Canopy Tour	Daytime and Nighttime	Daytime and Nighttime																																																				
Zip Line	Daytime and Nighttime	Daytime and Nighttime																																																				
Ropes Challenge Course	Daytime and Nighttime	Daytime and Nighttime																																																				
Climbing Wall	Daytime and Nighttime	Daytime and Nighttime																																																				
Multi-Purpose Activity Areas	Daytime and Nighttime	Daytime and Nighttime																																																				
Proposed Activity	Season and Duration of Use																																																					
	Summer	Winter																																																				
Mountain Biking and Hiking Trails	Daytime only	No Use																																																				
Mountain Coaster	Daytime only	Daytime only																																																				
Zip Line Canopy Tour	Daytime only	Daytime only																																																				
Zip Line	Daytime only	Daytime only																																																				
Ropes Challenge Course	Daytime only	Daytime only																																																				
Climbing Wall	Daytime only	Daytime only																																																				
Multi-Purpose Activity Areas	Daytime only	Daytime only																																																				
<i>Indicator: Discussion of how the proposed projects would incrementally add to the amount of developed multi-season recreation opportunities in the vicinity</i>																																																						
<p>Developed opportunities in the vicinity of Snowmass primarily exist on Town of Snowmass Village lands. The Town of Snowmass Village offers a variety of recreational opportunities, including hot air ballooning, road biking, bowling, rodeo, fly fishing, a recreation center, yoga, golf, tennis, the Ice Age Discovery Center, and paragliding, among others. Furthermore, the Town of Snowmass village hosts a variety of non-recreation events that draw guests to the area and often compliment the wide range of recreational opportunities in the area. Summer visitation at Snowmass is generated by the activities and events that exist not only in Snowmass, but also in Aspen and the Roaring Fork Valley as a whole. The recreational activities offered on NFS lands at</p>	<p>It is anticipated that even with the additional visitation driven by the proposed projects included in Alternative 2, summer visitation at Snowmass would continue to be generated by the activities and events that exist not only in Snowmass, but also in Aspen and the Roaring Fork Valley as a whole. It is anticipated that the additional multi-season offerings included in Alternative 2 would generate interest from visitors of these surrounding areas, and draw greater visitation from the large quantity of visitors already in the Roaring Fork Valley rather than increase visitation to the Roaring Fork Valley in and of itself. Accordingly, additional summer visitation to Snowmass under Alternative 2 is primarily attributable to redistributing people who are already coming to the Roaring Fork Valley to</p>	<p>Same as Alternative 2.</p>																																																				

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
Snowmass may attract locals and those already visiting the area, but generally do not generate visits in-and-of themselves. In other words, few visitors are coming to Snowmass solely for the recreational activities offered on NFS lands.	recreate, and increasing the number and variety of activities available within the Snowmass SUP area (spanning a single day or multiple days).	
<i>Indicator: Discussion of the proposed projects' effect on existing recreation opportunities and disclosure of any conflicts</i>		
Under Alternative 1, there would be no changes to resort operations and functions anticipated under the No Action Alternative. Snow sport related infrastructure would continue to dominate Snowmass, and there would be no potential conflicts with snow sports operations.	Under Alternative 2, snow sports would continue to be the primary focus at Snowmass. While additional summer visitation is expected, winter visitation is anticipated to remain substantially higher. In general, infrastructure that is dedicated to summer activities would remain subsidiary to the larger network of infrastructure that is in place to accommodate winter recreation. While the concentration of summer activities in the Elk Camp area would affect the atmosphere and environment in this vicinity during the summer months, as a whole, the Snowmass SUP area would still feel and function like a ski area. Most of the proposed projects would not conflict with winter operations. Mountain biking and hiking trails would infrequently be used or be visible in the winter. The proposed zip line canopy tour and zip line stations could have some minor effects to winter users as fencing around zip line and zip line canopy tour stations and guy wires would be installed to prevent collisions and other safety concerns for skiers. This infrastructure could impact the recreational experience for skiers in the trees or trail edges near these facilities. However, as skiers in the trees are accustomed to avoiding obstacles, the impact on the recreational experience is expected to be minimal. Additionally, at the scale of the SUP area, the frequency of encounters with this infrastructure would be negligible. The mountain coaster and	Same as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	ropes challenge course are both located in areas that are seldom skied, as dense vegetation and varying topography are not conducive to skiing.	
<i>Indicator: Discussion of the proposed projects consistency with SAROEA</i>		
There are no proposed activities under Alternative 1.	The proposed multi-season recreation opportunities included in Alternative 2 are consistent with SAROEA, and provide previously unavailable natural resource-based experiences that meet guest demand for a greater variety of multi-season recreation activities that cater to a broader spectrum of users.	Same as Alternative 2.
SCENERY		
Proposed projects within the Snowmass SUP area may be visible from the Town of Snowmass Village and/or within the existing ski area. In particular, the proposed zip line bottom station on private lands may create scenery impacts to adjacent landowners by detracting from the existing scenic values.		
<i>Indicator: Discussion of the existing scenic integrity in and around the Snowmass SUP area and potential changes to this condition</i>		
Ski trails, infrastructure (e.g., chairlifts and snowmaking), and skier facilities dominate the SUP area, while infrastructure specific to summer recreation is essentially non-existent throughout the SUP area, and summer trails (e.g., mountain biking and hiking) are much less noticeable. The combination of trails, lifts, and facilities that exist within the Snowmass SUP result in a heavily-altered scenic character, which is consistent with its SIO of <i>Very Low</i> and <i>Low</i> . From within the ski area, winter and summer guests are met with views of developed and undeveloped portions of the Snowmass SUP area in the foreground and middleground distance zone. Panoramic views of scenic natural and developed landscapes overlooking the Town of Snowmass Village, the Roaring Fork Valley, other nearby ski areas, the Maroon Bells and surrounding 14,000-foot peaks	The projects contained in Alternative 2 would add incrementally to the scenic character of the Snowmass SUP area as a developed recreation site. All proposed projects are located in an area of the SUP with an SIO of <i>Very Low</i> and would remain consistent with this classification. Generally, the proposed projects would be located in the existing developed trail network or otherwise near existing ski area infrastructure, which would reduce required vegetation clearing and the overall scenic impact. No significant modifications to topography are anticipated to be necessary to facilitate the construction or operation of any of the proposed projects. It is unlikely that any projects would alter the scenic characteristics of the Snowmass SUP area as viewed from the middleground and background distance zones.	Potential changes to the existing scenic integrity in and around the Snowmass SUP would be identical to those discussed under Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
characterize the background distance zone from viewpoints near the upper-most lift terminals.		
<i>Indicator: Discussion of potential impacts of lights during nighttime events and activities</i>		
Under Alternative 1, there would be no additional nighttime activities and thus no accompanying lights.	Under Alternative 2, the mountain coaster would be permitted to operate during nighttime hours throughout both the summer and winter seasons. Snowmass would incorporate a low-wattage LED lighting system on individual cars and at both the start and finish areas. Low-level lights would also be installed along the track so riders can be aware of upcoming turns. While these lights would be visible from higher-elevation vantage points in the Roaring Fork Valley, there would be a negligible impact in the noticeable amount of lighting, as there are existing lights on the Elk Camp Restaurant and on the Elk Camp Tubing Venue, both of which are in close proximity and operated at night during <i>Ullr Nights</i> . The mountain coaster is the only proposed activity that would include a lighting component for nighttime use.	Under Alternative 3, regular nighttime use would be precluded. All new nighttime uses in either the summer or winter season would require WRNF approval and would not exceed the existing frequency of guest presence in the Elk Camp area vicinity. Therefore, potential impacts from Alternative 3 would be the similar to Alternative 1.
<i>Indicator: Compliance with Forest Plan standards and guidelines for scenery management within the SUP area by meeting SIOs</i>		
Under Alternative 1, there would be no additional developments related to multi-season recreation. As such, the SUP area would continue to meet, and in some cases exceed, its SIO of <i>Low</i> and <i>Very Low</i> .	Alternative 2 would incrementally contribute to the developed character of the Snowmass SUP area, which is identified in the Forest Plan as Management Area 8.25 – Ski Area (Existing and Potential). With adherence to management requirements (defined in Table 2-2), none of the proposed projects are expected to increase scenery impacts to the character of the SUP area, such that it would not meet the SIO of <i>Low</i> or <i>Very Low</i> .	Under Alternative 3, compliance with Forest Plan standards and guidelines for scenery management within the SUP area by meeting SIOs would be met in exactly the same way as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<i>Indicator: Compliance with the intent of the BEIG for all proposed structures. Structures should meet Forest Plan scenery guidelines for materials, colors and reflectivity.</i>		
Under Alternative 1, there would be no additional structures related to multi-season recreation.	All facilities and structures proposed under Alternative 2 would be designed to blend with the surrounding natural environment and would meet the intent of the BEIG.	All facilities and structures proposed under Alternative 3 would be designed to blend with the surrounding natural environment and would meet the intent of the BEIG.
<i>Indicator: Narrative description of how proposed projects imitate landscape character</i>		
Under Alternative 1, there are no newly proposed projects.	<p>Under Alternative 2, the proposed projects would imitate landscape character in the following ways:</p> <p><u>Mountain Biking and Hiking Trails:</u> Mountain biking and hiking trails are found throughout NFS lands and are generally considered to be visually subordinate to the vegetation and landscape. Constructed mountain biking trail features would be appropriate in size and design for the setting, visually blend in with the site, and be constructed of natural materials. Further, the proposed beginner skills park would be visually subordinate to the ski area infrastructure located near the top terminal of the Elk Camp Gondola.</p> <p><u>Mountain Coaster:</u> The coaster and support facilities are designed to incorporate similar design and materials as existing ski area infrastructure (e.g., colored steel). The coaster is situated in a discrete, forested location that is on the periphery of existing snow sports infrastructure. Additionally, the coaster rail corridor is narrow (less than an average ski trail) limiting its visual footprint and requiring limited tree removal. For a majority of the coaster length, its height is consistently low to the ground and the coaster is lower than and subordinate to surrounding vegetation.</p>	Under Alternative 3 the proposed projects would imitate landscape character in exactly the same way as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	<p><u>Zip Line Canopy Tour</u>: The zip line canopy tour is designed to minimize and avoid tree removal, blend with the forest canopy, and utilize natural materials in its construction. The zip line canopy tour would be in a discrete, forested location located adjacent to and on the periphery of existing snow sports infrastructure. Tower stations would not be higher than the canopy in which they are located, in order to blend towers from multiple viewpoints. Additionally, the zip line canopy tour would operate within narrow corridors (less than an average ski trail) limiting their scenic footprint and requiring limited tree removal. The stations would be approximately the same height as the surrounding overstory vegetation; therefore, they would be partially screened, making them more visually consistent with and subordinate to the vegetation and landscape of the area.</p> <p><u>Zip Line</u>: The zip line is designed to minimize tree removal and utilize natural materials in its construction. This project would be subordinate to the surrounding vegetation and landscape; however, zip line cables would be visible as they extend far above the canopy at times. These cables would be small in diameter and would be similar in appearance to the nearby chairlift cables. The zip line would be located adjacent to and on the periphery of existing snow sports infrastructure.</p> <p><u>Ropes Challenge Course</u>: The final design of this project would incorporate natural and natural-looking materials, and would consider the surrounding vegetation and landscape. Additionally, the height of the project would likely be less than the height of surrounding vegetation,</p>	

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	<p>and would thus be partially screened and visually subordinate to the surrounding landscape.</p> <p><u>Climbing Wall</u>: The proposed climbing wall would be situated adjacent to a forested stand and would be subordinate in height and massing to the surrounding landscape and vegetation. Materials that mimic a natural rock wall would be utilized during its construction.</p> <p><u>Multi-Purpose Activity Areas</u>: The proposed multi-purpose activity areas would be highly integrated into their surrounding areas, essentially functioning as landscaped areas with the capacity to accommodate a range of users. Materials used to supplement these areas would all be natural (e.g., rock and wood). No permanent constructed features or buildings (facilities) would be associated with any of these proposed areas.</p>	
<i>Indicator: Compliance with the Town of Snowmass Village scenery and building code regulations for projects located on private lands</i>		
<p>Under Alternative 1, there would be no additional structures related to multi-season recreation. All existing structures are compliant with Town of Snowmass Village scenery and building code regulations.</p>	<p>Under Alternative 2, the bottom terminal of the proposed zip line would be located outside of the Snowmass SUP area and is located on Town of Snowmass Village Lands. Paralleling this NEPA process, Snowmass is currently applying to the Town of Snowmass Village to revise its PUD. Upon Town of Snowmass Village approval, the amended PUD would accommodate all developments proposed in this DEIS.</p>	<p>Under Alternative 3, compliance with the Town of Snowmass Village scenery and building code regulations for projects located on private lands is identical to the discussion under Alternative 2.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
NOISE		
Construction of the proposed projects, including timber removal, would affect noise levels in the Snowmass SUP area and adjacent areas. Additionally, operation and utilization of the zip line multi-use activity areas (e.g., concerts and special events) and other proposed projects would contribute incrementally to noise levels in the in the Snowmass SUP area and adjacent areas.		
<i>Indicator: Narrative discussion of existing noise levels</i>		
Under Alternative 1, noise would continue to be generated from on-mountain maintenance, base area traffic and activity, on-mountain operations (Elk Camp Restaurant, Elk Camp Gondola and Chairlift) and recreation related noise (mountain biking and hiking trails).	Not applicable.	Not applicable.
<i>Indicator: Narrative description of potential noise-related impacts associated with construction, operation and utilization of the zip line, multi-use activity areas (e.g., concerts and special events), and other proposed projects</i>		
<p>Construction: Alternative 1 does not include any new projects; therefore, noise from construction would not result in increased levels of noise.</p> <p>Operations: Alternative 1 does not include any new projects; therefore, noise from operations would not result in increased levels of noise.</p>	<p>Construction: Under Alternative 2, noise from constructed related activities would include construction equipment (i.e., diesel trucks and log skidders), construction of the proposed activities, and transporting materials for construction.</p> <p>Operations: <u>Elk Camp Area</u> Additional noise would be expected in this area as people would use it as a gathering place. As guests would travel away from Elk Camp Area, noise levels would decrease with distance. <u>Zip Line Canopy Tour, Zip Line and Mountain Coaster</u> Impacts to existing ambient noise levels are expected to be minimal. <u>Multi-Purpose Activity Areas</u> Additional noise would be expected during programmed events held at these sites, but would be of a limited duration.</p>	<p>Construction: Under Alternative 3, noise levels from construction would be similar to Alternative 2.</p> <p>Operations: Under Alternative 3, noise levels from operations would be similar to Alternative 2.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	<p><u>Other Proposed Projects</u> Impacts to existing ambient noise levels are expected to be minimal.</p>	
<p>SOCIAL AND ECONOMIC RESOURCES</p>		
<p>Implementation of the proposed projects could potentially alter certain socioeconomic characteristics of Pitkin County or the Town of Snowmass Village due to additional employees and their impacts within the community.</p>		
<p><i>Indicator: Potential effects to socioeconomic indicators in Pitkin County, including: population, employment (part-time seasonal employment vs. full-time equivalents), Town/County tax revenue, housing, affordable housing, public transportation and visitor spending</i></p>		
<p>Population: Colorado is expected to reach 7.8 million residents by 2040, an increase of about 2.3 million. Pitkin County population is expected to reach 28,000 by 2040, an increase of about 10,000.</p> <p>Employment: Under the No Action Alternative, Snowmass would continue to employ approximately 316 workers (or 193 full-time equivalents [FTEs]) in the summer including full-time positions.</p> <p>Revenue: Under the No Action Alternative, Snowmass’ summer economic impact accounts for approximately \$3.6 million (0.16% of Pitkin County’s Gross Regional Product [GRP]) from direct and secondary effects of spending.</p> <p>Housing: APCHA oversees 2,931 affordable housing units. ASC currently provides 348 employee housing units, which is 5% occupied during the summer months and could support more summer employees.</p> <p>Public Transportation: Roaring Fork Transportation Authority (RFTA) provides a number bus routes around the Roaring</p>	<p>Population: Alternative 2 would have a negligible effect on the baseline population trend.</p> <p>Employment: Alternative 2 would result in 34 new FTEs from direct employment by Snowmass in the summer. Additionally, approximately 2.6 FTEs would be generated outside Snowmass as a result of spending.</p> <p>Revenue: Under Alternative 2, Snowmass’ summer economic impact would add approximately \$165,000 to Pitkin County’s GRP from direct and secondary effects of spending.</p> <p>Housing: Alternative 2 would not have a measurably effect on the housing markets of Snowmass or Pitkin County.</p> <p>Public Transportation: Under Alternative 2, RFTA could see an increase in demand; however, the effect is not anticipated to be measurable.</p>	<p>Population: Alternative 3 would have a negligible effect on the baseline population trend.</p> <p>Employment: Alternative 3 would result in 34 new FTEs from direct employment by Snowmass in the summer. Additionally, approximately 2.2 FTEs would be generated outside Snowmass as a result of spending.</p> <p>Revenue: Under Alternative 3, Snowmass’ summer economic impact would add approximately \$140,000 to Pitkin County’s GRP from direct and secondary effects of spending.</p> <p>Housing: Alternative 2 would not have a measurably effect on the housing markets of Snowmass or Pitkin County.</p> <p>Public Transportation: Under Alternative 3, RFTA could see an increase in demand; however, the effect is not anticipated to be measurable.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
Fork Valley from Glenwood Springs to Aspen. During the summer months of 2015, ridership for all routes averaged 11 riders per hour.		
<i>Indicator: Narrative discussion of existing summer tourism levels and potential increases as a result of the proposed projects</i>		
Snowmass currently records approximately 25,000 summer visits. It is estimated that about 75% of Snowmass’ summer visitors are overnight visitors and about 25% are day visitors. Based on continued interest in summertime mountain recreation and recent visitation trends, new summer visitation is expected to be approximately 3% under the No Action Alternative.	Under the Proposed Action, Snowmass summer visitation is expected to increase by an additional 20,000 visits by 2019 for a total summer visitation of 45,000. However, 5% of these new visits are expected to represent new visitors to the region. The economic impacts resulting from these new visitors to the region (1,000) are reported for Alternative 2. It is anticipated that about 90% of these new visitors to the region would be overnight visitors and about 10% would be day visitors.	Under Alternative 3, Snowmass summer visitation is expected to increase by an additional 17,000 visits by 2019 for a total summer visitation of 42,000. However, 5% of these new visits are expected to represent new visitors to the region. The economic impacts resulting from these new visitors to the region (850) are reported for Alternative 3. It is anticipated that about 90% of these new visitors to the region would be overnight visitors and about 10% would be day visitors.
<i>Indicator: Qualitative and quantitative discussion of available housing, including designated employee housing, in Pitkin County during both summer and winter seasons</i>		
Snowmass currently provides 348 employee housing units. During the summer, the workforce housing is 5% occupied and could support more summer employees. Aspen/Pitkin County Housing Authority (APCHA) to oversee 2,931 ownership and rental units in Pitkin County.	Based on current capacities, the workforce housing would accommodate any additional summer employees, as needed.	Same as Alternative 2.
<i>Indicator: Disclosure of compliance with EO 12898, Environmental Justice</i>		
No existing minority populations were identified where either: (a) the minority population of the affected area exceeds 50% 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.	No changes or modifications would be approved under any alternative that would directly or indirectly affect minority or low-income populations in Pitkin County.	Same as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
CULTURAL RESOURCES		
Implementation of proposed projects and associated ground disturbance may affect previously unidentified cultural and heritage resources.		
<i>Indicator: Survey and document presence or absence of identified cultural resources</i>		
Seven previously-recorded resources and seven newly-recorded resources were recorded within the Area of Potential Effect (APE).	All inventory reports were submitted to the SHPO, in accordance with the National Historic Preservation Act (NHPA) Section 106 process. SHPO concurred with a finding of <i>no historic properties affected</i> for thirteen of the fourteen inventoried resources in a letter dated September 22, 2016. Forest Service and SHPO are currently consulting on the potential eligibility of Willow and Owl Creek unmodified intact ditch segments, and a determination will be available prior to the FEIS. In the event that these segments of the Willow and Owl Ditch are determined as contributing elements to the NRHP eligibility the Forest Service and SHPO will work together to develop avoidance/mitigation measures that ensure a determination of <i>no adverse effect</i> will be attainable for this resource.	Same as Alternative 2.
<i>Indicator: Documentation of impacts to any sites that are potentially-eligible for listing on the NRHP.</i>		
Implementation of Alternative 1 would have <i>no adverse effect</i> on any known NRHP listed or eligible historic properties.	Implementation of the Proposed Action would have <i>no adverse effect</i> on any known NRHP listed or eligible historic properties.	Implementation of Alternative 3 would have <i>no adverse effect</i> on any known NRHP listed or eligible historic properties.
TRAFFIC		
Proposed projects may generate measurable increases in daily/seasonal visitation, thereby affecting traffic movement and volumes within the Town of Snowmass Village, on Highway 82 and on construction/maintenance access roads proximate to the ski area.		
<i>Indicator: Historic and projected traffic counts for roadway networks accessing Snowmass for the summer operating season (e.g., Highway 82 between Glenwood Springs and Snowmass from commuting summer employees and between Aspen and Snowmass from summer visitation)</i>		
Under Alternative 1, traffic within the analysis area would only change from the existing conditions due to natural growth. This means an increase of 10% over the existing conditions in vehicle trips due to	Under Alternative 2, the number of vehicle trips attributable to summer visitation would be 53 on a typical weekday and 540 on a typical weekend day. Weekday and weekend trips are expected to grow	Under Alternative 3, projected traffic counts are expected to be similar to Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
visitors and additional employees. Weekday vehicle trips would increase from 30 to 33 per day for roads accessing Snowmass; weekend trips would increase from 300 to 330 per day; employee trips would increase from 99 to 109 per day. Existing Average Daily Traffic (ADT) on Highway 82 is 18,000. Traffic on Highway 82 is projected to increase by 14% by 2035.	by 80% from 30 to 53 vehicle trips and 300 to 540 vehicle trips respectively. It is expected that there would be an additional 63 employees, which translates to an increase in trips by 20% from 99 vehicle trips per day to 119 vehicle trips per day. ADT is projected to increase along Brush Creek and Owl Creek Roads by 10.5% on weekdays and 13% on weekends. Because a growth factor of 10% was used to estimate natural traffic growth in the region, the summer activities add only 0.5% on weekdays and 3% on weekends of additional vehicle trips per day on these facilities.	
<i>Indicator: Comparison of anticipated traffic volumes with existing traffic volumes and the design capacities of roadway networks accessing Snowmass</i>		
Existing summer traffic conditions are under 50% of the design capacity for the two major roadways into and out of Snowmass. Alternative 1 only includes natural growth in traffic over time of 10%. Projected traffic volumes with this growth would be just over 50% of the design capacity of these roadways.	Under Alternative 2, the 10.5% increase in traffic on weekdays and 13% increase on traffic on weekends would result in traffic levels at 55 and 62% of the design capacity of Brush Creek Road, and at 40% of the design capacity of Owl Creek Road.	Under Alternative 3, anticipated traffic volumes are expected to be similar to those in Alternative 2.
<i>Indicator: Quantification of existing and proposed parking capacity for day and destination visitors within Snowmass parking lots</i>		
There are 363 parking spaces available in the Base Village area. The parking structure currently provides 334 spaces, of which 243 are available for day visitors and commercial uses. On busy days, temporary parking areas accommodating an additional 120 vehicles are set up on undeveloped lots. When satellite lots and a vehicle occupancy of 2.5 persons per car is assumed, there is parking capacity for 10,775 guests in the Town of Snowmass Village. There is no proposed additional parking for any of the alternatives.	Under Alternative 2, existing and proposed parking capacity is the same as under Alternative 1. Existing capacity would accommodate potential increased visitation.	Under Alternative 3, existing and proposed parking capacity is the same as under Alternative 1. Existing capacity would accommodate potential increased visitation.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<i>Indicator: Discussion of potential impacts from construction traffic and construction access routes</i>		
Under Alternative 1, there would be no vehicle trips due to construction.	Under Alternative 2, the construction of the proposed summer activities would necessitate truck trips both for tree and debris removal from Snowmass as well as the delivery of materials to the mountain. In addition to these trips, construction employees may come to the site in their personal vehicles, adding a temporary increase in trips to a construction site. For staging and constructing the proposed projects, 800 one-way truck trips would be needed over the six years of anticipated construction. In addition to this, 56 truck trips would be needed to remove trees and debris from the mountain.	Under Alternative 3, the impacts from construction traffic would be similar to those in Alternative 2 with the exception of 52 truck trips for tree and debris removal.
AIR QUALITY		
Construction and operation of the proposed projects (including short-term construction-related activity, burning, and transportation related to timber removal) could result in localized impacts to air quality.		
<i>Indicator: Narrative description of existing air quality, including population centers and Class I and Class II areas in the vicinity</i>		
Three monitors located closest to Snowmass SUP area and in Class I areas are consistently well below the NAAQS. The closest Class I airshed is the Maroon Bells-Snowmass Wilderness (Snowmass SUP area abuts it on western and southern borders). The Aspen area was designated an attainment/maintenance area in 2010 and currently monitors for PM ₁₀ generated primarily from re-entrained road dust, carbon black, and soot.	Same as Alternative 1.	Same as Alternative 1.
<i>Indicator: Compliance with local, state and federal regulations regarding air quality</i>		
Under Alternative 1, there would be no additional developments related to multi-season recreation. As such, air quality in the area would continue to meet requirements.	Under Alternative 2, PM ₁₀ total contribution would be 0.001 tons per day primarily from construction related activities. Federal law pursuant to 40 CFR Section 93.118 allows for approximately 8 tons per day of PM ₁₀ . The 0.001 tons per day would not be a	Same as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1			Alternative 2			Alternative 3																																														
			significant contribution to the Aspen PM ₁₀ emissions budget.																																																	
<i>Indicator: Qualitative discussion of potential impacts to National Ambient Air Quality Standards and air quality related values (AQRVs)</i>																																																				
Under Alternative 1, no impacts would occur to air quality resources.			Under Alternative 2, given the small increments in estimated emissions due to projected expansion activities in the Snowmass SUP area, it is expected that there would be little impact to the existing air quality in and immediately surrounding Snowmass SUP area.			Same as Alternative 2.																																														
<i>Indicator: Estimated daily increase in number of vehicles associated with the increased annual visitation</i>																																																				
<table border="1"> <thead> <tr> <th colspan="3">Existing Number of Vehicle (Trips Per Day)</th> </tr> <tr> <th>Type</th> <th>Weekday Trips</th> <th>Weekend Trips</th> </tr> </thead> <tbody> <tr> <td>Visitor</td> <td>30</td> <td>300</td> </tr> <tr> <td>Employee</td> <td>99</td> <td>99</td> </tr> <tr> <td>Construction</td> <td>0</td> <td>0</td> </tr> </tbody> </table>			Existing Number of Vehicle (Trips Per Day)			Type	Weekday Trips	Weekend Trips	Visitor	30	300	Employee	99	99	Construction	0	0	<table border="1"> <thead> <tr> <th colspan="3">Projected Number of Vehicle (Trips Per Day)</th> </tr> <tr> <th>Type</th> <th>Weekday Trips</th> <th>Weekend Trips</th> </tr> </thead> <tbody> <tr> <td>Visitor</td> <td>53</td> <td>540</td> </tr> <tr> <td>Employee</td> <td>119</td> <td>119</td> </tr> <tr> <td>Construction</td> <td>5</td> <td>5</td> </tr> </tbody> </table>			Projected Number of Vehicle (Trips Per Day)			Type	Weekday Trips	Weekend Trips	Visitor	53	540	Employee	119	119	Construction	5	5	Same as Alternative 2.																
Existing Number of Vehicle (Trips Per Day)																																																				
Type	Weekday Trips	Weekend Trips																																																		
Visitor	30	300																																																		
Employee	99	99																																																		
Construction	0	0																																																		
Projected Number of Vehicle (Trips Per Day)																																																				
Type	Weekday Trips	Weekend Trips																																																		
Visitor	53	540																																																		
Employee	119	119																																																		
Construction	5	5																																																		
<i>Indicator: Estimated traffic and emissions associated with construction of the proposed project, including timber removal</i>																																																				
<table border="1"> <thead> <tr> <th>Pollutant</th> <th>Alternative 1 Emission Total (tons per day)</th> </tr> </thead> <tbody> <tr> <td>VOC</td> <td>0.123</td> </tr> <tr> <td>CO</td> <td>2.238</td> </tr> <tr> <td>NO_x</td> <td>0.663</td> </tr> <tr> <td>SO₂</td> <td>0.003</td> </tr> <tr> <td>PM_{2.5}</td> <td>0.036</td> </tr> <tr> <td>PM₁₀</td> <td>0.038</td> </tr> <tr> <td>CO₂</td> <td>281.5</td> </tr> <tr> <td>N₂O</td> <td>0.006</td> </tr> <tr> <td>CH₄</td> <td>0.013</td> </tr> <tr> <td>CO₂(e)</td> <td>283.5</td> </tr> </tbody> </table>			Pollutant	Alternative 1 Emission Total (tons per day)	VOC	0.123	CO	2.238	NO _x	0.663	SO ₂	0.003	PM _{2.5}	0.036	PM ₁₀	0.038	CO ₂	281.5	N ₂ O	0.006	CH ₄	0.013	CO ₂ (e)	283.5	<table border="1"> <thead> <tr> <th>Pollutant</th> <th>Alternative 2 Emission Total (tons per day)</th> </tr> </thead> <tbody> <tr> <td>VOC</td> <td>0.126</td> </tr> <tr> <td>CO</td> <td>2.265</td> </tr> <tr> <td>NO_x</td> <td>0.688</td> </tr> <tr> <td>SO₂</td> <td>0.003</td> </tr> <tr> <td>PM_{2.5}</td> <td>0.037</td> </tr> <tr> <td>PM₁₀</td> <td>0.039</td> </tr> <tr> <td>CO₂</td> <td>288.6</td> </tr> <tr> <td>N₂O</td> <td>0.006</td> </tr> <tr> <td>CH₄</td> <td>0.013</td> </tr> <tr> <td>CO₂(e)</td> <td>290.6</td> </tr> </tbody> </table>			Pollutant	Alternative 2 Emission Total (tons per day)	VOC	0.126	CO	2.265	NO _x	0.688	SO ₂	0.003	PM _{2.5}	0.037	PM ₁₀	0.039	CO ₂	288.6	N ₂ O	0.006	CH ₄	0.013	CO ₂ (e)	290.6	Same as Alternative 2.		
Pollutant	Alternative 1 Emission Total (tons per day)																																																			
VOC	0.123																																																			
CO	2.238																																																			
NO _x	0.663																																																			
SO ₂	0.003																																																			
PM _{2.5}	0.036																																																			
PM ₁₀	0.038																																																			
CO ₂	281.5																																																			
N ₂ O	0.006																																																			
CH ₄	0.013																																																			
CO ₂ (e)	283.5																																																			
Pollutant	Alternative 2 Emission Total (tons per day)																																																			
VOC	0.126																																																			
CO	2.265																																																			
NO _x	0.688																																																			
SO ₂	0.003																																																			
PM _{2.5}	0.037																																																			
PM ₁₀	0.039																																																			
CO ₂	288.6																																																			
N ₂ O	0.006																																																			
CH ₄	0.013																																																			
CO ₂ (e)	290.6																																																			

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<i>Indicator: Narrative discussion of timber removal techniques (e.g., burning) and their potential effect on air quality in the region</i>		
Under Alternative 1, no timber would be removed. There would be no effect to air quality as a result.	Pile and burn timber removal techniques would be limited, and proper open burn permits from the State would be obtained. The small acreage of timber removal, the variety of removal techniques, and the spacing out of timber removal would have minimal effects on air quality.	Same as Alternative 2.
CLIMATE CHANGE		
Climate change has potential to affect the proposed projects; construction and operation of the proposed projects (including short-term construction-related activity, burning, and transportation related to timber removal) could result in GHG emissions and other contributions to climate change		
<i>Indicator: Discussion of the impact of climate change on the operations of Snowmass and the proposed projects</i>		
Under Alternative 1, climate change is projected to affect Snowmass. Warming temperatures are projected to cause reduced snowpack and streamflow, increased risk of drought, wildfire and insect outbreaks. Temperature increases could result in a shortened winter season and a longer summer season.	Under Alternative 2, impacts to climate change would be the same as Alternative 1. With a longer summer season and warmer temperatures, the proposed projects could become a focal point for Snowmass' sustainability as a business.	Under Alternative 3, impacts to climate change would be the same as Alternative 2.
<i>Indicator: Qualitative discussion of potential GHG emissions associated with the proposed projects, during both construction and operation, and potential contributions to climate change</i>		
Under Alternative 1, there would be no contribution to climate change in the form of additional GHG emissions. However, climate change would still affect Snowmass under Alternative 1.	Under Alternative 2 CO ₂ emissions would be 7.1 tons per day. These CO ₂ equivalent tons were estimated using the Motor Vehicle Emission Simulator (MOVES) model. This estimate is based on the emissions from: 1) construction trips to build the structures associated with the projects; 2) tree and debris removal via truck from the mountain; 3) vehicle emissions associated with the increase in visitation and employee travel to Snowmass. It does not account for the reduction of carbon sequestration potential from tree removal or the potential increase in electricity use from increased visitation.	Alternative 3 would be the same as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<p><i>Indicator: Discussion of climate change and ongoing and reasonably foreseeable climate change impacts relevant to Snowmass SUP area, based on U.S. Global Change Research Program assessments</i></p>		
<p>Average annual temperature is projected to change +2.5°F to +5°F by 2050. Summers are projected to warm more than winters. Precipitation projections range from -5% to +6%; however, winter precipitation is expected to increase. A decrease in annual streamflow for rivers is predicted, due to the loss of moisture from warmer snowpacks, soils, and vegetation. Runoff is predicted to occur earlier (one to three weeks), resulting in decreasing flows in later summer. These predicted patterns would increase the frequency and severity of heat waves, droughts, wildfires, and extreme precipitation events.</p>	<p>Alternative 2 would be the same as Alternative 1. Climate change could exacerbate direct effects of the projects, including erosion from heavy precipitation events, insect outbreaks from drought, and reduced air quality from wildfires.</p>	<p>Alternative 3 would be the same as Alternative 1.</p>
<p>BOTANY</p>		
<p>Ground disturbance associated with construction and operation of proposed projects could affect plant communities throughout the study area, including TES species, WRNF SOLC, and invasive plant species.</p>		
<p><i>Indicator: Identification and disclose of impacts of any federally listed threatened and endangered species, Forest Service Region 2 sensitive species, and WRNF SOLC</i></p>		
<p>Threatened and Endangered Species: <i>No Effect</i> to <i>Spiranthes diluvialis</i>, federally threatened.</p> <p>Region 2 Sensitive Species: <i>No Impact</i> to the seven Forest Service sensitive species carried forward into the analysis: <i>Botrychium ascendens</i>, <i>B. paradoxum</i>, <i>Cypripedium parviflorum</i>, <i>Festuca hallii</i>, <i>Machaeranthera coloradoensis</i>, <i>Parnassia kotzebuei</i>, and <i>Rubus arcticus</i> subsp. <i>acaulis</i>.</p> <p>SOLC Plants: <i>No Impact</i> to plant SOLC or SVC species.</p>	<p>Threatened and Endangered Species: <i>No Effect</i> to <i>Spiranthes diluvialis</i>, federally threatened.</p> <p>Region 2 Sensitive Species: <i>May Adversely Impact</i> <i>Botrychium ascendens</i> and <i>B. paradoxum</i>.</p> <p><i>No Impact</i> to <i>Cypripedium parviflorum</i>, <i>Festuca hallii</i>, <i>Machaeranthera coloradoensis</i>, <i>Parnassia kotzebuei</i>, and <i>Rubus arcticus</i> subsp. <i>acaulis</i>.</p> <p>SOLC Plants: <i>Botrychium</i> spp. = Direct impact to less than 0.1 acre of occupied habitat and slightly less than Alternative 3.</p>	<p>Threatened and Endangered Species <i>No Effect</i> to <i>Spiranthes diluvialis</i>, federally threatened.</p> <p>Region 2 Sensitive Species <i>May Adversely Impact</i> <i>Botrychium ascendens</i> and <i>B. paradoxum</i>.</p> <p><i>No Impact</i> to <i>Cypripedium parviflorum</i>, <i>Festuca hallii</i>, <i>Machaeranthera coloradoensis</i>, <i>Parnassia kotzebuei</i>, and <i>Rubus arcticus</i> subsp. <i>acaulis</i>.</p> <p>SOLC Plants <i>Botrychium</i> spp. = Direct impact to less than 0.1 acre of occupied habitat and slightly more than Alternative 2.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	<p><i>Listera borealis</i> = Direct impact to less than 0.1 acre of occupied habitat</p> <p><i>Lycopodium annotinum</i> = Direct impact to less than 0.1 acre of occupied habitat.</p> <p>No Impact to SVC.</p>	<p><i>Listera borealis</i> = Direct impact to less than 0.1 acre of occupied habitat</p> <p><i>Lycopodium annotinum</i> = Direct impact to less than 0.1 acre of occupied habitat.</p> <p>No Impact to SVC.</p>
FOREST HEALTH		
Overstory vegetation would be altered as a result of the proposed projects. Additionally, construction and operation of the proposed projects has the potential to affect the presence of weeds.		
<i>Indicator: Quantification (acreage) of proposed ground disturbance and overstory vegetation removal effects by species/vegetation type</i>		
<p>No additional ground disturbance or forest overstory vegetation clearing would occur as a result of the No Action Alternative. Snowmass would continue to improve forest health during and after the Mountain Pine Beetle epidemic.</p>	<p>A total of 25 acres of ground disturbance and 17 acres of vegetation clearing would occur under Alternative 2.</p> <p>The 17 acres of removal includes 12 acres of spruce-fir, 4 acres of aspen and 1 acre of forb.</p> <p>With implementation of the tree replacement PDC, there would be no long-term negative effects to forest overstory vegetation.</p>	<p>A total of 23 acres of ground disturbance and 16 acres of vegetation clearing would occur under Alternative 3.</p> <p>The 16 acres of removal includes 11 acres of spruce-fir, 4 acres of aspen and 1 acre of forb.</p> <p>With implementation of the tree replacement PDC, there would be no long-term negative effects to forest overstory vegetation.</p>
<i>Indicator: Identify design criteria and BMPs to avoid the spread of noxious or other undesirable weed species and to manage existing populations toward eradication or acceptable levels when eradication is not realistic</i>		
<p>Under the No Action Alternative, no new projects would be implemented. Weeds would continue to be controlled according to Snowmass' existing Weed Management Plan.</p>	<p>Design criteria and BMPs to control and manage invasive weeds are included throughout the PDC incorporated into the action alternatives. Implementation of these PDC will help managers not only control existing populations of undesirable weeds, but also prevent their spread into any previously un-infested areas.</p>	<p>Same as Alternative 2.</p>
<i>Indicator: Disclosure and analysis of WRNF noxious weed design features</i>		
<p>Under the No Action Alternative, no new projects would be implemented. Weeds would continue to be controlled according to Snowmass' existing Weed Management Plan.</p>	<p>Noxious weed design features prescribed by the WRNF have been incorporated into PDC. These include 1) pretreatment of existing infestations; 2) cleaning of all off-road equipment; 3) revegetation with approved seed mixes that are certified weed</p>	<p>Same as Alternative 2.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	free; and 4) monitoring and treatment of the analysis area for three years. With implementation of PDC, no adverse impacts due to invasive weeds are expected to occur under Alternative 2.	
FISH AND WILDLIFE		
Development of proposed projects, including associated infrastructure, could affect individuals, populations, and/or habitat values for federally PTES fish and wildlife species, migratory birds, and SOLC. In particular, the proposed mountain biking trails within the relatively undisturbed forested block adjacent the Elk Camp area could impact habitat values and connectivity for species utilizing this area.		
<i>Indicator: Identify federally listed, Forest Service sensitive wildlife species, and migratory birds potentially present in the analysis area and disclose the presence or absence of these species through field studies</i>		
<p>No impacts would occur under Alternative 1. Existing conditions include:</p> <p>TES: <u>Canada lynx</u> Snowmass SUP area occupies 13% of the Snowmass LAU.</p> <p>Region 2 Sensitive Species: Refer to Table 3K-2 for species with and without potential habitat.</p> <p>Migratory Bird: Refer to Table 3K-3 for species with and without potential habitat.</p> <p>SOLC: <u>Elk</u> Maroon Bells-Snowmass Wilderness herd uses Spring Creek, Owl Creek and Willow Creek drainages during summer months.</p>	<p>TES: <u>Colorado pikeminnow, razorback sucker humpback chub, bonytail chub</u> The proposed project would result in 0.05 acre feet of additional water depletions in the upper Colorado River Watershed. However, the new depletion is covered under the 1995 USFWS Biological Opinion. No further analysis was required.</p> <p><u>Canada lynx</u> 10.1 acres of lynx habitat would be converted to non-habitat.</p> <p>Region 2 Sensitive Species: Refer to Table 3K-4 for complete list of species and determination summary.</p> <p>Species listed as “May impact individuals, but not likely to result trend toward federal listing (MII)” include marten, hoary bat, pygmy shrew, and olive-sided flycatcher.</p> <p>Migratory Bird: No bird nests were detected during field surveys. Impacts would be managed through the application of PDC.</p>	<p>TES: <u>Canada lynx</u> 9.0 acres of lynx habitat would be converted to non-habitat.</p> <p>Region 2 Sensitive Species: Same as Alternative 2.</p> <p>Migratory Bird: Same as Alternative 2.</p> <p>SOLC: <u>Elk</u> No detectable difference in improved survival or fecundity compared to Alternative 2.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	<p>SOLC: <u>Elk</u> The negative effects on elk would not be measurable on habitat effectiveness for the Maroon Bells-Snowmass Wilderness herd, or elk population numbers within DAU E-15.</p>	
<p><i>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.</i></p>		
<p>No impacts would occur to wildlife habitat.</p>	<p>The landscape is characterized by a mixture of spruce-fir, mixed conifer, aspen, and lodgepole pine forest, in addition to ski trails dominated by grasslands and shrublands, and alpine tundra in the uppermost portions of the SUP area, which all provide habitat for a variety of wildlife species. Overstory vegetation removal would consist of approximately 11.8 acres of spruce-fir and 4.3 acres of aspen. Species impacts are disclosed in Tables 3K-2, 3K-3 and 3K-4. Specific to lynx, 0 acre of impacts to diurnal security habitat; 2.6 acres of denning habitat would occur; and 7.5 acres of winter foraging habitat would be impacted. Trails 3 and 21 would be built within portions of a mixed conifer stand that currently provides opportunity for lynx diurnal security. The zone of disturbance associated with these trails would reduce the amount of the stand providing daytime refugia to lynx during the summer. Additional noise and visual effects from proposed activities extending into lynx habitat that have the potential to displace lynx during the operating period and for periods of time at night across a greater portion of the analysis area.</p>	<p>Overstory vegetation removal would consist of approximately 10.7 acres of spruce-fir and 4.3 acres of aspen. Species impacts are disclosed in Tables 3K-2, 3K-3 and 3K-4. Specific to lynx, 0 acre of impacts to diurnal security habitat; 1.9 acres of denning habitat would occur; and 7.0 acres of winter foraging habitat would be impacted.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<i>Indicator: Describe the existing environmental baseline by quantifying current use in the project area (operating lifts, mountain biking and hiking trails, horseback riding trails, etc.) and compare to proposed conditions</i>		
25,000 annual summer visits, concentrated in the vicinity of Elk Camp Gondola and Chairlift.	45,000 annual summer visits, concentrated in the vicinity of Elk Camp Gondola and Chairlift. This increased use would expand the zone of disturbance and result in additional impacts to wildlife.	Visitation and use would be similar to Alternative 2.
<i>Indicator: Disclosure of effects to terrestrial PTES, and migratory birds</i>		
No Impact.	<p>TES: Alternative 2 may affect, but is not likely to adversely affect Canada lynx.</p> <p>Region 2 Sensitive Species: For species that have the potential to be present within the project area, Alternative 2 would have no impact on northern goshawk, boreal owl, flammulated owl, and purple martin. For species that have the potential to be present within the project area, Alternative 2 may impact individuals for the following species: marten, hoary bat, pygmy shrew, and olive-sided flycatcher.</p> <p>SOLC: Alternative 2 would have no impact on the ability of the Forest to meet the objectives of improving habitat conditions for identified SOLC.</p>	Same as Alternative 2 except that disturbance and displacement of individuals would be less due to no regular nighttime use in areas.
<i>Indicator: Identification of and effects within immediate and adjacent LAUs</i>		
No impact to LAUs.	Under Alternative 2, 10.1 acres of lynx habitat would be converted to non-habitat. At a potentially key junction connecting Snowmass and Maroon Bells LAU nighttime activity, noise, and human presence could be a disruption to lynx during portions of the day and night when amenities are used.	Under Alternative 3, 9.0 acres of lynx habitat would be converted to non-habitat. Nighttime activity would not occur as a disruption to movements among LAUs.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<i>Indicator: Quantification and qualification of compensatory mitigation for impacts to lynx or other relevant species habitat, if necessary</i>		
No Impact.	Potential compensatory mitigation for impacts to lynx will be developed through the ESA Section 7 Consultation process and determined by the USFWS through their Biological Opinion.	Same as Alternative 2.
<i>Indicator: Identification of impacts to elk and mule deer summer range habitat with particular focus on the impacts to reproductive habitat. Describe the possible timing conflicts between deer/elk movement corridors/summer concentration areas with summer operating season. Specifically outline seasonal timing restrictions for affected species with listed status.</i>		
Maroon Bells-Snowmass Wilderness elk herd utilizes the Spring, Owl, and Brush Creek drainages as transition range during the spring for calving and fall for building fat reserves.	The Vista trail re-route, below the Elk Camp Gondola upper terminal, is within Colorado Parks and Wildlife (CPW) mapping of elk production range; however, trail closures would occur between May 15 and June 20. Night activities have the potential to displace elk across a greater portion of the analysis area. The negative effects on elk from all of the proposed projects at Elk Camp would not be measurable on habitat effectiveness for the Maroon Bells-Snowmass Wilderness herd, or elk population numbers within DAU E-15.	Same as Alternative 2. Night activities have the potential to displace elk across a small portion of the analysis area.
<i>Indicator: Identification of impacts to avian species, in particular to the construction and operation of the zip line canopy tour and zip line</i>		
No Impact.	Avian species could be present within the project area and could be impacted; however, no bird nests were detected during field surveys. Impacts would be managed through the application of PDC.	Same as Alternative 2.
<i>Indicator: Discussion of the proposed projects potential to cumulatively impact habitat connectivity within the Snowmass SUP and surrounding areas.</i>		
No Impact.	Habitat connectivity would be maintained throughout the project area at the level it currently exists, yet may be somewhat degraded during periods of nighttime use.	Same as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3																																																				
<i>Indicator: Identification of impacts to aquatic species from effects to water quality and stream health</i>																																																						
No Impact.	Potential impacts to aquatic species such as increase in sedimentation to streams would be managed through the application of PDC.	Same as Alternative 2.																																																				
<i>Indicator: Discussion of the operational season for the proposed projects</i>																																																						
Elk Camp Gondola and Chairlift operate from June through September.	<table border="1"> <thead> <tr> <th rowspan="2">Proposed Activity</th> <th colspan="2">Season and Duration of Use</th> </tr> <tr> <th>Summer</th> <th>Winter</th> </tr> </thead> <tbody> <tr> <td>Mountain Biking and Hiking Trails</td> <td>Daytime only</td> <td>No Use</td> </tr> <tr> <td>Mountain Coaster</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Zip Line Canopy Tour</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Zip Line</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Ropes Challenge Course</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Climbing Wall</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> <tr> <td>Multi-Purpose Activity Areas</td> <td>Daytime and Nighttime</td> <td>Daytime and Nighttime</td> </tr> </tbody> </table>	Proposed Activity	Season and Duration of Use		Summer	Winter	Mountain Biking and Hiking Trails	Daytime only	No Use	Mountain Coaster	Daytime and Nighttime	Daytime and Nighttime	Zip Line Canopy Tour	Daytime and Nighttime	Daytime and Nighttime	Zip Line	Daytime and Nighttime	Daytime and Nighttime	Ropes Challenge Course	Daytime and Nighttime	Daytime and Nighttime	Climbing Wall	Daytime and Nighttime	Daytime and Nighttime	Multi-Purpose Activity Areas	Daytime and Nighttime	Daytime and Nighttime	<table border="1"> <thead> <tr> <th rowspan="2">Proposed Activity</th> <th colspan="2">Season and Duration of Use</th> </tr> <tr> <th>Summer</th> <th>Winter</th> </tr> </thead> <tbody> <tr> <td>Mountain Biking and Hiking Trails</td> <td>Daytime only</td> <td>No Use</td> </tr> <tr> <td>Mountain Coaster</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Zip Line Canopy Tour</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Zip Line</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Ropes Challenge Course</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Climbing Wall</td> <td>Daytime only</td> <td>Daytime only</td> </tr> <tr> <td>Multi-Purpose Activity Areas</td> <td>Daytime only</td> <td>Daytime only</td> </tr> </tbody> </table>	Proposed Activity	Season and Duration of Use		Summer	Winter	Mountain Biking and Hiking Trails	Daytime only	No Use	Mountain Coaster	Daytime only	Daytime only	Zip Line Canopy Tour	Daytime only	Daytime only	Zip Line	Daytime only	Daytime only	Ropes Challenge Course	Daytime only	Daytime only	Climbing Wall	Daytime only	Daytime only	Multi-Purpose Activity Areas	Daytime only	Daytime only
	Proposed Activity		Season and Duration of Use																																																			
		Summer	Winter																																																			
	Mountain Biking and Hiking Trails	Daytime only	No Use																																																			
	Mountain Coaster	Daytime and Nighttime	Daytime and Nighttime																																																			
	Zip Line Canopy Tour	Daytime and Nighttime	Daytime and Nighttime																																																			
	Zip Line	Daytime and Nighttime	Daytime and Nighttime																																																			
	Ropes Challenge Course	Daytime and Nighttime	Daytime and Nighttime																																																			
	Climbing Wall	Daytime and Nighttime	Daytime and Nighttime																																																			
Multi-Purpose Activity Areas	Daytime and Nighttime	Daytime and Nighttime																																																				
Proposed Activity	Season and Duration of Use																																																					
	Summer	Winter																																																				
Mountain Biking and Hiking Trails	Daytime only	No Use																																																				
Mountain Coaster	Daytime only	Daytime only																																																				
Zip Line Canopy Tour	Daytime only	Daytime only																																																				
Zip Line	Daytime only	Daytime only																																																				
Ropes Challenge Course	Daytime only	Daytime only																																																				
Climbing Wall	Daytime only	Daytime only																																																				
Multi-Purpose Activity Areas	Daytime only	Daytime only																																																				
<i>Indicator: Identification of potential impacts from proposed nighttime activities</i>																																																						
Outdoor nighttime activities are currently limited to special events until 9:00 p.m. No additional impacts would occur under Alternative 1.	Nighttime activities have the potential to displace evaluated species across a greater portion of the analysis area. In some cases, the location of nighttime activity could affect localized connectivity of habitat. Several species are known to forage, bed, or travel at night and these biological functions could be impacted from supplemental lighting, noise, and human activity.	Night activities have the potential to displace evaluated species across a smaller portion of the analysis area. Habitat used by species would be available over a greater portion of a 24-hour photoperiod.																																																				

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
SOILS AND GEOLOGY		
Ground disturbance, including tree clearing and grading, associated with construction and operation of proposed projects has potential to increase erosion/soil compaction and lead to a loss of soil organic matter. Proposed project components that could result in unnecessary or excessive ground disturbance should be avoided.		
<i>Indicator: Identification and estimated quantification (acres) of temporary and permanent ground disturbance according to high/moderate/low erodibility soils classes and slope stability concerns, in particular to the cut and fill process need for the mountain biking trails</i>		
<p>Under Alternative 1 there would be no new ground disturbance.</p>	<p>Under Alternative 2 there would be 25.5 acres of ground disturbance (temporary and permanent). The proposed disturbance associated with Alternative 2 would occur in soils with “low” to “moderate” (including those listed as “low-moderate”) erosion potential. Only one soil type, 338B, was identified as having “moderate-high” erosion potential and overlaps 2.9 acres of disturbance associated with the proposed zip line canopy tour (and shelter), zip line, mountain biking trails, hiking trail re-routes, pedestrian access, and construction access included in Alternative 2 (refer to Table 3L-3).</p> <p>Under Alternative 2, 14 acres of ground disturbance would be considered a permanent disturbance, resulting in a loss of soil organic material within mapped soils units due to mountain biking trails, construction access or infrastructure. Permanent disturbance would occur to some degree across all of the aforementioned soil erodibility ratings, ranging from “low” to “moderate-high” (refer to Table 3L-4).</p> <p>One of the soil map units, 376C, does have “severe” limitations to cut and fill stability and includes 0.3 acre of grading and vegetation clearing/grading associated with mountain biking trails.</p>	<p>Alternative 3 would result in approximately 23.3 acres of ground disturbance (temporary and permanent). All of the project components of Alternative 3 are located within the same soil map units as those described in Alternative 2. Under Alternative 3, 12.7 acres of ground disturbance would be considered a permanent disturbance. The 12.7 acres of permanent ground disturbance would span the range of soil erodibility ratings, from “low” to “moderate-high.”</p> <p>None of the modifications to project components that exist between Alternatives 2 and 3 would affect the limitations to cut and fill slope stability as none occur in the area of “severe” limitation.</p>

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<i>Indicator: Discussion of soil conditions and baseline inventory of soil organic matter</i>		
The Woody Creek watershed covers most of the Snowmass SUP area. Previous disturbance in the watershed includes tree removal and grading associated with ski area infrastructure such as ski trails, mountain biking and hiking trails, lift installation, roads, and facilities. The Snowmass SUP area covers approximately 4,997 acres; in total nearly 2,000 acres of the SUP area has been cleared for ski area development (an additional 450 acres occur above treeline). Generally, much of that area has been revegetated with herbaceous ground cover.	Same as Alternative 1.	Same as Alternative 1.
<i>Indicator: Analysis of increased erosion hazard due to temporary and permanent ground disturbance</i>		
There is no ground disturbance proposed under Alternative 1.	For the entire analysis area, implementation of the soil management requirements and PDC would minimize erosion and loss of soil organic material (Table 2-2). None of the areas impacted by permanent or temporary ground disturbance have high erodibility; therefore, it is not anticipated that any of the proposed projects included in Alternative 2 would result in irreversible damage to soil resources. One of the soil map units, 376C, does have “severe” limitations to cut and fill stability and includes 0.3 acre of grading and vegetation clearing/grading associated with mountain biking trails. “Severe” limitations can be overcome with proper siting, design and mitigation measures, requiring additional attention when implementing the proposed trail in this location. Additionally, a “severe” rating may indicate that frequent maintenance and upkeep of erosion control measures would be required to control erosion and sedimentation to waterways. In general, “severe”	Same as Alternative 2.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
	limitations can be overcome by avoiding cliffs, unstable talus and very steep slopes.	
<i>Indicator: Inventory of erodible soils by soil map unit</i>		
Surface and subsurface soil erodibility is generally moderate within the analysis area including some areas with low and high erodibility potential. Soil organic matter can also be related to soil erodibility as organic horizons allow infiltration and provide productive soils for stabilizing vegetation. Maintenance of soil organic matter and surface O- and A-horizon integrity minimizes erosion, compaction, and hydrologic problems within the ski area. Refer to the kw rating in Table 3L-2 for a complete inventory of baseline soil conditions.	Same as Alternative 1.	Same as Alternative 1.
<i>Indicator: Digitization of bare ground/low vegetation cover areas within SUP boundary</i>		
A bare ground assessment completed in 2014 revealed approximately 230 acres of the analysis area could benefit from receiving additional rehabilitation by amending those areas that have not recovered with carbonaceous soil amendments. Since that time, Snowmass completed rehabilitation on 8 acres that were identified as priority. Included in these 230 acres is approximately 70 acres of terrain classified as having “severe” stability risk according to the Forest Service Stability model.	Under Alternative 2, the 14 acres of new permanent impacts as outlined in Table 3L-4 would be offset by commensurate acreage of previously-disturbed ground identified in the bare ground digitization project, as well as by ski area and WRNF personnel. This collaborative approach to restoration of both current and past construction projects allows the ski area to meet soil and other resource protections and improve watershed, wildlife, and overall conditions on the ground. The remaining 11.5 acres of ground disturbance that would be considered temporary would not need to be directly offset but would require diligent adherence to soils-related PDC and BMPs to maintain levels of soil organic matter and re-establish vegetation in these areas.	The 12.7 acres of new permanent impacts associated with the selection of Alternative 3 would be offset by a commensurate acreage of previously-disturbed ground identified in the bare ground digitization project, as well as by ski area and WRNF personnel. This collaborative approach to restoration of both current and past construction projects allows the ski area to meet soil and other resource protections and improve watershed, wildlife, and overall conditions on the ground. The remaining 10.6 acres of ground disturbance that would be considered temporary would not need to be directly offset but would require diligent adherence to soils-related PDC and BMPs to maintain levels of soil organic matter and re-establish vegetation in these areas.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3										
WATERSHED												
Implementation of proposed projects has the potential to affect stream and riparian health. In particular, stream crossings by mountain biking and hiking trails may have an increased potential to affect stream and riparian health and should be minimized.												
<i>Indicator: Anticipated temporary and permanent changes in water yield (acre feet) and peak flows (cfs), and subsequent watershed effects</i>												
No impacts to water yield or peak flows.	Water yields and peak runoff flow rates originating from the study watersheds would increase between 0.2 to 2% relative to existing conditions. Refer to Tables 3M-9 and 3M-10 for more information.	Water yields and peak runoff flow rates originating from the study watersheds would increase between 0.2 to 1.9% relative to existing conditions. Refer to Tables 3M-14 and 3M-15 for more information.										
<i>Indicator: Discussion of existing stream health conditions and WIZ impacts, within the context of the following stream health metrics: bank stability, fine sediment, residual pool depth, wood frequency, and macroinvertebrates. Evaluation of compliance with WCPH and Forest Plan requirements.</i>												
<p>The WRNF does not complete quantitative stream health surveys on streams smaller than third-order.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Stream Health Metric</th> <th style="text-align: center;">East Fork Brush Creek Rating</th> </tr> </thead> <tbody> <tr> <td>Bed Fine Sediments</td> <td style="text-align: center;">Robust</td> </tr> <tr> <td>Unstable Banks</td> <td style="text-align: center;">Diminished</td> </tr> <tr> <td>Large Woody Debris</td> <td style="text-align: center;">Robust</td> </tr> <tr> <td>Residual Pool Depth</td> <td style="text-align: center;">Robust</td> </tr> </tbody> </table>	Stream Health Metric	East Fork Brush Creek Rating	Bed Fine Sediments	Robust	Unstable Banks	Diminished	Large Woody Debris	Robust	Residual Pool Depth	Robust	<p>With the implementation of PDC, the proposed projects would not have a negative impact on existing stream health. Projects would be constructed near streams channels, requiring removal of selected trees within 0.6 acre of the East Fork Brush Creek WIZ and 0.04 acre in the WIZ of Brush Creek Tributary #2.</p> <p>PDC contained in Table 2-2 would ensure compliance with Forest Plan and WCPH requirements.</p>	<p>With the implementation of PDC, the proposed projects would not have a negative impact on existing stream health. Projects would be constructed near streams channels, requiring removal of selected trees within 0.7 acre of the East Fork Brush Creek WIZ and 0.04 acre in the WIZ of Brush Creek Tributary #2.</p> <p>PDC contained in Table 2-2 would ensure compliance with Forest Plan and WCPH requirements.</p>
Stream Health Metric	East Fork Brush Creek Rating											
Bed Fine Sediments	Robust											
Unstable Banks	Diminished											
Large Woody Debris	Robust											
Residual Pool Depth	Robust											
<i>Indicator: Quantification of stream health through surveys that classify each channel and channel sensitivity to disturbance</i>												
Refer to the Existing Stream Health discussion in Chapter 3, Section M – Watershed for a quantification of existing stream health.	Refer to the Existing Stream Health discussion in Chapter 3, Section M – Watershed for a quantification of existing stream health.	Refer to the Existing Stream Health discussion in Chapter 3, Section M – Watershed for a quantification of existing stream health.										
<i>Indicator: Qualitative and quantitative discussion of existing surface drainage conditions within the context of Forest Plan Standards for Management Area 8.25</i>												
<p>Refer to the Existing CDA discussion in Chapter 3, Section M – Watershed for a description of existing surface drainage conditions.</p> <p>A quantification of connected disturbed areas and roads is presented in Tables 3M-5 and 3M-6.</p>	<p>With the implementation of PDC contained in Table 2-2, there would be minimal impacts to surface drainage conditions and Forest Plan Standards would be met.</p>	<p>With the implementation of PDC contained in Table 2-2, there would be minimal impacts to surface drainage conditions and Forest Plan Standards would be met.</p>										

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<i>Indicator: Quantification and discussion of existing drainage concerns and treatment areas, including areas of rilling and gullyng</i>		
A culvert on East Fork Brush Creek in the Elk Camp area is corroded. Stream flows underneath the culvert, which could contribute sediment to the stream. Recommend replacing the culvert. Headcutting and rilling down-gradient from a wetland-type area, and subsequent sediment transport to Brush Creek Trib. #2 via waterbar (<i>Funnel</i> ski trail). Recommend installation of adequate BMPs for erosion and sediment control. Road fill slope failure and sediment into stream; located at the discharge of a road waterbar on road fill where a culvert conveys East Fork Brush Creek under the road. Recommend repairing fill slope and improving road drainage.	With the implementation of PDC contained in Table 2-2, there would be minimal impacts to surface drainage conditions and Forest Plan Standards would be met.	With the implementation of PDC contained in Table 2-2, there would be minimal impacts to surface drainage conditions and Forest Plan Standards would be met.
<i>Indicator: Development and analysis of drainage management measures to maintain or improve stream health</i>		
No Impacts.	PDC outlined in Table 2-2 include measures to maintain or improve stream health.	PDC outlined in Table 2-2 include measures to maintain or improve stream health.
<i>Indicator: Quantity (acres) of impacts to the WIZ</i>		
No Impact.	Removal of selected trees in the WIZ would occur within 0.6 acre in the East Fork Brush Creek watershed and 0.04 acre in the Brush Creek Tributary #2 watershed.	Removal of selected trees in the WIZ would occur within 0.7 acre in the East Fork Brush Creek watershed and 0.04 acre in the Brush Creek Tributary #2 watershed.
<i>Indicator: Quantity (acres) of CDA</i>		
Under Alternative 1, existing mountain roads within the analysis area were determined to be connected to the stream network (0.23 acre). This small acreage of CDA could be further reduced with adequate design, implementation, and maintenance of BMPs for erosion and sediment control.	Impacts within the WIZ (approximately 0.6 acre) could lead to increased CDA. This acreage of CDA would be minimized with application of required PDC for erosion and sediment control.	Impacts within the WIZ (approximately 0.7 acre) could lead to increased CDA. This acreage of CDA would be minimized with application of required PDC for erosion and sediment control.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
<i>Indicator: Quantification in channel network extension (length of connected channel)</i>		
Approximately 813 linear feet of disturbed areas are connected to the stream channel network (refer to Table 3M-5).	Implementation of PDC would avoid or minimize an increase in length of connected channel.	Implementation of PDC would avoid or minimize an increase in length of connected channel.
<i>Indicator: Quantification (acres) of ground disturbing activities located on highly erodible soils as it pertains to stream health</i>		
No Impact.	Approximately 0.5 acre of the proposed grading associated with the construction of mountain biking trails (Trail 14) would overlap areas with “moderately high” and “severe” mass movement potential. This segment of proposed Trail 14 also includes two stream crossings within the vicinity of these potentially unstable soils. Special design considerations would need to be taken into account when constructing Trail 14 to ensure proper drainage and avoid increases in sedimentation. Except for this segment of mountain biking trail, all of the other projects proposed in Alternative 2 overlap areas rated as having “slight” to “moderately low” mass movement potential. Proposed terrain grading, especially in areas of “high” and “severe” mass movement potential could impact stream health due to increased sedimentation; however, with proper siting, design and mitigation measures, stream health would be maintained. Bridges or boardwalks would be constructed to avoid grading and minimize impacts in the WIZ.	Same as Alternative 2.
<i>Indicator: Identification of any Clean Water Act (CWA) §303(d) impaired or threatened waterbody segments in the study area</i>		
No Impact.	None of the stream segments within the analysis area are listed on the Colorado State 303(d) list as impaired streams under the CWA.	None of the stream segments within the analysis area are listed on the Colorado State 303(d) list as impaired streams under the CWA.

**Table 2-4:
Summary Comparison of Direct and Indirect Environmental Consequences**

Alternative 1	Alternative 2	Alternative 3
WETLANDS		
Identified wetlands and other waters of the U.S. throughout the project area could be temporarily and/or permanently affected by construction and implementation of proposed projects. Minimization of wetland crossings should be considered for mountain biking and hiking trails.		
<i>Indicator: Quantification of wetlands and other waters of the U.S. (acres/linear feet)</i>		
A total of 21.2 acres of wetlands/riparian habitat were mapped within the analysis area including 11.0 acres of Palustrine Scrub-Shrub (PSS), and 10.2 acres of Palustrine Emergent (PEM).	Same as Alternative 1.	Same as Alternative 1.
<i>Indicator: Disclosure of wetland functions and values</i>		
Wetlands are generally functioning at or near the reference standards. No effects to functions and values of wetlands and riparian areas would occur.	Same as Alternative 1.	Same as Alternative 1.
<i>Indicator: Narrative description of wetland communities, classifications (using the Cowardin System) and disclosure of anticipated temporary and/or permanent impacts (acres/linear feet)</i>		
A total of 21.2 acres of wetlands/riparian habitats were mapped for the analysis area including: 11.0 acres of PSS, and 10.2 acres of PEM. There would be no permanent or temporary impacts to wetlands or other waters of the U.S. under the No Action Alternative.	Construction of mountain biking trails, two access paths, and zip line canopy tour, zip line and ropes challenge course crossing would temporarily impact approximately 469 linear feet of wetlands. Application of PDC will avoid or minimize direct impacts to wetland areas. There would be no permanent wetland impact associated with Alternative 2.	Construction of mountain biking trails, two access paths, and zip line canopy tour, zip line and ropes challenge course crossing would temporarily impact approximately 942 linear feet of wetlands. Application of PDC will avoid or minimize direct impacts to wetland areas. There would be no permanent wetland impact associated with Alternative 3.
<i>Indicator: Quantify number of stream and wetland crossings from proposed projects and estimate length of boardwalk needed to span streams and wetlands</i>		
No wetland or stream crossings would occur under the No Action Alternative.	Fourteen crossings resulting in 469 linear feet of wetland crossings.	Nineteen crossings resulting in 942 linear feet of wetland crossings.
<i>Indicator: Description of compliance with EO 11990, Protection of Wetlands</i>		
Not applicable.	In compliance with EO 11990, all wetland impacts will be avoided and minimized to the most practicable extent possible.	In compliance with EO 11990, all wetland impacts will be avoided and minimized to the most practicable extent possible.

G. IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The Preferred Alternative is the alternative 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.

Chapter 3

Affected Environment and Environmental Consequences

This page intentionally left blank.

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.¹⁵ 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 this chapter 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 discussion provides a description of the environment potentially affected, as based upon current uses and management activities/decisions.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

This discussion provides an analysis of direct and indirect environmental effects 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).

¹⁵ 40 CFR 1502.15

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 but collectively major actions taking place over a period of time. Past, present and reasonably foreseeable future actions are identified 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 irretreivable 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 irretreivably lost while the land is a road, but the timber resource is not irreversibly lost because the land could grow trees in the near future. The Forest Service recognizes the fact that certain management activities will produce irreversible or irretreivable commitments of resources. The CEQ requires the disclosure of irreversible and irretreivable commitments of resources potentially resulting from federal actions.¹⁶

A. RECREATION

SCOPE OF THE ANALYSIS

The scope of this analysis of recreational opportunities extends to winter and summer uses at Snowmass on NFS lands within the ski area's 4,997-acre SUP boundary. Most multi-season recreation opportunities at Snowmass are near the Elk Camp area on public lands administered by the WRNF. This analysis defines the existing multi-season recreation opportunities within the Snowmass SUP area and provides an analysis of potential changes in the recreational dynamic anticipated with proposed projects. Recreational opportunities on NFS lands within the Snowmass SUP area, on adjacent NFS and private lands, and throughout Pitkin County, Colorado are all incorporated into this analysis.

AFFECTED ENVIRONMENT

Since its inception as a ski area, Snowmass has gained recognition as one of the world's premier destination resorts. Much of this recognition is associated with Snowmass' winter operations, which attract a wide national and international destination market, as well as significant visitation from regional and local markets. While winter operations and more specifically, snow sports, have long been associated with the highly regarded recreation experience at Snowmass, multi-season and more specifically, summer recreation opportunities, have been growing in popularity over the past two decades. Snowmass has been

¹⁶ 40 CFR 1502.16

offering summer recreation opportunities since the 1990s and has utilized the Elk Camp area as the designated hub for these activities since 2009.

Multi-Season Recreation

Demand for multi-season and summer recreation opportunities at ski areas and other NFS lands has grown nationwide in recent years, with a heightened effect in Colorado. This trend has manifested across the WRNF, and over the last two decades multi-season recreation opportunities have evolved significantly.

The existing summer recreation opportunities at Snowmass can be characterized as providing a dispersed recreation experience. A greater number of developed recreation opportunities are present on adjacent Town of Snowmass Village lands; however, within the Snowmass SUP activities cater to visitors with more advanced physical abilities and skill sets that are necessary to participate. Specifically, these activities include lift-served mountain biking and hiking via the Elk Camp Gondola and Chairlift, and dispersed activities along multiple-use trails on the western side of the ski area. Mountain biking is one of the most popular activities with guests, thus Snowmass offers an array of programs and a versatile trail network. Families visiting Snowmass tend to participate in activities with lower risk that typically only require an introductory level of prior experience. Currently these activities are limited to scenic chairlift rides, hiking, nature-based programs, and disc golf within the SUP area.

In general, there is a lack of adventurous, exploratory activities at Snowmass that do not require a significant learning curve, or a high level of skill, in order to participate. These types of developed recreation opportunities are important as they allow visitors of the National Forest to learn about their surroundings and interact with them in an interpretive way without barriers to participation.

Mountain Biking

The mountain biking program and trail network at Snowmass has grown immensely over the past two decades. The Snowmass area is designated by the International Mountain Biking Association as a “Bronze” level Ride Center, indicating the high quality and variety of trails in the region. Much of the recent growth can be attributed to the 2012 *Mountain Biking Master Development Plan* that was prepared by Gravity Logic (2012 Gravity Logic MDP). Gravity Logic is an industry leader in mountain bike park/trail design and development, and Snowmass now features four of their signature trails, which were included in the 2012 Gravity Logic MDP. Mountain biking trails are spread across the SUP area, including NFS trails and those built by Snowmass trail crews. In total, there are more than 45 miles of trails and service roads open to mountain biking traversing NFS lands within the Snowmass SUP area and adjacent private lands within Snowmass’ operating boundary. Guests can purchase daily or season passes for bike haul on the Elk Camp Gondola and Chairlift, or they can access upper-mountain trails by riding from the base areas.

Snowmass currently offers three types of mountain biking experiences—traditional cross-country (XC), downhill, and all-mountain/enduro. Each of these categories has its own trail design needs. Traditional XC riders generally utilize lighter equipment with smaller suspension systems, and typically climb uphill under their own power (i.e., they typically do not use lift service). These riders typically employ their skills on singletrack trails, which are narrower in comparison to those designed for the other mountain biking experiences and include slower sections where braking and pedaling are necessary. Singletrack trails designed for XC riders have up and downhill sections but generally are built across consistent grades.

Downhill and all-mountain/enduro riders both fall into the category of gravity riders, a category that has a greater emphasis on riding trails that require less pedaling and utilize natural elevation change and features to travel at higher speeds. Gravity riders typically utilize flow and hybrid trail types; however, there are singletrack gravity trails as well. Flow trails are wider and incorporate features that allow riders to develop a rhythm with little pedaling or braking, while hybrid trails blend elements of singletrack and flow trail configurations. Because singletracks are narrower, they often present a greater challenge when designed for gravity riders. Bikes designed for downhill use are often heavier and typically include longer-travel suspension designed to descend steep, rough terrain without the need to ascend for long periods. Downhill riders often wear protective equipment, such as full-face helmets, long-sleeves, and body armor. Generally, downhill riders utilize lifts or shuttles to transport them uphill. They seek opportunities to test their abilities on terrain features such as jumps, drops, wall rides, and rock gardens. A growing category of riders are considered all-mountain/enduro riders. This category blends XC and downhill, with a focus on more downhill riding. They utilize lifts, but are not averse to ascending trails.

While trail design is primarily grouped into two general categories, XC or gravity, the trail and rider types within these categories, as discussed in the previous paragraph, define the experience that each of these general trail types provides. There are exceptions to these categories and subcategories but it is important to understand that XC trails are built across consistent grades, are primarily singletrack, and cater to traditional XC riders. Gravity trails typically consist of flow and hybrid trail types and cater to downhill and all-mountain/enduro riders. Gravity trails can also be singletrack; however, given the emphasis on downhill riding at higher speeds, these are often more technical and reserved for higher skill level riders as they still descend steep, rough terrain but are narrower.

Within the Snowmass SUP boundary, 45 miles of trails (not including service roads) exist either partially or wholly and connect to a greater regional trail system. The majority of these mountain bike trails are designed for XC use. Mountain biking trails and segments of mountain biking trails that exist entirely within the Snowmass SUP account for approximately 26.4 miles. Of the 26.4 miles of mountain biking trails within the SUP area only 11.6 miles of trail are designed as gravity trails and frequently maintained as part of Snowmass' summer operations. These four trails—*Viking*, *Verde*, *Valhalla*, and *Vapor*—are all located in the Elk Camp area and served by either the Elk Camp Gondola or Elk Camp Chairlift.

Currently the trail network at Snowmass is suitable for most ability levels; however, it caters towards riders with an existing skill set that are capable of riding trails rated “more difficult” and “most difficult.” The Town of Snowmass Village *Parks, Open Space, Trails and Recreation Plan* (adoption pending) identifies a general deficiency in the supply of “easier” trails in the Snowmass area, and notes challenges with user conflicts on multi-use trails.¹⁷ In recent years, Snowmass has shifted its focus towards constructing trails for all ability levels and rider types, including a beginner skills park and flow trail, intermediate XC and flow trails, and advanced downhill trails.

Table 3A-1 shows the existing mountain biking trail distribution by ability level for all trails at Snowmass, including those that extend beyond the SUP boundary onto adjacent private lands and/or other NFS lands. Note that the table only includes mountain biking trails, and does not include mountain service roads, which some guests utilize for biking. While some of the trails are open only to mountain bikes, a majority are multi-use trails also open to hikers and equestrian use. Additional mountain biking trails that exist entirely outside the Snowmass SUP area, but are on adjacent NFS lands, are not included in this table.

**Table 3A-1:
Existing Mountain Biking Trail Specifications**

Ability Level	Trail Name	Trail Type	Length (miles)
Easier	Verde*	Gravity	3.0
	Verde (to be decommissioned)	Gravity	0.5
	Beginner Loop	XC	0.6
More Difficult	Luge*	XC	1.1
	Burlingame	XC	0.6
	Village Bound	XC	3.1
	Cross Mountain	XC	2.9
	Viking*	Gravity	2.0
	Espresso	XC	1.7
	Ditch	XC	2.1
	Tom Blake	XC	2.0
	Tom Blake Ridge	XC	1.7
	Sequel	XC	1.0
	Powerline	XC	0.7
	Stark's	XC	1.1
	Connector	XC	1.2
	Snowmass Way*	XC	2.1

¹⁷ TOSV, 2016b

**Table 3A-1:
Existing Mountain Biking Trail Specifications**

Ability Level	Trail Name	Trail Type	Length (miles)
Most Difficult	Vapor*	Gravity	2.9
	Valhalla*	Gravity	3.2
	Parker's Plunge*	XC	0.9
	K.A.R.*	XC	0.8
	Government	XC	9.5
	West Government	XC	0.6
Total			45.3

Note: *indicates trails that are only open to mountain bikes

As shown in Table 3A-1, there is a notable lack of beginner ability-level mountain biking terrain. It should be noted that there is also an existing beginner skills park, which is not included in Table 3A-1 as it is located entirely on private land. The existing skills park advances the learning progression of riders, but does so in an area that is limited in space and removed from the rest of Snowmass' trail network. There is also a deficiency in gravity trails for all ability levels. Table 3A-2 shows the distribution of mountain biking trails by ability level and type of trail.

**Table 3A-2:
Mountain Biking Trails/Ability Level Distribution – Existing Conditions**

Ability Level	XC Mileage	XC Percent of Total	Gravity Mileage	Gravity Percent of Total	Total Mileage	Percent of Total
Easier	0.6	1%	3.5	8%	4.1	9%
More Difficult	21.3	47%	2.0	4%	23.3	51%
Most Difficult	11.8	26%	6.1	14%	17.9	40%
Total	33.7	74%	11.6	26%	45.3	100%

Table 3A-2 illustrates that nearly three-quarters of the mountain biking trail mileage at Snowmass consists of XC trails, with approximately one-quarter consisting of gravity trails. While this trail/ability level distribution comparison does include trails that extend beyond the Snowmass SUP, it is reflective of the mountain biking recreation experience one can expect to encounter at Snowmass. Trails are typically ridden start to finish regardless of land ownership. Visitors of Snowmass and the WRNF can access approximately 45 miles of trails from the Snowmass SUP, only 11.6 miles of which provide the desired gravity trail riding experience and are based in the Elk Camp area.

Hiking

Both guided and non-guided hiking opportunities are available at Snowmass. The Aspen Center for Environmental Studies offers daily hiking tours at the top of the Elk Camp Gondola (on the *Rabbit Run* Nature Trail Walk) and at the Village Mall (on the *Snowmass* Nature Trail Walk). These tours vary in

length and difficulty, and feature interpretation by qualified naturalists. They provide opportunities for guests to experience the National Forest and learn about the plants and wildlife that inhabit it. The tours are free, although the *Rabbit Run* tour requires the purchase of a gondola ticket.

Approximately 35 miles of trails, including those that extend beyond the SUP into adjacent private and NFS lands, are open to hiking at Snowmass. Note that this does not include mountain service roads, which are also open to hiking. Hiking trails and segments of hiking trails that exist entirely within the Snowmass SUP account for approximately 19.5 miles. Of the 19.5 miles of hiking trails within the SUP area only 5.8 miles of trail are designed as hiking only.

Table 3A-3 shows the existing hiking trail distribution by ability level. Several of these trails are only open to hiking, but a majority are open to multiple uses, including mountain biking and equestrian use. There is a general lack of locational diversity in hiking trails. Specifically, existing trails do not access more remote portions of the Snowmass SUP area. Many miles of hiking trails also exist outside the Snowmass SUP area on NFS lands, including those in the surrounding Maroon Bells-Snowmass Wilderness, but are not included in Table 3A-3.

**Table 3A-3:
Existing Hiking Trail Specifications**

Ability Level	Trail Name	Length (miles)
Easier	Beginner Loop	0.6
	Overlook*	0.9
	Rabbit Run*	0.7
More Difficult	Burlingame	0.6
	Connector	1.2
	Cross Mountain	2.9
	Ditch	2.1
	Espresso	1.7
	Sierra Loop*	1.9
	Powerline	0.7
	Sequel	1.0
	Stark's	1.1
	Tom Blake	2.0
	Tom Blake Ridge	1.7
Village Bound	3.1	
Most Difficult	Government	9.5
	West Government	0.6
	Summit*	1.1
	Vista*	2.1
Total		35.5

Note: *Indicates trails that are only open to hiking

Hiking trails within the SUP area supplement those that exist on NFS, Town of Snowmass Village, Pitkin County, and other lands in the surrounding area. The *Government* trail provides a vital connection to *East Snowmass Creek* trail to the west, and other hiking trails to the east. These connections are essential to the overall trails system in the Roaring Fork Valley and are included in WRNF forest-wide guidelines for trail development. Thus, the total mileage of these trails is included in the discussion of hiking opportunities available at Snowmass. However, it is important to understand that only 19.5 miles of these trails are entirely contained within the Snowmass SUP area, and of those 19.5 miles, only 5.8 miles are designated as hiking only. The vast majority of trails being used for hiking at Snowmass are multi-use trails and extend onto adjacent private and public lands, creating opportunities for user conflicts. Hiking-only opportunities within the SUP area are limited, but provide a unique experience as they are in close proximity to the other recreation opportunities and amenities offered at Snowmass, and are an important resource for multi-season programming.

Table 3A-4 shows the distribution of hiking trails by ability level.

Table 3A-4:
Hiking Trails/Ability Level Distribution – Existing Conditions

Ability Level	Total Mileage	Percent of Total
Easier	2.2	6%
More Difficult	20.0	56%
Most Difficult	13.3	37%
Total	35.5	100%

As illustrated in Table 3A-4 there is generally a lack of “easier” ability level hiking trails, and the majority of trails within the SUP area cater to guests of the “more difficult” ability level.

Developed Multi-Season Recreation Opportunities

As previously discussed, the current multi-season recreation opportunities available within the Snowmass SUP area are primarily undeveloped and have a substantial learning curve or require a high level of skill to participate. While the existing opportunities and programs at Snowmass have been highly popular with the public, many potential visitors of the National Forest either lack prior experience with these activities, familiarity or comfort with the outdoors, physical fitness (especially in the high alpine environment) or the necessary skill set to engage in the activities currently offered within the Snowmass SUP boundary. Developed natural resource-based recreation opportunities allow guests to interact and learn about the surrounding National Forest through an experience that is more structured and introductory. Further, many visitors to Snowmass are looking for activities the whole family can enjoy which often require the aforementioned qualities as a result of varying skill sets and levels of comfort.

At Elk Camp, Snowmass offers a program called *Valhalla Nights* on select Friday evenings in July and August. This event offers special activities in addition to what is usually offered, including a barbecue dinner, campfire, live music, line dancing, movies, and activities for children. Outdoor live music is

restricted to small-scale acts (fewer than 500 people) and usually occurs in conjunction with a special event. In the summer, live music moves inside the Elk Camp Restaurant by 9:00 p.m. The kid's playground includes sand pits, small ladders, slides, climbing apparatus, and other equipment.

Currently, two 18-hole disc golf courses are open to the public at Snowmass. One disc golf course exists in the Elk Camp Meadows area. The second course begins near the mid-unload of the Village Express Chairlift, finishes just above the Village Mall, and is located entirely on private lands. Snowmass offers disc golf rentals in both the Base Village and Village Mall. Disc golfers may pay to ride the gondola to the beginning of Course #1, or may hike to the start of the course.

Paintball is available on private lands in the Spider Sabich picnic/race area, with groups meeting at the base of the Elk Camp Gondola twice per day. Two paintball venues, each capable of accommodating about 30 people at a time are available. A climbing wall and "Eurobungy" are also offered on private lands in the Village Mall.

Developed opportunities in the vicinity of Snowmass primarily exist on Town of Snowmass Village lands. The Town of Snowmass Village offers a variety of recreational opportunities, including hot air ballooning, road biking, bowling, rodeo, fly fishing, a recreation center, yoga, golf, tennis, the Ice Age Discovery Center, and paragliding, among others. Furthermore, the Town of Snowmass Village hosts a variety of non-recreation events that draw guests to the area and often compliment the wide range of recreational opportunities in the area.

The current conditions highlight that while developed recreation opportunities are available in the general Snowmass area, few are located within the SUP area. Providing developed natural resource-based recreation opportunities is important, as not all visitors of the National Forest are comfortable in remote or unsupervised situations, which as previously discussed, can hinder their ability to interact with the natural resources of Snowmass and the WRNF in a meaningful way.

Visitation and Guest Distribution

Visitation

Summer visitation at Snowmass is generated by the activities and events that exist not only in Snowmass, but also in Aspen and the Roaring Fork Valley as a whole. The recreational activities offered on NFS lands at Snowmass may attract locals and those already visiting the area, but generally do not generate visits in-and-of themselves. In other words, few visitors are coming to Snowmass solely for the recreational activities offered on NFS lands.

Winter visitation is much higher than summer—750,00 compared to 25,000 annual visits. Of the 25,000 summer visitors, 25 percent are day visitors and 75 percent are overnight visitors. In its existing state, and with the current capacity of recreation opportunities offered at Snowmass, summer visitation is expected to increase by 3 percent annually.

Existing summer visitation trends can be broken down further, by analyzing the weekday compared to weekend visitation. Of the 25,000 annual summer visitors, 16,670 of these visits occur during the weekend and 8,330 occur during the weekdays. This equates to 695 daily summer visitors on a typical weekend and 135 daily summer visitors on typical weekday. On a busy weekend, daily visitation can reach 900 visitors per day.

Guest Distribution

To better define the summer recreational experience at Snowmass, guest distribution across the mountain was analyzed. Elk Camp is the on-mountain hub of existing summer and multi-season activity on NFS lands at Snowmass. As mentioned in the previous paragraph approximately 25,000 guests visit Snowmass each summer. The vast majority of these guests access Elk Camp by riding the Elk Camp Gondola, though an increasing number are arriving via mountain biking or hiking trails.

The top of the Elk Camp Gondola is located at 9,805 feet. During the summer months, guests can also ride the Elk Camp Chairlift to 11,325 feet, where they can access additional mountain biking and hiking trails, and view the Roaring Fork Valley, Maroon Bells, and surrounding 14,000-foot peaks. The Elk Camp Gondola accesses the facilities at Elk Camp, the disc golf course, the *Rabbit Run* Nature Trail Walk (led by the Aspen Center for Environmental Studies), several mountain biking and hiking trails, and the Elk Camp Restaurant. It is estimated that 50 percent of summer visitors currently utilize the services of the Elk Camp Restaurant, which has an existing lunchtime capacity of 1,749 guests and includes 545 seats (395 indoor, 150 outdoor). This facility well equipped to handle existing summer visitation as it designed to meet the much larger winter visitation trends.

It is estimated that of the 25,000 guests who ride the Elk Camp Gondola every summer, 25 percent are utilizing the gondola for mountain biking, 15 percent for hiking, and 60 percent for sightseeing. This translates to an average of approximately 230 general visitors, 120 mountain bikers, and 80 hikers, per day; on busy weekends, which reach 900 visitors per day, these numbers fluctuate and grow immensely. Almost every one of these visitors would ride the Elk Camp Gondola and disperse into the SUP area from the Elk Camp area.¹⁸

Resort Operations and Functions

Snowmass' approximate 25,000 summer visitors is small in comparison to the approximate 750,000 annual winter visitors averaged over the past five seasons.¹⁹ Thus, while summer visitation has been increasing at Snowmass, the primary use of on-mountain facilities occurs during the winter months. Chairlifts, trails, and mountain roads are prevalent throughout the ski area, while infrastructure specific to summer recreation is virtually non-existent.

¹⁸ ASC, 2016

¹⁹ Ibid.

The Base Village is the foundation of summer activities at Snowmass, providing primary access to the National Forest via the Elk Camp Gondola. It also serves the function of equipment rental, ticket and retail sales, food and beverage services, and restrooms along with various other guest service facilities that are available in the Base Village.

Snowmass operates both the Elk Camp Gondola and Chairlift from June through September (as weather allows) which as previously discussed, serve the existing multi-season recreation opportunities. On-mountain services during the summer months (typically between mid-June and early September) are provided via the Elk Camp Restaurant, which is open daily in the summer and provides food service, restrooms, both indoor and outdoor table seating, and broad views to surrounding mountains.

In addition to multi-season operations in the Elk Camp area, including the Elk Camp Gondola and Chairlift, various other resort operations take place throughout the summer. Maintenance crews work on the mountain daily, implementing summer construction plans, which includes lift and trail maintenance, facility and infrastructure maintenance, and other tasks related to offering a quality summer experience, while also preparing the mountain for the winter season.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Alternative 1 does not include any new multi-season activities at Snowmass. Multi-season activities would continue to be offered in the Elk Camp area; however, selection of this alternative would not expand the current programs and would not meet the growing multi-season recreational needs of Snowmass. Under Alternative 1, the average visitor to the Snowmass SUP area would be expected to engage in dispersed recreation activities and possess the necessary knowledge and skill set to do so. Based on historic trends in visitation to the Snowmass SUP area (and expected future demand), annual summer visitation is expected to increase slightly (approximately 3 percent annually) from the current 25,000 visitors under the No Action Alternative. As is currently the case, most of this visitation would occur in the Elk Camp area, via the Elk Camp Gondola.

Alternative 1 would not address any element of the Purpose and Need, as disclosed in Chapter 1.

Multi-Season Recreation

There would be no changes to the multi-season recreational experience at Snowmass. Mountain biking and hiking would likely continue to be the most popular activities, with the Elk Camp Gondola and Chairlift providing primary access to dispersed recreation opportunities. Refer to the Affected Environment discussion for details regarding current activities.

Visitation and Guest Distribution

Visitation

Existing summer visitation at Snowmass is 25,000 guests. Under Alternative 1 – No Action, summer visitation at Snowmass is expected to increase by 3 percent annually. This number is approximate; however, it can be assumed that there is a natural increase of summer visitation occurring at Snowmass and the surrounding areas independent of an action alternative being selected.

Guest Distribution

No changes to guest distribution would be anticipated under the No Action Alternative. Refer to the Affected Environment discussion for details regarding current guest distribution.

Resort Operations and Functions

There would be no changes to resort operations and functions anticipated under the No Action Alternative. Snow sport related infrastructure would continue to dominate Snowmass, and there would be no potential conflicts with snow sports operations under Alternative 1. Both summer and winter visitation would be anticipated to marginally increase under this alternative. Refer to Affected Environment for a complete description of current conditions.

Alternative 2 – Proposed Action

The proposed projects would enhance the spectrum of multi-season recreation opportunities at Snowmass, catering to a broader range of visitors. The proposed projects in Alternative 2 would add variety to the mountain biking and hiking trail networks—two existing recreation opportunities with established popularity—while also creating developed recreation opportunities that would allow additional forest users to interact with NFS lands. By offering developed recreation opportunities that remove barriers to participation, Snowmass would encourage outdoor recreation to a broader spectrum of visitors to the WRNF.

The proposed multi-season recreation opportunities included in Alternative 2 would alter trends in visitation, which would be reflected in the guest distribution throughout the Snowmass SUP area. Projected summer visitation would increase at a greater rate under this alternative compared with Alternative 1; however, Snowmass would retain its primary function as a ski area, and winter sports would still define the recreation profile.

In addition to day use activities occurring during normal operating hours (10:00 a.m. to 4:00 p.m.), Table 3A-5 details the additional operating times of the multi-season activities under Alternative 2.

**Table 3A-5:
Season and Hours of Operation – Alternative 2**

Proposed Activity	Season and Duration of Use	
	Summer	Winter
Mountain Biking and Hiking Trails	Daytime only	No Use
Mountain Coaster	Daytime and Nighttime	Daytime and Nighttime
Zip line Canopy Tour	Daytime and Nighttime	Daytime and Nighttime
Zip Line	Daytime and Nighttime	Daytime and Nighttime
Ropes Challenge Course	Daytime and Nighttime	Daytime and Nighttime
Climbing Wall	Daytime and Nighttime	Daytime and Nighttime
Multi-Purpose Activity Areas	Daytime and Nighttime	Daytime and Nighttime

As highlighted in Table 3A-5, all of the proposed developed recreation opportunities, except for mountain biking and hiking trails, could be operated during both the summer and winter seasons. Winter use of some of the activities would be weather dependent. During the summer season, all of the developed recreation opportunities could operate during nighttime hours (after sunset) under Alternative 2. Because mountain biking and hiking are not a part of the developed recreation project components, these activities would not be offered at night. Regular nighttime use is not anticipated for the majority of the proposed projects during the winter season but could potentially occur. The mountain coaster is the only proposed activity that would include a lighting component for nighttime use. Other project proposed for nighttime activity would require some temporary lighting to operate at nighttime. PDC outlined in Table 2-2 provide additional details regarding resort operations and lighting.

Multi-Season Recreation

Mountain Biking Trails

Under Alternative 2, Snowmass proposes to construct ten new mountain biking trails (approximately 12.9 miles), a beginner skills park including three new mountain biking trails (approximately 1.2 miles), and re-route the existing *Vapor* mountain biking trail (0.1 mile). All of the proposed mountain biking trails are gravity trails, which cater to downhill and all-mountain/enduro riders. As previously discussed under Affected Environment in this section, gravity trails include a variety of trail styles that are described as flow, singletrack, or hybrid. Flow trails are wider and incorporate features that allow riders to develop a rhythm with little pedaling or braking. Singletrack trails are often narrower and include slower sections where braking and pedaling are necessary; these are typically more technical when designed as gravity trails. The hybrid trail designation refers to trails that blend elements of both flow and singletrack configurations throughout. It is anticipated that these trails would be ridden on bikes with longer-travel suspension designed to descend steep, rough terrain at high speeds. Most riders would be expected to wear at least some protective equipment.

Table 3A-6 illustrates the variety that the proposed trails would add to the existing mountain biking trail network. As previously discussed under Affected Environment, one of the deficiencies of the current trail network is the lack of beginner terrain, which inhibits the learning progression of riders. The proposed trails feature a designated flow trail for “easier” ability level riders and a skills park for “easier” to “more difficult” ability level riders. The proposed skills park would provide guests an opportunity to learn key bike handling skills by establishing an area in close proximity to the main trails that can be quickly repeated and features jumps, drops, berms, and other features that allow riders to progress by mirroring the types terrain provided beyond the skills park. Additionally, TTFs, which include wooden or dirt features that range from 1 foot to 7 feet above grade, would be constructed on certain trails (refer to Table 3A-6) and provide opportunities for riders to test their skills at a degree of difficulty appropriate to the overall trail rating.

**Table 3A-6:
Trail Specifications – Alternative 2**

Trail Type/Ability Level	Trail Name	Trail Style	TTFs	Length (miles)
MOUNTAIN BIKING TRAILS				
Easier	Trail 3	Flow	Yes	0.6
More Difficult	Trail 6	Flow	Yes	1.0
	Trail 8	Singletrack	No	0.7
	Trail 14	Hybrid	No	4.8
	Trail 15	Hybrid	No	0.5
Most Difficult	Trail 4	Flow	Yes	0.7
	Trail 9	Hybrid	No	1.1
	Trail 17	Hybrid	No	2.0
	Trail 18	Hybrid	No	0.9
	Trail 21	Singletrack	No	0.6
<i>Vapor</i> Trail Re-route				0.1
Total				13.0
MOUNTAIN BIKING SKILLS PARK				
Easier	Meadows 1	Skills Park	No	0.5
More Difficult	Meadows 2	Skills Park	Yes	0.4
	Meadows 3	Skills Park	Yes	0.3
Total				1.2

As described in the Affected Environment discussion, there is an overall deficiency in gravity trails for every ability level. All of the proposed trails are gravity trails, and strive to create a greater balance between the amount of gravity trails and traditional XC trails offered at Snowmass. Currently XC trails account for nearly three-quarters of the existing trail network at Snowmass (refer to Table 3A-2).

Table 3A-7 details how the proposed mountain biking trails included in Alternative 2 would create a more balanced distribution of mountain biking trails by ability level and type of trail.

**Table 3A-7:
Mountain Biking Trails/Ability Level Distribution – Alternative 2**

Ability Level	XC Mileage	XC Percent of Total	Gravity Mileage	Gravity Percent of Total	Total Mileage	Percent of Total
Easier	0.6	1%	4.6	7%	5.2	9%
More Difficult	21.3	36%	9.7	16%	31	52%
Most Difficult	11.8	20%	11.5	19%	23.2	39%
Total	33.7	57%	25.8	43%	59.3	100%

Note: Beginner skills park and re-route mileage included

As highlighted in Table 3A-7, Alternative 2 would more than double the mileage of gravity trails resulting in a total of 25.8 miles (previously 11.6 miles). This would create a much more balanced ratio of traditional XC trails to gravity trails, building on the recent success Snowmass has had with its existing Gravity Logic featured trails. Also highlighted in Table 3A-7 is the addition of mileage across all ability levels, creating an improved supply and variety of terrain in the form of gravity trails, which have been extremely popular with guests.

Hiking Trails

All of the re-routes would occur on trails designated as hiking only, which as discussed in the Affected Environment are limited within the Snowmass SUP area. Trail re-routes would occur on the existing *Vista*, *Sierra Loop*, and *Rabbit Run* hiking trails and would ensure that the existing recreation experience is maintained for the hiking only trails provided by Snowmass while also promoting a range of hiking opportunities within the overall network of trails on NFS lands.

Currently, the *Vista* trail is intersected by multiple downhill mountain biking trails that negatively impact the quality of the hiking experience on this trail. With several more trails planned for this area, the proposed re-route would help provide a better recreational experience for both hikers and bikers. *Sierra Loop* and *Rabbit Run* would be re-routed around the proposed mountain coaster and ropes challenge course, respectively. Maintaining the existing functions of these trails ensures the continuation of an activity that allows for independent interaction with the National Forest, as well as a platform for educational and interpretive programs (e.g., Aspen Center for Environmental Studies guided hiking tours).

The proposed re-routes are detailed in Table 3A-8.

**Table 3A-8:
Hiking Trail Specifications – Alternative 2**

Trail Name	Trail Style	Existing Trail Segment Length (miles)	Re-route Length (miles)	Net Gain/Loss of Re-route (miles)
<i>Vista Trail Re-route</i>	Hiking	1.2	1.4	+0.2
<i>Sierra Loop Trail Re-route</i>	Hiking	0.9	0.9	0
<i>Rabbit Run Trail Re-route</i>	Hiking	0.1	0.1	0
Total		2.2	2.4	+0.2

Table 3A-8 highlights that the new lengths of re-routed trail associated with Alternative 2 would not result in a measurable impact to the length of trail within the hiking trail network. The distribution of hiking trails by ability level would not change, as the entire hiking trail network would only increase by 0.2 mile. However, the proposed re-routes would serve the purpose of maintaining, and in some cases improving, the existing hiking recreation experience. In conjunction with the other project components included in the Proposed Action, the proposed hiking trail re-routes are necessary to prevent conflicts between different user groups (e.g., downhill mountain bikers and hikers).

Developed Multi-Season Recreation Opportunities

In general, the developed multi-season recreation opportunities proposed in Alternative 2 would expand the variety of activities available to visitors of the Snowmass area, with the greatest effect on the opportunities available within the Snowmass SUP area. Specifically, developed recreation opportunities included in Alternative 2 are a mountain coaster, zip line canopy tour, zip line, ropes challenge course, climbing wall, and three multi-purpose activity areas. Each of these proposed project components would increase the diversity of users able to participate in activity-based interaction with a forested, mountain environment on NFS lands by providing opportunities that require little specialized knowledge, skills, equipment or familiarity with a high alpine environment. By supplementing the existing dispersed recreation opportunities at Snowmass with more structured and developed recreational offerings, user groups such as families, the elderly/aging, or those with disabilities are provided an opportunity to interact with the WRNF in a meaningful way that is currently non-existent within the Snowmass SUP area.

While offerings within the Snowmass SUP area only represent one component of recreation available in the surrounding area, these additional activities would likely encourage new users to participate in natural resource-based recreation, thus increasing the number of visitors engaging in outdoor activities on the WRNF. As previously discussed under Affected Environment, developed recreation opportunities primarily exist on private lands within Town of Snowmass Village. Under these conditions, the developed recreation project components included in Alternative 2 would incrementally add to the amount of developed multi-season recreation opportunities in and around the Snowmass SUP area.

The proposed developed multi-season recreation opportunities included in Alternative 2 are consistent with SAROE, and provide previously unavailable natural resource-based experiences that meet guest demand for a greater variety of multi-season recreation activities that cater to a broader spectrum of users. The following paragraphs describe the individual proposed developed recreation components in detail, including their ability to encourage outdoor recreation and enhance the existing recreation experience at Snowmass.

Mountain Coaster

Mountain coasters are capable of exposing new guests (non-skiing) to the outdoors by providing an adventure and thrill-based experience that requires little specialized knowledge/skills, physical abilities, or familiarity with the mountain environment. Although the mountain coaster allows limited direct physical access to the natural environment due to the self-confined nature of the bobsled-type car, it is designed and located to incorporate natural resource assets into the experience as users are transported through a high alpine setting. The track would be located near ground level and would incorporate terrain elements into the activity, lasting for a duration of seven to nine minutes for a round-trip ride. Natural resource attributes experienced would likely include the scenery of the Roaring Fork valley; mountain topography, which the track itself relies on for gravity propulsion during the descent; and the general forested setting as the track weaves in and out of tree stands.

Mountain coasters are part of a suite of activities that may introduce new national Forest visitors to outdoor recreation and nature through a variety of settings, experiences, and activities. In this sense, mountain coasters are capable of promoting further exploration of NFS lands adjacent to the activity area, as well as NFS lands outside the permit boundary.

The proposed mountain coaster's location is in an area that is not currently skied. The track would cross an unused ski trail, which is now the top of the Elk Camp tubing venue. The track would also cross a mountain biking trail, requiring the track to be elevated and fenced, as necessary. As previously discussed, the *Sierra Loop* hiking trail and *Vapor* mountain biking trail would be re-routed to avoid conflict with the coaster's alignment. The coaster is proposed to operate during both summer and winter seasons. Guests riding the mountain coaster could potentially be seen and/or heard by guests engaging in other winter or summer activities; however, this would only be for a limited amount of time and is in a heavily used area where this type of overlap in activities could be expected. Appropriate warnings and closures would be utilized to prevent interference with snow sports. Existing vegetation would visually screen the mountain coaster from other activities and most vantage points and enhance user experiences. The coaster would be subordinate to the ski area's existing facilities, vegetation, and landscape as outlined in SAROE. Furthermore, mountain coasters have been implemented in other locations of the WRNF and are consistent with SAROE for their ability to encourage outdoor recreation (refer to previous paragraph for details).

Zip Line Canopy Tour

The proposed zip line canopy tour included in Alternative 2 would be near the Elk Camp area and would include nine segments connecting aerial stations/platforms mounted to trees within the canopy of an intact tree island. The zip line canopy tour would primarily utilize differences in platform height to propel guests between stations/platforms; however, in some cases, platforms would be connected with sky bridges or pedestrian trails. The tour would begin with a short hike from the top of the Elk Camp Gondola across a bridge to the area behind Rayburn's Pond and terminate on the *Slider* ski trail near the Elk Camp service road. The proposed zip line canopy tour would encourage outdoor recreation by providing visitors an adventure-based activity in a natural setting, with intimate views of and closeness to the forest canopy and individual trees.

The elevated view from within the canopy would provide guests with a different perspective of their surroundings while offering an exhilarating adventure-based experience that is inherently tied to the natural resources of the area and requires little to no physical strength or prior experience. This activity utilizes a change in elevation (gravity-based) to propel guests through the canopy and highlights the natural resource attributes of topography and overstory vegetation to create a unique engagement and understanding of the mountain forest setting. Groups of up to eight participants would be accompanied by guides continuously throughout the tour, creating a structured and interpretive experience in which guides could educate guests of their surroundings while ensuring that the provided equipment and activity infrastructure is being used correctly. Guest access to and from the zip line canopy tour would be provided via open air shuttles as necessary on the Elk Camp service road to accommodate varying guest needs and to continue the educational messaging program. It is anticipated that most guests would follow the zip line canopy tour with the zip line (discussed in detail under the next heading). The duration of these activities would vary based on the guest's desire to participate in the zip line canopy tour, zip line, or both. The entire tour (zip line canopy tour and zip line) would last three to four hours.

In general, zip line canopy tours are based in traditional, natural resource-based recreation activities that occur on other NFS lands. The harnesses, zip lines, and activity itself replicate traditional climbing and mountaineering activities. While the zip line canopy tour would reflect a recreation experience that caters to all types of guests, including those with little specialized knowledge/skills, physical abilities or familiarity with a mountain setting, it is designed to promote further exploration of other NFS lands (within and outside the Snowmass SUP boundary) through an introductory recreation experience.

The zip line canopy tour and associated infrastructure proposed in Alternative 2 would not affect other existing recreation opportunities in either summer or winter seasons, because it would be located off the ground within the overstory of a forested area. Infrastructure associated with the zip line canopy tour would blend with the forested area; where zip lines would be visible, they would not detract from other recreation experiences taking place in the vicinity, as they resemble the ski area infrastructure. Guests engaging in the zip line canopy tour could potentially be seen and/or heard by guests engaging in other summer activities; however, this would only be for a limited amount of time and would only briefly

overlap with dispersed recreation activities. There is no intended winter use associated with the zip line canopy tour. Appropriate warnings and closures would be utilized to prevent interference with snow sports.

Zip lines, which this tour would be utilizing to transport guests throughout the canopy, are specifically described as “inclusions” under SAROE, meaning that their use is consistent with the intentions of the Act. As outlined by SAROE, the zip line canopy tour would harmonize with the natural environment of the site where it would be located by being visually consistent with or subordinate to the ski area’s existing facilities, vegetation, and landscape. This would conceal the zip line canopy tour from existing and proposed activities, thus enhancing visitor experiences of those participating in the zip line canopy tour or other activities in the vicinity.

Zip Line

Under Alternative 2, a zip line would begin under the Elk Camp Gondola across the *Funnel* ski trail from the zip line canopy tour’s point of termination and end near the Gondola Turn Station. This location is intended to allow guests wanting to participate in the zip line canopy tour and zip line as a continuous activity to do so by walking across the *Funnel* ski trail under the Elk Camp Gondola to the zip line. The zip line would be approximately 3,000 feet long. The zip line would encourage outdoor recreation by providing an adventure and thrill-based experience in a natural setting that requires little specialized knowledge/skills, physical abilities, or familiarity with the mountain environment.

Similar to the proposed zip line canopy tour, the proposed zip line would utilize the natural topography of the mountain environment to provide a gravity-propelled, thrill-based adventure experience for guests. While providing fewer opportunities for hands-on teaching than the zip line canopy tour, the experience of a zip line can still provide for an interpretive and educational experience. Guests participating in this activity inherently become more aware of their surroundings as the zip line is dependent on the elevation and vertical relief associated with the natural topography that characterizes its mountain setting.

Observing the natural resources of the Snowmass SUP area from this perspective, whether or not the user consciously does so, becomes inseparable from the experience. Guest access to and from the zip line (and zip line canopy tour, if done as a continuous activity) would be provided via open air shuttles as necessary on the Elk Camp service road to accommodate varying guest needs and to continue the educational messaging program.

While zip lines may not directly connect people with the natural environment in a traditional sense, they are part of a suite of activities that are partly designed to introduce NFS lands users to outdoor recreation and nature. Like the zip line canopy tour, zip lines are based in other traditional, natural resource-based recreation activities that occur on other NFS lands. The harnesses, zip lines and activity itself replicate traditional climbing and mountaineering activities. These activities may lead to further exploration of NFS lands adjacent to the activity area (within the Snowmass SUP area), as well as NFS lands outside the permit boundary.

For the aforementioned reasons, zip lines are “inclusions” identified under SAROEA, meaning that their use is consistent with the intentions of the Act (refer to Chapter 1, Section J – Consistency with Forest Service Policy). While the zip line will operate during daytime hours during the winter season, appropriate warnings and closures would be utilized to prevent interference with snow sports. Like the zip line canopy tour, it is expected that users of the zip line may be seen and/or heard by guests engaging in other summer recreation activities. However, due to its proximity to surrounding ski area infrastructure and the duration which guests would be noticeable on the zip line it is not anticipated that this would hinder other activities in any way.

Ropes Challenge Course

A ropes challenge course including thirty to forty individual challenge elements (i.e., manufactured obstacles), two to five ground access points (entry and egress capable), and a course completion zip line, would be included in the Elk Camp Meadows area under Alternative 2. Typical obstacles associated with ropes challenge courses include ladders, nets, swings, bridges, and zip lines that would be constructed using large trees as anchors for platforms and course elements. The overall goal of the ropes challenge course is to provide a self-paced, family-friendly, teambuilding, and multigenerational challenge experience. This activity would encourage outdoor recreation by being located outdoors in a supervised natural setting and in close proximity to other numerous outdoor recreational opportunities.

The proposed ropes challenge course would provide a movement intensive activity in a structured and semi-guided setting that requires limited physical exertion. During this activity, participants would explore the natural environment through a series of manufactured obstacles, while learning the skills to safely use harnesses and maneuver through an unfamiliar environment. Guests participating in this activity would be in close proximity to natural features, while guides interspersed throughout the course could provide further education on the surrounding environment as guests make their way through the obstacles.

Challenge courses are based in other traditional, natural resource-based recreation activities that occur on other NFS lands. The harnesses, equipment and activity itself replicate traditional adventure, climbing and mountaineering activities. By overcoming unfamiliar obstacles in a natural setting and developing a basic foundation of commonly used mountaineering skills, this activity is capable of giving guests the experience and confidence they need to engage in similar activities and explore elsewhere on NFS lands (within or outside the Snowmass SUP boundary).

This project component would be integrated into the forested setting just uphill of the lower Magic Carpet, in an area that is currently not skied. There would be no conflict with winter uses for this activity; however, as previously discussed, the existing *Rabbit Run* hiking trail would need to be re-routed around the ropes challenge course to avoid conflict between the two user groups. The ropes challenge course would be visible to summer and winter guests in the Elk Camp area. However, the visibility of these projects is not anticipated to detract from the recreational experience in this area. The ropes challenge

course is consistent with SAROEA as it could encourage users to continue exploration of the natural environment and test their skills on other NFS lands. Additionally, natural vegetation screens, along with infrastructure that utilizes and matches the natural attributes of the forested area encompassing the ropes challenge course, would allow the project to harmonize with the natural environment and remain subordinate to the ski area's existing facilities, vegetation, and landscape as outlined in SAROEA.

Climbing Wall

A climbing wall is proposed in the Elk Camp area, on the skier's right side of the *Bull Run* ski trail across the slope from the Elk Camp Restaurant within the former Café Suzanne restaurant site. The custom climbing wall would be 50 to 70 feet wide and up to 40 feet high and would use materials that would mimic a natural rock wall. It would be designed to suit a range of ability levels and would incorporate a wide variety of natural features including freestanding boulders, pinnacles, cracks, arêtes, archways, overhangs, dihedrals and more. The climbing wall would encourage outdoor recreation by being located outdoors in a supervised and controlled setting that mimics the natural features one could expect to find on the surrounding NFS lands, while also being in close proximity to other developed outdoor recreational opportunities.

The proposed climbing wall would provide a skills-based activity for guests wishing to use their physical abilities in a structured and controlled environment. The climbing wall would require moderate levels of exertion and would challenge guests by climbing up a series of holds to reach the top of the wall. Guests would be able to climb up to 40 feet, roughly the height of the forest canopy. Participants would have limited direct physical interaction with the natural environment, but like the zip line canopy tour, zip line, and ropes challenge course, this activity would provide a unique perspective in a mountain setting. Views from this activity could instill an awareness and appreciation of nature in guests of any age. This activity is based in other traditional, natural resource-based recreation activities that occur on other NFS lands. The harnesses, equipment, and activity itself replicate traditional climbing and mountaineering activities. The climbing wall could encourage users to continue to explore the natural environment and test their skills on other NFS lands outside the permit boundary.

The site of the climbing wall was selected due to its proximity to the Elk Camp area and the developed nature of its surroundings. Use of the climbing wall would occur in both the summer and winter seasons. Guests that are using the climbing wall could be visible to those engaging in other nearby activities. However, due to the developed nature of the area, there is little opportunity to screen this activity with natural vegetation. The climbing wall would use materials that mimic the surrounding area, and this type of developed recreation is characteristic of the area due to its proximity to the Elk Camp Restaurant. In this regard, the climbing wall would not detract from or interfere with other recreation uses in the area. Additionally, the climbing wall is consistent with SAROEA as it has potential to encourage its users to continue to explore the natural environment and test their skills on other NFS lands.

Multi-Purpose Activity Areas

Three areas would be designated, landscaped, and utilized to provide areas for guests to meet for special events, temporary activities, and scenic viewing. There would be a site at the Elk Camp summit, providing a unique scenic vista into the Maroon Bells-Snowmass Wilderness; another site in close proximity to the top of the Elk Camp Gondola along Rayburn's pond; and a third site in close proximity to the Elk Camp Restaurant and the activities of Elk Camp Meadows. Several types of activities would be programmed for these sites and could include outdoor naturalist presentations; educational and training presentations; music concerts, dance, yoga, and other artistic/fitness activities; and special events.

The multi-purpose activity areas would support multi-season recreation by providing areas where visitors could engage in activities and learn in a natural setting. In this regard, the multi-purpose activity areas encourage outdoor recreation and enjoyment of nature by supporting other recreation programming and allowing activities that utilize limited spaces to be practiced outdoors (i.e., yoga). The multi-purpose areas would not interfere with other recreation opportunities in either summer or winter, as all of the sites are located within the existing footprints of developed sites. These developed sites include the Elk Camp facility and developed site, Rayburn's Pond developed site, and Elk Camp Chairlift developed site. The majority of the programming for these areas would occur during the summer months; however, it is anticipated that visitors may use these areas during the winter months, as weather allows and in a manner that would not disrupt the ski terrain.

Visitation and Guest Distribution

Visitation

As a result of the additional multi-season recreation activities included in Alternative 2, summer visitation to Snowmass is projected to increase from 25,000 annual summer visits to 45,000 annual summer visits over the course of five to ten years from project implementation. Of the projected 45,000 annual summer visits, 30,000 of the visits are anticipated to occur during the weekends and 15,000 during the weekdays. This equates to 1,250 visitors on a typical weekend day and 250 visitors on a typical weekday under Alternative 2. On a busy weekend day it is projected that visitation could reach 2,000 visitors. The vast majority of these visitors would remain in the Elk Camp area and would continue to utilize the Elk Camp Gondola, which is well equipped to handle the increased visitation because of its winter capacity.

It is anticipated that even with the additional visitation driven by the proposed projects included in Alternative 2, summer visitation at Snowmass would continue to be primarily generated by the activities and events that exist not only in Snowmass, but also in Aspen and the Roaring Fork Valley, as a whole. It is anticipated that the additional multi-season offerings included in Alternative 2 would generate interest from visitors of these surrounding areas, and draw greater visitation from the large quantity of visitors already in the Roaring Fork Valley rather than increase visitation to the Roaring Fork Valley in and of itself. Accordingly, additional summer visitation to Snowmass under Alternative 2 is primarily attributable to redistributing people who are already coming to the Roaring Fork Valley to recreate, and

increasing the number and variety of activities available within the Snowmass SUP area (spanning a single day or multiple days).

Guest Distribution

Under Alternative 2, with visitation projected to increase to 45,000 over the course of five to ten years, the greatest concentration of guests would still be in the Elk Camp area at the top of the Elk Camp Gondola. The proposed projects in Alternative 2 utilize the Elk Camp area as it provides an optimal location for gathering during the summer months and is in close proximity to the natural features needed to accommodate the proposed array of summer activities.

Both the Elk Camp Gondola and Chairlift would continue to serve the activities in this area. The chairlift would be used primarily for access to mountain biking and one of the multi-purpose activity areas. Due to the disproportionately larger winter operations, the Elk Camp Gondola and Chairlift both have more than enough capacity to distribute guests throughout the area. In the same regard, the Elk Camp Restaurant would continue to accommodate all on-mountain service needs in the area. While it is anticipated that use of the Elk Camp Restaurant would increase from 50 percent to 75 percent of users in the area, there are no proposed changes to the Elk Camp Restaurant, even as users at one time increase accordingly with the anticipated 45,000 annual summer visits. On a busy weekend day, which is estimated at approximately 2,000 visitors a day under the proposed conditions, this would equate to 1,500 users of the Elk Camp Restaurant. As previously discussed under Affected Environment, the Elk Camp Restaurant has a lunchtime capacity of 1,749 guests; therefore, the existing capacity and seating of the restaurant would be fully capable of accommodating the increased visitation associated with Alternative 2.

Distribution throughout the Elk Camp area is primarily dependent on the capacity and throughput of the different activities proposed under Alternative 2. At full design capacity during a projected busy weekend of 2,000 visitors a day, the following quantities of users are expected to be distributed across the proposed activities/venues in the Elk Camp vicinity.

While the quantities of visitors would fluctuate between weekdays, weekends, and busier periods of holiday visitation throughout the summer season, Table 3A-9 portrays guest distribution when summer operations are projected at their highest. Viewing guest distribution when operations are at their projected height reveals how the proposed activities would accommodate visitors under the greatest anticipated occupancy.

**Table 3A-9:
Guest Distribution – Alternative 2**

Activity	Daily Design Capacity	Guests per Day	Percent of Total Busy Weekend Guests
Mountain Coaster	1,000	750	38%
Climbing Wall	300	300	15%
Ropes Challenge Course	600	250	13%
Multi-Purpose Activity Areas/General/Milling	N/A ^a	230	12%
Zip Line	210	150	8%
Mountain Biking	120	120	6%
Hiking	120	120	6%
Zip Line Canopy Tour	96	80	4%
Total		2,000	100%

Notes:

^a The multi-purpose activity areas each have a capacity of approximately 250 people. However, it is not anticipated that this capacity would be utilized unless a special event or specific programming is occurring at a multi-purpose activity area.

Table 3A-9 highlights that 66 percent of users would be distributed in close proximity to Elk Camp, including the mountain coaster, climbing wall, and ropes challenge course. These three activities are the closest to Elk Camp and the gondola, which as the hub of summer recreation, would always have the highest concentration of guests. By design, these activities also have the shortest durations, which corresponds to a much quicker throughput of guests. By placing the activities with the greatest capacity and throughput in closest proximity to the area of highest concentration, guests would be most efficiently distributed. Further, this pattern of distribution would prevent interference with activities that rely on a more secluded setting for their intended user experience.

Guest distribution through the remaining activities is much lower, which correlates with the more secluded experience and longer durations that the zip line canopy tour, zip line, mountain biking, and hiking experiences provide. Of these four activities, the zip line would accommodate the largest number of users and is almost double that of the zip line canopy tour because it can be done on its own, in a much shorter amount of time. Guests participating in the zip line activity on its own would access the area via nearby trails or open-air shuttle departing from both the base area and the Elk Camp hub. Approximately one to two shuttle trips per hour would transport guests to zip line along the Elk Camp service road. There would be no new user conflicts between existing recreationists (particularly mountain bikers) and the open-air shuttles as adequate signage would be used for all trail and road intersections. Additionally, the Elk Camp service road accommodates regular operations traffic and has not presented conflicts in the past. The zip line canopy tour, mountain biking, and hiking activities all rely on creating a user experience that is more natural resource-based, and correspondingly is removed from the highest concentration of users. As such, these three activities would span the longest durations and extend farthest from the Elk Camp hub.

Each of the multi-purpose activity areas has a capacity approximately 250 people; however, this capacity would only be anticipated to be met during specific programming and events. Due to the program-specific nature of visitor presence at the multi-purpose activity areas, there is not a projected distribution throughout these areas, which could be expected to operate on a self-regulating basis. These areas would accommodate guests moving between activities, but capacity would fluctuate based on various programming occurring at a given time or a guests' personal desire to occupy the area based on how many others are already in the vicinity.

Under Alternative 2 and as highlighted in Table 3A-5, all of the proposed developed recreation activities would be allowed to operate during nighttime hours throughout the summer and winter seasons. During the summer, this means that guests would regularly be near the proposed activity locations (excluding mountain biking and hiking) until 9:00 p.m. After 9:00 p.m., once nighttime hours commence during the summer season, guests could still be in the proposed activity areas. However, this is not anticipated to occur on an every night basis. Summer events in the Elk Camp area, including *Farm to Table* events and *Valhalla Nights*, have operated until 9:00 p.m. over the past few seasons, although only on select Tuesday and Friday nights throughout the summer. Both of these events feature live music and utilize the Elk Camp Gondola to transport guests to the area. Under Alternative 2, the proposed developed recreation opportunities could operate every day and night throughout the summer season, thus increasing the presence of guests throughout the activity areas during evening hours. In the winter season, regular nighttime use of the proposed activities is not anticipated for any activity other than the mountain coaster; however, operation of other developed recreation activities would be allowable. During the winter season, evening operation of the mountain coaster, which would typically begin around 5:30 p.m., could occur on all evenings of the week. Currently, *Ullr Nights* operates from 5:30 p.m. to 9:00 p.m. and features an array of activities that include music, ice-skating, snowbiking, and operation of the Elk Camp tubing venue. During these select Friday nights of the winter season there is a high concentration of guests in the Elk Camp Restaurant and Elk Camp Meadows areas. It is anticipated that while operation of the mountain coaster in conjunction with *Ullr Nights* could draw more guests to the area it would primarily redistribute guests already attending *Ullr Nights*.

In both summer and winter seasons, guest distribution during evening operations of the proposed activities is anticipated to be less than daytime operations within the respective activity areas.

Resort Operations and Functions

Under Alternative 2, snow sports would continue to be the primary focus at Snowmass. While additional summer visitation is expected, winter visitation is anticipated to remain substantially higher. In general, infrastructure that is dedicated to summer activities would remain subsidiary to the larger network of infrastructure that is in place to accommodate winter recreation. While the concentration of summer activities in the Elk Camp area would affect the atmosphere and environment in this vicinity during the summer months, as a whole, the Snowmass SUP area would still feel and function like a ski area.

Most of the proposed projects would not conflict with winter operations. Mountain biking and hiking trails are infrequently used or visible in the winter. The proposed zip line canopy tour and zip line stations could have some minor effects to winter users as fencing around zip line and zip line canopy tour stations and guy wires would be installed to prevent collisions and other safety concerns for skiers. This infrastructure could impact the recreational experience for skiers in the trees or trail edges near these facilities. However, as skiers in the trees are accustomed to avoiding obstacles, the impact on the recreational experience is expected to be minimal. Additionally, at the scale of the SUP area, the frequency of encounters with this infrastructure would be negligible. The mountain coaster and ropes challenge course are both located in areas that are seldom skied, as dense vegetation and varying topography are not conducive to skiing.

The visibility of the zip line canopy tour, zip line, ropes challenge course, climbing wall and mountain coaster infrastructure could impact the winter recreational experience by detracting from the natural setting of the area. However, as previously discussed, each of these project components utilizes natural features that are anticipated to either screen or integrate infrastructure into the surrounding areas in a way that minimizes the duration that these activities are noticeable. The proposed mountain coaster is the only activity proposed to operate during the winter season. Its impacts to other recreation users would be negligible as it is located in an area already utilized for non-skiing activities (i.e., Elk Camp tubing venue).

The existing facilities in the Base Village would remain the foundation of summer activities at Snowmass, providing primary access to the National Forest via the Elk Camp Gondola while also serving the function of equipment rental, ticket and retail sales, food and beverage services, and restrooms along with various other guest service facilities. Snowmass would continue to operate both the Elk Camp Gondola and Chairlift from June through September (as weather allows). No additional lifts or lift infrastructure would be necessary to accommodate the multi-season activities proposed in Alternative 2. As discussed under direct and indirect effects to visitation, on-mountain services in the Elk Camp area would continue to be accommodated by the Elk Camp Restaurant, which has ample seating capacity as it also accommodates guests during the winter season.

Alternative 3

Alternative 3 includes all of the same project components as Alternative 2 with modifications to the proposed mountain biking trails and multi-purpose activity areas. Specifically, mountain biking Trail 21 as proposed in Alternative 2 would be replaced with Trail 16, a trail only included in Alternative 3. Trail 21 was removed from Alternative 3 in response to potential wildlife issues that will be discussed in Section K – Fish and Wildlife. Additionally, Trail 17 and the beginner skills park area, which are included in Alternative 2, are not included in Alternative 3. Trail 17 was removed from Alternative 3 due to redundancy of similar ability level trails in trail system, and the skills park was removed due to a

redundancy with a smaller skills park area currently located on private lands. All of the other mountain biking trails would remain identical to those proposed in Alternative 2.

The multi-purpose activity area proposed in Elk Camp Meadows under Alternative 2 would not be included in Alternative 3. The Elk Camp Meadows multi-purpose activity area was removed from Alternative 3 due to visual concerns that will be discussed in Section B – Scenery. The remaining two multi-purpose activity areas proposed in Alternative 3, Elk Camp Summit and Rayburn’s Pond, are identical to the Alternative 2.

Table 3A-10 details the season and day/nighttime uses of the multi-season activities proposed under Alternative 3.

**Table 3A-10:
Season and Hours of Operation – Alternative 3**

Proposed Activity	Season and Duration of Use	
	Summer	Winter
Mountain Biking and Hiking Trails	Daytime only	No Use
Mountain Coaster	Daytime only	Daytime only
Zip line Canopy Tour	Daytime only	Daytime only
Zip Line	Daytime only	Daytime only
Ropes Challenge Course	Daytime only	Daytime only
Climbing Wall	Daytime only	Daytime only
Multi-Purpose Activity Areas	Daytime only	Daytime only

As shown in the table, all of the proposed developed recreation opportunities, except for mountain biking and hiking trails could be operated during both the summer and winter seasons. Winter use of some of the activities would be weather dependent. Alternative 3 would preclude nighttime use of the proposed activities on a regular basis. During the summer season, operation of the proposed activities would conclude at 4:00 p.m., which is the time when the Elk Camp Gondola currently provides its last ride down on a typical summer day. During special programming, such as *Farm to Table*, *Valhalla Nights*, or *Ullr Nights* events, certain activities may operate until 9:00 p.m. (the existing time of conclusion for these events), but would require WRNF approval and would not operate on a regular basis. All new nighttime uses in either the summer or winter season would require WRNF approval and would not exceed the existing frequency of guest presence in the Elk Camp area vicinity.

In general, impacts to recreation under Alternative 3 would be similar to those discussed above under Alternative 2. The discussion below is specific to the differences between Alternatives 2 and 3.

Multi-Season Recreation

Mountain Biking Trails

Under Alternative 3, Trail 21 from the Proposed Action is replaced with Trail 16 (also known as *Grey Wolf*) of the 2015 SMMDP. Trail 16 would be a 1.5-mile singletrack trail paralleling the Elk Camp Chairlift alignment down the *Grey Wolf* ski trail. As far as trail style and ability level rating, Trail 16 would adequately replace Trail 21 as a “most difficult” singletrack style trail, while also providing an additional mile of trail. However, the location of Trail 16 has the potential to detract from the recreation experience. The majority of Trail 16 would be located on an open ski trail, receiving significantly more exposure to the elements of the high alpine environment, and lacking the seclusion of the intact tree island provided by Trail 21. Further, it is anticipated that Trail 16 would have a shorter operating season than Trail 21 as its exposure and higher elevation would likely hold snow for a measurably longer period. The grade and openness of Trail 16 would also require the trail to be constructed with many more switchbacks and large berms to help riders control their speed during the descent, a design feature that could pose a challenge for winter grooming operations of the *Grey Wolf* ski trail. Lastly, the location of Trail 16 would not provide the same connectivity as Trail 21 to the other proposed trails. Trail 16 is located away from the greatest concentration of proposed trails and would route riders through the Elk Camp area in order to continue their descent to the bottom of the terrain network.

Under Alternative 3, the removal of Trail 16 would result in minor impacts to the specifications of the terrain network, as Trail 16 would replace Trail 21 with a trail of the same style and ability level, only differing in mileage. As is the case for all of the trails proposed in Alternative 2, Trail 16 is a gravity trail and would create a more balanced distribution between traditional XC trails and gravity trails. However, Trail 16 could alter the user experience in a way that would provide a less optimal recreation opportunity when compared to Trail 21.

Removal of Trail 17 and the beginner skills park area from Alternative 3 could have a measurable impact on the proposed terrain network. Removal of Trail 17 would reduce the “most difficult” trail acreage by 2.0 miles. “Most difficult” terrain was not identified as an existing deficiency in the Affected Environment; however, it still plays an important role in providing variety and options for riders that characterize the recreation experience. Additionally, removal of Trail 17 would reduce the mileage of gravity trails by 2.0 miles, which would do less to reduce the imbalance between traditional XC trails and gravity trails when compared to Alternative 2.

While the beginner skills park only contains a total of 1.2 miles of trails, its removal has the potential to reduce the opportunity for learning progression among users that is associated with the recreation experience of Alternative 2. The existing skills park on private land is very limited in size, and would not be able to accommodate the anticipated increase in users that would be associated with the proposed additions to the terrain network. Additionally, the existing skills park located on private land is not in close proximity to the rest of the mountain biking trail network and restricts user access and programming

because of this separation. Under Alternative 3, significantly fewer guests would be provided an opportunity to learn key bike handling skills in an area that can be quickly repeated, allowing riders to progress by mirroring the types terrain provided on the main trails. When compared to Alternative 2, relying only on the skills park on private land would negatively impact the mountain biking recreation experience, as programming and accessibility to an area that enhances a rider's ability to improve would be restricted.

Under Alternative 3, which includes the replacement of Trail 21 with Trail 16, the elimination of Trail 17, and no beginner skills park located in the Elk Camp area, the overall length of mountain biking trails in Alternative 3 would be approximately 12.0 miles; 2.2 miles less than Alternative 2. Alternative 3 would enhance the terrain variety of the mountain biking network at Snowmass, greatly reducing the imbalance of traditional XC trails to gravity trails, but would do so to a lesser degree than Alternative 2.

Developed Recreation Opportunities

Multi-Purpose Activity Areas

Under Alternative 3, only two multi-purpose activities areas, at the Elk Camp Summit and Rayburn's Pond locations, are included in Alternative 3 and would be identical to those described in Alternative 2. Removal of the Elk Camp Meadows multi-purpose activity area under Alternative 3 would reduce the overall accessibility of the multi-purpose activity areas and eliminate one of the supporting areas for multi-season recreation programming. Greater reliance on and use of the other two multi-purpose activity areas and on-mountain facilities would likely occur under Alternative 3. However, as far as the user experience is considered, removal of the Elk Camp Meadows multi-purpose activity area would likely have a negligible effect on the recreation experience for the average guest.

Visitation and Guest Distribution

Under Alternative 3, projected visitation trends could be slightly altered from those estimated for Alternative 2. It is anticipated that while Alternative 3 would still generate substantial increases in visitation from the existing conditions, its annual growth rate would be slightly less than that of Alternative 2 due to the elimination of one multi-purpose area. This difference would not have a measurable impact on the recreation resource. Refer to the discussion of Visitation and Guest Distribution under Alternative 2 for projections of how the projects would alter existing visitation trends at Snowmass.

Furthermore, despite the slight decrease in projected overall visitation, guest distribution under Alternative 3 would be generally similar to Alternative 2. The highest concentration of guests would still be found at the activity venues in closest proximity to the Elk Camp area, which more specifically include the mountain coaster, ropes challenge course, and climbing wall. Guests would continue to spread out into the greater Elk Camp area for activities and venues with lower capacities and throughput, namely the mountain biking and hiking trail network, zip line canopy tour, and zip line.

Under Alternative 3, there would be no regular distribution of guests throughout the project areas during nighttime hours in either the summer or winter seasons. Summer nighttime use of the proposed activities could potentially occur during special events (i.e., *Farm to Table* and/or *Valhalla Nights*); however, this would only occur with special permission from the WRNF under Alternative 3 and would not occur on a regular basis. The mountain coaster would be permitted to operate during *Ullr Nights* when guests are already located in the Elk Camp Restaurant and Elk Camp Meadows areas, as is the case in Alternative 2. All other nighttime uses in either the summer or winter season would require WRNF approval and would not exceed the existing frequency of guest presence in the Elk Camp vicinity.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for recreation extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for recreation are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on recreation resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Snowmass Planned Unit Development Amendment
- Past Snowmass Projects (Summer Trails, New/Realigned Mountain Bike Trails, Winter Evening Activities Project)
- Regional Projects (Snowmass Village Parks, Open Space, Trails, and Recreation Plan, Ajax Adventure Camp, Aspen-Sopris Ranger District Five Year Recreation Event Special Use Permit)

- WRNF Forest Plan – 2002 Revision
- Maroon Bells-Snowmass Wilderness Visitor Use Plan

Recreation within the Snowmass SUP Area

Recreation at Snowmass has been prevalent since its inception as a ski resort. Skiing and other winter sports have become the driving force behind the economy of the area and have gained Snowmass international recognition as a destination resort. During the summer, recreation opportunities such as mountain biking, hiking, and horseback riding have been available, although in a more passive environment than winter recreation. Past projects, as listed above, have affected recreational opportunities at Snowmass, primarily bolstering the summer and multi-season recreation opportunities available within the Snowmass SUP area.

As noted throughout this discussion, the proposed projects would supplement existing activities by providing more developed recreation opportunities, furthering the progression of summer recreation that has occurred in recent years. It is anticipated that when combined with the recreation opportunities provided by past projects, the currently proposed multi-season activities would cater to a broader spectrum of forest visitors. As such, outdoor recreation would be encouraged among families and the casual visitor who might not have much experience or lack high levels of physical fitness. In this regard, the currently proposed projects would cumulatively affect the recreation experience within the Snowmass SUP area by providing a greater balance between dispersed and developed recreation opportunities that could be expected to attract a larger number of users to NFS lands.

Recreation Opportunities beyond the Snowmass SUP Area

Beyond Snowmass and in the broader context of the Roaring Fork Valley, opportunities for recreational activities are abundant—on both private and public lands (NFS, Pitkin County, and other municipal land). Although summer is a short season in the mountain environment, summer recreational opportunities for different types of users outnumber winter recreational opportunities. These are primarily dispersed activities that depend on an individual's skills, fitness and experience. They include, but are not limited to hiking, road/mountain biking, sightseeing, fishing, camping, horseback riding, rock climbing, kayaking, and rafting. In addition to the hiking trails and mountain biking trails that are available at Snowmass, hundreds of miles of trails can be found on NFS lands throughout the Roaring Fork Valley. Visitors of NFS lands outside of the Snowmass SUP are also increasing due to population growth, the natural resources present, and array of dispersed activities that exist in the area. Ongoing projects and visitor management show that this trend is occurring independent of additional recreation being provided at Snowmass. While ongoing projects and visitor management work to mitigate the impacts that fall disproportionately on high use destinations (e.g., Maroon Bells, Maroon Creek Trail) it is anticipated that additional visitors to the area could create future challenges for management and mitigation of impacts to high use destinations. In some cases, the additional recreation opportunities within the Snowmass SUP area may alleviate pressure on high use destinations by providing alternative opportunities for recreation

in a location that is easier to manage due to its developed nature and existing infrastructure. However, when considered cumulatively with the growing visitation to the greater Snowmass area, it is anticipated that pressure on high use destinations would increase.

Additionally, numerous outfitters throughout Pitkin County provide guided services for activities such as rafting, fishing and horseback riding. As highlighted in the list of projects with potential to cumulatively affect the recreation resource, there is a demand for a wide range of recreation opportunities throughout the entire Roaring Fork Valley. The Forest Service currently experiences pressure to expand the range of outfitter and guide permittees and operations. Due to the heavy influence of the natural setting of the area, many of these outdoor activities—both dispersed/self-directed and guided—meet the Forest Service’s definition of “natural resource-based recreation” as well as “encouraging outdoor recreation.” The proposed projects at Snowmass would add cumulatively to the variety and supply of recreation in the Town of Snowmass Village and Pitkin County. This could lead to an increase in use of other trails and activities on NFS lands as enhanced recreational opportunities available within the Snowmass SUP would accommodate a wider variety of users, thus drawing additional visitors to the area. Adding additional summer visitors is also anticipated to increase demand for outfitter and guided activities, both on and off NFS lands in Pitkin County. As such, it is likely that the Forest Service would experience additional pressure to increase the amount of operating days for outfitter and guide permittees, as well as permit new outfitters and guides for both existing activities and new activities not currently permitted.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

No irreversible and/or irretrievable commitment of resources have been identified that may impact the recreational resources in association with the alternatives analyzed in this document.

B. SCENERY

SCOPE OF THE ANALYSIS

The spatial scope of the scenery analysis includes the Snowmass SUP area and areas from which the SUP area is visible. The temporal scope of this analysis spans from the ski area’s inception in 1967 into the foreseeable future during which Snowmass can be expected to operate.

Analysis of the aesthetic environment requires an evaluation of the proposed project areas and their ability to absorb the effects of both historic and ongoing human-induced and natural changes. Slope, natural vegetation types and patterns, topography, and viewing distance are important factors in this analysis. Snowmass, over the past five decades of operation, has developed lift and trail networks, guest service facilities, and other infrastructure on NFS lands to enhance the visitor’s recreational experience within the SUP area.

The impacts of the proposed projects to scenery resources are considered in relation to the overall existing development, recreational, and residential theme of Snowmass and the Town of Snowmass Village. Due

to the popularity of Snowmass as a destination ski area, it can reasonably be assumed that the majority of visitors expect to encounter developed lift and trail systems within the viewshed. However, the importance of providing a natural-appearing, scenic landscape is clearly noted in the 2002 WRNF Forest Plan FEIS.²⁰

FOREST SERVICE SCENERY MANAGEMENT SYSTEM

The Scenery Management System (SMS) was adopted in 1995 as the primary scenery management direction by the Forest Service. The SMS is a systematic approach for assessing scenic resources in a project area and developing findings to help make management decisions on projects. The system is founded on an ecological aesthetic, which recognizes that management which preserves the integrity, stability, and beauty of the biotic community and preserves the scenery, as well.

Scenic Integrity and Landscape Character

Scenic integrity is a measure of the degree to which a landscape is visually perceived to be complete, indicating the degree of intactness and wholeness of the landscape character. An action can cause scenic resource change that can be objectively measured. By assessing the existing scenic character of an area in terms of pattern elements (form, line, color and texture) and pattern character (dominance, scale diversity and continuity), it is possible to identify the extent to which the scenic character of a facility would exhibit scenic contrast with the landscape, or its converse, scenery compatibility.

In 2002 the WRNF documented and disclosed the “existing scenic integrity” of all lands on the Forest in the Forest Plan FEIS.²¹ The existing scenic integrity of the project area is detailed in the following discussion.

The Forest Plan establishes acceptable limits of change for Scenic Resources.²² The limits of acceptable change of a particular area (e.g., Forest Plan Management Area) are the documented SIO, which serve as a management goal for scenic resources for that area. SIO provide a measure of visible disruption of landscape character and help locate and rank areas in need of scenic rehabilitation.

SIO range from *Very High* (unaltered environment) to *Unacceptably Low* (extremely altered environment). As indicated in the Forest Plan, the majority of the Snowmass SUP area is designated as *Very Low*, with the Burnt Mountain area of the SUP area designated as *Low*.²³ All of the projects analyzed in this DEIS are located within the *Very Low* SIO. The *Very Low* SIO is defined as:²⁴

The valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may borrow from valued attributes such

²⁰ USDA Forest Service, 2002b p. 3-503

²¹ USDA Forest Service, 2002b

²² USDA Forest Service, 2002a

²³ SIO designations within the Snowmass SUP are depicted graphically in the project file.

²⁴ USDA Forest Service, 1995

as size, shape, edge effect, pattern of natural openings, changes in vegetation types, or architectural styles within or outside the landscape being viewed. However, deviations must be shaped by and blend with the natural terrain so that elements such as unnatural edges, roads, landings and structures do not dominate the composition.

The *Low* SIO is defined as:²⁵

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, vegetative type changes or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed but compatible or complimentary to the character within.

The Forest Plan states that all NFS lands shall be managed to attain the highest possible scenic quality commensurate with other appropriate public uses, costs, and benefits.²⁶

SMS 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.

²⁵ Ibid.

²⁶ USDA Forest Service, 2002a

Forest Plan Standards and Guidelines

In addition to the SMS, the Forest Plan contains forest-wide standards and guidelines, which apply to resources across the WRNF.²⁷ While the Forest Plan contains no forest-wide standards for scenery management, it offers the following guidelines that are applicable to this project:²⁸

- Management activities should be designed and implemented to achieve, at minimum, the level of scenic integrity shown on the SIO Map.
- Plan, design and locate vegetation manipulation on a scale that retains the color and texture of the landscape character, borrowing directional emphasis of form and line from natural features.
- Choose facility and structure design, scale, color of materials, location and orientation to meet the scenic integrity objective on the SIO map. Facilities, structures and towers 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.

Management Area 8.25 standards and guidelines applicable to this project and the scenery resource include:

- Standard: Permanent outdoor advertising is not a needed public service and is not allowed.
- Guideline: Facilities are designed with an architectural theme intended to blend facilities with the natural environment.
- Guideline: Vegetation is retained to screen facilities from key viewpoints.
- Guideline: Roads are designed to minimize visual and resource impacts. They are constructed and maintained with good alignments and grades that minimize erosion.

Furthermore, the following information on the desired condition for scenic values is contained in Management Area 8.25:²⁹

Protection of scenic values is emphasized through application of basic landscape aesthetics and design principles, integrated with forest management and development objectives. Reasonable efforts are made to limit the visibility of structures, ski lifts, roads, utilities, buildings, signs, and other man-made facilities by locating them behind landform features or by screening them behind existing vegetation. Facilities are architecturally designed to blend and harmonize with the national forest setting as seen from key viewpoints. Facilities that no longer serve a useful purpose are removed.

²⁷ A *standard* is a course of action that 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.

²⁸ USDA Forest Service, 2002a

²⁹ Ibid.

The Forest Plan further states that it is a regional goal to “provide for scenic quality and a range of recreational opportunities that respond to the needs of the forest customers and local communities.”³⁰

Forest Service Manual

On April 17, 2014, the Forest Service released its Final Directives for Additional Seasonal and Year-Round Recreation Activities at Ski Areas. FSM 2343.14 includes this final direction and criteria to help authorized officers determine whether proposals for these activities are consistent with SAROE. FSM 2343.14(1) includes criteria for evaluating additional seasonal and year-round recreation activities and associated facilities that may be authorized at ski areas. This guidance includes criteria specific to the visual impact of proposed activities and associated facilities. Activities and associated facilities must, to the extent practicable, harmonize with the natural environment of the site where they would be located by:

- Being visually consistent with or subordinate to the ski area’s existing facilities, vegetation and landscape; and
- Not requiring significant modifications to topography to facilitate construction or operations.

This analysis includes a specific discussion of the proposed projects in relation to these criteria. Refer to Appendix B for additional information.

The Built Environment Image Guide

The BEIG is a manual for the “thoughtful design and management” of the built environment contained within the National Forests by province.³¹ 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.”³² The BEIG divides the U.S. into eight provinces, which combine common elements from the ecological and cultural contexts over large geographical areas; the WRNF is within the Rocky Mountain Province. Site development, sustainability, and architectural character should conform to BEIG guidelines described for this Province.

AFFECTED ENVIRONMENT

Scenic Characteristics of the Snowmass SUP

Snowmass is located on the western side of the continental divide alongside the Roaring Fork Valley. It is within the WRNF, and is bordered by the Town of Snowmass Village, as well as the Maroon Bells-Snowmass Wilderness on the opposite side of the SUP boundary. The high, rugged peaks of the Elk Mountains dominate the surrounding viewshed, many of which have notable 14,000-foot summits and are

³⁰ Ibid.

³¹ USDA Forest Service, 2001

³² Ibid.

recognizable for their distinct reddish color. Landforms typical of the high alpine environment, which include cirques, valleys, couloirs, talus and scree slopes, characterize the scenery one could expect to observe from higher elevations within the SUP area.

Since Snowmass' inception as a ski area in 1967, the development of lifts, trails, infrastructure, and skier facilities has occurred on private and NFS lands. Following the establishment of the original base area at Fanny Hill, a variety of skiable terrain has been developed on NFS lands within the Snowmass 4,997-acre SUP area. Ski trails, infrastructure (e.g., chairlifts and snowmaking), and skier facilities dominate the SUP area, while infrastructure specific to summer recreation is essentially non-existent throughout the SUP area, and summer trails (e.g., mountain biking and hiking) are much less noticeable.

Vegetation cover within the SUP area varies due to the diversity of elevation, slope aspect, and gradient that exists. Vegetation types include quaking aspen, lodgepole pine, Douglas fir, subalpine fir, and Engelmann spruce, along with mixed shrubs on the forest floor. An assortment of high-alpine grasses and plants exist in above-treeline portions of the SUP area. The vegetation patterns typical of cut ski trails distinguish the scenic character of the ski area. Traditional (below treeline) trails are the major contributing factor to the *Very Low* SIO classification ("appears heavily altered") for the developed portions of the SUP area. The above treeline portions of the SUP area with built infrastructure currently only meet the *Very Low* SIO due to the difficulty in blending facilities to meet the form, line, color and texture of the surrounding environment.

A number of facilities, including lifts, restaurants, service buildings, and snowmaking infrastructure exist across the SUP area. Several of these facilities are visible from the ski area, the Town of Snowmass Village, and Brush Creek Road.

The combination of trails, lifts, and facilities that exist at Snowmass result in a heavily-altered scenic character, which as previously discussed is consistent with the *Very Low* and *Low* SIO. From within the ski area, winter and summer guests are met with views of developed and undeveloped portions of the Snowmass SUP area in the foreground and middleground distance zone. Panoramic views of scenic natural and developed landscapes overlooking the Town of Snowmass Village, the Roaring Fork Valley, other nearby ski areas, the Maroon Bells and surrounding 14,000-foot peaks characterize the background distance zone from viewpoints near the upper-most lift terminals.

Scenic Characteristics of Areas Proposed for Alteration

The project area encompasses different components of the action alternatives and is discussed below to define the baseline scenic conditions of the potentially affected area. Analysis of the action alternatives potential impacts on the scenic characteristics of the project area as a whole and more specific project locations is included in the Direct and Indirect Environmental Consequences.

Elk Camp

The topography at Snowmass can generally be described as three separate peaks: Elk Camp, The Cirque, and Sam's Knob. The overarching project area is defined by Elk Camp, as all of the proposed projects are contained within its surrounding area on the eastern side of the Snowmass SUP. Elk Camp, and more specifically the area at the top of the Elk Camp Gondola adjacent the Elk Camp Restaurant, has acted as the designated hub for multi-season recreation activities since 2009. This is a highly developed area, dominated by existing ski area infrastructure. Traditional ski trails (below treeline), lift terminals, and supporting ski area facilities all characterize the project area and are visible in the middleground and background distance zones from adjacent Town of Snowmass Village land.

Structural facilities in the Elk Camp area include: the Elk Camp Restaurant, a ski patrol station at the summit of Elk Camp, a vehicle maintenance facility, and a lift maintenance facility. Due to the different purposes of the facilities on Elk Camp, there is not necessarily a consistent architectural theme; however, all facilities blend with the landscape beyond the foreground distance zone and are designed to harmonize with the natural environment. No permanent outdoor advertising exists on NFS lands within the Snowmass SUP area. All signage on Snowmass is for trail and lift signage, which all include a consistent design theme and coloration.

During the summer, guests use the Elk Camp Gondola to access the Elk Camp Restaurant and nearby mountain biking and hiking trails, as well as a disc golf course in this area. The Elk Camp Chairlift also runs during the summer and is used to access additional mountain biking and hiking trails, including the Snowmass bike park trails that were designed by Gravity Logic. All existing summer activities in the Elk Camp area occur within the developed ski trail network. The existing mountain biking trail network is primarily concentrated within the project area (some trails span further west) and is not visible beyond the immediate foreground. Other summer and multi-season activities at Snowmass are located on private lands in the Spider Sabich picnic area and Village Mall. These areas include paintball, a climbing wall, and a "Eurobungy." The concentration of activities, buildings and infrastructure in the Elk Camp area create a highly altered scenic environment, particularly in close proximity to the Elk Camp Restaurant.

Proposed Project Areas

Within the greater project area of Elk Camp, each of the proposed projects has potential to alter the existing scenic characteristics of a specific location. The following paragraphs provide an overview of these specific locations, followed by a summary of their scenic characteristics.

The proposed mountain biking and hiking trails extend to the furthest reaches of the project area, spanning the extent of the SUP boundary from top to bottom. Bikers and hikers would traverse through existing, generally undisturbed tree islands, with the exception of ski trails and lift infrastructure.

The proposed zip line canopy tour would start at Elk Camp Meadows and travel down to the *Slider* ski trail near the Elk Camp service road. The alignment is mostly in an existing, undisturbed tree islands,

with the exception of more disturbed environment across the *Elk Camp Bypass* ski trail and spanning the service road. The zip line would primarily travel alongside previously altered landscape, an open ski trail that parallels the Elk Camp Gondola. A rest shelter (approximately 500 to 1,500 square feet) is proposed in the trees on the skier's right side of the *Slider* ski trail near the Elk Camp service road. The landscape has been altered by the construction of the service road and surrounding ski trails.

The proposed climbing wall, ropes challenge course, and mountain coaster would be located in the Elk Camp area. This area is developed with buildings, chairlifts and other ski area infrastructure. The climbing wall would be in a development environment across from the Elk Camp Restaurant. The ropes challenge course and mountain coaster would be located within tree islands just uphill of the lower Magic Carpet and between *Gunner's View* and *Sandy Park* ski trails; however, they would be within sight of the developed Elk Camp area. The Elk Camp Meadows multi-purpose activity area would be in the middle of the developed Elk Camp area, while Rayburn's Pond would be a short walk from the Elk Camp area on a less disturbed pond environment. The third multi-purpose activity area, Elk Camp Summit, is located at the top of the Elk Camp Chairlift with ski area signage and infrastructure visible.

The project area, which has been defined as Elk Camp, has an existing scenic integrity of *Very Low* that is currently being met. As described in the previous paragraphs, all of the proposed project components would be located in or near the developed ski trail network. Additionally, almost all of the proposed activities would overlap existing tree islands of quaking aspen, lodgepole pine, Douglas fir, subalpine fir, and Engelmann spruce that exist between cut ski trails within the project area. Project locations that are in closer proximity to the Elk Camp Restaurant have a more developed scenic character than those that extend further into the project area due to the concentration of facilities, infrastructure, and activities available in this vicinity. In their current state, none of the specific project locations are distinguishable outside of the immediate foreground distance zone. Due to the developed ski trail network within Elk Camp, the overall project area is visible from all viewing distance zones depending on a viewer's location within the SUP area or on adjacent private lands within the Town of Snowmass Village. Potential impacts to the project area as a whole and to the specific locations of the proposed project components associated with each action alternative will be discussed at length under the Direct and Indirect Environmental Consequences discussion.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

No changes or modifications are included in Alternative 1 that would affect the scenic quality of the Snowmass SUP area. Generally speaking, the SUP area would continue to meet, and in some cases exceed, its SIO of *Low* and *Very Low*.

Alternative 2 – Proposed Action

Implementation of the Proposed Action would incrementally contribute to the developed character of the Snowmass SUP area, which is identified in the Forest Plan as Management Area 8.25 – Ski Area (Existing and Potential). With adherence to management requirements (defined in Table 2-2), none of the proposed projects are expected to increase scenery impacts to the character of the SUP area, such that it would not meet the SIO of *Low* or *Very Low*.

Generally, the proposed projects would be located in the existing developed ski trail network or otherwise near existing ski area infrastructure, which would reduce required vegetation clearing and the overall scenery impact. In some cases, the location of these facilities in and near the existing ski trail network would increase the visibility for recreationalists within the Snowmass SUP area (particularly winter sports users); however, most of the proposed activities are located in existing tree islands, which would serve as a natural screen from most viewer distance zones. Furthermore, the proposed activities and associated facilities would be located within a portion of the SUP area that contains a high level of existing development and is planned for future development in the SMMDP.

The facilities and structures would be designed to blend with the surrounding natural environment and would meet the intent of the BEIG. No significant modifications to topography are anticipated to be necessary to facilitate the construction or operation of any of the proposed projects. It is unlikely that any projects would alter the scenic characteristics of the Snowmass SUP area as viewed from the middleground and background distance zones.

In the following analysis, all projects are considered in terms of how they “harmonize with the natural environment,” as defined and discussed in FSM 2343.14. The reader is referred to Appendix B of this document for additional information.

Mountain Biking and Hiking Trails

The proposed mountain biking trails would require vegetation clearing and grading along narrow trail corridors, but would not be visible beyond the foreground distance zone. Technical Trail Features would be visually subordinate to the surrounding landscape and would be visible to trail users. The beginner skills park would be in a highly developed area with concentrated use. These trails would be visible from the Elk Camp area, but would be consistent with the developed recreation in this area.

The proposed mountain biking and hiking re-routes would have minimal impacts on scenic quality. These re-routes would include a small amount of vegetation clearing (and grading) (approximately 1 acre) in order to clear a trail approximately 2 feet wide (after revegetation). It is anticipated that these projects would not be visible from viewpoints beyond the foreground distance zone.

The proposed mountain biking and hiking trails would add incrementally to the scenic character of the Snowmass SUP area as a developed recreation site. These projects would be consistent with the SIO of *Very Low*.

Harmonizing with the Natural Environment

Mountain biking and hiking trails are found throughout NFS lands and are generally considered to be visually subordinate to the vegetation and landscape. Constructed mountain biking trail features should be appropriate in size and design for the setting, visually blend in with the site, and be constructed of natural materials. Further, the proposed beginner skills park would be visually subordinate to the ski area infrastructure located near the top terminal of the Elk Camp Gondola. The proposed beginner skills park would have the highest concentration of Technical Trail Features, all of which (including those that are temporary) would be designed to blend with the surrounding environment through the appropriate use of materials and colors.

These projects would require small amounts of grading and vegetation clearing (approximately 5 acres of grading only and approximately 11 acres of vegetation clearing and grading).

Mountain Coaster

The proposed mountain coaster would include ground-level tubular tracks that would require an approximately 16-foot-wide corridor of vegetation removal within the timbered area between *Gunner's View* and *Sandy Park* ski trails. This equates to approximately 2 acres of vegetation removal through the forest canopy (including 0.37 acre of vegetation clearing and grading). Straight-line edges would be avoided both by design and due to topography/slope gradient, and edges would be “feathered” (where possible and appropriate), thereby minimizing visibility of the mountain coaster. The mountain coaster would be visible in the immediate foreground and potentially in the foreground distance zones for limited durations in segments where forest openings exist. The track would consist of naturally colored steel rails supported by a combination of galvanized lattice and tower structures that would not exceed the height of the surrounding vegetation. The rails (including an uphill lift track approximately 2,300 feet long and downhill track approximately 3,300 feet long) are not anticipated to be visible beyond the immediate foreground view, as the coaster is located in a timbered area, which would serve as a natural screen. Regardless, as with all structures, facilities, and features, the coaster would need to meet Forest Service color and reflectivity guidelines. The use of treatments and colored steel on the exposed metal components of the mountain coaster would be utilized to meet Forest Service color and reflectivity guidelines.

Additionally, a loading station building at the bottom of the mountain coaster, including passenger loading and unloading platforms and equipment storage (approximately 1,500 square feet), and a top station for an attendant (approximately 400 square feet) would be constructed. These facilities would fit the highly developed scenic character of Elk Camp Meadows and be constructed to meet Forest Service color and reflectivity guidelines. Further, the proposed structures would be designed to remain consistent

with the architectural theme of the existing structures in the Elk Camp area, utilizing similar materials and colors, consistent with the BEIG.

The mountain coaster would incorporate lights, and use after dark is being considered (primarily during the winter season, as nighttime use in the summer would occur before dusk). Snowmass would incorporate a low-wattage LED lighting system on individual cars and at both the start and finish areas. Low-level lights would also be installed along the track so riders can be aware of upcoming turns. While these lights would be visible from higher-elevation vantage points in the Roaring Fork Valley, there would be a negligible impact in the noticeable amount of lighting, as there are existing lights on the Elk Camp Restaurant and on the Elk Camp Tubing Venue, both of which are in close proximity to the project and operated after dark during *Ullr Nights*. The mountain coaster is the only proposed activity that would include a lighting component for nighttime use.

The mountain coaster can be installed and operated to be consistent with the SIO of *Very Low*.

Harmonizing with the Natural Environment

The coaster and support facilities are designed to incorporate similar design and materials as existing ski area infrastructure (e.g., colored steel). BEIG concepts and criteria will be incorporated into final design.

The coaster is situated in a discrete, forested location that is on the periphery of existing snow sports infrastructure. The track location and design would utilize existing vegetation to visually screen from other activities and enhance visitor experiences. Construction access would be designed to retain as much vegetation as possible. The track would cross the existing *Vapor* mountain biking trail, requiring the track to be elevated and fenced as necessary. Elsewhere, the trail has been re-routed in one location to avoid conflicts. Additionally, The coaster rail corridor is narrow (less than an average ski trail) limiting its visual footprint and requiring limited tree removal. For a majority of the coaster length, its height is consistently low to the ground and the coaster is lower than and subordinate to surrounding vegetation.

The mountain coaster would require small amounts of vegetation clearing and grading (approximately 1.3 acres of vegetation clearing only, 0.14 acre of grading only, and approximately 0.37 acre of vegetation clearing and grading).

Zip Line Canopy Tour

The zip line canopy tour would traverse the timbered area generally between *Funnel* and *Slider* ski trails via zip lines between stations that would be integrated into the canopy. The zip line canopy tour stations would be located close to ski trails and visible from trails during the summer and winter. The zip line canopy tour would include nine segments connecting ten stations, some being connected with sky bridges and/or rappels to pedestrian trails. The final zip line of the zip line canopy tour would terminate on the *Slider* ski trail near the Elk Camp service road.

The zip line canopy tour would be visible in the immediate foreground for skiers on the *Funnel* and *Slider* ski trails, but would blend with the surrounding environment because the design relies almost entirely on existing trees to accommodate the proposed stations. The height of each station would vary based on available natural resources. The height of the stations would not exceed the height of the canopy and in general, would be approximately 40 feet tall. Each station would measure approximately 12 feet by 12 feet. The platforms would utilize wooden and/or natural-looking materials for construction in order to blend with existing overstory vegetation (additional information about the design of this structure is included in the project file). Guy wires from each platform would be required for structural stability.

Natural colored buck and rail or temporary winter fencing, with flagging or markers to alert recreationists of its presence, would enclose the areas where the guy wires tie into the ground. Fencing on the uphill side of the stations and guy wires would be required for safety purposes. If permanent fencing such as buck and rail were used, it would blend with the tree island background.

Overstory vegetation clearing along the cable segments would be required to maintain a corridor approximately 10 feet wide. Because the project would be located within the forest canopy, some vegetation clearing would be required for most segments and could be visible from the Elk Camp area or riding up Elk Camp Gondola.

Additionally, a rest shelter (approximately 500 to 1,500 square feet) is proposed in the trees on the skier's right side of the *Slider* ski trail near the Elk Camp service road. The facility and structure would be designed to blend with the environment and would meet the intent of the BEIG.

The canopy can be installed and operated to be consistent with the SIO of *Very Low*.

Harmonizing with the Natural Environment

The zip line canopy tour is designed to minimize and avoid tree removal, blend with the forest canopy, and utilize natural materials in its construction. BEIG concepts and criteria will be incorporated into final design.

The zip line canopy tour would be situated in a discrete, forested location located adjacent to and on the periphery of existing snow sports infrastructure. Tower stations would not be higher than the canopy in which they are located, in order to blend towers from multiple viewpoints. Additionally, the zip line canopy tour would operate within narrow corridors (less than an average ski trail) limiting their scenic footprint and requiring limited tree removal. The stations would be approximately the same height as the surrounding overstory vegetation; therefore, they would be partially screened, making them more visually consistent with and subordinate to the vegetation and landscape of the area.

The zip line canopy tour would require small amounts of vegetation clearing and vegetation clearing and grading (approximately 1.43 acres of vegetation clearing and approximately 0.27 acre of vegetation clearing and grading).

Zip Line

A zip line is proposed to begin under the Elk Camp Gondola, cross the *Funnel* ski trail from the zip line canopy tour's point of termination, and end near the Gondola Turn Station, which is located on private land. The zip line would be approximately 3,000 feet long. Overstory vegetation would be cleared where necessary to create a corridor 16 feet wide for zip line operation; however, the majority of the zip line corridor is already cleared due to its location adjacent an open ski trail.

The zip line would include top and bottom stations that would be no higher than approximately 40 feet above ground level. The stations would be approximately 12 feet by 12 feet and consist of wooden and/or natural-looking materials to the extent possible (additional information about the design of these structures is included in the project file). Stations would be secured by guy wires, and buck and rail fencing would enclose the areas where the guy wires tie into the ground. Because the zip line stations are located close to ski trails, naturally colored buck and rail or temporary winter fencing with flagging or markers would be required at the least on the uphill side around stations and guy wires for safety purposes; however, the stations would be set against or in tree islands and buck and rail fencing would blend with the tree island background.

The small shelter described for the zip line canopy tour would also be utilized by the zip line as it is anticipated that most guests would use these activities in conjunction with one another.

Minimal vegetation clearing would be required for the proposed zip line as it would be located in an existing cleared area and thus would not have a significant impact on scenic quality in the project area. This project would traverse over developed ski terrain and forested blocks with resemblance to the nearby chairlifts. The top station of the zip line would be visible in the immediate foreground in the Elk Camp area and in the foreground from the top terminal of the Elk Camp Gondola to summer and winter users. The structure would also likely be visible in the foreground from other locations primarily in the greater Elk Camp area. Further, the bottom station of the zip line would be visible in the foreground and middleground distance zones from surrounding Town of Snowmass Village lands. Because the bottom terminal of the zip line is on private land, it would be subject to the zoning requirements and ordinances of the Town of Snowmass Village. The analysis in this DEIS is separate from Town of Snowmass Village permitting and only applies to NFS lands. However, discussion of an ongoing Town of Snowmass Village PUD Amendment as it relates to this portion of the proposed projects is included in the Cumulative Effects discussion. Even though the bottom terminal of the zip line is on private land, it would be designed to be consistent with the architecture, colors and materials of the other structures within the ski area.

Access roads approximately 12 feet wide would be constructed to facilitate construction, maintenance, and emergency access.

The proposed zip line would add incrementally to the scenic character of the Snowmass SUP area as a developed recreation site. This project would be consistent with the SIO of *Very Low*.

Harmonizing with the Natural Environment

The proposed zip line would add incrementally to the characteristics of the Snowmass SUP area as a developed site. The zip line is designed to minimize tree removal and utilize natural materials in its construction. BEIG concepts and criteria would be incorporated into the final design. Zip line cables would be visible as they extend above the canopy at times. These cables would be small in diameter and would be similar in appearance to the nearby chairlift cables. The zip line would be located adjacent to and on the periphery of existing snow sports infrastructure. Only minimal vegetation clearing would be necessary as the proposed zip line follows the alignment of an existing ski trail. While the top and bottom stations of the zip line would be visible primarily in the immediate foreground, they could also potentially be visible above the canopy in the foreground from certain viewpoints.

These proposed zip line would require small amounts of vegetation clearing and grading (approximately 0.62 acre of vegetation clearing only, 0.02 acre of grading only, and 0.03 acre of vegetation clearing and grading).

Ropes Challenge Course

The ropes challenge course would be located in a forested area just uphill of the lower Magic Carpet in the Elk Camp Meadows area. The course would feature 30 to 40 individual challenge elements that would be elevated off the ground and subordinate to the height of the surrounding canopy. The ropes challenge course would be visible in the immediate foreground/foreground from other activities and trails in the Elk Camp Meadows area and the Elk Camp Restaurant. The existing vegetation in this area would sufficiently screen the ropes challenge course from other distance zones. The ropes challenge course would be constructed using large trees as anchors for all platforms and course elements. The existing *Rabbit Run* hiking trail would be re-routed 500 feet around the proposed ropes challenge course location. The final design of the ropes challenge course would incorporate guidance contained in the BEIG, and would blend with surrounding vegetation and landscape features.

The ropes challenge course would be located in an area of the Snowmass SUP that features a high concentration of existing recreation opportunities and is currently developed and disturbed. It is unlikely that any components of this project would be visible and distinguishable from the middleground and background distance zones.

The proposed ropes challenge course would add incrementally to the scenic character of the Snowmass SUP area as a developed recreation site. This project would be consistent with the SIO of *Very Low*.

Harmonizing with the Natural Environment

Due to the types of materials proposed for this project and its location, it is likely that this project would be less visually intrusive than other infrastructure (e.g., chairlifts) already present throughout the

Snowmass SUP area. The final design of this project would incorporate natural and natural-looking materials, and would consider the surrounding vegetation and landscape. Additionally, the height of the project would likely be less than the height of surrounding vegetation, and would thus be partially screened and visually subordinate to the surrounding landscape.

The proposed ropes challenge course would require small amounts of vegetation clearing and grading (approximately 0.4 acre of vegetation clearing only and approximately 0.13 acre of vegetation clearing and grading).

Climbing Wall

A climbing wall is proposed for the skier's right side of the *Bull Run* ski trail, across the slope from the Elk Camp Restaurant within the former Café Suzanne restaurant site. The climbing wall would be 50 to 70 feet wide and up to 40 feet high, and subordinate to the height of the surrounding canopy. The climbing wall would be visible in the immediate foreground/foreground from other activities and trails in the Elk Camp Meadows area, as well as from the Elk Camp Restaurant. The location of this proposed project would be situated adjacent to a forested stand, on the foundation of a previously developed site and would use materials that mimic a natural rock wall. The final design of the climbing wall would incorporate guidance contained in the BEIG and would blend with surrounding vegetation and landscape features to the greatest extent possible.

The climbing wall would be located in an area of the Snowmass SUP that features a high concentration of existing recreation opportunities and is currently developed and disturbed. It is unlikely that any components of this project would be visible and distinguishable from the middleground and background distance zones.

The proposed climbing wall would add incrementally to the scenic character of the Snowmass SUP area as a developed recreation site. This project would be consistent with the SIO of *Very Low*.

Harmonizing with the Natural Environment

The proposed climbing wall would be situated adjacent to a forested stand and would be subordinate in height and massing to the surrounding landscape and vegetation. Materials mimicking a natural rock wall would be utilized during its construction. Further, the climbing wall would be constructed within the footprint of a previously disturbed area (Café Suzanne), in an area of highly developed scenic character.

The proposed climbing wall would require small amounts of vegetation clearing and grading (approximately 0.14 acre of grading only and approximately 0.04 acre of vegetation clearing and grading).

Multi-Purpose Activity Areas

Under Alternative 2, three locations are proposed to be designated, landscaped and utilized to provide areas for guests to meet for special events, temporary activities, and scenic viewing. A multi-purpose

activity area at Elk Camp Summit, accessed via the Elk Camp Chairlift, would offer a unique scenic vista into the Maroon Bells-Snowmass Wilderness. This area would include landscaping and grading within an approximately 4,000-square foot area, installing benches, and constructing hardened platforms for gathering areas.

Another multi-purpose activity area is proposed adjacent to Rayburn's Pond near the top of the Elk Camp Gondola. This project would include landscaping and grading within an approximately 4,000-square foot area, and would accommodate approximately 250 people. The area would not be visible from Elk Camp.

The third location (specific to Alternative 2) would be located in closer proximity to the Elk Camp Restaurant and the activities of Elk Camp Meadows. This area would include landscaping and grading within an approximately 4,000-square foot area.

There is no nighttime use proposed for the multi-purpose activity area at the Elk Camp Summit; however, there is a potential for nighttime use associated with special events at the other two areas. This would occur on a special event basis and nighttime use would not be a part of regular programming. While the lights from special events would be visible from higher-elevation vantage points in the Roaring Fork Valley, there would be a negligible impact in the noticeable amount of lighting, as there is existing light use for special events around the Elk Camp Area. Snowmass would request special nighttime use of the multi-purpose activity areas from the WRNF.

The multi-purpose activity areas would be landscaped areas free of permanent constructed features or buildings (facilities) within existing footprints of the Elk Camp facility and developed site, Rayburn's Pond developed site, and Elk Camp Chairlift developed site. Due to their integration with the natural environment and close proximity to developed sites, it is unlikely that any components of this project would be visible and distinguishable from the middleground and background distance zones. All of the multi-purpose activity areas would be visible in the immediate foreground/foreground of their respective developed sites. The final design of these areas would incorporate guidance contained in the BEIG, and would blend with surrounding vegetation and landscape features.

The multi-purpose activity areas can be installed and operated to be consistent with the SIO of *Very Low*.

Harmonizing with the Natural Environment

The proposed multi-purpose activity areas would be highly integrated into their surrounding areas, essentially functioning as landscaped areas with the capacity to accommodate a range of users. Materials that would be used to supplement these areas would all be natural (e.g., rocks and wood features). There are no permanent constructed features or buildings (facilities) associated with any of these proposed areas. Further, all of these areas would be constructed within the existing footprints of developed sites.

These areas would require small amounts of grading and vegetation clearing (approximately 0.39 acre of grading only and approximately 0.11 acre of vegetation clearing and grading).

Alternative 3

The direct and indirect environmental consequences for Alternative 3 would be identical to those described above for the Proposed Action, with the following exceptions and modifications.

Mountain Biking and Hiking Trails

Mountain biking Trail 21 in the Proposed Action is replaced with Trail 16 (also known as *Grey Wolf*). Trail 17 and the beginner skills park area are also removed from Alternative 3. All of the other proposed mountain biking and hiking trails analyzed under the Proposed Action are included in Alternative 3.

Trail 16, specific to Alternative 3, would be located in developed areas of the SUP and would primarily follow the path of an open ski trail. As is the case with trails proposed in Alternative 2, this trail would look very similar to the existing biking trails at Snowmass, which are not visible beyond the foreground distance zone. The variations to the proposed trails in Alternative 3 would require slightly different amounts of vegetation clearing and grading (approximately 10 acres); the areas of vegetation clearing would be very narrow corridors, approximately 4 to 6 feet after revegetation, that would not be visible from beyond the immediate foreground (and then, only from certain angles). Hiking disturbance would be identical to Alternative 2.

The variations to proposed mountain biking trails under Alternative 3 would remain consistent with the SIO of *Very Low*.

Harmonizing with the Natural Environment

Refer to the discussion under Alternative 2. The proposed trail configuration included in Alternative 3 would modify the necessary grading and vegetation clearing (approximately 4 acres of grading only and 10 acres of vegetation clearing and grading).

Multi-Purpose Activity Areas

In response to scenery concerns, the Elk Camp Meadows multi-purpose activity area is from Alternative 3. As previously described, Elk Camp Meadows is a highly developed recreation site that hosts an array of activities; it is also near the Elk Camp Restaurant. Impacts from the two remaining multi-purpose activities areas, Elk Camp Summit and Rayburn's Pond, are identical to those described for Alternative 2. Therefore, Alternative 3 would include a reduction of built infrastructure compared to Alternative 2.

Harmonizing with the Natural Environment

Refer to the discussion under Alternative 2. The elimination of the Elk Camp Meadows multi-purpose activity area in Alternative 3 would reduce the necessary grading and vegetation clearing associated with these projects (approximately 0.15 acre of grading only and 0.11 acre of vegetation clearing and grading).

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for scenic resources extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for scenic resources are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on scenic resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Snowmass Planned Unit Development Amendment
- Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement
- WRNF Forest Plan – 2002 Revision

Snowmass Planned Unit Development Amendment

Paralleling the NEPA process, Snowmass is currently applying to the Town of Snowmass Village to revise its PUD. The revised PUD will govern the allowable activities and structures within Snowmass' operational boundary. As previously discussed, the bottom terminal of the proposed zip line included in this analysis is outside of the Snowmass SUP area and is located on Town of Snowmass Village lands. This portion of the proposal is not on NFS lands but would be within Snowmass' operational boundary, and is subject to the ongoing PUD amendment. The Forest Service decision regarding the zip line would apply only to NFS lands analyzed within this DEIS and would not apply to private property surrounding the SUP area even though it is within Snowmass' operational boundary. Forest Service regulations would require Snowmass to abide by applicable laws and conditions imposed by Town of Snowmass Village

jurisdictions. Decisions by jurisdictions to issue or not issue approvals related to this proposal may be aided by the analyses presented in this DEIS, but are separate and entirely up to the Town of Snowmass Village. Upon Town of Snowmass Village approval, the amended PUD would accommodate all developments proposed in this DEIS. Scenic impacts from the zip line could not occur without review and approval by the Town of Snowmass Village, which is currently undergoing a PUD amendment.

Projects within the Snowmass SUP Boundary

Evidence of developed recreation at Snowmass dominates the scenic character of the SUP area and adjacent Town of Snowmass Village. Previous development of Snowmass over the past five decades (including the recent Ski Trail Enhancements and High Alpine Lift Replacement) has involved overstory vegetation clearing and grading for the creation of trails and chairlifts, as well the construction of chairlifts, roads, infrastructure, buildings, and, more recently, the construction of summer trails and activities. These alterations have cumulatively impacted the scenic character of the landscape over time, with many of these activities pre-dating both the original Visual Management System (VMS) and newer SMS guidance. Some of the buildings at Snowmass were constructed before the establishment of the BEIG. However, Snowmass has increasingly moved toward a consistent architectural theme as new facilities are constructed.

Management of scenic resources, as outlined in the Forest Plan, will continue to guide future ski area development at Snowmass. Projects included in the 2015 SMMDP that are unimplemented and not contained in this document would also be subject to these standards and guidelines. While the Forest Plan includes numerous management prescriptions that could impact scenic resources across the Forest, the application of Forest Plan standards and guidelines at Snowmass will ensure that scenic quality is maintained or improved.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The addition of summer and multi-season activities/infrastructure in the SUP area would represent irretrievable effects to scenic resources at Snowmass. However, this commitment of the scenic resource is not irreversible because facilities could be removed and, in time, areas could be reclaimed and revegetated, restoring their natural appearance.

C. NOISE

SCOPE OF THE ANALYSIS

The spatial bounds considered for this analysis include the Snowmass SUP area and adjacent public and private lands. The analysis focuses on areas in and around the Elk Camp Gondola and Chairlift, as this would be the primary area of development.

Characteristics of noise generated during the summer months differ from the noise that is generated during the winter months. The summer has significantly fewer guests visiting the Snowmass SUP area,

but summer noise levels tend to be higher and occur for limited periods of time, due to construction and maintenance activities. During the winter months, more guests visiting the Snowmass SUP area cause an increase in traffic volume, but occur at lower decibel levels noises (with the exception of avalanche control).³³ For this analysis, noise levels were analyzed during the summer months.

AFFECTED ENVIRONMENT

Throughout this analysis, A-weighted decibel (dBA) levels are used in order to compare the relative loudness of sounds as perceived by the human ear.³⁴ For comparison purposes, typical noise levels (in dBA) associated with a variety of common sources are outlined in Table 3C-1.

**Table 3C-1:
Noise Levels for Common Sources**

Source/Type	Noise Level (dBA)
Lowest threshold of human hearing	0
Quiet rural area	25 to 30
Quiet residential area	40
Rainfall	50
Conversation, busy office	50 to 60
Heavy traffic	70
Diesel truck	80 to 90
Snowmobile at 25 feet	100
Thunder	120

Source: Center for Hearing and Communication, 2016

Existing noise levels during the summer months within and adjacent to the Snowmass SUP boundary would continue to be generated from a number of sources including mountain maintenance and operations, base area traffic and activity, and recreation-related noise. These noise levels would likely be observed during operational hours (mid-June to mid-September, 10:00 a.m. to 4:00 p.m.).

Mountain maintenance and on-going construction activities can cause high decibel levels of noise. These noises can originate from trucks traveling up and down mountain roads, workers conducting lift and facility maintenance, construction of new infrastructure, and logging operations to remove dead trees or construct new trails. Typical noise levels from construction equipment and activity can range from 70 to 90 dBA. This is on the higher end of the noise level; however, the activities typically last for a short duration of time.

³³ Snowmass summer visitation is 25,000 guests annually compared to 750,000 winter guests annually. Refer to Section A – Recreation.

³⁴ *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).

The Base Village is an area at Snowmass where higher noise levels would be expected adjacent to the analysis area. Noise levels in the Base Village are important because guests enter through this portal to NFS lands. Sounds heard in this area can affect the guest's overall experience. Guests would expect to hear noises from people gathering, dining facilities, ticket offices, retail and rental shops, concerts or music, and nearby traffic. Noise levels for this area could range from a conversation (50 dBA) to heavy traffic (70 dBA).

During the summer months, mountain operations center around the Elk Camp area. Guests hiking up the mountain or arriving at the Elk Camp area via the Elk Camp Gondola are likely to notice the quieter environment compared to the Base Village. The gondola and lift operations could be heard in this area when in close proximity. Chairlift equipment can range from 75 to 81 dBA, whereas the restaurant might range from 60 to 75 dBA.³⁵

Other noises heard around the analysis area originate from recreational users. These include people mountain biking, hiking, playing disc golf, and climbing the climbing wall. Mountain biking and hiking activates typically generate noise levels comparable to a normal conversation (60 dBA). Other events, such as *Farm to Table* Tuesdays, generate noise in the Elk Camp area. *Farm to Table* Tuesdays primarily occurs indoors and includes live music with music concluding at 9:00 p.m. At the Base Village, concerts are occasionally held throughout the summer. In 2016 Snowmass held twelve concerts between mid-June to mid-August. Concert noise levels can range from 110 to 120 dBA.³⁶

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Under the Alternative 1 noise impacts within the Snowmass SUP area would not change from those described under Affected Environment.

Alternative 2 – Proposed Action

Under Alternative 2, noise within and adjacent to the Snowmass SUP boundary would be generated from similar sources as described in the Affected Environment; however, an increase in noise levels would be expected due to construction of summer activities, additional visitors to the Base Village, additional on-mountain operations, and additional guests participating in recreational activities. Noise from these construction activities can occasionally be heard from outside the SUP area.

The proposed projects are not anticipated to result in uncharacteristic increases to the existing noise levels within and adjacent to the Snowmass SUP area. The construction of proposed projects could result in a temporary increase noise levels within and adjacent to the Snowmass SUP area. Operational noise of additional recreational users would add incrementally to existing noise levels within the Snowmass SUP

³⁵ Radman, 2012

³⁶ Center for Hearing and Communication, 2016

boundary, but this additional noise is not anticipated to have an adverse effect. This incremental increase would be further diluted due the location on the mountain of the majority of the proposed projects.

Construction

Construction-generated noise would generally be short term, as it would cease upon completion of the project. Noise from construction-related activities would include construction equipment (i.e., diesel trucks and log skidders), construction of the proposed activities (e.g., falling logs and pouring concrete), and transporting materials for construction.

A variety of construction vehicles could be used for the proposed projects, and could include standard pickup trucks, diesel concrete trucks, and/or diesel flatbed semi-tractor trailers. The proposed activities are estimated to require 400 truckloads of materials and equipment over a seven-year implementation period. Assuming an 85-day summer construction window, this amounts to less than one truckload of equipment per day; however, the number of truckloads per day would vary based on the phase of construction. Certain days could include ten or more truckloads of materials while other days could include no truckloads. Noise levels from diesel trucks typically ranges from 80 to 85 dBA.³⁷

Construction noises could also cause higher noise levels from such activities as falling trees and pouring concrete to flying equipment with helicopters. Noise levels from equipment used to fall trees (e.g., chainsaws and skidsteers), as well as concrete trucks and mixers all range from 80 to 90 dBA. Noise levels from a helicopter at 100 feet ranges from 90 to 100 dBA.³⁸

Operations

Operational noise would be long term and would occur throughout the summer seasons for the life of the project.

Elk Camp Area

The Elk Camp area is currently used by guests as a hub to gather and engage in year-round activities. Under Alternative 2, this use would continue and annual visitation is expected to increase to approximately 45,000 guests (current visitation is 25,000 guests). This additional visitation would generate more noise. These noise levels would likely be observed during operational hours (mid-June to mid-September, 10:00 a.m. to 4:00 p.m.). During the summer months, events would also generate noise from the Elk Camp Restaurant and from surrounding recreation activities.

From the Elk Camp area, noise levels would be expected to decrease with distance. For example, a guest on the mountain coaster might hear more noise from the mountain coaster track, other mountain coaster users or general milling around the Elk Camp area compared to a hiker on the re-routed *Vista* trail once

³⁷ Ibid.

³⁸ USDOT, 2015

they leave the Elk Camp area. Once the hiker leaves the Elk Camp area, they might hear the Elk Camp Gondola; however, in general, the environment would be more quiet and serene.

Zip Line Canopy Tour, Zip Line, and Mountain Coaster

Increased noise impacts from the proposed projects and anticipated increased visitation under Alternative 2 could impact the overall recreational experience at Snowmass. The recreational experience in the greater Elk Camp area could be impacted by additional noise of new activities and guests using them; however, the Snowmass SUP area is currently the focus of developed recreation (consistent with Management Area 8.25). Additional noise from the proposed activities would be consistent with existing conditions and guest expectations at this location (refer to Section A – Recreation for more information about the guest experience).

The zip line canopy tour, zip line, and mountain coaster would generate additional noise, primarily from the guest participating in an activity; however, the noise from these activities would be considered a small, incremental addition to the existing noise level currently experienced in these activity locations. This would not adversely impact the existing and proposed surrounding recreational experience of users because they would expect to hear the activity in which they are participating. Noise generated by these activities could impact the recreational experience of other users in the vicinity, including hikers, mountain bikers, and skiers, who may desire a quieter, more remote recreational experience. It has been observed that the primary noise generated by mountain coasters is rider-generated (i.e., yelling) noise during downhill curved sections. Mountain coaster rides generate an average of 65 decibels for listeners 50 feet away, which is comparatively similar to normal speech at 3 feet away. Based on this data, impacts to existing ambient noise levels are expected to be minimal.³⁹

Multi-Purpose Activity Areas

Multi-purpose activity areas would produce some additional noise, specifically during events and programs. The multi-purpose activity areas could host programs from outdoor naturalist presentations; educational and training presentations; concerts, dance, yoga, and other artistic/fitness activities; and special events. Noise levels could range from a normal conversation (60 dBA) to a concert (100 to 120 dBA).⁴⁰ The noise levels from the multi-purpose activity areas could impact other users in the vicinity, but these activities would be temporary (lasting a couple of hours) and not occur daily.

Other Proposed Projects

Other proposed projects, such as the ropes challenge course, climbing wall and bike skills park, would incrementally add to the noise levels in the Elk Camp area where additional noise impacts would be consistent with existing conditions and guest expectations. Guests using the mountain biking and hiking trails would expect to experience a quieter, more serene environment on the trails once they leave the Elk Camp area. As hikers and mountain bikers approach the Elk Camp area, they would expect to hear

³⁹ J.C. Brennan & Associates, Inc., 2010

⁴⁰ Center for Hearing and Communication, 2016

crowds and noise from the zip line canopy tour, mountain coaster or ropes challenge course users. In general, impacts to existing ambient noise levels are expected to be minimal from these proposed projects.

Alternative 3

Under Alternative 3, noise within and adjacent to the Snowmass SUP boundary would be similar to Alternative 2. However, it is expected that there would be fewer users dispersed across the trail network and fewer programs and events with the elimination of Elk Camp Meadows multi-purpose activity area. Additionally, under Alternative 3, nighttime noise due to operations would not occur except for special events.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for noise extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for noise are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on noise resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Past Snowmass Projects (Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement, Winter Evening Activities Project)
- Regional Projects (Continued Build out of Town of Snowmass Village, Ajax Adventure Camp, Aspen-Sopris Ranger District Five Year Recreation Event Special Use Permit)

- WRNF Forest Plan – 2002 Revision
- WRNF Travel Management Plan

The expansion and development within and adjacent to the Snowmass SUP area has incrementally added to the level of noise in the area. Within the Snowmass SUP area, noise levels have been impacted by development of the Elk Camp Restaurant and vicinity, development of additional ski terrain, construction of ski lifts, construction of mountain biking and hiking trails, and similar activities. Adjacent to the Snowmass SUP area, residential construction, Town of Snowmass Village build-out, and construction of the Snowmass base area have all added to the noise level in the area.

The proposed summer activities would incrementally add to the noise level within the Snowmass SUP area with the construction of the activities in the short-term and with additional visitors and traffic in the long-term. These developments and future Snowmass development would gradually add to the level of noise within the SUP area.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

No irreversible and/or irretrievable commitment of resources have been identified that may impact noise levels in association with the alternatives analyzed in this document.

D. SOCIAL AND ECONOMIC RESOURCES

SCOPE OF THE ANALYSIS

The multi-season recreational activities proposed at Snowmass have the potential to affect not only the physical environment but also the social and economic (socioeconomic) environment. A correlation exists between public use of NFS lands and the economies and societies of adjacent communities. This correlation encompasses many factors—such as seasonal tourism, population, visitor spending, employment, personal income and tax revenues—which are assessed and disclosed herein. The area of economic effect, or analysis area, for the proposed project is defined as Pitkin County, Colorado.

Definitions

Terminology specific to economic analysis is used throughout this section. To help the reader, the following definitions are provided:

Economic Impact Theory – A significant body of prior research regarding ski area operations makes it clear that by drawing non-local visitation to an area, resorts such as Snowmass can generate economic activity in the form of employment and visitor sales. These benefits accrue to both the resort and to local businesses that benefit from spending by visitors. Perhaps just as important, the direct dollars spent at resort areas and local businesses have a secondary (multiplier) impact, creating additional sales/jobs within the local and regional economy.

Economic Impacts – Economic impacts are typically defined at three levels:

1. *Direct* – Employment and sales 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.
2. *Indirect* – Employment and sales created by industry-to-industry spending. For instance, increased food and beverage spending at Snowmass 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.
3. *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.

Methodology and Assumptions

Economic impacts of the three alternatives were projected using a computer-based model (IMPLAN3).⁴¹ 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 analysis documents as part of the NEPA process. IMPLAN3 economic modeling requires the estimation of annual visitation, visitor spending, resort employment and construction costs in order to simulate the effect of these activities on the economy in terms of sales, employment, labor income and tax revenues. While IMPLAN3 modeling utilizes the most current observed industry interdependencies calibrated to the local and regional economy of Pitkin County, the results of any economic model are only as accurate as the data used to describe the proposed change (i.e., an alternative). Therefore, certain estimations and assumptions related to all alternatives were made. As a result, the projected values presented in this analysis should not be considered precise, but rather accurate estimates of the potential economic impacts under all alternatives.

Construction activity at the resort and year-round visitation to the resort area generate economic activity in Pitkin County. In order to analyze the economic impacts of the proposed projects, the Forest Service and Snowmass have made reasonable estimates of the proposed construction budget and anticipated visitation to Snowmass. For the purposes of this analysis, construction of the project components is expected to occur over the three-year period from 2017 through 2019. The projection period for

⁴¹ IMPLAN3 software guides users through 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 U.S. The result is a detailed summary of economic impacts including: changes in jobs, household incomes, tax impacts, and GRP 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 be found at http://implan.com/index.php?option=com_content&view=article&id=889&Itemid=1482 and data used for the economic analysis is contained in the project file.

visitation-based impacts is from 2017 to 2019 and projections of annual spending are based on 2019 values. IMPLAN3 model values related to the Affected Environment, or existing condition, are estimated for 2016.

For the purposes of this analysis, winter visitation is expected to remain in its current trend under each alternative (i.e., none of the alternatives are designed, or expected, to increase winter visitation to the ski area). Therefore, the existing economic impact of winter visitors to Snowmass is disclosed in the Affected Environment, but only changes in summer visitation are analyzed for each alternative. Under each action alternative, the majority (95 percent) of new summer visits to Snowmass are assumed to be made by visitors who are already coming to the region, including the Town of Snowmass Village. These visits represent new visitors to Snowmass but not new visitors to Pitkin County—they are Snowmass guests who already live in or would be staying in Pitkin County, but might visit Snowmass multiple times as a result of the action alternatives instead of visiting the ski area once (or not at all) during their stay in Pitkin County. As existing visitors to the region, the impact of their spending outside of Snowmass is already part of the existing economy of Pitkin County and is not reported as a new economic impact herein. The remaining 5 percent of new summer visits to Snowmass are assumed to be made by new visitors to the region—these represent visitors who decide to come to Snowmass and Pitkin County as a result of the projects included in the action alternatives. The spending impacts of these visitors are reported as new impacts to the Pitkin County economy.

Based on continued interest in summer recreation and recent visitation trends, new summer visitation is expected to be about 3 percent per year, or 750 people, under the No Action Alternative for Snowmass. New visitation to NFS lands under the No Action Alternative would see a portion of this growth, but would not likely impact NFS lands with the minimal increase.

In this analysis, existing and prospective new jobs are discussed as “employment positions” or “FTEs.” An employment position may be a year-round or seasonal job and either full-time or part-time, whereas 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.⁴²

AFFECTED ENVIRONMENT

Snowmass

Visitation

Snowmass is a four-season resort whose primary purpose is for winter recreation. Over the past few years, Snowmass has experienced modest fluctuations in winter visitation, averaging about 750,000 winter visits

⁴² A full time, year-round job is one FTE, but a part time seasonal job is half the hours every week and half of the year, equating to one-quarter of an FTE (i.e., “half-of-a-half”).

annually.⁴³ About 69 percent of Snowmass’ winter visitors are overnight visitors and about 31 percent are day use visitors.

While winter visitation at Snowmass has experienced ups and downs in the past few years, summer visitation to the ski area has experienced consistent growth during this same period.⁴⁴ Snowmass currently records approximately 25,000 summer visits. It is estimated that about 75 percent of Snowmass’ summer visitors are overnight visitors and about 25 percent are day use visitors.

Employment

As is true for most mountain resorts, Snowmass employs more workers in the winter than in the summer. Snowmass currently employs approximately 1,545 workers (or 710 FTEs) in the winter and approximately 316 workers (or 193 FTEs) in the summer including full-time positions.⁴⁵ These are *direct* resort jobs (i.e., employees of Snowmass) and are ongoing employment positions that are created each year in response to visitation to Snowmass. Tables 3D-1 and 3D-2 summarize the existing employment at Snowmass.

**Table 3D-1:
Snowmass Baseline Employment**

Employment Type	Full-Time	Part-Time	FTEs
Year-Round Employment	78	0	78
Winter Seasonal Employment	1062	405	632
Summer Seasonal Employment	222	16	115
Annual Employment ^a	1,362	421	825

Source: Snowmass, 2016; annual average employment

Notes:

^a Conversions as follows:

Full-Time Year-Round = 1.0 (Works full-time for 12 months);

Part-Time Year-Round = 0.5 (Works part-time for 12 months);

Full-Time Seasonal = 0.5 (Works full-time for about 6 months);

Part-Time Seasonal = 0.25 (Works part-time for about 6 months).

**Table 3D-2:
Snowmass Baseline Employment By Season**

Winter Positions	Winter FTEs	Summer Positions	Summer FTEs
1,545	710	316	193

Source: Snowmass, 2016; annual average employment

⁴³ ASC, 2016a

⁴⁴ Ibid.

⁴⁵ FTEs are explained under Scope of the Analysis.

Economic Impact of Snowmass on the Pitkin County Economy

Based on projections from the IMPLAN3 model, winter visitors currently spend approximately \$122.9 million each year. This *direct* spending generates a total annual output of approximately \$169 million into the economy, which includes *direct* and *secondary* impacts. Approximately 1,710 FTEs and \$77.3 million in labor income are generated each year in response to Snowmass spending.⁴⁶ This includes the 1,545 employment positions (710 FTEs) currently provided by Snowmass in the winter. Snowmass' economic impact currently accounts for approximately \$114.1 million (5 percent) of the GRP of Pitkin County. Approximately \$17.1 million in federal taxes and approximately \$11.8 million in state and local taxes are generated each year by this economic activity. Table 3D-3 summarizes the impact of existing winter visitation.

**Table 3D-3:
Baseline Impact of Winter Visitation at Snowmass**

Impact Type	Employment (FTEs)	Labor Income	Total Value Added (GRP)	Total Output (Sales)
Direct Effect	1,410	\$61,287,000	\$84,398,000	\$122,898,000
Secondary Effect	300	\$16,055,000	\$29,741,000	\$46,150,000
Total Effect	1,710	\$77,342,000	\$114,139,000	\$169,048,000

Source: IMPLAN, 2016

Based on projections from the IMPLAN3 model, Snowmass' summer visitors currently spend approximately \$4 million each year. This *direct* spending generates a total annual output of approximately \$5.4 million into the economy, which includes *direct* and *secondary* impacts. Approximately 56 FTEs and \$2.5 million in labor income are generated each year in response to Snowmass spending. This includes the 316 employment positions (193 FTEs) currently provided by Snowmass in the summer. Snowmass' summer economic impact currently accounts for approximately \$3.6 million (0.16 percent) of the GRP of Pitkin County. Approximately \$543,000 in federal taxes and approximately \$379,000 in state and local taxes are generated each year by this economic activity. Table 3D-4 summarizes the impact of existing summer visitation.

⁴⁶ The Congressional Labor Office defines labor income as income that is derived from employment. This includes all compensation that is a return from work effort, and typically includes labor earnings (wages and salaries), employer-provided benefits (health insurance, life insurance, etc.) and taxes paid to the government on behalf of the employees. Employment created by the operation of and visitation to Snowmass produces labor income for employees and businesses in Pitkin County.

**Table 3D-4:
Baseline Impact of Summer Visitation at Snowmass**

Impact Type	Employment (FTEs)	Labor Income	Total Value Added (GRP)	Total Output (Sales)
Direct Effect	46	\$1,934,000	\$2,671,000	\$3,971,000
Secondary Effect	10	\$523,000	\$946,000	\$1,474,000
Total Effect	56	\$2,457,000	\$3,617,000	\$5,445,000

Source: IMPLAN, 2016

To put winter versus summer visitor spending into context, the total effect of Snowmass’ winter visitor spending (\$169 million) is more than 30 times that of the summer visitors (\$5.4 million).

Population

Pitkin County’s population has been steadily increasing since the 1970s—in 2015 it was nearly 17,800 full-time residents.⁴⁷ This increasing trend is projected to continue in both the State of Colorado and Pitkin County, with Colorado projected to reach 7.8 million residents by 2040 and Pitkin County population projected to reach 28,000 by 2040.⁴⁸

Housing

Housing has been a focal point in the City of Aspen and Pitkin County for a long time. In 1984 the City of Aspen and Pitkin County, under an Inter-Governmental Agreement, created the APCA. The City of Aspen, Pitkin County and APCA all support affordable housing funding that is used by APCA to oversee 2,931 units. These units are 55 percent ownership housing and 45 percent rental inventory.⁴⁹ Second homeowners account for 55 percent of all housing unit property owners in Pitkin County.⁵⁰

In 2012 the housing authority prepared a Strategic Review of Housing outlining purpose and need for the program and whether APCA was meeting the needs of the community.⁵¹ In 2015 Pitkin County also published Employee Housing Guidelines, and in 2016 a policy study was completed on affordable housing guidelines.⁵² The reports show that APCA has had a positive impact on housing in Pitkin County. Together the reports stress the importance of housing, and more specifically affordable housing, in Pitkin County.

Snowmass Employee Housing

Snowmass currently provides 348 employee housing units. During the summer, the workforce housing is 5 percent occupied and could support more summer employees.

⁴⁷ U.S. Census Bureau, 2015

⁴⁸ Rocky Mountain PBS News, 2015 and Colorado Department of Local Affairs – State Demography Office, 2015

⁴⁹ Navigate et al., 2016

⁵⁰ Pitkin County Public Health Improvement Plan, 2013

⁵¹ APCA, 2012 and 2015

⁵² APCA, 2015 and Navigate et al., 2016

Snowmass employees live across the Roaring Fork Valley. Snowmass estimates 46 percent of employees live in Aspen, 19 percent live in Carbondale, 15 percent live in Snowmass, 13 percent live in Basalt, and 7 percent live farther down valley (including Glenwood Springs). In the future as additional employment opportunities arise in Aspen and Snowmass, the deficit of affordable housing may result in a larger portion of employees commuting into Snowmass from down valley communities (or other counties) where cheaper housing is available.

Race

Racial diversity is limited in Pitkin County—95 percent of the County’s population is White, Hispanic or Latino.⁵³ The racial breakdown of Pitkin County is provided in Table 3D-5.

Table 3D-5:
Race Within Pitkin County (2014)

Race	Population	Percent
White	16,413	94.9
Black or African American	295	1.7
American Indian and Alaska Native	107	0.6
Asian	177	1.0
Native Hawaiian and Other Pacific Islander	2	0.0
Some Other Race	134	0.8
Two or More Races	175	1.0

Source: U.S. Census Bureau, 2015

Economy

In 2013 Colorado’s Gross Domestic Product was \$288.8 billion.⁵⁴ In 2013 Pitkin County’s economy had a GRP of approximately \$2 billion.⁵⁵ Travel and tourism is an important economic component of Pitkin County, contributing approximately \$1 billion to Pitkin County’s GRP.⁵⁶ 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.⁵⁷ 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 accounts for about 15 percent of total employment nationally and about 18 percent in the State of Colorado. In comparison, Pitkin County is much more dependent on tourism with approximately 50

⁵³ U.S. Census Bureau, 2015

⁵⁴ U.S. Department of Commerce, 2016

⁵⁵ IMPLAN, 2014

⁵⁶ Colorado Office of Economic Development and International Trade, 2014 and Dean Runyan Associates, 2016

⁵⁷ 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.”

percent of the total employment in the County attributed to travel and tourism sectors.⁵⁸ It should also be noted that the percentage of employment related to travel and tourism in Pitkin County is likely higher than reported, as second home construction and some other tourism related activities are not included in this calculation.

Employment Status

Employment status is a measure of the number of people who are jobless or employed in the local labor force. In 2016 Pitkin County had a labor force of nearly 11,000, with 10,300 persons employed and 600 persons unemployed.⁵⁹ This is based on a five-year average from 2011 to 2016. During this time, the labor force in Pitkin County fluctuated between 10,200 and 11,200 people, with the low occurring in May and the high in December.

The most common metric of employment status is the unemployment rate, calculated as the number of people who are jobless, looking for jobs and available for work divided by the labor force. In 2016 the five-year average for Pitkin County’s unemployment rate was 5.5 percent, which was lower than the state five-year average of 5.7 percent. The labor force numbers in Pitkin County and the State of Colorado are provided in Table 3D-6. Pitkin County experiences seasonal fluctuation in unemployment rate with high unemployment typically occurring in May and November and low unemployment in March and September. The unemployment in the last five years for Pitkin County has ranged from 2.0 to 11.9 percent.⁶⁰

**Table 3D-6:
Pitkin County Labor Force, 2011–2016**

Area	Labor Force	Employed	Unemployed	Unemployment Rate (%)
Pitkin County	10,906	10,306	600	5.5
State of Colorado	2,804,219	2,644,378	159,840	5.7

Source: U.S. Bureau of Labor Statistics, 2016

Income and Poverty

Household income and the proportion of the population below the poverty level are important measures of the ability of households and individuals to achieve economic security. In 2014 Pitkin County had a higher median household income (\$71,060) and a lower percentage of the population below the poverty level (7.0 percent) than both the State of Colorado and the U.S. as a whole.⁶¹ It is important to note that this figure is based on total personal income, from both labor (e.g., wages) and non-labor (e.g., investment income) sources. Pitkin County is historically one of the highest per capital median incomes levels in the

⁵⁸ U.S. Department of Commerce, 2016

⁵⁹ U.S. Bureau of Labor Statistics, 2016

⁶⁰ Ibid.

⁶¹ U.S. Census Bureau, 2015

State of Colorado, which could be influenced by the number of high personal income residents choosing Pitkin County as a primary residence. These figures are presented in Table 3D-7.

Table 3D-7:
Pitkin County Median Household Income and
Percentage of Population below the Poverty Level

Geographic Area	Median Household Income including Benefits	Percentage of Population Below the Poverty Level
United States	\$53,482	13.5
Colorado	\$59,448	11.5
Pitkin County	\$71,060	7.0

Source: U.S. Census Bureau, 2015

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. EO 12898 relates to environmental justice and requires, in brief, that each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately 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:⁶²

- “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.”
- “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.”⁶³

No existing minority populations were 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

⁶² CEQ, 1997

⁶³ Ibid.

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 analysis area.

Social Services

Social services is a broad topic that includes public transportation, public health services, family services, child care and other services provided by the County, the Town of Snowmass Village, and non-profits in Pitkin County. These programs and organizations provide services to individuals living in the community who cannot afford to maintain a healthy and comfortable lifestyle. These services are being used by some Snowmass employees to supplement the high cost of living in a mountain resort town.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

While each of the action alternatives would generate economic activity in the form of sales, employment labor income and tax revenues, the overall socioeconomic trends in Pitkin County (population growth, racial diversity, a travel and tourism-based economy, and income and poverty) are expected to remain within their current trends under each alternative.

Population

Population growth projections expect Colorado and Pitkin County's baseline resident population to grow in the coming years. Colorado is expected to reach 7.8 million residents by 2040, an increase of about 2.3 million.⁶⁴ Pitkin County population is expected to reach 28,000 by 2040, an increase of about 10,000.⁶⁵ Although some workers may relocate to Pitkin County to fill the new employment positions created by each alternative, this population projection accounts for a reasonable amount of job creation in the County such as what would be experienced under the action alternatives. Thus, population growth resulting from any of the action alternatives is expected to have a negligible effect on the baseline population trend.

Housing

Housing availability in the Roaring Fork Valley and the Town of Snowmass Village is an ongoing issue; however, the action alternatives are not anticipated to measurably affect the housing markets of Snowmass or Pitkin County. The majority of workers are anticipated to already be living in the area and enough employee housing would be available to accommodate the increase in summer employment. As indicated in the Affected Environment discussion, Snowmass currently provides 348 employee housing units and APCHA offers 2,931 units. Based on current capacities, the workforce housing would accommodate any additional employees, as needed.

⁶⁴ Rocky Mountain PBS News, 2015

⁶⁵ Colorado Department of Local Affairs – State Demography Office, 2015

Race

Racial diversity is limited in Pitkin County, with about 95 percent of the Pitkin County population identifying as white. None of the action alternatives are anticipated to measurably affect the racial breakdown of the county.

Economy

Travel and tourism has been an important component of the Pitkin County economy. Currently, at least 50 percent of all employment in Pitkin County is related to travel and tourism operations.⁶⁶ None of the action alternatives are anticipated to affect this overall economic condition. Snowmass is expected to remain one of the primary economic drivers in Pitkin County for the foreseeable future under each alternative.

Income and Poverty

Measures of individual prosperity are closely related to the overall economic condition in a local economy. Travel and tourism is expected to remain a primary economic driver in Pitkin County under each alternative, and as such the nature of employment opportunities and compensation is also expected to remain in its current trend. Pitkin County can be expected to retain its relatively higher median household income (\$71,060) and a lower percentage of the population below the poverty level (7.0 percent) than both the State of Colorado and the U.S. as a whole under each alternative.⁶⁷

Environmental Justice

No changes or modifications would be approved under any alternative that would directly or indirectly affect minority or low-income populations in Pitkin County. The baseline conditions presented in the Affected Environment discussion would be expected to continue into the future under each alternative.

Social Services

Employees generated by the action alternatives are likely to be below annual mean income in Colorado, and as a result, could be in a position to require social services. Social services such as public transportation, public health services, child care services, and search and rescue could see an increase in demand; however, the effect to social services is not anticipated to be measurable.

Alternative 1 – No Action

Visitation

Based on continued interest in summer recreation and recent visitation trends, new summer visitation is expected to be approximately 3 percent under the No Action Alternative. However, new visitation to NFS

⁶⁶ U.S. Department of Commerce, 2016

⁶⁷ U.S. Census Bureau, 2015

lands under the No Action Alternative is expected to experience minimal growth as no projects would be built on NFS lands.

Employment

Under the No Action Alternative, Snowmass would continue to employ approximately 316 workers (or 193 FTEs) in the summer including full-time positions. As minimal growth occurs in the future, additional employees would be necessary over time.

Economic Impact of Snowmass Resort Operations on the Pitkin County Economy

As new visitation to NFS lands is expected to be negligible under the No Action Alternative, minimal changes to the existing economic impact of summer visitation at Snowmass are anticipated. Snowmass' summer visitors would continue to spend approximately \$4 million each year. This *direct* spending would continue to generate a total annual output of approximately \$5.5 million into the economy, which includes *direct* and *secondary* impacts. Approximately 56 FTEs and \$2.5 million in labor income would continue to be generated each year in response to Snowmass spending. This would include the approximately 316 employment positions (193 FTEs) currently provided by Snowmass in the summer. Snowmass' summer economic impact would continue to account for approximately \$3.6 million (0.16 percent) of the GRP of Pitkin County. Approximately \$543,000 in federal taxes and approximately \$379,000 in state and local taxes would continue to be generated each year by this economic activity.

Alternative 2 – Proposed Action

Visitation

Under the Proposed Action, Snowmass summer visitation is expected to increase by an additional 20,000 visits by 2019 for a total summer visitation of 45,000. Five percent of these new visits are expected to represent new visitors to the region while 95 percent would be visitors who are already coming to the region. The economic impacts resulting from these new visitors to the region (approximately 1,000 visitors) are reported for Alternative 2. It is anticipated that about 90 percent of these new visitors to the region would be overnight visitors and about 10 percent would be day visitors.

Economic Impact of Snowmass Resort Operations on the Pitkin County Economy

Based on projections from the IMPLAN3 model, new summer visitors to the region would spend approximately \$181,000 each year under the Proposed Action. This *direct* spending would generate a total annual output of approximately \$248,000 into the economy, which includes *direct* and *secondary* impacts. Approximately 2.6 FTEs and \$112,000 in labor income would be generated outside of the resort each year in response to this spending. These new out-of-resort jobs would be created in addition to the 34 new FTEs that would be directly employed by Snowmass in the summer, combining for a total of

36.6 new FTEs created under the Proposed Action.⁶⁸ The new economic activity anticipated under the Proposed Action would contribute approximately \$165,000 to the GRP of Pitkin County. Approximately \$24,750 in federal taxes and approximately \$17,320 in state and local taxes would be generated each year by this economic activity. Table 3D-8 summarizes the impact of this new summer visitation to the region. As these impacts would result from new visitation to the region, they would be created each year *in addition to* the baseline impact of Snowmass’ current visitors presented in the Affected Environment discussion.

Table 3D-8:
Impact of Summer Visitation at Snowmass– Alternative 2

Impact Type	Employment (FTEs)	Labor Income	Total Value Added (GRP)	Total Output (Sales)
Direct Effect	2.1	\$88,000	\$122,000	\$181,000
Secondary Effect	0.4	\$24,000	\$43,000	\$67,000
Total Effect	2.6	\$112,000	\$165,000	\$248,000

Source: IMPLAN, 2016

Construction Impacts

Construction of the Proposed Action is expected to occur in three construction seasons, from 2017 through 2019. The construction budget for the Alternative 2 projects was input to the IMPLAN3 model to provide estimates of *direct* and *secondary* employment, labor income, total value added and total output associated with the construction activity. Construction of the project components would generate a total output of approximately \$12.7 million, which includes *direct* and *secondary* impacts. Approximately 81 FTEs and \$5.6 million in labor income would be generated in the years of construction. This construction activity would account for approximately \$7.1 million (0.32 percent) to the GRP of Pitkin County. Approximately \$1.1 million in federal taxes and approximately \$330,000 in state and local taxes would be generated by the construction activity. These impacts would be short-term—only affecting the economy from 2017 to 2019, the years in which construction activity would occur. Table 3D-9 summarizes the potential impact of construction of the Proposed Action on the Pitkin County economy.

Table 3D-9:
Impact of Construction – Alternative 2

Impact Type	Employment (FTEs)	Labor Income	Total Value Added (GRP)	Total Output (Sales)
Direct Effect	63	\$4,524,000	\$5,426,000	\$10,000,000
Secondary Effect	18	\$1,028,000	\$1,692,000	\$2,719,000
Total Effect	81	\$5,552,000	\$7,117,000	\$12,719,000

Source: IMPLAN, 2016

⁶⁸ It is important to note that the 2.6 new out of resort FTEs would be created in response to new visitation to the region (1,000 visits), while the 34 new FTEs at Snowmass would be created in response to new visitation to the ski area (20,000 visits).

Alternative 3

Visitation

Under Alternative 3, Snowmass summer visitation is expected to increase by an additional 17,000 visits by 2019 for a total summer visitation of 42,000. Five percent of these new visits are expected to represent new visitors to the region while 95 percent would be visitors who are already coming to the region. The economic impacts resulting from these new visitors to the region (approximately 850 visitors) are reported for Alternative 3. It is anticipated that about 90 percent of these new visitors to the region would be overnight visitors and about 10 percent would be day use visitors.

Economic Impact of Snowmass Resort Operations on the Pitkin County Economy

Based on projections from the IMPLAN3 model, new summer visitors to the region would spend approximately \$154,000 each year under Alternative 3. This *direct* spending would generate a total annual output of approximately \$211,000 into the economy, which includes direct and secondary impacts. Approximately 2.2 FTEs and \$95,000 in labor income would be generated outside of the resort each year in response to this spending. These new out-of-resort jobs would be created in addition to the 34 new FTEs that would be directly employed by Snowmass in the summer, for a total of 36.2 new FTEs created under Alternative 3.⁶⁹ The new economic activity anticipated under Alternative 3 would contribute approximately \$140,000 to the GRP of Pitkin County. Approximately \$21,000 in federal taxes and approximately \$14,700 in state and local taxes would be generated each year by this economic activity. Table 3D-10 summarizes the impact of this new summer visitation to the region. As these impacts would result from new visitation to the region, they would be created each year *in addition* to the baseline impact of Snowmass' current visitors presented in the Affected Environment discussion.

**Table 3D-10:
Impact of Summer Visitation at Snowmass– Alternative 3**

Impact Type	Employment (FTEs)	Labor Income	Total Value Added (GRP)	Total Output (Sales)
Direct Effect	1.8	\$75,000	\$103,000	\$154,000
Secondary Effect	0.4	\$20,000	\$37,000	\$57,000
Total Effect	2.2	\$95,000	\$140,000	\$211,000

Source: IMPLAN, 2016

Construction Impacts

Construction of Alternative 3 is expected to occur in three construction seasons, from 2017 through 2019. The construction budget for the Alternative 3 projects was input to the IMPLAN3 model to provide estimates of *direct* and *secondary* employment, labor income, total value added and total output associated with the construction activity. In total, construction of the project components would generate

⁶⁹ It is important to note that the 2.2 new out of resort FTEs would be created in response to new visitation to the region (850 visits), while the 34 new FTEs at Snowmass would be created in response to new visitation to the ski area (17,000 visits).

a total output of approximately \$12.5 million, which includes *direct* and *secondary* impacts. Approximately 79 FTEs and \$5.4 million in labor income would be generated in the years of construction. This construction activity would account for approximately \$7 million (0.31 percent) to the GRP of Pitkin County. Approximately \$1 million in federal taxes and approximately \$324,000 in state and local taxes would be generated by the construction activity. These impacts would be short-term—only affecting the economy from 2017 to 2019, the years in which construction activity would occur. Table 3D-11 summarizes the potential impact of construction of Alternative 3 on the Pitkin County economy.

Table 3D-11:
Impact of Construction – Alternative 3

Impact Type	Employment (FTEs)	Labor Income	Total Value Added (GRP)	Total Output (Sales)
Direct Effect	62	\$4,434,000	\$5,317,000	\$9,800,000
Secondary Effect	17	\$1,008,000	\$1,658,000	\$2,665,000
Total Effect	79	\$5,441,000	\$6,975,000	\$12,465,000

Source: IMPLAN, 2016

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for social and economic resources extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for social and economic resources are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment.

The following projects could have cumulative impacts on social and economic resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Snowmass Planned Unit Development Amendment
- Regional Projects (Continued Build out of Town of Snowmass Village, Aspen-Sopris Ranger District Five Year Recreation Event Special Use Permit)

Forest Service decisions within the Snowmass SUP area, as well as the approval of private land development by ASC and Pitkin County, have contributed to economic growth trends within the County over the past few decades. As previously detailed in the Affected Environment discussion, travel and tourism is an important economic component of Pitkin County and Snowmass is an important part of this industry in Pitkin County. Snowmass attracts both visitors and employees. As Snowmass grows, they will hire more employees and attract new visitors, incrementally adding to the economic and social impacts to the region. As noted, the estimation of economic impacts is related to visitation, as expenditures by visitors generate industry sales and support new jobs. No major increases in winter visitation as a result of Alternative 1, Alternative 2 or Alternative 3 are anticipated. Increases in summer visitation are anticipated under each alternative. While there are quantifiable economic impacts associated with increased visitation under each alternative, they are minor in the context of Pitkin County and no cumulative effects are anticipated.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

No irreversible and/or irretrievable commitment of economic resources has been identified in association with any of the alternatives analyzed in this document.

E. CULTURAL RESOURCES

SCOPE OF THE ANALYSIS

This cultural resources assessment is mandated by the 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 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. Other applicable laws include: The Native American Grave Protection and Repatriation Act, (P.L. 101-601), The American Indian Religious Freedom Act of 1978 (P.L. 96-341), and The Religious Freedom Restoration Act of 1993 (P.L. 1-3-141).

This assessment is based on 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 the Snowmass SUP boundary. The APE is defined under 36 CFR 800.16(d) as the geographic

area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

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. The WRNF determines the Project Effect to Historic Properties based on NRHP eligibility and then requests concurrence by SHPO on Project Effect.

A cultural resource inventory was completed by Metcalf Archaeological Consultants, Inc. The complete report can be found in the project file.

Native American Consultation

As part of the Section 106 NHPA consultation process, the Southern Ute Tribe, Ute Indian Tribe, and Ute Mountain Ute Tribe were notified by mail on March 25, 2016. No responses have been received as of November 2016. The Tribes will be notified of the DEIS publication and solicited for their review.

AFFECTED ENVIRONMENT

The project area is located northeast of the Elk Mountains, bordering the Maroon Bells-Snowmass Wilderness, in the Southern Rocky Mountain physiographic province.⁷⁰ It lies immediately on the northwest side of Burnt Mountain and overlooks Brush Creek watershed and is located approximately 0.5 mile to 0.3 mile south-southeast of Snowmass. Steep mountain slopes dominated by ridge-and-trough topography characterize the northwestern bowl of Burnt Mountain. The top of the project area begins on a hilltop, southwest of Burnt Mountain Peak, at an elevation of 11,320 feet and drops to an elevation of 8,480 feet, near the mountain base. Current land use is mainly limited to recreational activities, namely skiing in the winter, and hiking and biking in the summer.

Regional History

The prehistoric archaeological record in the Northern Colorado River Basin is divided into four eras: Paleoindian, Archaic, Formative, and Protohistoric. The Paleoindian Era spans approximately the first five millennia of occupation, from about 11,500 B.C. to 6400 B.C. Several traditions are defined, usually by projectile point types or complexes. This period is best characterized by low population densities, high mobility, a significant focus on large mammal procurement, and region- and continent-wide consistency in settlement and subsistence patterns.

⁷⁰ Fenneman, 1946

The Archaic Era dates between 6400 B.C. and A.D. 1.⁷¹ The Archaic appears to represent a continuation and florescence of the broad-based subsistence seen at the end of the Paleoindian Era. Human lifestyles were still highly mobile, but there was a trend towards more intensive and long-term use of local resources. Reed and Metcalf identify four periods: Pioneer, Settled, Transitional, and Terminal, defined by large changes in mobility, settlement, and subsistence.⁷²

The Formative Era (A.D. 1 to A.D. 1300) in this region is a mixture between continuation of the previous subsistence strategies (i.e., hunting and gathering) and evidence for horticulture. Horticultural evidence is limited to areas along the Piceance Creek and regions further west such as the Douglas Creek drainage. Cultural evidence at higher elevations is more consistent with Reed and Metcalf's Aspen Tradition.⁷³

The Protohistoric Era (A.D. 1300 to A.D. 1881) is defined by early contact between the Native Americans and Euro-American explorers and fur trappers and concludes with the establishment of Ute Reservations. In the project area, little changed with respect to settlement or subsistence strategies. Sites from this period may include small triangular arrow points and wickiups, in addition to European trade goods. Also, gold, silver, and coal mining in the Rocky Mountains began in the mid-1800s.

The Historic Era (post to A.D. 1881) is defined by the "Euro-American history" and in the region began with the first Euro-Americans exploring the area, followed closely by trappers, government surveyors, miners, and ranchers. The mining boom in the Rockies and farther west in Utah drove the expansion of the railways and fostered the development of agriculture, ranching, and other local industry that began primarily to support the mining. The opening of vast portions of the West for settlement with the various homestead acts also contributed to settlement of the area. Prior to 1880, economic activity in the area was confined to ranching. Once silver-bearing ores were discovered in 1880, the nearby Town of Aspen was established and mining was the main economic activity in the area. Growth was constrained until 1888 and the establishment of the Colorado Midland Railway, which connected the mines around Aspen (originally known as Ute City), Ashcroft, and Independence, to the markets in Denver.⁷⁴ The mining boom in the Rockies drove the expansion of the railways and fostered the development of agriculture, ranching, and other local industries that began primarily to support mining efforts. The opening of vast portions of the West for settlement with the various homestead acts also contributed to settlement of the area. Irrigation ditches were often among the first construction efforts undertaken after initial settlement of an area.⁷⁵ Several ditches were built to support the local economy, including some that cross through the project area. These ditches were utilized to transport water from the high-elevation basins to low-lying areas for agricultural pursuits. By the 1880s, ranchers occupied the Brush Creek Valley, where Snowmass

⁷¹ Reed and Metcalf, 1999 p.71

⁷² Ibid.

⁷³ Reed and Metcalf, 1999 p.140

⁷⁴ Hall, 1895

⁷⁵ Halleran, 2005

Village presently resides. They raised sheep and cattle and grew wheat and hay.⁷⁶ See also Athearn, Buckles and Buckles, and Mehls for summaries of the historic era in the Colorado mountains.⁷⁷

Eventually, outdoor activities, including hunting, fishing, rafting, and skiing, became important to the local economy. The area experienced a skiing “boom” when, in 1946, ASC was formed. By 1948, with the help of Chicago industrialist Walter Paepcke, the Town of Aspen began to convert into a health, sports, and cultural center.⁷⁸ With a dramatic increase in tourism, these changes undoubtedly caused a huge ripple effect for activities throughout the Roaring Fork Valley. In 1957, an architect (Fritz Benedict) and engineer (Hans Sarbach) approached the Forest Service about potential ski sites on Baldy and Burnt Mountains. In 1958, Olympic skier Bill Janss, the vice president of Janss Investment Corporation, began buying ranches in the Brush Creek Valley to emulate the success of Aspen Mountain (formerly known as Ajax). Through a series of proposals, meetings, and permit applications the interested parties worked with the Forest Service on the Burnt Mountain proposal site.⁷⁹ On December 17, 1967, the Snowmass-At-Aspen ski area officially opened with five chairlifts, fifty miles of ski trails, seven hotels, and six restaurants. The Town of Snowmass was incorporated in 1977.⁸⁰

File Search and Inventory Results

A file search was completed on September 16, 2015 through the Colorado Office of Archaeology and Historic Preservation (OAHP). The results of the file search are derived from GIS shapefiles provided by the OAHP and an online check of the OAHP – *COMPASS* database. It includes records of all previously conducted archaeological investigations and all known cultural resources recorded in the study area, including NRHP properties. One additional survey that was recently conducted in the project area in 2013, but not included in OAHP’s records was also included in this analysis.

The combined files search information indicates that there have been eight previous inventories and eight previously recorded sites and linear site segments. The eight previously recorded sites and linear segments from these surveys are all historic in age and include two hay cribs, two hunting blinds or bear traps, two recordings of the Willow and Owl Ditch, one artifact scatter, and one log cabin remnant with an associated artifact scatter. In addition to cultural sites, two isolated finds were documented in past inventories, none of which are eligible for inclusion on the NRHP.

In addition to the standard file search, archival maps were also reviewed that include historic General Land Office records and relevant U.S. Geological Survey topographic maps to determine if vestiges of trails, transportation routes, homesteads, structures, or other resources are present in the project area.

⁷⁶ TOSV, 2016a

⁷⁷ Athearn, 1981; Buckles and Buckles, 1984; Mehls, 1984

⁷⁸ Ubbelohde et al., 1995 p.363

⁷⁹ Colorado Ski History, 2016

⁸⁰ Colorado Ski History, 2016; TOSV, 2016a

Review of relevant General Land Office plats, dating to 1916 and 1933, revealed one ditch and several unnamed roads and trails throughout the project area.⁸¹

Cultural Resource Sites and Isolated Finds Inventory

An intensive Class III cultural resource inventory was conducted for the APE of the proposed multi-season projects at Snowmass. The APE includes a 1,320-acre block of land administered by the WRNF. Some of the previous cultural resource survey areas (37.63 acres) conducted in the APE since 2001 were excluded from the inventory. The remaining area was pedestrian surveyed by walking transects spaced no more than 20 meters apart or were completed by distant visual inspection for any cultural features on slopes too steep to walk.⁸² The total survey included 1,282 acres. The entire area was surveyed to Class III standards.

The survey of the APE for the proposed multi-season projects at Snowmass resulted in the recording of fourteen cultural resources that are all historic in age. Of these, seven were previously recorded which include three sites, three isolated finds, and one linear ditch segment.⁸³

All of the previously recorded sites/isolated finds were attempted to be re-located during the survey conducted for this project. Three of the previously recorded sites/isolated finds could not be re-located probably because they were destroyed by ski resort development. The three other re-visits to previously sites/isolated finds resulted in re-locating the resources at three of the previously recorded sites. As expected, the wooden structures at each site continue to deteriorate but no substantial damage is present. The re-visit of another previously recorded site also indicated that it is on private land and is outside of the project APE. These six previously-recorded sites/isolated finds were initially recommended to not be eligible for the NRHP. Surveyors did not observe any changes that would alter these conclusions.

A segment of the Willow and Owl Ditch was previously recorded in 2013 and recommended as not NRHP eligible due to poor integrity. However, this survey in conjunction with SHPO consultation revealed that this segment covers a larger area than was originally assessed in 2013, and could potentially support the eligibility of the entire resource in its unmodified reaches.

Newly recorded sites consist of seven road segments. In their entirety, the sites of each of the newly recorded road segments are considered potentially eligible. However, each of the newly recorded road segments retain poor integrity and are non-contributing to potential eligibility of the entire resource. Thus, all of the newly recorded sites are recommended to not be eligible for the NRHP.

As a result of the cultural survey, seven previously-recorded resources (three sites, three isolated finds, and a ditch segment) and seven new resources (all road segments) within the project area were

⁸¹ General Land Office, 1916 and 1933

⁸² Visual inspections were necessary for 94 acres of slopes exceeding 60 degrees.

⁸³ Isolated finds are defined as less than 5 prehistoric artifacts or 49 historic artifacts without associated features.

investigated or documented. All but one of the resources were recommended as not eligible for inclusion on the NRHP. SHPO concurred with a finding of *no historic properties affected* for thirteen of the fourteen historic resources identified by the survey conducted for this project in a letter dated September 22, 2016. SHPO did not concur with the recommendation of a segment of the Willow and Owl Ditch as ineligible, as the survey revealed that this particular resource covers a larger area than was originally considered, and has potential eligibility in its unmodified reaches. The Forest Service and SHPO are currently consulting on eligibility of this segment of the Willow and Owl Ditch and associated avoidance/mitigation measures. Discussion of this particular resource will be continued under Direct and Indirect Environmental Consequences associated with Alternatives 2 and 3.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

New development projects within the Snowmass SUP area would not occur. Snowmass would continue to operate under its current configuration and capacity. Because no ground disturbance would take place under Alternative 1, there is no potential to affect historic sites within the APE.

Alternatives 2 and 3

All but one of the fourteen cultural resources found within the project area were recorded and determined to be ineligible for inclusion on the NRHP. For the Willow and Owl Ditch segment, SHPO consultation revealed that the unmodified portions of this ditch segment could potentially support the eligibility of the Willow and Owl Ditch in its entirety. Most of the previously recorded ditch segments is piped to accommodate ski area development; however, the newly surveyed ditch segment, represents a mixture of piped and unmodified ditch segments that alter the previous determination of ineligibility.

The Forest Service and SHPO are currently consulting on the potential eligibility of the ditch segment, and a determination will be available prior to the FEIS. In the event that segments of the unmodified (not piped) sections of the Willow and Owl Ditch are determined eligible the Forest Service and SHPO will work together to develop avoidance/mitigation measures that ensure a determination of *no adverse effect* will be attainable for this resource.

Impacts to the historic resources found within the project area would be avoided with implementation of PDC such as marking the limits of disturbance and avoiding known sites. Further, mitigation measures will be added into the FEIS to ensure avoidance of historic resources with potential NRHP eligibility. Therefore, the action alternatives would have *no adverse effect* on any known resource.

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 (refer to Table 2-2), if previously-unknown cultural resources or artifacts are discovered during implementation of any approved projects, all ground disturbing activities would cease, and SHPO consultation would commence.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for cultural extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for cultural are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment.

From a cumulative perspective, since implementation of projects contained in the action alternatives were 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 Snowmass projects.

All reasonably foreseeable future 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

No irreversible or irretrievable commitment of cultural resources have been identified in association with any of the alternatives analyzed in this document.

F. TRAFFIC

SCOPE OF THE ANALYSIS

The spatial bounds of this traffic analysis extend from Highway 82 between the Aspen Airport and Brush Creek Road to the east, and the Town of Snowmass Village lands west of Highway 82 to the west (refer to Figure 3F-1). This analysis focuses on the primary roadways in and out of the Base Village area of Snowmass, as these would be the facilities impacted by additional summer visitation.

Because neither action alternative is likely to increase winter visitation to Snowmass, only summer traffic and parking are addressed in this section. For winter traffic generation and parking, refer to the *Snowmass Base Village Transportation Analysis and Parking Management Strategy Report* completed in 2015.⁸⁴ This report was used to inform trip distributions, vehicle occupancy, and other assumptions used in this analysis.

Alternatives 2 and 3 were treated identically with regards to traffic and parking. Visitation is expected to increase for both alternatives; however, the difference in additional trails and the multi-purpose activity area between Alternatives 2 and 3 is not expected to generate substantially more vehicles. These additional summer activities offered by Snowmass would induce vehicle trips due to increased visitation and employment by Snowmass. The additional vehicle trips and their impact to the primary roadways in the Town of Snowmass Village are assessed and disclosed herein. These additional trips are generated from an expected increase in visitation from 25,000 to 45,000 visitors per summer, which has an 85-day operating season.

AFFECTED ENVIRONMENT

The Town of Snowmass Village, Snowmass, and Pitkin County are popular year-round destinations for regional, national and international visitors. Snowmass is the northern-most mountain of ASC's four mountains in the Roaring Fork Valley. The other resorts (Aspen Mountain, Aspen Highlands, and Buttermilk), as well as the City of Aspen, offer summer recreational activities and events. Although the primary attraction to Snowmass is winter recreation (approximately 750,000 skier visitors per year annually), summer visitation has increased to 25,000 visitors per year over the 85-day season, with approximately 75 percent being overnight visitors and 25 percent being day use visitors.⁸⁵ In its current state, summer visitation is anticipated to grow by 3 percent annually.⁸⁶

⁸⁴ Felsburg Holt & Ullevig, 2015

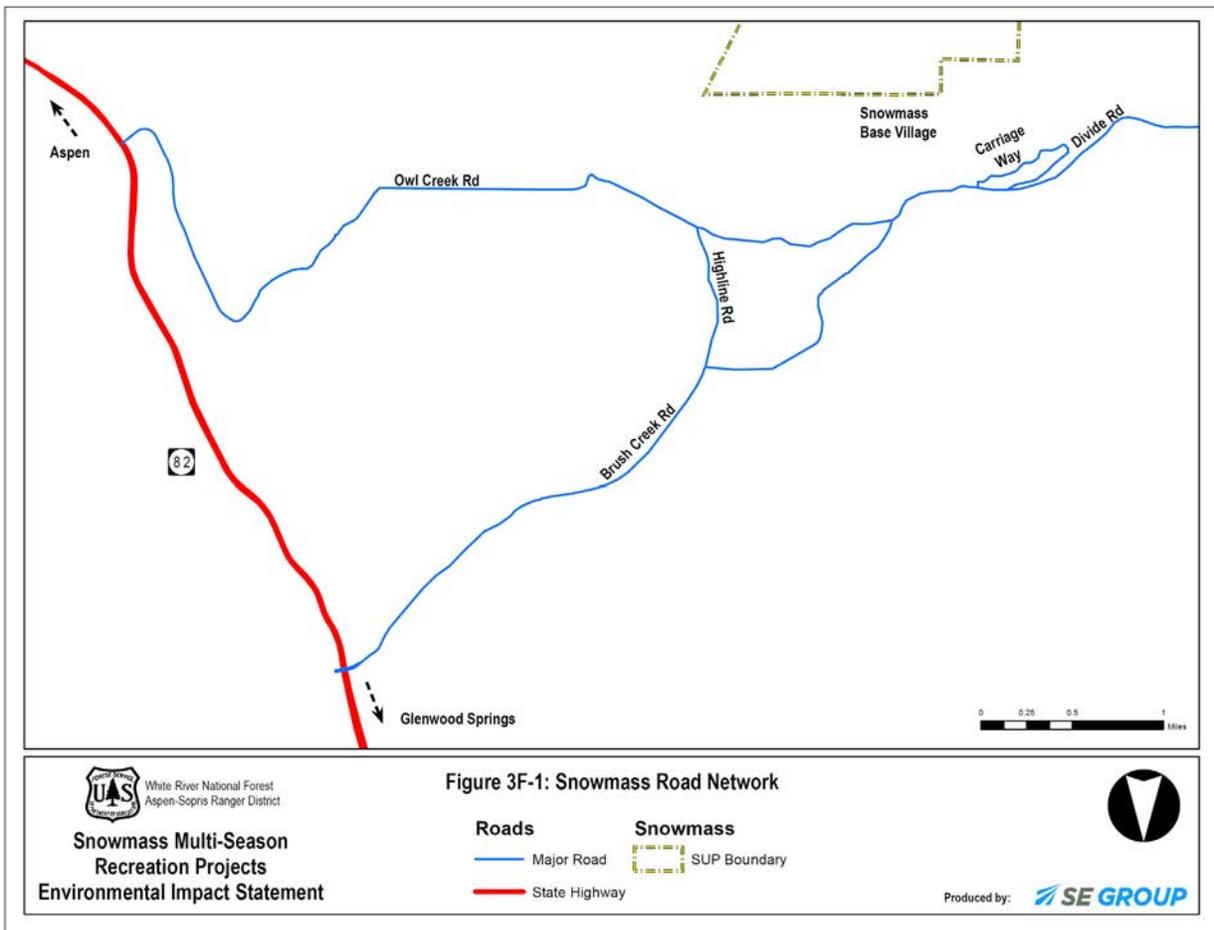
⁸⁵ ASC, 2016a

⁸⁶ Ibid.

Ski Area Access

Snowmass is accessed via Highway 82, the principal north-south corridor connecting Aspen to Glenwood Springs where Interstate 70 is located. Colorado Department of Transportation (CDOT) classifies Highway 82 as an “Expressway, Major Bypass” in this area for purposes of access management. It is a four-lane road with either a median or separation between the two directions, and contains several signalized intersections. In 2015 it experienced an average of 18,000 vehicles per day at mile point 27, the count station closest to the Highway 82’s intersection with Brush Creek Road.⁸⁷

Access from Highway 82 to the Base Village area of Snowmass is accommodated by either Owl Creek or Brush Creek roads. Owl Creek Road provides a more direct route between Aspen and Snowmass, but has a lower design capacity of 650 vehicles per hour (VPH).⁸⁸ More visitors access Snowmass via Brush Creek Road, whether they are coming from Aspen or down valley locations towards Glenwood Springs.



⁸⁷ CDOT, 2015

⁸⁸ Town of Snowmass Village, 2010

Transit service to Snowmass is also provided via the Roaring Forking Transportation Authority (RFTA) or Town of Snowmass Village’s Transit System. RFTA provides service between Aspen and the Mall at Snowmass, as well as to the Brush Creek Intercept Lot at the junction of Brush Creek and Highway 82. This lot serves as a transfer center for those transferring between RFTA and local transit, or between personal vehicles and transit. Additionally, several lodging providers offer courtesy vans and shuttles for their guests.

Traffic

Brush Creek and Owl Creek roads, between Highway 82 and the Base Village are the primary facilities studied for traffic impacts.

The following definitions are used in this analysis:

- “ADT” means the average two-way daily traffic volume. ADT represents the total traffic on a section of roadway for an average day. Raw data is processed and converted to Average Annual Daily Traffic (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.
- “AVO” means average vehicle occupancy.
- “Trip” means a single or one-direction vehicle movement with either the origin or the destination inside the analysis area. A vehicle leaving the highway and entering a property is one trip. Later, when the vehicle leaves the property it is a second trip.
- “VPH” means vehicles per hour, which is the total two-way hourly traffic volume on a section of roadway.
- “TMC” means turning movement counts, which are the actual turning movements counted at an intersection by a video camera.
- “LOS” is a qualitative measure that describes how easily traffic flows at an intersection and is based on many metrics. It means “level of service” and is used by giving an intersection is given letter scale ranging from A to F—A indicates excellent operation with little delay while F indicates high levels of congestion.

Traffic counts were collected between August 11, 2016 (a Thursday) and August 14, 2016 (a Sunday) in order to record both weekday and weekend conditions. The weather was sunny and temperatures were in the 70s (degrees Fahrenheit [°F]) with no rain events during the data collection period. The Town of Snowmass Village was consulted and some small events were being held during this time period, representative of an average summer weekend. ADT data were collected hourly on both Brush Creek and Owl Creek roads, west of their respective intersections with Highline Road. TMC data for AM and PM peak hours were collected at two intersections: Brush Creek Road/Highway 82 and Brush Creek

Road/Owl Creek Road. These locations were chosen in order to get a sense of how many cars were coming into Snowmass Village from various origins. Table 3F-1 shows the peak hours recorded for each intersection.

**Table 3F-1:
Peak Hours**

Intersection	Weekday AM	Weekday PM	Weekend AM	Weekend PM
Brush Creek Road and Highway 82	7:30 a.m.–8:30 a.m.	4:30 p.m.–5:30 p.m.	10:30 a.m.–11:30 a.m.	4:00 p.m.–5:00 p.m.
Brush Creek Road and Owl Creek Road	8:00 a.m.–9:00 a.m.	4:30 p.m.–5:30 p.m.	10:30 a.m.–11:30 a.m.	3:30 p.m.–4:30 p.m.

Examining the counts, the following trends were observed; figures showing these counts and their locations can be found in the technical report located in the project file.⁸⁹

- Daily counts were lower on the weekend than the weekday on both roads that access the Base Village area (refer to Table 3F-2).
- Westbound (traveling to Snowmass Village):
 - Weekday: Brush Creek Road carried 63 percent while Owl Creek Road carried 37 percent.
 - Weekend: Brush Creek Road carried 64 percent while Owl Creek Road carried 36 percent.
- Eastbound (leaving Snowmass Village):
 - Weekday: Brush Creek Road carried 49 percent while Owl Creek carried 51 percent.
 - Weekend: Brush Creek Road carried 63 percent while Owl Creek Road carried 37 percent.
- Turn Movements in the Morning:
 - Typical weekday morning (8:00 a.m. to 9:00 a.m.), there were 97 vehicles turning from Owl Creek Road in to the Base Village area and 290 vehicles coming from Brush Creek Road.
 - Typical weekend morning (10:30 a.m. to 11:30 a.m.) there were 90 vehicles turning from Owl Creek Road in to the Base Village area and 202 vehicles coming from Brush Creek Road.
 - When the peak hour counts for these two directions were combined, the weekday morning peak hour had a 33 percent higher VPH than weekend traffic.

⁸⁹ SE Group, 2016

- Turn Movements in the Afternoon:
 - Typical weekday afternoon (4:30 p.m. to 5:30 p.m.), there were 168 vehicles turning onto Owl Creek Road from the Base Village area and 339 vehicles heading out on Brush Creek Road from the Base Village.
 - Typical weekend afternoon (4:00 p.m. to 5:00 p.m.), there were 128 vehicles turning onto Owl Creek Road from the Base Village area and 255 vehicles heading out on Brush Creek Road from the Base Village.
 - When the peak hour counts for these two directions were combined, the weekday morning peak hour has a 32 percent higher VPH than weekend traffic.

Table 3F-2:
ADT on Brush Creek and Owl Creek Roads

	Weekday	Weekend
Brush Creek Road	8,901	6,653
Owl Creek Road	5,397	3,785

LOS grades were not completed for this report. Winter traffic volumes are much higher at these intersections and range in letter scale from A to C; therefore, the summer counts in this report can be expected to be no worse than a C on the LOS scale.⁹⁰

The Town of Snowmass Village’s Comprehensive Plan cites the acceptable traffic levels for both Brush Creek and Owl Creek roads.⁹¹ It recommends Brush Creek Road not exceed 925 one-way vehicle trips and Owl Creek not exceed 650 one-way vehicle trips during peak periods. This measure will be used as the design capacity for the purposes of this study. The existing conditions for this study show the highest flows on Brush Creek Road at 453 one-way vehicle trips eastbound on weekday afternoons, and Owl Creek Road at 234 one-way vehicle trips westbound on weekday afternoons. These current trip levels are less than 50 percent of the design capacity limits for these roadways.

Only a portion of existing traffic is attributable to summer visitation to Snowmass, as presented in Table 3F-3. These calculations are based on the following assumptions:

- Annual visitation to Snowmass is 25,000 over an 85-day season
- 10 percent of visitors access Snowmass using transit

⁹⁰ Felsburg Holt & Ullevig, 2015

⁹¹ Town of Snowmass Village, 2010

Using the existing summer visitation number of 25,000 visits over an 85-day season; the ratio of weekend visits to weekday visits; an assumption of 10 percent using transit, walking, or biking; and a vehicle occupancy of 2.5 persons per car; the average number of vehicle trips in the summer is 30 per weekday and 300 per weekend (refer to Table 3F-3).

**Table 3F-3:
Existing Vehicle Trips Due to Summer Visitation**

	Weekday	Weekend
Annual Snowmass Summer Visitors	5,000	20,000
Number of Days in the Season	61	24
Average Number of Visitors per Day	82	833
Account for 10% Arriving via Transit, Walk, Bike	74	750
Existing Vehicle Trips associated with Snowmass Summer Activities (assumes AVO of 2.5) (vehicles/day)	30	300

Existing employee trips attributable to Snowmass summer activities were based on assumption of 33 percent walking, biking, or using transit, and a vehicle occupancy of 1.5 vehicles per car (refer to Table 3F-4).

**Table 3F-4:
Existing Vehicle Trips Due to Summer Employees**

	Daily
Average Daily Snowmass Summer Employees	316
Employee Vehicle Trips (typical day)	226
Account for 10% Arriving via Transit, Walk, Bike	149
Employee Vehicle Trips associated with Snowmass Summer Activities (assumes AVO of 1.5) (vehicles/day)	99

Transit

Transit ridership in the Town of Snowmass Village was between 18,000 and 22,000 passengers per month for the months of July and August 2015. During July, weekday travel was slightly higher than weekend travel (608 passengers per day versus 560 passengers per day). During August, the opposite trend was observed—weekday travel counted 588 passengers per day versus 981 passengers per day on the weekends. Transit ridership is very event-dependent with spikes in the data shown for particular Thursdays and weekend days when events were planned in the village. During events, message signs are used to strongly encourage patrons to park at one of three parking lots at the edge of town and take transit into the Base Village area. Comparing the transit passengers per day to the ADT observed on Brush Creek Road, an assumption that 10 percent of visitors to Snowmass are taking transit seems reasonable.

Parking

There are 363 parking spaces available in the Base Village area. The parking structure currently provides 334 spaces, of which 243 are available for day visitors and commercial uses. During the winter these spaces often fill by 10:30 a.m. or 11:00 a.m. On busy days, temporary parking areas accommodating an additional 120 vehicles are set up on undeveloped lots. The Town of Snowmass Village Comprehensive Plan does not identify a need to exceed 200 spaces in the Base Village area, expecting that others can park at either Two Creeks, the Rodeo Lot, or the Highway 82 Intercept Lot and take transit into the Base Village area.⁹² When satellite lots and a vehicle occupancy of 2.5 persons per car is assumed, there is parking capacity for 10,775 guests in the Town of Snowmass Village.⁹³ Therefore, these data indicate that adequate parking is currently available to accommodate summer visitation.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Independent of the projects proposed at Snowmass, traffic along Highway 82 is expected to increase by 14 percent by 2035 due to natural growth of population and tourism in the Roaring Fork Valley.⁹⁴ In this analysis, an assumption of 10 percent natural growth was used for Brush Creek and Owl Creek roads into and out of the Town of Snowmass Village, as some of the Highway 82 traffic and its anticipated growth would not turn onto these facilities and pass through to other communities along Highway 82. The vehicle trips associated with projected visitors for the action alternatives is added on top of the 10 percent natural growth.

Alternative 1 – No Action

Under Alternative 1, traffic within the analysis area would only change from the existing conditions described in the Affected Environment discussion due to natural growth. This means that an increase in vehicle trips due to visitors on weekdays and weekends, as well as the additional employees needed to accommodate the natural growth in visitation, is 10 percent over the existing conditions (refer to Table 3F-5).

**Table 3F-5:
Vehicle Trips – Alternative 1**

	Existing Conditions	Natural Growth of 10%
Weekday Vehicle Trips by Visitors	30	33
Weekend Vehicle Trips by Visitors	300	330
Daily Employee Vehicle Trips	99	109

⁹² Felsburg Holt & Ullevig, 2015

⁹³ SE Group, 2015

⁹⁴ CDOT, 2015

Alternative 2 – Proposed Action

Upon completion of the multi-season recreation projects proposed under Alternative 2, the total number of annual summer visits is projected to be 45,000, with 1,5000 visitors on a typical summer weekend day. Using the same assumptions used to calculate existing vehicle trips described in the Affected Environment discussion, the number of vehicle trips attributable to summer visitation under Alternative 2 would be 53 on a typical weekday and 540 on a typical weekend day (refer to Table 3F-6).

**Table 3F-6:
Vehicle Trips Due to Summer Visitation – Alternative 2**

	Weekday	Weekend
Annual Snowmass Summer Visitors	9,000	36,000
Number of Days in the Season	61	24
Average Number of Visitors per Day	148	1,500
Account for 10% Arriving via Transit, Walk, Bike	133	1,350
Projected Vehicle Trips associated with Snowmass Summer Activities (assumes AVO of 2.5) (vehicles/day)	53	540

Weekday and weekend trips are expected to grow by 80 percent from 30 to 53 vehicle trips and 300 to 540 vehicle trips respectively. It is expected that there would be an additional 63 employees, which translates to a 20 percent increase in trips from 99 vehicle trips per day to 119 vehicle trips per day (refer to Table 3F-7).

**Table 3F-7:
Employee Vehicle Trips – Alternative 2**

	Daily
Average Number of Daily Employees during Summer	379
Employee Vehicle Trips (typical day)	271
Account for 33% Arriving via Transit, Walk, Bike	179
Employee Vehicle Trips associated with Snowmass Summer Activities (assumes AVO of 1.5) (vehicles/day)	119

The same trip distribution is expected for future conditions as was analyzed for the existing conditions.

Traffic Impacts

The following formula was used to determine the traffic impacts of Alternative 2 at Snowmass on Brush Creek and Owl Creek roads:

$$[Existing\ ADT \times 10\% \text{ natural growth}] + [\Delta \text{ of Existing and Projected Trips}] = Future\ ADT$$

Each trip was counted both westbound and eastbound to account for a full-trip in and out of the Snowmass Base Village area. Daily employee trip differences were added to both weekday and weekend visitor trip differences, resulting in a total trip difference between the existing and projected conditions.

Adding the vehicle trips to the roadway network based on future ADT, and accounting for natural growth in traffic, the following trends were observed:⁹⁵

- ADT is projected to increase along Brush Creek and Owl Creek roads by 11 percent on weekdays and 13 percent on weekends. Because a growth factor of 10 percent was used to estimate natural traffic growth in the region, the summer activities add only 0.5 percent and 3 percent additional vehicle trips per day on these facilities.
- Turn Movements: Using the intersection of Brush Creek Road and Highway 82, the projected peak hour for vehicle trips for Brush Creek continues to be eastbound on weekday afternoons. The existing conditions showed this peak hour to be at 49 percent of the design capacity of 925 one-way vehicle trips per hour. The projected conditions, 13 percent more vehicle trips, change this number of one-way trips along Brush Creek Road to 513, which is 56 percent of the design capacity for this facility.
- Turn Movements: Using the intersection of Brush Creek Road and Owl Creek roads, the number of vehicles on Lower Brush Creek Road is projected to be 572 during the weekday PM peak hour and 544 and during the weekend PM peak hour (refer to Table 3F-1 for peak hour times). This represents 59 percent and 62 percent of design capacity for this facility.
- Turn Movements: Using the intersection of Brush Creek Road and Owl Creek roads, the projected peak hour for vehicle trips on Owl Creek continues to be westbound on weekday afternoons. The existing conditions showed this peak hour to be at 36 percent of the design capacity of 650 one-way vehicle trips per hour (refer to Table 3F-1 for peak hour times). The projected conditions, 10 percent more vehicle trips, change this number of one-way trips along Owl Creek Road to 257, which is 40 percent of the design capacity for this facility.
- Daily projected vehicle trips to the Base Village area are expected to increase by 34 percent on weekdays and 65 percent on weekends.
- Parking: The parking structure capacity of 243 spaces can easily handle the increase in weekday trips from 128 to 172 trips per day. The weekend increase from 399 to 659 vehicle trips requires a turnover rate of 2.7 times per day in order to have available spaces in the parking structure. When satellite lots in the Town of Snowmass Village are taken into account, there is adequate parking in the 4,310 spaces available.

The facilities into and out of Snowmass Village were designed for winter capacities. Even with a projected increase in summer visitation, the traffic impacts are minimal when compared to winter season levels of vehicle trips.

⁹⁵ SE Group, 2016; figures showing detailed traffic impacts by location are in the technical report located in the project file.

Construction Trips

The construction of the proposed summer activities would necessitate truck trips both for tree and debris removal from Snowmass and materials delivery. In addition to these trips, construction employees may come to the site in their personal vehicles, adding a temporary increase in trips to a construction site.

The types of trucks that would be used for tree and debris-removal as well as construction include:

- Pickup Truck (gas)
- Pickup Truck with trailer (gas)
- Single Axle 2-ton Flatbed Truck (gas)
- Tandem Axle Dump Truck (diesel)
- Concrete Truck (diesel)
- Tractor Trailer Logging truck (diesel)
- Tandem Axle Flatbed Truck (diesel)
- Flatbed Semi Tractor Trailer (diesel)
- Log Skidder (diesel)

Table 3F-8 shows the acreage of tree removal calculated for Alternatives 2 and 3. The acreage was converted to the number of tons of timber that would be removed from the mountain, and assuming that trucks can carry 25 tons at a time, this was converted to truck loads. Truck trips include both an out and back trip for the truck.

**Table 3F-8:
Construction Trips for Tree and Debris Removal – Alternatives 2 and 3**

	Tree Removal (acres)	Timber Removed (tons)	Truck Loads	Truck Trips
Alternative 2	17.2	688	28	56
Alternative 3	16.1	644	26	52

Snowmass has estimated that the total number of truck loads required for hauling and staging materials for Alternative 2, and similarly for Alternative 3, is 800 one-way truck trips.⁹⁶ The construction of summer activity infrastructure is planned to take place over five to seven years, with more construction occurring during the first three years. The construction season typically occurs between May and October. Daily traffic impact from construction (including both hauling and staging materials and debris removal, assuming an 85-day construction season and three years of construction), would be three truck trips per day. Depending on the phase of construction, more or less than three truck trips could occur on any given day. Due to this low number of daily trips, the construction trip impact is negligible and is not accounted for in the final traffic impact analysis.

⁹⁶ ASC, 2016a

Alternative 3

Under Alternative 3, traffic impacts to Snowmass and the primary roadways in the Town of Snowmass Village would be similar to those in Alternative 2. The reduced number of trails and programs at Elk Camp Meadows is not expected to change vehicle trip projections by a measurable amount.

The level of tree and debris removal during construction of the proposed projects under Alternative 3 is slightly lower than that of Alternative 2. Only 52 truck trips are anticipated in Alternative 3 compared to 55 under Alternative 2 (refer to Table 3F-8). Daily traffic impact from construction would be similar to Alternative 2 and impacts would be negligible.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for traffic extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for traffic are limited to public and private lands in the vicinity of the Snowmass SUP area (including roadways within the Town of Snowmass Village and along Highway 82 between Brush Creek Road and Owl Creek roads).

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on traffic resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Continued Build Out of Town of Snowmass Village
- Town of Snowmass Village Community Connectivity Plan

Snowmass 2015 Master Development Plan

Development of Snowmass over the past five decades has attracted an increasing number of multi-season recreation visitors. The creation of trails and chairlifts, roads, infrastructure, buildings, and, more recently, the installation of summer and multi-season recreational activities have all contributed to an increase in visitors (and thus more vehicles) coming to Snowmass. These amenities have cumulatively impacted the level of vehicle traffic and parking availability observed in the Base Village area. Peak winter days have vehicle trip numbers that are close to the design capacity of the roadways. It is likely that the additional winter and summer projects beyond those proposed in this analysis would stimulate additional vehicle traffic to Snowmass.

Projects in the Town of Snowmass Village

Residential and commercial development in the Town of Snowmass Village would generate additional trips to, from and within the Town and its surrounding area. Although the Town of Snowmass Village is nearing buildout, there are still some available parcels for development. Redevelopment of existing properties may add densities to certain areas of the Town, producing more activity and trips in those areas. New development or denser redevelopment have the potential to generate additional vehicle trips within the Base Village area and along Brush Creek and Owl Creek roads. Each development would cumulatively impact the traffic and congestion both at Snowmass and in the Town of Snowmass Village.

Transportation Demand Management, efficient and attractive transit, and better walking and bicycling facilities could reduce the cumulative impact of development.

The Community Connectivity Plan was recently completed by the Town of Snowmass Village. Its recommendations include safer crossings of Brush Creek Road, trail enhancements and connections, as well as upgrades to the Snowmass Transit system. If implemented, the recommendations in the plan would cumulatively impact Snowmass and the Town of Snowmass Village by reducing vehicle trips on the primary roadways. By encouraging visitors to park at the lots at the edge of Town, take transit, walk, or bike to their destinations, vehicle trips could be reduced, offsetting an increase in vehicle trips due to residential and commercial development.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

No irreversible and/or irretrievable commitments of resources in relation to traffic, parking or ski area access have been identified in association with any of the alternatives analyzed in this document.

G. AIR QUALITY

SCOPE OF THE ANALYSIS

This analysis of air quality resources is primarily based on the impacts of traffic in the study area (refer to Section F – Traffic). The principal air quality concerns derive from emissions related to visitor, employee, and construction traffic. The spatial extent of the air quality analysis focuses on the existing SUP area of Snowmass (NFS lands), areas proximate to Snowmass on private and public lands, and Class I areas within 50 miles of the Snowmass SUP boundary.

Air emissions for on-road and non-road mobile sources were estimated using the Environmental Protection Agency's (EPA) Motor Vehicle Emissions Simulator (MOVES) (version MOVES2014a from December 2015).⁹⁷ The MOVES2014a model was used to simulate a base case scenario and to provide a baseline estimate of emissions for Pitkin County. Baseline conditions were then modified to account for increase in traffic and construction activities and simulated for summer of 2017 for both non-road and on-road emission.

REGULATORY DIRECTION

The goal for air quality on NFS lands in Colorado is to manage emissions generated in or near federal land management areas such that air quality will meet CAA and Colorado State air quality requirements. Specific requirements can be found in the Forest Service Air Quality Program, Colorado Smoke Management Program Memorandum of Understanding, and Colorado Air Quality Control Commission Regulation No. 9.⁹⁸ In addition, NAAQS for particulate matter (PM_{2.5} and PM₁₀) and the Prevention of Significant Deterioration (PSD) increment for Class I and II areas must be met.

Forest Service direction regarding air resources is found in the 2002 WRNF Forest Plan. No specific air quality related standards or guidelines have been promulgated for the 8.25 Management Area; however, forest-wide standards require that activities “[c]omply with local, state, and federal air quality regulations and maintain conformity with the State Implementation Plan.”⁹⁹

Applicable Air Quality Regulations

Federal

The CAA was enacted in 1955, but it contained few requirements for reducing air pollutant emissions. It was amended numerous times from 1963 through 1990 to address reductions in vehicular and stationary source emissions and to establish national air pollution concentration limits. It also established several programs, including: NAAQS, which limited air concentrations to protect public health and welfare; the New Source Performance Standards, which set emission standards for major sources; and the State

⁹⁷ EPA, 2016a

⁹⁸ CDPHE, 2015

⁹⁹ USDA Forest Service, 2002a

Implementation Plan procedures, which were designed to bring areas that exceeded NAAQS levels (non-attainment areas) to within the standards. In addition, the PSD program was established to help protect attainment areas of the country (Class I and II areas). The PSD Class II designation allows for moderate growth or degradation of air quality within certain limits above baseline air quality. The PSD program also included protection of National Parks, and Wilderness areas greater than 5,000 acres (Class I areas). Finally, the PSD program established visibility impairment restrictions on major sources impacting the Class I areas.

The CAA designates two different air quality areas that receive different levels of protection. Class I areas generally include National Parks, federally designated Wilderness areas that are in excess of 5,000 acres and that were created prior to 1977, National Monuments, National Seashores, and other areas of special national or regional value. Class I designation warrants the highest level of protection afforded to an area. Class II designation typically applies to non-Class I areas.

Class I and II areas are either designated as attainment, non-attainment, or unclassifiable areas. Unclassifiable designations apply where pollution is not anticipated to exceed national standards and where insufficient information is available to either substantiate or reject this assumption. Unclassified areas generally have little, if any, industrial development and comparatively sparse populations. The low likelihood of air quality problems makes these areas a lower priority for expensive monitoring programs.

The EPA has promulgated regulations to protect and enhance air quality. The PSD regulations are intended to help maintain good air quality in areas that attain the national standards and to provide special protections for National Parks, federally designated Wilderness areas, National Monuments, National Seashores, and other areas of special national or regional natural, recreational, scenic, or historical value.¹⁰⁰ These regulations stipulate that new sources must not cause a decline in ambient air quality and must use best available control technology to limit emissions.

A PSD permit is required for, “major emitting facilities” which emit, or have the potential to emit, 100 tons or more per year of any air pollutant.¹⁰¹ EPA regulations specifically list the sources that are considered “major emitting facilities”—this list does not include ski areas.¹⁰² However, the regulations note that the term “major emitting facilities” also includes “any other source with the potential to emit 250 tons per year or more of any air pollutant.”¹⁰³ A PSD permit is not required for Snowmass because ski areas are not classified as stationary sources and Snowmass does not have the potential to emit over 250 tons of any regulated air pollutant.

In an effort to eliminate or minimize the severity and number of exceedances of the NAAQS and to achieve expeditious attainment of these standards, the EPA promulgated the Conformity Rule in 1993.

¹⁰⁰ 42 USC 7470-7479

¹⁰¹ 42 USC 7475[a] and 7479[1]

¹⁰² 42 USC 7479[1]

¹⁰³ Ibid.

Conformity regulations apply to federal actions and environmental analyses in non-attainment areas completed after March 15, 1994. The conformity regulations do not apply to Pitkin County or to the Snowmass area because they are classified as attainment areas or as unclassifiable for all criteria pollutants.¹⁰⁴

State

The EPA retains oversight authority but has delegated enforcement of the CAA to the states. The Air Pollution Control Division of the Colorado Department of Public Health and Environment (CDPHE) acts as the lead agency in Colorado. The state is required to develop and administer air pollution prevention and control programs; state standards must be either the same as, or more stringent than, federal CAA standards. In Colorado, the state has adopted all federal ambient air quality standards as reflected in the CAA with additional standards for particular sources of pollution.

The CDPHE currently monitors the Aspen area for PM₁₀. The Aspen area first observed air quality problems in 1975, when monitoring started and continued through 1987. This area includes the City of Aspen and a small portion of the surrounding area in Pitkin County. PM₁₀ refers to a subset of particulate matter 10 micrometers in diameter and smaller. PM₁₀ is an inhalable pollutant. In the Aspen area, PM₁₀ is created primarily from re-entrained road dust, carbon black (from automobile and diesel engines) and soot (from fireplaces and woodstoves). PM₁₀ from these combustion sources contains a large percentage of elemental and organic carbon, which contributes to atmospheric haze and to health problems.

The Aspen area was then designated a “moderate” nonattainment area in 1990 pursuant to section 107(d)(4)(B) of the CAA. In 2010 the area was designated as an attainment/maintenance area. This maintenance plan revision establishes a mobile source PM₁₀ emission budget for the Aspen Attainment/Maintenance Area of 1,146 lbs/day for 2023 and beyond. This budget is the total of the 2023 mobile source PM₁₀ emissions, which includes PM₁₀ emissions from highways, paved roads, and unpaved roads. This budget has been adopted in the Colorado Air Quality Control Commission’s “Ambient Air Quality Standards for the State of Colorado” regulation.¹⁰⁵

AFFECTED ENVIRONMENT

Location and Regional Description

The Snowmass SUP area is in a high elevation area (between 9,000 and 12,000 feet amsl) of the Central Rocky Mountains region of Colorado, in the central portion of Pitkin County, Colorado. The Snowmass SUP area is within the WRNF and abuts the Maroon Bells-Snowmass Wilderness Area on its western and southern border.

¹⁰⁴ CDPHE, 2001b

¹⁰⁵ CDPHE, 2001a

The Snowmass SUP area experiences warm to boreal conditions depending on the time of year. The Snowmass SUP area experiences a wide range of temperatures: less than 5°F in the winter and typically around 77°F in the summer.

Nearest Class I and Non-Attainment Areas

Colorado is home to numerous State and National Parks, Monuments, and Wilderness areas. Among these are a number of federal Class I areas. The 1977 amendments to the CAA establish Class I, II and III areas, where emissions of particulate matter and sulfur dioxide are to be restricted. The restrictions are most severe in Class I areas and are progressively more lenient in Class II and III areas. Mandatory Class I federal lands include various national Wilderness areas, National Parks, National Memorials and some International Parks based on acreage or existence prior to 1978. Federal land managers are charged with direct responsibility to protect the air quality and related values (including visibility) of Class I lands and to consider, in consultation with EPA, whether proposed industrial facilities would have an adverse impact on these values. Federal land managers are also required to determine whether existing industrial sources of air pollution must be retrofitted to reduce impacts on Class I areas to acceptable levels. The Class I areas within approximately 50 miles to Snowmass SUP area include:

- Maroon Bells-Snowmass Wilderness, abuts the Snowmass SUP area on its western and southern borders;
- West Elk Wilderness (30 miles southwest);
- La Garita Wilderness (45 miles south);
- Flat Tops Wilderness (45 miles north);
- Eagle Nest Wilderness (45 miles northeast);

The Snowmass SUP area is not located in any EPA designated non-attainment area for ozone, particulate matter, carbon monoxide, lead, nitrogen dioxide, or sulfur dioxide.

Summary of Air Quality in Areas Near Snowmass

A variety of ambient air quality monitors are within 100 miles of Snowmass SUP area. A complete list of these air quality monitors and locations is contained in the project file. Table 3G-1 lists the current NAAQS for selected criteria pollutants, relevant to the project area.

**Table 3G-1:
 Primary Forms of the NAAQS for Selected Criteria Pollutants**

Pollutant	Averaging Time	Level	Form
Carbon Monoxide	8 hours	9 ppm	Not to be exceeded more than once per year
	1 hour	35 ppm	
Ozone	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over three years
PM _{2.5}	1 year	12.0 ug m-3	Annual Mean averaged over three years
	24 hours	35 ug m-3	98th percentile, averaged over three years
PM ₁₀	24 hours	150 ug m-3	Not to be exceeded more than once per year on average over three years

Source: EPA, 2016c

Among other parameters, PM_{2.5} and PM₁₀ are measured twice each week for a 24-hour period at each Interagency Monitoring of Protected Visual Environments (IMPROVE) site. IMPROVE is a monitoring program whose goal is to measure atmospheric concentrations of pollutants and identify sources of the pollutants associated with diminished visibility in Class I areas. Data contained in the project file shows the historical PM_{2.5} (annual average value averaged over three years) and PM₁₀ (daily average) values for the three IMPROVE monitors nearest to the Snowmass SUP area along with the attendant NAAQS. The three IMPROVE monitors, White River National Forest (6 miles east), Flat Tops (60 miles northwest), and Ripple Creek (65 miles northwest), are consistently well below the NAAQS.

As part of the IMPROVE program, visibility is estimated from the measured data. Please note that there is no National 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.¹⁰⁶ The visibility metric has units of deciviews (dv) where a one dv change is what is perceptible to the human eye.¹⁰⁷ Lower dv 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 two of three IMPROVE monitors nearest to Snowmass SUP area (there is no computed visibility data for one of the IMPROVE monitors for Ripple Creek in the Federal Land Manager Environmental Database in the Federal Land Manager Environmental Database). The visibility range based on the 30-day average for the poorest periods at Flat Tops is roughly 11 dv (equivalent to visibility of about 80 miles) and the best visibility periods of about 1.5 dv (equivalent to visibility of about 200 miles) at WRNF.

EPA's Ambient Air Quality Monitoring Program is conducted by EPA, state, and local agencies through the National Air Monitoring Stations, State and Local Air Monitoring Stations, Special Purpose Monitoring Stations, and the Photochemical Assessment Monitoring Stations. Eight-hour (8-hour) ozone

¹⁰⁶ EPA, 2001

¹⁰⁷ Air Resource Specialists, 1993

measurements from seven Ambient Air Quality Monitoring Program monitors were extracted from the data record. Based on the data, the fourth highest maximum daily 8-hour ozone measurement was identified for each year that data was available. The running average of the fourth highest reading was estimated and plotted. This plot revealed the three-year average of the annual fourth highest 8-hour ozone measurement routinely exceeds the NAAQS at four of the seven monitors nearest the Snowmass SUP area in 2013 and prior years. In years 2014 and 2015, three monitors are at or slightly below the NAAQS. However, because of the incomplete time record for the data for all monitors, it is difficult to determine an overall trend in 8-hour ozone measurements without subsequent analyses.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Under Alternative 1, there would be no impact to air quality in the form of additional GHG emissions from increases in vehicle traffic or construction of multi-season recreation activities. As discussed in Section F – Traffic, a natural growth of 10 percent was assumed over existing conditions. With the 10 percent natural growth, the three closest IMPROVE monitors (WRNF, Flat Tops, and Ripple Creek) would likely remain well below the NAAQS.

Alternative 2 – Proposed Action

To analyze the impacts to air quality in Pitkin County, the EPA model MOVES2014a was used to simulate emissions for the proposed summer projects in the Snowmass SUP area.¹⁰⁸ The MOVES2014a model was used to calculate emissions from traffic and construction. Other emission sources, such as electricity to operate lifts and facilities or secondary emissions from visitor air travel were considered outside the scope of this analysis.

Two major categories (1) on-road and (2) non-road were used to simulate the increased emissions to the atmosphere due to the Snowmass summer projects. On-road calculations were assumed to be gasoline fueled automobiles from visitors and employees.¹⁰⁹ Non-road calculations were assumed to be diesel fueled heavy duty vehicles from construction activities.¹¹⁰

Timber removal would be necessary to construct the proposed projects. Timber would be removed from the Snowmass SUP area using a variety of methods. One method would use a skidder or logging truck to remove trees. These would either be removed from the site altogether, or be gathered into piles for burning. Another method is the “lop and scatter” method where selected trees would be cut down and left in the forest. Fewer than 20 acres of timber removal are proposed in Alternative 2. These trees would be removed throughout the five years of project construction, and burning of timber would be minimized. Should burning occur, ASC would obtain an open burn permit from CDPHE and comply with open burn

¹⁰⁸ EPA, 2016a

¹⁰⁹ Vehicle source category 21 in MOVES2014a

¹¹⁰ Vehicle source category 61 in MOVES2014a

regulations.¹¹¹ The vehicle trips needed to remove timber are included in the construction emission calculations.

To calculate the emissions from on-road vehicle sources, first the vehicle miles traveled (VMT) were estimated for Owl Creek Road, Brush Creek Road and other local Snowmass roads during the summer months (June to September). The same basic assumptions were used as in the traffic analysis (refer to Section F – Traffic). The reader is referred to the technical report in the project file for detailed calculations of VMT. As a result of Alternative 2 visitor, employee, and construction mobile sources, VMT is expected to increase by 37,300 miles for on-road gasoline fueled automobiles and 2,600 miles for on-road diesel fueled heavy duty vehicles per 85-day summer season.¹¹²

In addition to on-road vehicle sources, non-road vehicle emissions were simulated. For construction-related activities, a small increase in non-road vehicles were projected to occur during the construction phase. Table 3G-2 are the results of the MOVES2014a model for both on-road and non-road mobile emission sources in tons per day.

**Table 3G-2:
 On-Road and Non-Road Mobile Emission Sources in Tons Per Day**

Pollutant	On-Road			Non-Road			Total
	Base Case	Project	Difference	Base Case	Project	Difference	
VOC	0.131	0.132	0.001	0.061	0.063	0.002	0.003
CO	2.994	3.02	0.026	0.816	0.824	0.008	0.027
NO _x	0.725	0.727	0.002	0.316	0.340	0.024	0.025
SO ₂	0.006	0.006	0	0	0	0	0
PM _{2.5}	0.019	0.019	0	0.027	0.028	0.001	0.001
PM ₁₀	0.021	0.013	0	0.028	0.029	0.001	0.001
CO ₂	431.8	435.2	3.400	77.1	81.7	4.6	7.1
N ₂ O	0.013	0.013	0	NA	NA	NA	0
CH ₄	0.019	0.019	0	0.004	0.004	0	0
CO ₂ (e)	436.1	439.5	3.400	77.1	81.7	4.6	7.1

Table 3G-2 illustrates small incremental increases in the emissions from on-road and non-road mobile sources predicted to occur from proposed activities in the Snowmass SUP area. From a qualitative point of view, given the small increments in estimated emissions due to projected expansion activities in the Snowmass SUP area, it is expected that there would be little impact to the existing air quality in and immediately surrounding Snowmass SUP area. Given the large distances to large populated centers coupled with the small predicted emissions changes due to on-road and non-road mobile sources from the

¹¹¹ CDPHE, 2016

¹¹² Wilkinson, 2016

expansion activities, it is unlikely that projected projects in the Snowmass SUP area would impact existing air quality, and it is anticipated that air pollutant levels would remain below NAAQS.

Alternative 3

Under Alternative 3, air quality impacts to Snowmass and surrounding region would be similar to those in Alternative 2. The reduced number of trails and programs at Elk Camp Meadows is not expected to change air quality or NAAQS levels by a measurable amount.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for air quality extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for air quality are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on air quality resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Continued Build Out of Town of Snowmass Village
- Town of Snowmass Village Community Connectivity Plan

Snowmass 2015 Master Development Plan

Development of Snowmass over the past five decades has incrementally added to the level of emissions in the Roaring Fork Valley and Pitkin County. The creation of infrastructure, hotels and homes, and general ski area development have all contributed to an increase in visitors and construction activity at Snowmass and to air pollutant levels in the area.

Build Out of the Town and Snowmass Village and the Community Connectivity Plan

Residential and commercial development in the Town of Snowmass Village would generate additional trips to, from and within the Town and its surrounding area. The additional trips would result in additional emissions in the area. Although the Town of Snowmass Village is nearing buildout, there are still some available parcels for development. Redevelopment of existing properties may add densities to certain areas of the Town, producing more emissions for the area. Each development would cumulatively impact the air quality at Snowmass and in the Town of Snowmass Village. The goals of the Community Connectivity Plan are centered around reducing the number of trips to, from, and within Town of Snowmass Village using a vehicle. If recommendations from the plan are implemented, anticipated increases in air quality pollutants from vehicle emissions may be diminished.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

No irreversible and/or irretrievable commitments of resources in relation to traffic, parking or ski area access have been identified in association with any of the alternatives analyzed in this document.

H. CLIMATE CHANGE

SCOPE OF THE ANALYSIS

Although climate change is a global issue, the spatial scope of this analysis is the mountainous regions of Colorado and adjacent areas in the Southern Rocky Mountains with similar climate, ecology, wildlife and plant species. This region is expected to experience similar effects from climate change, and represents the range of what may occur at Snowmass. The temporal scope of this analysis spans from the ski area's inception in 1967 through 2050, the date climate change literature uses as a benchmark in discussion of climate change effects.¹¹³

On August 1, 2016 the CEQ issued *Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*.¹¹⁴ The guidance directs agencies to consider: (1) The potential effects of a proposed action on climate change as indicated by assessing GHG emissions; (2) The effects of climate change on a proposed action and its environmental impacts. Because the NEPA review of this project was underway when this guidance was published, it is considered to the extent practicable.

The MOVES model developed by the EPA was used to estimate the GHG emissions resulting from construction and increased vehicle trips associated with the action alternatives (refer to Section G – Air Quality).¹¹⁵ The MOVES2014a model was used to calculate emissions for criteria air pollutants,

¹¹³ Gordon and Ojima, 2015

¹¹⁴ CEQ, 2016

¹¹⁵ EPA, 2016a

greenhouse gases, and air toxins from traffic and construction. Other emission sources, such as electricity to operate lifts and facilities or secondary emissions from visitor air travel were considered outside the scope of this analysis.

AFFECTED ENVIRONMENT

Climate

The climate of Colorado is characterized by frequent sunshine, low humidity, and large temperature variations. While Colorado as a whole receives less than 20 inches of annual precipitation, mountainous areas in the state receive up to 60 inches of precipitation, mostly as snow.¹¹⁶ In Pitkin County, where Snowmass is located, the average rainfall is 18.9 inches and average snowfall is 170 inches per year. The average January temperature in 2016 was 19.5°F (the range was 7°F to 32.3°F) while the average July temperature in 2016 was 64.8°F (range was 48.4°F to 81.2°F).¹¹⁷

The effects of climate change have already been observed in both Colorado and the Southern Rocky Mountains. In the last thirty years, the annual average temperature in Colorado has increased by 2°F.¹¹⁸ The daily minimum temperatures have warmed more than the daily maximum temperatures, and temperature increases are observed in all seasons, with the highest temperature increases recorded in the summer months. In addition to these temperature increases, the timing of snowmelt and peak runoff has shifted to earlier parts of the spring by one to four weeks over the last thirty years.¹¹⁹ More frequent soil-moisture drought conditions have also been observed in this timeframe, reflecting the warming trends and below average precipitation that have been observed since 2000.¹²⁰ These warmer and drier conditions are projected to increase the frequency and intensity of drought, thereby increasing wildfire risk.¹²¹ These changing conditions are part of the baseline of this DEIS, and are reflected in the Affected Environment discussions throughout this chapter.

Global Change Models predict a warming trend will continue into mid-century (2050) and beyond.¹²² The models are complex, integrated computer simulations of earth's physical processes that projects how the global climate system will respond to increasing GHG concentrations. According to the *Colorado Climate Change Vulnerability Study* (2015) the statewide average annual temperature is projected to change +2.5°F to +5°F by 2050. Summers are projected to warm more than winters. The models diverge in the precipitation projections from -5 to +6 percent; however, winter precipitation is expected to increase. A decrease in annual streamflow for rivers is predicted, due to the loss of moisture from warmer snowpacks, soils, and vegetation. Runoff is predicted to occur earlier (one to three weeks), resulting in

¹¹⁶ Lukas et al., 2014

¹¹⁷ NCDC, 2016

¹¹⁸ Gordon and Ojima, 2015

¹¹⁹ Ibid.

¹²⁰ Ibid.

¹²¹ Melilo et al., 2014

¹²² Gordon and Ojima, 2015

decreasing flows in later summer. These predicted patterns will increase the frequency and severity of heat waves, droughts, wildfires, and extreme precipitation events.¹²³

Energy Use and GHG Emissions

ASC has an internal Environmental Management System, which keeps track of energy use and emissions across their portfolio of resorts and properties and supports a number of sustainability initiatives. Their environmental policy includes goals related to GHG emission reductions, energy efficiency, water conservation, and other objectives.¹²⁴ ASC estimates that approximately 25,944 metric tons of carbon dioxide (CO₂) were emitted through resort operations in 2015 (including emissions from fuel, natural gas, electricity, and water used for snowmaking and municipal use across all resorts and properties owned by ASC).¹²⁵ ASC owns three types of clean power electricity generation facilities: solar power, micro-hydroelectric, and a coal mine methane plant. According to ASC, these facilities prevented the emission of approximately 93,503 metric tons of CO₂ in 2015.¹²⁶ However, ASC does not claim the emissions as offsets as they sell the power generated to local utilities. While the company's emissions have declined since 2000 when they began reporting them, their goal is to reduce their emissions 25 percent and use offsetting to become carbon neutral by 2020.¹²⁷

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Under Alternative 1, there would be no contribution to climate change in the form of additional GHG emissions. However, the climate change effects described in the Affected Environment discussion would continue to affect operations at Snowmass into the future. Warming temperatures will likely lead to reduced snowpack and streamflow, increased risk of drought, wildfire, and insect outbreaks.¹²⁸ The summer season may be longer than 85 days by 2050, increasing the length of summer season for recreation. Snowmass may face increasing challenges protecting its SUP area from wildfire and drought, as well as providing adequate water for snowmaking and other activities.

Alternative 2 – Proposed Action

Alternative 2 has the potential to contribute to climate change through increased GHG emissions. Alternative 2 would result in GHG emissions from: 1) construction trips to build the structures associated with the projects; 2) tree and debris removal via truck from the mountain; and 3) vehicle emissions associated with the increase in visitation and employee travel to Snowmass (discussed in Section F – Traffic). In total, Alternative 2 could result in increased emissions of approximately 7.1 tons of CO₂

¹²³ Ibid.

¹²⁴ ASC, 2016b

¹²⁵ ASC, 2016c

¹²⁶ Ibid.

¹²⁷ ASC, 2014

¹²⁸ Melilo et al., 2014

equivalent per day during the construction phase, as estimated using the MOVES model (refer to Section G – Air Quality).¹²⁹ Once construction is complete, it is anticipated that emissions would decrease to include only traffic emissions from visitation. This is a small proportion of ASC’s total annual CO₂ emissions.

This estimate does not account for the reduction of carbon sequestration potential resulting from tree removal or the potential increase in electricity use required for the proposed projects.¹³⁰ Under Alternative 2, 17.2 acres of trees would be removed, which would reduce the carbon sequestration potential of the project area. The proposed projects would rely primarily on infrastructure that is currently operational in the summer season (primarily the Elk Camp Gondola and Elk Camp Restaurant), and electricity requirements for operation of the new projects would be minimal. Little or no electricity would be required for operation of new trails, the climbing wall, multi-purpose activity areas, ropes challenge course, zip line canopy tour, or zip line. The mountain coaster would require electricity for the uphill track and low-level lighting. Overall, operation of the proposed projects is not anticipated to result in a meaningful change in electricity use at Snowmass.

Due to the warming effects of climate change described in the Affected Environment discussion, it is likely that the summer season may be longer than 85 days in the future. Providing multi-season recreation opportunities would improve the quality of the recreation experience and economic sustainability of operations at Snowmass if winter seasons for skiing become shorter. This could extend the season for hiking, mountain biking, the mountain coaster, the zip line canopy tour, and event opportunities at Elk Camp.

The Snowmass SUP area may be impacted by drought, heavy precipitation events, insect infestations, and increased risk of wildfire. These effects could impact the quality of the guest experience and lead to ecological change. Potential spruce beetle infestations (discussed in Section J – Forest Health) could be more severe as a result of climate change. Potential impacts to soils and slope stability resulting from Alternative 2 (discussed in Section L – Soils and Geology) and associated water quality effects (discussed in Section M – Watershed) could also be exacerbated by heavy precipitation events associated with climate change.

Alternative 3

Under Alternative 3, climate change impacts to Snowmass and surrounding region would be similar to those in Alternative 2. The reduced number of trails and programs at Elk Camp Meadows is not expected to change climate change outcomes by a measurable amount compared to Alternative 2.

¹²⁹ Wilkinson, 2016

¹³⁰ Carbon sequestration is the process of capture and long-term storage of atmospheric CO₂ in plants.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for climate change extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for climate change are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

Continued development and use of fossil fuels at Snowmass, throughout Pitkin County, and around the world will continue to escalate the issue of climate change. Cumulatively, these projects would have the effect of increased temperatures and weather variability, which could increase risks such as wildfire and heavy precipitation events. Temperature increases could also result in shortened ski seasons. These cumulative impacts could result in an increased focus on multi-season and non-skiing activities in order to preserve the sustainability of ASC as a business.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The addition of summer and multi-season activities and infrastructure at Snowmass represent irretrievable contributions to climate change. The emissions that would be generated from the construction and operation of the proposed projects and increased visitation cannot be retrieved. However, these climate change contributing emissions are not considered irreversible due to offsetting and mitigation commitments by ASC. The loss of carbon sequestration capacity resulting from vegetation removal could be reversed in the long-term if vegetation were allowed to regrow.

I. BOTANY

SCOPE OF THE ANALYSIS

The analysis area for botanical resources is approximately 1,000 acres in size within the greater Snowmass SUP area. It encompasses all proposed project activities, which are located in the general vicinity the Elk Camp Gondola and Chairlift. This analysis summarizes the more detailed Botanical Biological Report (Biological Assessment/Biological Evaluation and Specialist Report) contained in the project file.¹³¹ The Botanical Biological Report and this analysis describe the existing condition and disclose anticipated impacts to federally listed threatened, endangered, proposed, and Forest Service Region 2 sensitive plant species, other plant SOLC and SVC.

AFFECTED ENVIRONMENT

Elevations within the analysis area range from 8,500 to 11,300 feet above mean sea level. Vegetation types observed within the analysis area include Engelmann spruce – subalpine fir forests (*Picea engelmannii* – *Abies lasiocarpa*), aspen forests (*Populus tremuloides*), open grass- and forb-dominated communities, riparian and wetland habitats, and rock-outcrop vegetation.

A pre-field review was conducted of all Region 2 TES and SOLC plants known or suspected to be present in the analysis area. This included reviews of the current Regional Forester’s Sensitive Plant List, the Colorado Natural Heritage Program’s Biological Database records for TES and SOLC plants present within the analysis area, the USFWS online Information, Planning, and Conservation (IPaC) decision support system for the most current listing of TES and candidate species, and Forest Service files and records for the analysis area.¹³²

A site-specific field reconnaissance for sensitive and other rare plants was conducted in August and September of 2016. The reconnaissance traversed all habitats in the analysis area and had two objectives: 1) to look at a representative sample of all plant community types; and 2) to focus the search effort on habitats known to contain target plants. The site-specific surveys focused on areas with a potential for direct and indirect impacts from the proposed projects. Some of the projects were conceptual in nature at the time of assessment. Should project activities change, PDC have been developed to ensure that additional surveys would be conducted prior to project disturbance (refer to Table 2-2).

Threatened and Endangered Species

The only federally listed plant species with potential to occur in the analysis area (according to the USFWS IPaC system) is the federally threatened Ute ladies’-tresses orchid (*Spiranthes diluvialis*). There is no habitat for this species within the Snowmass SUP area; however, an increase in water depletions associated with proposed project activities has the potential to affect the flow regime of Brush Creek and

¹³¹ Western Ecological Resource, 2016

¹³² USDA Forest Service, 2015

its associated tributaries, which flow into the Roaring Fork River along which the orchid occurs. Although water depletions associated with Snowmass have been previously consulted on for the four federally listed Colorado River fish species, there has been no previous consultation on *Spiranthes diluvialis*.¹³³ Therefore, *Spiranthes diluvialis* is carried forward for analysis (refer to Table 3I-1). No critical habitats are currently designated for any listed plant species within the analysis area. Lack of plants and suitable habitat was confirmed during field reconnaissance for all other federally listed TES plants.

**Table 3I-1:
 Federally Listed Plants Considered in Analysis**

<i>Scientific Name</i> Common Name	Habitat Description and Central Colorado Location	Species Excluded from Analysis?	Rationale for Exclusion
<i>Spiranthes diluvialis</i> Ute ladies'-tresses orchid	Riparian point bars and stream sides, meadows with subsurface hydrology, up to 8,000' elevation.* Along the Roaring Fork River near Carbondale, Colorado	No	Species Analyzed

Notes: For purposes of this analysis, the federal action is equal to the analysis area.

* 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 (Popovich, 2013).

Region 2 Sensitive Species

FSM 2670 defines a sensitive plant as one that is not presently listed as threatened or endangered by the USFWS, but for which 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 Region 2.¹³⁴ Documented and suspected occurrences of sensitive plants on the WRNF are listed in Table 3I-2. Seven sensitive plant species have been carried forward into the analysis. These include the upswept moonwort (*Botrychium ascendens*), paradox moonwort (*B. paradoxum*), yellow lady's slipper orchid (*Cypripedium parviflorum*), Plains rough fescue (*Festuca hallii*), Colorado tansyaster (*Machaeranthera coloradoensis*), Kotzebue's grass of Parnassus (*Parnassia kotzebuei*), and dwarf raspberry (*Rubus arcticus* subsp. *acaulis*).

¹³³ USFWS, 1995a

¹³⁴ USDA Forest Service, 2015

**Table 3I-2:
WRNF Region 2 Sensitive Plant Species**

<i>Scientific Name</i> Common Name	General Habitat and Colorado Range	Excluded from Analysis?	Rationale
<i>Armeria maritima</i> subsp. <i>sibirica</i> * Sea pink	Grassy tundra slopes, on wet, sandy, or spongy organic soils; 11,460–12,580'; Park and Summit Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Astragalus leptaleus</i> Park milkvetch	Ecotone of saturated and dry soils; moist swales and meadows; 6,000–10,000'; Chaffee, Custer, Eagle, Fremont, Gunnison, Jackson, Larimer, Park and Summit Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Botrychium ascendens</i> Upswept moonwort	Disturbed but stabilized subalpine areas; several sites in Colorado.	No	Species Analyzed
<i>Botrychium paradoxum</i> Paradox moonwort	Moist meadows to sparsely vegetated upland; one site in Colorado on west slope.	No	Species Analyzed
<i>Braya glabella</i> * Smooth rockcress	Calcareous substrates, especially Leadville limestone; sparsely vegetated gravelly slopes above timberline; 12,000–13,000'.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Carex diandra</i> Lesser panicled sedge	Montane and subalpine wetland fens; 7,000–9,600'; Boulder, Garfield, Grand, Jackson, Larimer and Saguache Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Carex livida</i> Livid sedge	Mineral rich wetland fens; 9,000–10,100'; Boulder, Grand, Jackson, Larimer and Park Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Cypripedium parviflorum</i> Yellow lady's slipper orchid	Moist forests including ponderosa pine, Douglas-fir, and aspen; 7,400–8,500' in Colorado; Clear Creek, Custer, Douglas, El Paso, Garfield, Huerfano, Jefferson, La Plata, Larimer, Las Animas, Montrose, Park, Pueblo and Teller Counties, Colorado.	No	Species Analyzed
<i>Draba exunguiculata</i> Clawless draba	Alpine on rocky and gravelly slopes or fell fields; 11,700–14,000'; Boulder, Clear Creek, El Paso, Gilpin, Grand, Lake, Park and Summit Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Draba grayana</i> 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 and Summit Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities

**Table 3I-2:
WRNF Region 2 Sensitive Plant Species**

<i>Scientific Name</i> Common Name	General Habitat and Colorado Range	Excluded from Analysis?	Rationale
<i>Draba weberi</i> Weber's Whitlow grass	Splash zones, among the rocks along streams and lakes and spruce forests. Above 11,000'.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Drosera rotundifolia</i> 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
<i>Epipactis gigantea</i> Giant helleborine	Warm-water seeps and springs. 4,800–8,000'; Archuleta, Las Animas, Chaffee, Delta, Mesa, Montrose, Moffat and Saguache Counties, Colorado	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Eriogonum exilifolium</i> Dropleaf buckwheat	Sagebrush flats; 7,500–9,000'; North and Middle Parks in Larimer, Jackson and Grand Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Eriophorum chamissonis</i> Altai cottongrass	Open areas with hydric soils, fens; 10,160–13,200'; Eagle, Gunnison, Hinsdale, La Plata, Mineral, Park, Pitkin, Saguache, San Juan and San Miguel Counties; includes <i>Eriophorum altaicum</i> var. <i>neogaeum</i>	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Eriophorum gracile</i> Slender cottongrass	Montane and subalpine fens, saturated soils; 8,100–11,140' in Colorado; Gunnison, Jackson, Larimer, Las Animas, Park, San Miguel and Summit Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Festuca hallii</i> Plains rough fescue	Alpine and subalpine grasslands and meadows; 8,500–11,500'; Huerfano and Larimer Counties, Colorado.	No	Species Analyzed
<i>Kobresia simpliciuscula</i> Simple kobresia	Fens and moist alpine areas; 8,970–12,800'; Boulder, Clear Creek, Grand, Gunnison, Park and Summit Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Machaeranthera coloradoensis</i>* 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 and San Juan Counties, Colorado.	No	Species Analyzed

**Table 3I-2:
WRNF Region 2 Sensitive Plant Species**

<i>Scientific Name</i> Common Name	General Habitat and Colorado Range	Excluded from Analysis?	Rationale
<i>Parnassia kotzebuei</i> * Kotzebue's grass of Parnassus	Alpine and subalpine, in wet rocky areas, amongst moss mats and along streamlets; 10,000–12,000'; north-central and southwestern Colorado, Boulder, Clear Creek, Garfield, Larimer, Grand, Park, San Juan and Summit Counties, Colorado.	No	Species Analyzed
<i>Penstemon harringtonii</i> * Harrington penstemon	Sagebrush communities, often on calcareous substrates; 6,800–9,000'; endemic to Eagle, Garfield, Grand, Pitkin, Routt, and Summit Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Ptilagrostis porteri</i> * Porter's false needlegrass	Hummocks in fens and willow carrs; 9,350–12,000'; El Paso, Lake, Park and Summit Counties, Colorado. Also, n. New Mexico.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Ranunculus karelinii</i> * Ice cold buttercup	Alpine slopes among rocks and scree; 12,000–14,100'; central Colorado, including Chaffee, Clear Creek, Gunnison, Hinsdale, Lake, Ouray, Park and Summit Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Rubus arcticus</i> subsp. <i>acaulis</i> Dwarf raspberry	Wetlands in willow carrs and mossy streambanks; 7,000–9,720'; Clear Creek, Grand and Park Counties, Colorado.	No	Species Analyzed
<i>Salix candida</i> Silver willow	Often associated, but not restricted to rich and extremely rich fens; 8,900–10,400'; Lake, Larimer and Park Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Salix serissima</i> Autumn willow	Wetland areas including marshes, fens, and bogs; 7,800–10,200'; Boulder, Custer, La Plata, Park, Larimer and Routt Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Sphagnum angustifolium</i> Narrowleaf sphagnum	Acidic fens with high concentrations of iron and other ions. San Juan and Gunnison National Forests, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Sphagnum balticum</i> 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

**Table 3I-2:
 WRNF Region 2 Sensitive Plant Species**

<i>Scientific Name</i> Common Name	General Habitat and Colorado Range	Excluded from Analysis?	Rationale
<i>Thalictrum heliophilum</i> * Sun-loving meadowrue	Endemic to sparsely vegetated steep shale talus slopes of the Green River Formation; 6,300–8,800'	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Utricularia minor</i> Lesser bladderwort	Shallow water of subalpine ponds; 8,200→10,000' in Colorado; Boulder, Delta, Gilpin, Jackson, La Plata, Larimer, Montezuma and Park Counties, Colorado.	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities
<i>Viburnum opulus</i> var. <i>americanum</i> American cranberry bush	Riparian and riparian transition to cottonwood, river birch and hawthorn. 6,000–7,000'	Yes	No known or suspected plants or habitat in areas potentially affected by proposed project activities

Source: USDA Forest Service, 2015

Notes:

*= Species of viability concern (USDA Forest Service, 2002a)

Narrowleaf moonwort (*Botrychium lineare*) was removed from the 2015 Sensitive Species List owing to the addition of populations previously attributed to *B. furcatum* and other new populations discovered (Tyler, 2015a). Altai cottongrass (*Eriophorum altaicum* var. *neogaeum*) was removed from the 2015 Sensitive Species List due to an on-going taxonomic dispute and there is insufficient information to determine if there is a population viability concern.

No occupied habitat was observed for any of the Region 2 sensitive plant species during comprehensive field reconnaissance. The field survey efforts were completed by a highly qualified and experienced botanist, focusing on areas of potential habitat for the sensitive species, and none of the plants were found. However, because moonworts occur in mixed species aggregations and may not emerge every year, it is possible that the Region 2 listed moonworts (*Botrychium ascendens* and *B. paradoxum*) may be present among populations of common moonworts described below. For the other five Forest Service sensitive plants—*Cypripedium parviflorum*, *Festuca hallii*, *Machaeranthera coloradoensis*, *Parnassia kotzebuei*, and *Rubus arcticus* subsp. *acaulis*—none of these plants were detected during field reconnaissance; therefore, they are presumed to be absent.

Species of Local Concern

Plant SOLC are not designated sensitive and carry no legal status. However, they are a component of the biological diversity on the WRNF, which is required to be maintained by the National Forest Management Act and Forest Service direction.¹³⁵ There are 81 designated SOLC plants for the WRNF. A list of these plants is available in the project file. Previous occurrences of SOLC plants include several common moonwort species (*Botrychium* spp.) including reflected moonwort (*Botrychium echo*), red-stem triangle moonwort (*Botrychium lanceolatum*), common moonwort (*B. neolunaria*), western moonwort (*B. hesperium*), and Mingan moonwort (*B. minganense*). These moonwort species have been documented

¹³⁵ 36 CFR § 219.19; FSM 2670.22

near the analysis area and potential habitat occurs in previously disturbed, but now stabilized sites such as ski trails, lift tower foundations, and forest skid-trails.

Seven SOLC were documented within the analysis area and the results are summarized below. Detailed maps, tables and Element Occurrence Records for each of the locations of these plant species are contained in the project file.

- *Botrychium* spp. (Moonworts) – Five species of common moonworts were observed within the analysis area. These include reflected moonwort (*Botrychium echo*), red-stem triangle moonwort (*B. lanceolatum* var. *lanceolatum* red-stem phenotype), Mingan moonwort (*B. minganense*), common moonwort (*B. neolunaria*), and western moonwort (*B. hesperium*). The majority of these moonworts were found above 10,200 feet on various ski trails near proposed multi-season recreational trails. Approximately 300 moonwort individuals occupying 0.70 acre of habitat in 32 discrete locations were identified during the surveys conducted in 2016. Previous surveys for rare plants within the Snowmass SUP resulted in detecting additional moonworts in similar habitat types and locations.¹³⁶ There are likely numerous additional moonworts scattered throughout the ski area in appropriate habitats outside of proposed project activities.
- *Listera borealis* (Northern Twayblade) – Two small populations of five and fifteen plants each (less than 0.1 acre) were identified. The first population is located approximately 1,000 feet northwest of the upper terminal of the Elk Camp Gondola and the second is located west of the intersection of the *Hanging Valley* and *Sandy Park* ski trails. Both populations occur adjacent to spruce-fir wetlands near proposed multi-season recreation trails. A PDC will be implemented to field adjust the proposed trails to avoid impacting these plants to the extent practicable.
- *Lycopodium annotinum* (Stiff Clubmoss) – Three areas of stiff clubmoss were found within the analysis area. Two small patches (less than 0.1 acre) were identified, one near the lower end of the *Bear Bottom* ski trail and the other just west of *Sandy Park* ski trail. Both locations are near proposed mountain biking and hiking trails. The third location was found outside of proposed project activities. A PDC will be implemented to field adjust the proposed trails to avoid impacting these plants to the extent practicable.

The SVC are species designated in the Forest Plan. Specific management direction for plant SVC include surveying for species prior to commencement of project activities and minimizing impacts to such species that would affect species viability or tend the species towards federal listing. There are twelve plant SVC for the WRNF; however, none of these species have habitat within the analysis area. A list of the plant SVC is contained in the project file. No occupied or potential habitat was observed for any of the SVC plant species during comprehensive field reconnaissance.

¹³⁶ Colfer, 2016f

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Threatened and Endangered Species

The analysis area does not provide habitat for any federally listed or proposed plant species and there would be no increase in water depletions under the No Action Alternative. Therefore, there would be *No Effect* to *Spiranthes diluvialis*, a federally threatened plant. Table 3I-3 provides a summary of determinations for TES plant species under each alternative.

Region 2 Sensitive Species

Under the No Action Alternative, there would be a continuation of existing management practices. A determination of *No Impact* is warranted for the seven Forest Service sensitive plant species carried forward into the analysis for Alternative 1. These include *Botrychium ascendens*, *B. paradoxum*, *Cypripedium parviflorum*, *Festuca hallii*, *Machaeranthera coloradoensis*, *Parnassia kotzebuei*, and *Rubus arcticus* subsp. *acaulis*.

Species of Local Concern

Under the No Action Alternative, there would be a continuation of existing management practices; therefore, there would be no direct or indirect impacts to the populations of common moonworts, stiff clubmoss or northern twayblade found during field reconnaissance. Therefore, the No Action Alternative is not expected to compromise the long-term viability of these plant species within the planning area or range-wide. There are no SVC present within the analysis area.

Alternative 2 – Proposed Action

Threatened and Endangered Species

Although the analysis area does not provide habitat for any federally listed or proposed plant species, an increase in consumptive use of water at the Elk Camp Restaurant has the potential to impact the flow regime of Brush Creek and thus indirectly affect adjacent riparian habitats. The source of water for the Elk Camp Restaurant is the Sandy Park Diversion on the East Fork Brush Creek and wastewater is treated by the Snowmass Water and Sanitation District before being released back into the watershed. Under the Proposed Action the consumptive use of water during the summer season would increase from 6,250 gallons (0.02 acre feet) to 15,750 gallons (0.05 acre feet) for a total increase in 0.03 acre feet per year.¹³⁷ However, the net depletion to Brush Creek would be extremely small compared to inter- and intra-annual variations in flow due to climatic conditions, variability in snowpack, and irrigation use. In addition, any small changes in the flow regime of Brush Creek would diminish downstream as other tributaries contribute water to the system and ultimately join the Roaring Fork River, which has a flow magnitude higher than Brush Creek. Finally, for the Platte River System, where water depletions are

¹³⁷ Resource Engineering, 2016a

commonly consulted upon for *Spiranthes diluvialis*, the USFWS has adopted a *De minimus* threshold so that water-related activities resulting in less than 0.1 acre foot per year of depletions in flow to the nearest surface water tributary do not require consultation.¹³⁸ Even though the proposed project does not occur in the Platte River System, it is likely that the same principal could apply. Therefore, it is concluded that the effects of water depletions of the proposed project on *Spiranthes diluvialis* would be so small as to be immeasurable or would be non-existent; therefore, a **No Effect** determination is warranted.

Region 2 Sensitive Species

The analysis area provides potential habitat for the sensitive moonworts, *Botrychium ascendens* and *B. paradoxum*. Although these species were not identified during comprehensive field reconnaissance, it is possible they may have been overlooked due to their small size and/or lack of development. Hence, there is a remote possibility that these species could occur in the analysis area. However, it is anticipated that the direct and indirect impacts associated with project activities would be localized and not of sufficient intensity or scale to cause a significant effect. A determination of **May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing** is warranted for these two sensitive plant species. Over time, the temporary ground disturbances associated with the implementation of proposed project activities may benefit moonwort species by creating open disturbed, but stabilized habitats that many of these plants prefer. PDC would be implemented for all project activities to ensure that any disturbances are adequately revegetated and noxious weeds are controlled.

For the other five Forest Service sensitive species analyzed in this document, *Cypripedium parviflorum*, *Festuca hallii*, *Machaeranthera coloradoensis*, *Parnassia kotzebuei*, and *Rubus arcticus* subsp. *acaulis*, a determination of No Impact is warranted. None of these species were found during comprehensive field reconnaissance; therefore, they are presumed to be absent.

¹³⁸ USFWS, 2009

**Table 3I-3:
 Summary of Determinations for TES Plant Species**

<i>Scientific Name</i> Common Name	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
FEDERALLY LISTED			
<i>Spiranthes diluvialis</i> Ute ladies'-tresses orchid	NE	NE	NE
FOREST SERVICE SENSITIVE			
<i>Botrychium ascendens</i> Upswept moonwort	NI	MAII	MAII
<i>Botrychium paradoxum</i> Paradox moonwort	NI	MAII	MAII
<i>Cypripedium parviflorum</i> Yellow lady's slipper orchid	NI	NI	NI
<i>Festuca hallii</i> Plains rough fescue	NI	NI	NI
<i>Machaeranthera coloradoensis</i> * Colorado tansyaster	NI	NI	NI
<i>Parnassia kotzebuei</i> * Kotzebue's grass of Parnassus	NI	NI	NI
<i>Rubus arcticus</i> subsp. <i>acaulis</i> Dwarf raspberry	NI	NI	NI

Source: USDA Forest Service, 2002a

Notes:

* = Species of viability concern

NE = No Effect; NI = No Impact; MAII = May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.

Species of Local Concern

Under the Proposed Action, there would be direct impacts to less than 0.1 acre of occupied moonwort habitat resulting from mountain biking trails. In addition, there would be less than 0.1 acre of anticipated impacts to one of the two populations of northern twayblade and less than 0.1 acre of impacts to one of three populations of stiff clubmoss due to mountain biking trails (refer to Table 3I-4). PDC have been developed in order mitigate impacts to these plant SOLC (refer to Table 2-2). With proper implementation of the PDC, it is anticipated that these effects would either be negated or be relatively minor and not of sufficient scale or intensity to compromise the viability of these rare plants range-wide.

**Table 3I-4:
Impact Summary for SOLC – Alternative 2**

<i>Scientific Name</i> Common Name	Impact/Total Area (acre)	Percent Impact (%)
<i>Botrychium</i> spp.* Moonworts	0.039/0.698	5.6
<i>Listera borealis</i> Northern twayblade	0.004/0.032	12.5
<i>Lycopodium annotinum</i> Stiff clubmoss	0.002/0.021	9.5

Notes: Impact numbers based on actual mapped habitat for proposed project. Additional unmapped locations of rare plants likely occur within the analysis area.

* Includes five common species of moonworts; *Botrychium echo*, *B. lanceolatum* var. *lanceolatum* red-stem phenotype, *B. minganense*, *B. neolunaria*, and *B. hesperium*.

Indirect impacts to SOLC plants could potentially include changes in vegetation composition, such as the removal of forest overstory leading to increased light regime, the creation of habitat for and introduction of invasive plant species, alteration of hydrologic patterns, and increased soil erosion or sedimentation. While many of these indirect impacts have the potential to negatively affect plant species, with implementation of PDC, it is anticipated that these effects would be relatively minor and not of sufficient scale or intensity to compromise the viability of these rare plants range-wide. In addition, some indirect effects could potentially benefit some rare plants such as *Botrychium* spp. For example, increased light regime from forest overstory removal and creation of recreation facilities could potentially benefit moonworts in the long-term by creating open, disturbed sites that these plants prefer.

There are no impacts to SVC as none of these plants occur within the analysis area.

Alternative 3

Threatened and Endangered Species

Although the analysis area does not provide habitat for any federally listed or proposed plant species, an increase in consumptive use of water at the Elk Camp Restaurant has the potential to indirectly affect downstream riparian habitats occupied by the federally threatened *Spiranthes diluvialis*. As discussed under Alternative 2, the effects of water depletions on *Spiranthes diluvialis* would be so small as to be immeasurable or would be non-existent; therefore, a **No Effect** determination is warranted.

Region 2 Sensitive Species

The analysis area provides potential habitat for the sensitive moonworts, *Botrychium ascendens* and *B. paradoxum*. Although these species were not identified during comprehensive field reconnaissance, it is possible they may have been overlooked due to their small size and/or lack of development. Hence, there is a remote possibility that these species could occur in the analysis area. However, it is anticipated that the direct and indirect impacts associated with project activities would be localized and not of sufficient intensity or scale to cause a significant effect. A determination of **May adversely impact**

individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing is warranted for these two sensitive plant species. Over time, the temporary ground disturbances associated with the implementation of proposed project activities may benefit moonwort species by creating open disturbed, but stabilized habitats that many of these plants prefer. PDC would be implemented for all project activities to ensure that any disturbances are adequately revegetated and noxious weeds are controlled.

For the other five Forest Service sensitive species analyzed in this document—*Cypripedium parviflorum*, *Festuca hallii*, *Machaeranthera coloradoensis*, *Parnassia kotzebuei*, and *Rubus arcticus* subsp. *acaulis*—a determination of **No Impact** is warranted. None of these species were found during comprehensive field reconnaissance and hence they are presumed to be absent.

Species of Local Concern

Under Alternative 3, there would be direct impacts to less than 0.1 acre of occupied moonwort habitat resulting from mountain biking trails. This is slightly more than Alternative 2 because of different trail alignments. In addition, there would be less than 0.1 acre of anticipated impacts to one of the two populations of northern twayblade and less than 0.1 acre of impacts to one of three populations of stiff clubmoss due to mountain biking trails (Table 3I-5). The proposed direct impacts to the northern twayblade and stiff clubmoss are the same under Alternatives 2 and 3. Potential indirect impacts to SOLC plants under Alternative 3 are the same as under Alternative 2, and potentially include changes in vegetation composition, introduction of invasive plant species, alteration of hydrologic patterns, and increased soil erosion or sedimentation. PDC have been developed in order mitigate impacts to these plant species of local concern (refer to Table 2-2). With proper implementation of the PDC, it is anticipated that these effects would either be negated or relatively minor and not of sufficient scale or intensity to compromise the viability of these rare plants range-wide.

**Table 3I-5:
Impact Summary for SOLC – Alternative 3**

<i>Scientific Name</i> Common Name	Impact/Total Area (acre)	Percent Impact (%)
<i>Botrychium</i> spp.* Moonworts	0.061/0.698	8.7
<i>Listera borealis</i> Northern twayblade	0.004/0.032	12.5
<i>Lycopodium annotinum</i> Stiff clubmoss	0.002/0.021	9.5

Notes: Impact numbers based on actual mapped habitat for proposed project. Additional unmapped locations of rare plants likely occur within the analysis area.

* Includes five common species of moonworts; *Botrychium echo*, *B. lanceolatum* var. *lanceolatum* red-stem phenotype, *B. minganense*, *B. neolunaria*, and *B. hesperium*.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for botany extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for botany are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on botany resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Past Snowmass Projects (Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement, Burnt Mountain Egress Trail, Summer Trails, New/Realigned Mountain Bike Trails, Sheer Bliss Pond Modification)
- WRNF Forest Plan – 2002 Revision

For Alternatives 2 and 3, there is a remote possibility of cumulative effects to moonwort species, especially because the rarity of *Botrychium ascendens* and *B. paradoxum* make them extremely vulnerable to extirpation. Assuming presence of the above listed species, past actions likely had both positive and negative effects on *Botrychium* spp. Historic activities within the analysis area, such as ski trail development and forest thinning that reduced forest cover while minimizing ground disturbance and soil sterilization likely benefitted moonworts by creating open habitats preferred by these species. However, introduction of invasive non-native species, infrastructure development (e.g., buildings, lift tower foundations) and creation of new roads and trails may have been detrimental to moonworts by increasing competition for light, causing erosion and sedimentation, and eradicating habitat. In addition, another impact of ski area development maybe loss of the natural disturbance regime, to which native

plants are adapted. Present and future projects would likely cause similar effects to those in the past, contributing cumulatively to the actions and effects described above. Forest Service Standards as found in the Forest Plan mandate that, “Activities will be managed to avoid disturbance to sensitive species that would result in a trend toward federal listing or loss of viability.” Cumulative effects are not expected to contribute to increases in any current, or predicted, downward trend in sensitive plant species population numbers, extent or habitat across the planning unit.

The evaluation of cumulative impacts for SOLC plant species is difficult due to a lack of information regarding species presence, absence, and population numbers and extent. For the rare species analyzed in this document and the cumulative effects projects listed in Appendix A, it is unlikely that any significant cumulative impacts have occurred, are occurring or would occur. Should SOLC plant species be impacted by Alternatives 2 and 3, those losses would be in addition to other collectively minor cumulative impacts occurring throughout the region. Overall, Alternatives 2 and 3 are not expected to lead to or contribute to appreciable cumulative effects to plant SOLC.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Ground disturbance related to the multi-season recreation projects would represent an irretrievable effect to botanical resources within the SUP area. However, this is not considered an irreversible commitment because most botanical resources are 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, Region 2 sensitive plant species should be avoided and impacts minimized, if any are encountered.

J. FOREST HEALTH

SCOPE OF THE ANALYSIS

The analysis area for the forest health is approximately 1,000 acres in size within a portion of the Snowmass SUP area. It encompasses all proposed project activities, which are located in the vicinity of Elk Camp Gondola and Chairlift. This analysis describes the existing condition and discloses anticipated impacts to vegetation communities, invasive non-native weeds, and general forest health.

AFFECTED ENVIRONMENT

Vegetation

Vegetative communities currently occupying sites within the Snowmass SUP area are a product of many influences, including elevation, slope, aspect, plant community succession, wildfire, forest pathogens, and damaging agents. These elements function together over time and space to produce a continually changing mosaic of plant communities and cover types.

Within the 1,000-acre analysis area, 417 acres are mixed conifer, 317 acres are grass/forb, and 255 acres are aspen. The mixed conifer cover type is either predominately Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) in the higher elevations, or spruce, fir, lodgepole (*Pinus contorta* subsp. *latifolia*), and/or Douglas fir (*Pseudotsuga menziesii*) in the lower elevations of the SUP. A brief description of the plant community for each of these four cover types is included in this discussion. Wetland vegetation also occurs within the analysis area and is described in Section N – Wetlands.

Aspen Stands

Aspen stands predominate the forests at the lower elevations of the analysis area. These are very dense, even-aged aspen stands with a significant subalpine fir (*Populus tremuloides*) component. Stocking is generally uniform—all size classes from 5 to 12 inches in diameter are well represented. Subalpine fir is present as widely scattered, mature individuals, along with more numerous seedlings and saplings.

Abundant aspen sprouting has occurred around the periphery of these stands where trees have been cut and there is good exposure to the sun. Additionally, there are numerous aspen saplings within the interior of some of these stands where they have been opened up through thinning or mortality. The understory of the aspen stands consist of a lush and diverse understory of native forbs and a few shrubs and graminoids. Common species observed include western sweet cicely (*Osmorhiza occidentalis*), aspen fleabane (*Erigeron speciosus*), tall fleabane (*E. elatior*), silvery lupine (*Lupinus argenteus*), butterweed groundsel (*Senecio serra*), blue wildrye (*Elymus glaucus*), nettleleaf giant hyssop (*Agastache urticifolia*), Colorado columbine (*Aquilegia coerulea*), snowberry (*Symphoricarpos rotundifolius*) and red baneberry (*Actaea rubra*).

Mixed Conifer – Below Elk Camp

These are uneven aged, multistoried mixed conifer (subalpine fir, Douglas fir, lodgepole pine, and Engelmann spruce) stands. Stocking is uniform and all size classes from 6 to 18 inches in diameter are well represented. Most trees display good bole form, but crown development is variable. Many of the over mature/dominant trees throughout these stands have sparse rounded crowns or dead tops, an indication that they are beginning to die back. The co-dominants and intermediates also display variable crown form. Competition and suppression have limited crown development to the point where many trees have low (less than 30 percent) crown ratios, reducing horizontal cover. Subalpine fir seedlings and saplings are numerically abundant, but unevenly distributed throughout the understory. Forest floor vegetation is depauperate where little sunlight is reaching the forest floor. Elsewhere, heartleaf arnica (*Arnica cordifolia*), grouse whortleberry (*Vaccinium myrtillus* subsp. *oreophilum*), bluntseed sweet cicely (*Osmorrhiza depauperata*), and paxistima (*Paxistima myrsinites*) are well established in the understory.

Mixed Conifer – Above Elk Camp

These are uneven aged, multi-storied mixed conifer (subalpine fir and Engelmann spruce) stands. Stocking is uniform and all size classes from 6 to 16 inches in diameter are well represented. Although a few of the over mature/dominant trees throughout these stands have sparse rounded crowns or dead tops (an indication that they are beginning to die back), nearly all dominant canopy layer trees display good bole form and excellent crown development. The co-dominants and intermediates also display good crown form. Subalpine fir seedlings and saplings are numerically abundant, but unevenly distributed throughout the understory. Forest floor vegetation is depauperate where little sunlight is reaching the forest floor. Elsewhere, heartleaf arnica, grouse whortleberry, bluntseed sweet cicely, and paxistima are well established in the understory.

Non-Forested Habitats

The Elk Camp Summit multi-purpose activity area would be located at the subalpine/alpine ecotone and is dominated by grasses and forbs characteristic of its 11,300-foot elevation. This plant community is characterized by low-growing grasses, forbs, and shrubs. Vegetation includes Rocky mountain fescue (*Festuca saximontana*), Scribner's wheatgrass (*Elymus scribneri*), alpine bluegrass (*Poa alpina*), cutleaf daisy (*Erigeron compositus*), ballhead sandwort (*Eremogone congesta*), manyray goldenrod (*Solidago multiradiata*), grouse whortleberry and yarrow (*Achillea lanulosa*).

Rock outcrop vegetation was also observed in a few areas of the analysis area. These rocky areas typically support American rockbrake (*Cryptogramma acrostichoides*), tall blacktip ragwort (*Senecio atratus*), rock jasmine (*Ciliaria austromontana*), Fendler sandwort (*Eremogone fendleri*), and alpine false goldenaster (*Heterotheca pumila*).

The climbing wall would be constructed on a revegetated site where the old Café Suzanne was once located. Vegetation here is characteristic of Snowmass' revegetation seed mix.

Finally, the area near the top of the Elk Camp Gondola and the Meadows Chairlift consists of a variety of non-native agricultural grasses such as timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*), and smooth brome (*Bromus inermis*) as well as native species such as slender wheatgrass (*Elymus trachycaulus*), Rocky Mountain fescue (*Festuca saximontana*), mountain brome (*Bromus marginatus*), and tufted hairgrass (*Deschampsia caespitosa*), as well as forbs including yarrow and dandelion (*Taraxacum officinale*).

Invasive Non-Native Weeds

Six species of Colorado-listed noxious weeds were documented within the analysis area. These include scentless chamomile (*Matricaria perforata*), ox-eye daisy (*Leucanthemum vulgare*), Canada thistle (*Cirsium arvense*), plumeless thistle (*Carduus acanthoides*), houndstongue (*Cynoglossum officinale*), and poison hemlock (*Conium maculatum*). In addition, yellow sweet clover (*Melilotus officinalis*), which is a

weedy non-native agricultural plant, and several non-native pasture grasses were also observed (refer to Table 3J-1).

The scentless chamomile, ox-eye daisy and Canada thistle are the most common invasive non-native weeds in the analysis area, and are most abundant along road sides, at chairlift terminals, and in other disturbed zones such as underground utilities. Plumeless thistle, houndstongue and poison hemlock appear to be relatively uncommon at this time, but are scattered throughout the lower elevations of the analysis area. The project file contains a map of the locations of each of the invasive non-native weed populations observed throughout the analysis area.

The Colorado Noxious Weed Act directs the Department of Agriculture to develop and implement management plans for all List A and List B noxious weed species. There are no List A Noxious Weeds at Snowmass. However, there are five List B species. Four of these species are to be suppressed, while the fifth (plumeless thistle) is slated for elimination by 2018. These management plans are regularly reviewed, updated and detailed in the Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act, or the Noxious Weed Rule for short.¹³⁹

**Table 3J-1:
Non-Native Plants and Invasive Weeds**

<i>Scientific Name/ Common Name</i>	Noxious Weed and Class	Management Status
PERENNIAL GRAMINOIDS		
<i>Bromus inermis</i> Smooth brome	No	N/A
<i>Dactylis glomerate</i> Orchardgrass	No	N/A
<i>Phleum pretense</i> Timothy	No	N/A
PERENNIAL FORBS		
<i>Cirsium arvense (Breea)</i> Canada thistle	Yes, Class B	Suppression
<i>Leucanthemum vulgare</i> (<i>Crysanthemum leucanthemum</i>) Ox-eye daisy	Yes, Class B	Suppression
<i>Taraxacum officinale</i> Dandelion	No	N/A

¹³⁹ 8 CCR 1206-2

**Table 3J-1:
 Non-Native Plants and Invasive Weeds**

<i>Scientific Name/ Common Name</i>	Noxious Weed and Class	Management Status
ANNUAL/BIENNIAL FORBS		
<i>Carduus acanthoides</i> Plumeless thistle	Yes, Class B	Elimination by 2018
<i>Conium maculatum</i> Poison hemlock	Yes, Class C	N/A
<i>Cynoglossum officinale</i> Houndstongue	Yes, Class B	Suppression
<i>Matricaria perforate</i> Scentless chamomile	Yes, Class B	Suppression
<i>Melilotus officinalis</i> Yellow sweet clover	No	N/A

Source: Colorado Department of Agriculture, 2016

Notes:

“Elimination” means the removal or destruction of all emerged, growing plants of a population of List A or List B species designated for eradication by the Commissioner. It is the first step in achieving Eradication and is succeeded by efforts to detect and destroy newly emerged plants arising from seed, reproductive propagule, or remaining root stock for the duration of the seed longevity for the particular species.

“Suppression” means reducing the vigor of noxious weed populations within an infested region, decreasing the propensity of noxious weed species to spread to surrounding lands, and mitigating the negative effects of noxious weed populations on infested lands. Suppression efforts may employ a wide variety of integrated management techniques

Spruce Beetle

Spruce bark beetle (*Dendroctonus rufipennis*) poses an increasing concern for the health of spruce forests throughout the Rocky Mountains, including Colorado and the WRNF.¹⁴⁰ Spruce bark beetles typically colonize downed spruce and then spread to standing trees.¹⁴¹ Therefore, proper care and treatment of downed spruce is an important component of managing this insect. Outbreaks cause extensive tree mortality and can alter stand structure and composition, which can impact scenic resources and create fire hazards.¹⁴² The recent Mountain Pine Beetle epidemic in the area has already significantly changed the scenery in the region and the extensive dead and downed trees pose a fire hazard. Careful attention to the prevention of a spruce beetle outbreak is a primary goal on the WRNF.

¹⁴⁰ USDA Forest Service, 2010

¹⁴¹ Ibid.

¹⁴² Ibid.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Vegetation

Under the No Action Alternative, no vegetation would be disturbed. Over the short-term, plant communities would remain similar to that described in the affected environment. Species composition, stand structure and configuration would remain similar to existing conditions. Barring a natural disturbance such as a wildfire, plant communities would gradually change through natural succession to later seral stages.

Invasive Non-Native Weeds

Under the No Action Alternative, Snowmass would continue to manage invasive non-native weeds according to their current Noxious Weed Management guidelines. No adverse impacts due to invasive and non-native weeds are anticipated.

Spruce Beetle

No spruce trees would be cut as a result of the No Action Alternative; therefore, there would be no direct impact to the risk of spruce beetle infestation. Natural processes related to this insect are anticipated to continue.

Alternative 2 – Proposed Action

Vegetation

Under Alternative 2, there would be negligible impacts to overstory vegetation due to grading and vegetation clearing. The proposed projects would require 17.2 acres of overstory vegetation removal. Of the 17.2 acres, 11.9 acres of spruce-fir, 4.3 acres of aspen stands and 1.0 acre of grasses and forb would be impacted by the proposed projects (refer Table 3J-2). This represents minimal impacts to these vegetation cover types within the greater Snowmass SUP area; 0.6 percent of impacts to spruce-fir stands within the Snowmass SUP area, 0.5 percent of aspen stands and less than 0.1 percent of grass and forb.

For each of the vegetation cover types impacted by the proposed projects, a couple of projects are typically the majority of the disturbance. For example, of the 2.8 acres of spruce-fir vegetation clearing, 2.4 acres are clearing for the zip line canopy tour and mountain coaster. The remaining 0.4 acre is clearing for the ropes challenge course. Of the 9.0 acres of spruce-fir vegetation clearing and grading, 7.8 acres are clearing for mountain biking and hiking trails. Of the 3.5 acres of aspen vegetation clearing and grading, 3.4 acres are clearing for mountain biking and hiking trails.

In total, 17.2 acres of overstory vegetation would be cleared of the total disturbance of 25.5 acres under Alternative 2. The remaining 8.3 acres are grading on ski trails or exposed soil.

**Table 3J-2:
Disturbance by Vegetation Type – Alternative 2**

Vegetation Type	Acres of Disturbance		
	Vegetation Clearing	Vegetation Clearing and Grading	Total
Spruce-Fir	2.8	9.0	11.9
Aspen	0.8	3.5	4.3
Forb	0.1	0.9	1.0
Total	3.7	13.5	17.2

Invasive Non-Native Weeds

Under Alternative 2, there would be no adverse impacts due to invasive non-native weeds. PDC and BMPs would be followed to control and manage invasive weeds. PDC include: 1) pretreatment of existing infestations; 2) cleaning all off-road equipment; 3) revegetation with approved seed mixes that are certified noxious weed free; and 4) monitoring and treatment of the analysis area for three years. Implementation of these PDC will help control existing populations of undesirable weeds, but also prevent their spread into any previously un-infested areas.

Spruce Beetle

Spruce trees would be cut for the multi-season recreation activities under Alternative 2. The implementation of PDC listed in Table 2-2 would ensure that downed spruce trees are properly treated (or promptly removed or burned) to prevent colonization by spruce beetles. These PDC would minimize the risk that tree removal would contribute to a spruce beetle outbreak.

Alternative 3

Vegetation

Under Alternative 3, there would be negligible impacts to overstory vegetation due to grading and vegetation clearing. The proposed projects would require 16.1 acres of overstory vegetation removal. Of the 16.1 acres, 10.7 acres of spruce-fir, 4.4 acres of aspen stands and 1.0 acre of grasses and forb would be impacted by the proposed projects (refer Table 3J-3). This represents minimal impacts to these vegetation cover types within the greater Snowmass SUP area; 0.6 percent of impacts to spruce-fir stands within the Snowmass SUP area, 0.5 percent of aspen stands and less than 0.1 percent of grass and forb.

For each of the vegetation cover types impacted by the proposed projects, a couple of projects are typically the majority of the disturbance. For example, of the 2.8 acres of spruce-fir vegetation clearing, 2.4 acres are clearing for the zip line canopy tour and mountain coaster. The remaining 0.4 acre is clearing for the ropes challenge course. Of the 7.9 acres of spruce-fir vegetation clearing and grading, 6.7 acres are clearing for mountain biking and hiking trails. Of the 3.5 acres of aspen vegetation clearing and grading, 3.4 acres are clearing for mountain biking and hiking trails.

In total, 16.1 acres of overstory vegetation would be cleared of the total disturbance of 23.3 acres under Alternative 3. The remaining 7.2 acres are grading on ski trails or exposed dirt.

**Table 3J-3:
Disturbance by Vegetation Type – Alternative 3**

Vegetation Type	Acres of Disturbance		
	Vegetation Clearing	Vegetation Clearing and Grading	Total
Spruce-Fir	2.8	7.9	10.7
Aspen	0.8	3.6	4.4
Forb	0.1	0.9	1.0
Total	3.7	12.4	16.1

Invasive Non-Native Weeds

Under Alternative 3, there would be no adverse impacts due to invasive non-native weeds. PDC and BMPs would be followed to control and manage invasive weeds. PDC include: 1) pretreatment of existing infestations; 2) cleaning all off-road equipment; 3) revegetation with approved seed mixes that are certified noxious weed free; and 4) monitoring and treatment of the analysis area for three years. Implementation of these PDC will help control existing populations of undesirable weeds, but also prevent their spread into any previously un-infested areas.

Spruce Beetle

Spruce trees would be cut for the multi-season recreation activities under Alternative 3. The implementation of PDC listed in Table 2-2 would ensure that downed spruce trees are properly treated (or promptly removed or burned) to prevent colonization by spruce beetles. These PDC would minimize the risk that tree removal would contribute to a spruce beetle outbreak.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for forest health extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for forest health are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on forest health resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Past Snowmass Projects (Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement, Burnt Mountain Egress Trail, Summer Trails, New/Realigned Mountain Bike Trails, Sheer Bliss Pond Modification)
- WRNF Forest Plan – 2002 Revision

These past projects in conjunction with the proposed multi-season recreation projects cumulatively impact forest health through the cutting of trees and potential spread of invasive non-native weeds and infectious disease. The recent Mountain Pine Beetle epidemic in the area has already significantly changed the forest structure in the region and the extensive dead and downed trees pose a fire hazard. Careful attention to the prevention of a spruce beetle outbreak is a primary goal on the WRNF.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Ground disturbance related to multi-season recreation projects would represent an irretrievable effect to forest health resources within the SUP area and adjacent private lands. However, this is not considered an irreversible commitment because timber is a renewable resource.

K. FISH AND WILDLIFE

SCOPE OF THE ANALYSIS

This wildlife analysis is tiered to the Forest Plan and to the 2008 Southern Rockies Lynx Amendment.¹⁴³ Species analyzed include federally threatened, endangered, and proposed species, Forest Service Region 2 sensitive species, migratory birds, and SOLC. A Biological Assessment and a Biological Evaluation have been prepared and are included in the project file.¹⁴⁴ These documents are incorporated by reference and summarized herein. The spatial extent of the wildlife analysis encompasses Snowmass SUP boundary, but varies in scope depending on the individual life history and range of individual species.

AFFECTED ENVIRONMENT

Threatened and Endangered Species

Federally threatened and endangered species that may occur or could potentially be affected by activities in the Snowmass SUP area were retrieved from the USFWS IPaC website. Species included in the IPaC *Trust Resources Report* for the Snowmass Multi-Season Recreation Projects are shown in Table 3K-1.¹⁴⁵ A pre-field review was conducted of available information to assemble occurrence records, evaluate habitat needs and ecological requirements, and determine whether field reconnaissance was needed to complete the analysis. Sources of information included Forest Service records and files, the Colorado Natural Heritage Program database, CPW information, and published research.

No further analysis is needed for species that are not known or suspected to occur in the project area, or for which no suitable habitat is present or affected by proposed activities. Table 3K-1 documents the rationale for excluding a species. If suitable but unoccupied habitat is present, additional survey is required, unless presence is assumed and potential effects evaluated.

The landscape within and surrounding the project area was surveyed for the existence of habitat for federally listed wildlife species during site visits conducted during the summer of 2016.

¹⁴³ USDA Forest Service, 2002a and 2008

¹⁴⁴ Colfer, 2016a,b

¹⁴⁵ USFWS, 2016

**Table 3K-1:
Threatened, Endangered, and Proposed Wildlife Species**

Species Common Name/ <i>Scientific Name</i>	Status ^a	Typical Habitat ^b	Suitable Habitat?	Rational if not carried forward for analysis
MAMMALS				
Canada lynx (<i>Lynx canadensis</i>)	T	A, C, D, E, G	Yes	Carried forward
North American Wolverine (<i>Gulo gulo luscus</i>)	P	O	No	No persistent, deep, reliable snow cover.
BIRDS				
Yellow Billed Cuckoo (<i>Coccyzus americanus</i>)	T	C	No	No cottonwood/riparian habitat.
Mexican Spotted Owl (<i>Strix occidentalis lucida</i>)	T	B, D	No	Not documented on WRNF since 1903. Only identified area on the WRNF with nest habitat is located in Glenwood Canyon.
FISH				
Colorado pikeminnow (<i>Ptychocheilus lucius</i>)	E	J	Yes	Carried forward.
Razorback Sucker (<i>Xyrauchen texanus</i>)	E	J	Yes	
Humpback Chub (<i>Gila cypha</i>)	E	J	Yes	
Bonytail Chub (<i>Gila elegans</i>)	E	J	Yes	
Greenback Cutthroat Trout (<i>Oncorhynchus clarki stomias</i>)	T	E	No	No lineage GB populations in Brush Creek or downstream to Roaring Fork. Brown and brook trout present in Brush Creek and would outcompete lineage GB if present.
INVERTEBRATES				
Uncompahgre fritillary butterfly, (<i>Boloria acrocneuma</i>)	E	K	No	No suitable habitat (alpine snow willow stands >12,000' on peaks ≥12,600'). Project far outside species' distribution.

Source: USDA Forest Service, 2002b

Notes:

^a Status: S=Sensitive; T=Threatened; E=Endangered; P=Proposed

^b Habitat Key: A=Aspen; B=Cliff/Rock/Scree; C=Cottonwood/Riparian; D=Conifer Forest; E=Headwaters/Willow Riparian; F=Lakes/Rivers; G=Marsh/Wetlands/Beaver Complexes/Fens; H=Rangelands/Sage; I=Creek w/Limestone drips; J=Colorado River; Green River, Lower Yampa & White Rivers; K=Above timberline; L=Mountain parks; M=Piñon Juniper; N=Soils derived from Pierre, Niobrara, and Troublesome formations; O=High elevations with deep, persistent, and reliable spring snow cover.

North American wolverine, Uncompahgre fritillary butterfly, yellow-billed cuckoo, Mexican spotted owl, and greenback cutthroat trout were eliminated from detailed analysis because their ranges do not include the analysis area, and habitat required during their life history is not found within the project area. The effect of the proposed projects on the four big river fish and the Canada lynx is analyzed in detail.

Upper Colorado River Endangered Fish

The Upper Colorado River Basin is home to 14 native fish species, including the endangered humpback chub, bonytail chub, Colorado pikeminnow, and razorback sucker. These endangered fish are found only in the Colorado River system.

The USFWS has determined that water depletions are among the current activities with the greatest impact on all four of these endangered fish. Activities resulting in water depletion in the Upper Colorado River Basin may jeopardize the continued existence of the four endangered fish. The proposed projects are expected to increase visitation at Snowmass, resulting in an increase in consumptive water usage and additional depletions to the Colorado River basin. Therefore, the impact of the project on the four big river fish are carried forward for analysis.

Canada Lynx

The Snowmass SUP boundary is located within the Snowmass LAU (areas to depict lynx home ranges), which is approximately 61,000 acres in size. The Snowmass SUP boundary occupies about 5,000 acres, or 13 percent of the Snowmass LAU. Less than 1 percent of this LAU has been mapped as unsuitable for Canada lynx.

Across the Snowmass SUP area, forested habitat for Canada lynx exists in a narrow band between the aspen zone and the alpine zone. Within the current project area, the majority of lynx habitat exists between the aspen zone at about 9,100 feet, and the 10,200 feet elevation. Above 10,200 feet, habitat has been fragmented by ski trail development, leaving only narrow forest strips between ski trails that do not provide habitat for lynx or hares. Lynx habitat between the aspen zone and 10,200 feet is generally of low-moderate quality, as lynx and hare habitat examinations have demonstrated.¹⁴⁶ Above 10,200 feet, the landscape provides travel habitat, but limited summer habitat and almost no winter habitat.

Elsewhere in the SUP area, larger blocks of conifer forest remain between ski trails; these stands that may provide habitat for lynx and hares. These blocks vary in size with the largest being in the Burnt Mountain area, more moderately-sized habitat blocks located centrally, and the least amount of remaining lynx habitat located on the higher elevations across the SUP area and in the Sam's Knob/Big Burn portion of the mountain. One of the large blocks relevant to this project (182-acre Stand 70; refer to Figure 3K-1) is located west of the Elk Camp Restaurant in which mountain biking trails and the zip line canopy tour are proposed.

¹⁴⁶ Colfer, 2016c

Existing habitat connectivity across Snowmass' summer operational area has been negatively affected by fragmentation resulting from the development of Snowmass as a winter recreation area. The existing summer hiking/mountain biking trails have added minimally to that fragmentation. The noise and visual effects of recreational use of these existing trails has also impacted portions of these stands. The area influenced by noise and visual impacts is referred to by biologists as the "zone of disturbance." The extent of this zone has not been defined in the literature for Canada lynx; however, research on Eurasian lynx by Sunde et al. suggests that lynx require cover for daytime security that is at least 650 feet from human developments and relatively free from human intrusions.¹⁴⁷ As Sunde's data provides the only estimate available for lynx, security habitat for the purposes of this analysis will include sites with a disturbance-free radius of at least 650 feet.

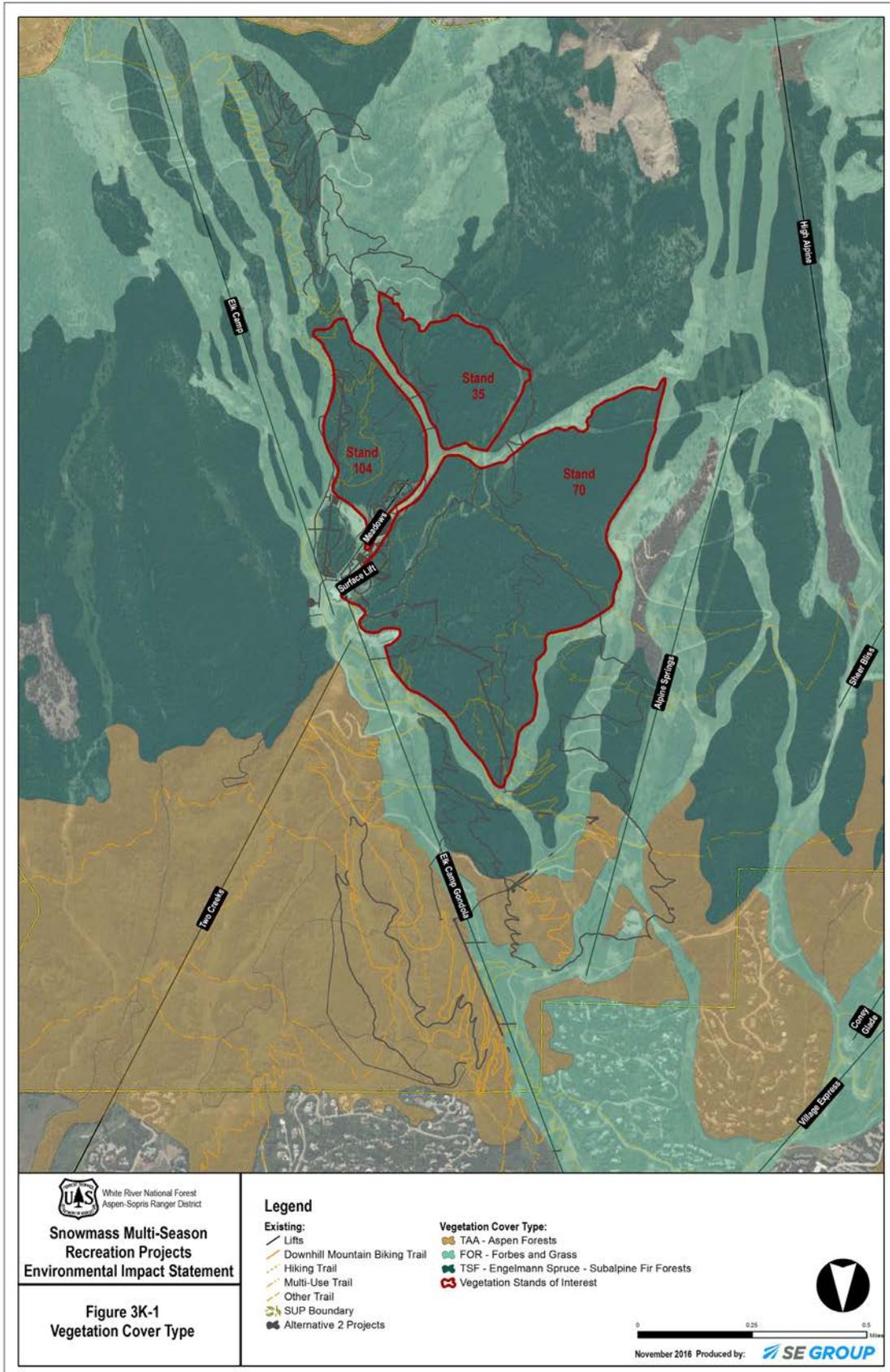
Conifer stands with dense horizontal cover at the snow level provide winter habitat for snowshoe hares, the primary prey species for Canada lynx. Within the Snowmass SUP area, many of the conifer stands that provide such cover are skied during the winter. There is evidence that the year-round suitability of hare habitat is substantially decreased by tree skiing.¹⁴⁸ Snowshoe hare pellet surveys conducted over the past several years at Snowmass have demonstrated that while hares are present within stands in the project area, hare abundance is low. The combined effects of historic fragmentation, tree skiing, and summer recreation have limited the year-round effectiveness of conifer stands in the project area as lynx habitat.

Conifer stands providing lynx habitat in the project area range in size from 18 acres to 182 acres. Three conifer stands in particular, Stands 70 (182 acres), 104 (42 acres), and 35 (39 acres), provide suitable lynx habitat, and may provide daytime habitat due to their size and location within the spruce/fir zone (refer to Figure 3K-1). However, all three of these stands are currently bisected by biking and hiking trails, which reduces their effectiveness during the summer daytime. During the winter, the presence of biking trails does not affect diurnal security because the trails are not used. Male Canada lynx are most active during the summer in the periods around dawn and dusk. Females with litters are active equally throughout the photoperiod. Therefore, the vast majority of summer recreational use would take place when males and females without litters are least active.

Based on the previously cited study by Sunde, the existing summer trails within Stand 104 have reduced the suitability of Stand 104 as a daytime refuge to the point where it is unlikely that a lynx would choose this stand in which to rest during the day. Stands 70 and 35 are likely to still provide refugia, although reduced in places also due to currently used hiking and/or biking trails. Daytime refugia exist elsewhere in the Snowmass SUP area, and throughout the Snowmass LAU.

¹⁴⁷ Sunde et al., 1998

¹⁴⁸ Broderdorp, 2016; USFWS, 2013



Region 2 Sensitive Species

Based on documented habitat affinities, ten species identified in Table 3K-2 were determined to have potential habitat in the project areas. Sensitive species for which there is no habitat in the project area were eliminated from detailed analysis. The sensitive species analysis is included in the project Biological Evaluation, located in the project file.

**Table 3K-2:
Region 2 Sensitive Wildlife Species**

Species	Occurrence on WRNF	Habitat Association	Detailed Analysis?	Rationale if not carried forward for analysis
MAMMALS				
Spotted bat (<i>Euderma maculatum</i>)	Rifle District (one record south rim of Glenwood Canyon)	Montane forests, P-J open semidesert shrublands; rocky cliffs for roosts.	N	No habitat present in project area as described in column 3.
River otter (<i>Lontra canadensis</i>)	Rare occurrence of recent transplants, Summit and Eagle Counties	Riparian habitats that traverse a variety of other habitats. Mainly larger river systems.	N	No habitat present in project area as described in column 3.
Marten (<i>Martes americana</i>)	Widespread in spruce/fir and lodgepole pine	Mesic, dense coniferous forests with complex physical structure. During winter, prefer mature conifer. Stand structure may be more important than species composition.	Y	Carried forward
Fringed myotis (<i>Myotis thysanodes</i>)	Western portions of WRNF up to 7,500'	Low elevation conifer, oakbrush, shrublands; caves, mines, building roosts.	N	No habitat. Project area well above known elevation range.
Hoary Bat (<i>Lasiurus cinereus</i>)	Statewide from the plains to timberline	Solitary tree roosting bat using mixed conifer, lodgepole pine, ponderosa pine, piñon-juniper, cottonwood, and willow.	Y	Carried forward
Townsend's Big-eared bat (<i>Plecotus townsendii townsendii</i>)	Documented on WRNF in several cave locations	Semidesert shrublands, P-J, open montane forests; caves and abandoned mine roosts.	N	No Impact. No habitat. No caves or abandoned mines in project area.

**Table 3K-2:
Region 2 Sensitive Wildlife Species**

Species	Occurrence on WRNF	Habitat Association	Detailed Analysis?	Rationale if not carried forward for analysis
Rocky Mountain bighorn sheep (<i>Ovis canadensis canadensis</i>)	Upper reaches of the Elk Mountains from Taylor Pass to McClure Pass.	Rocky, steep, or rugged terrain for escape cover with open grass-dominated habitats nearby for foraging. Summer range at high elevation and winter range in valley bottoms or where snow depth is minimal.	N	No habitat present in project area as described in column 3.
Pygmy shrew (<i>Sorex hoyi</i>)	Documented on WRNF in 2009	Mesic boreal environments; wide range of habitats, S-F forests, clear-cuts, boggy meadows, willow thickets, aspen and subalpine parklands. All captures in Colorado above 9,600' elevation.	Y	Carried forward
BIRDS				
Northern goshawk (<i>Accipiter gentilis</i>)	Widespread in suitable habitat	Open forests, mainly mixed conifer and aspen, above 7,500' elevation.	Y	Carried forward
Boreal owl (<i>Aegolius funereus</i>)	Widespread in suitable habitat	Mature S-F or S-F/lodgepole pine interspersed with meadows.	Y	Carried forward
Sage sparrow (<i>Amphispiza belli</i>)	Not documented on WRNF, found adjacent to SW Rifle District and in western Eagle County	Sagebrush shrublands.	N	No sagebrush habitat
Ferruginous hawk (<i>Buteo regalis</i>)	Migrant on WRNF on large grassland areas	Grasslands and semi-desert shrublands	N	No grassland habitat
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	Widespread historic records on forest; Currently in northern Summit County and adjacent to Eagle and Holy Cross Ranger Districts in Routt & northern Eagle County. Extirpated south of I-70 on WRNF.	Large sagebrush shrublands	N	No sagebrush habitat
Northern harrier (<i>Circus cyaneus</i>)	Migrant	Marshes, wetlands, grasslands, alpine tundra during fall migration.	N	No suitable habitat other than during migration.

**Table 3K-2:
Region 2 Sensitive Wildlife Species**

Species	Occurrence on WRNF	Habitat Association	Detailed Analysis?	Rationale if not carried forward for analysis
Olive-sided flycatcher (<i>Contopus borealis</i>)	Widespread	Breeds in mature spruce/fir and Douglas fir, esp. on steep slopes; ponderosa pine at Derby Mesa.	Y	Carried forward
Black swift (<i>Cypseloides niger</i>)	Several documented nesting areas on WRNF	Nests behind waterfalls; forage at high elevations over montane and lowland habitats.	N	No waterfalls
American peregrine falcon (<i>Falco peregrinus anatum</i>)	Several documented nesting aeries on WRNF	Nest on cliffs, forage over forests and shrublands.	N	No cliffs. Closest eyrie 12 miles distant
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Documented nest site off forest near Carbondale on Roaring Fork. No known nest sites on WRNF.	In Central Colorado, primarily uses low elevation riparian habitat along the Colorado, Eagle, and White River drainages and their major tributaries. Roosts and nests in trees near open water	N	No nest habitat. Closest known nest in Carbondale
White-tailed ptarmigan (<i>Lagopus leucurus</i>)	Widespread in alpine on WRNF	Alpine tundra, high-elevation willow thickets, krummholz, spruce-fir (winter).	N	Outside of CPW mapped range. No alpine willow habitat in project area.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Primary WRNF records from western portions of Flat tops; seen above Sylvan Lake (Eagle District) along sagebrush edges during migration	Open riparian areas, grasslands & shrublands, esp. semidesert shrublands, and sometimes P-J. Below 9,000'.	N	No shrubland or grassland riparian habitat. Above elevation range.
Lewis' woodpecker (<i>Melanerpes lewis</i>)	Not documented on WRNF, found adjacent to Forest.	Lowland and foothill riparian forests, mature cottonwood groves.	N	No lowland or foothill riparian forest
Flammulated owl (<i>Otus flammeolus</i>)	Scattered records across WRNF	Aspen-mixed conifer forests, P-J woodlands, ponderosa pine; to 10,000' elevation.	Y	Carried forward
Purple martin (<i>Progne subis</i>)	Western half of WRNF	Breeds in mature aspen near water and parks.	Y	Carried forward

**Table 3K-2:
Region 2 Sensitive Wildlife Species**

Species	Occurrence on WRNF	Habitat Association	Detailed Analysis?	Rationale if not carried forward for analysis
Brewer's sparrow (<i>Spizella breweri</i>)	Widespread in suitable habitat on WRNF	Sagebrush shrublands, mountain parks; may be found in alpine willow stands. Not known from Pitkin County.	N	No sagebrush shrublands, mountain parks, alpine willow stands.
Columbian sharp-tailed grouse (<i>Tympanachus phasianellus columbianus</i>)	NW corner of Blanco District, NE Eagle County and very north end of Summit County; population adjacent to Forest in southern Routt County	Mid elevation mountain sagebrush/grassland habitat usually adjacent to forested areas.	N	No sagebrush, mountain shrub, or grassland habitat. South of geographic range
AMPHIBIANS				
Boreal toad (<i>Bufo boreas boreas</i>)	Small disjunct populations across the WRNF	Subalpine forest habitats with marshes, wet meadows, streams, beaver ponds, and lakes.	Y	Carried forward
Northern leopard frog (<i>Rana pipiens</i>)	Two known populations on Rifle and Blanco Districts. Private/Bureau of Land Management near Carbondale.	Wet meadows, marshes, ponds, beaver ponds, streams.	N	No known populations closer than Carbondale.
FISH				
Bluehead sucker (<i>Catostomus discobolus</i>)	Colorado River to Granby, Milk, Piceance, Rifle, Alkali, and Divide Creeks	Larger rivers of western slope of Colorado.	N	No large, western slope rivers impacted by project.
Flannelmouth sucker (<i>Catostomus latipinnis</i>)	Colorado River to Granby, Milk, Piceance, and Divide Creeks	Larger rivers of western slope of Colorado.	N	No large, western slope rivers impacted by project.
Mountain sucker (<i>Catostomus platyrhynchus</i>)	Numerous small to medium streams below 8600' elevation draining into the White River, Deep Creek	Throughout west on both sides of Continental Divide-clear cold creeks & small-medium rivers with rubble, gravel, or sand substrate.	N	Project area well above the known elevation range for this species. None known from Brush Creek.
Roundtail chub (<i>Gila robusta</i>)	Colorado River through Glenwood Canyon, downstream on White River, Milk and Divide Creeks	Larger rivers of Colorado River basin.	N	No large, western slope rivers impacted by project.

**Table 3K-2:
Region 2 Sensitive Wildlife Species**

Species	Occurrence on WRNF	Habitat Association	Detailed Analysis?	Rationale if not carried forward for analysis
Colorado River cutthroat trout (<i>Oncorhynchus clarki pleuriticus</i>)	Widespread in localized reaches	Headwater streams and lakes.	N	No identified populations in Brush Creek drainage.
INSECTS				
Western bumblebee (<i>Bombus occidentalis</i>)	Species or habitat suspected to occur on WRNF, unconfirmed	High elevation areas, most frequently in montane and subalpine meadows with abundant and diverse wild flower populations.	N	Impacts to montane and subalpine habitat insignificant in comparison with available habitat.
Monarch Butterfly (<i>Danaus plexippus plexippus</i>)	Species or habitat suspected to occur on WRNF, unconfirmed	Forests, woodlands, shrublands, grasslands, cropland, and urban areas. Dependent on milkweed, the larval host plant.	N	No milkweed in project area.
Great Basin silverspot (<i>Speyeria nokomis nokomis</i>)	Confirmed in Moffat and Mesa Co., but not on WRNF	Wetlands fed by springs or seeps; elevation <7500'; hosts on <i>Viola nephrophylla</i> (<i>V. sororia</i> subsp. <i>affinis</i>).	N	Outside elevation range

Sources: Luce and Keinath, 2007; Boyle, 2006; Buskirk and Ruggiero, 1994; Keinath, 2004; Snider, 2011; Gruver and Keinath, 2006; Beecham et al., 2007; Siemers, 2009; Beauvais and McCumber, 2006; Kennedy, 2003; Hayward, 1994; Holmes and Johnson, 2005a,b; Collins and Reynolds, 2005; Stiver et al., 2006; Slater and Rock, 2005; Kotliar, 2007; Wiggins, 2004 and 2005; Andrews and Righter, 1992; Hoffman, 2006; Abele et al., 2004; McCallum, 1994; Hoffman and Thomas, 2007; Keinath and McGee, 2005; Smith and Keinath, 2007; Ptacek et al., 2005; Rees et al., 2005a,b; Belica and Nibbelink, 2006; Young, 2008; Toretta, 2013; Selby, 2007.

Notes: Regional Foresters List of Sensitive Species edited for the WRNF, October 23, 2015.

Migratory Birds

In 2008 the Forest Service Chief signed a Memorandum of Understanding (MOU) (#08-MU-1113-2400-264) with the USFWS to promote the conservation of migratory birds.¹⁴⁹ This MOU was pursuant to EO 131866, Responsibilities of Federal Agencies to Protect Migratory Birds.¹⁵⁰ The EO directs agencies to take certain actions to further comply with the migratory bird conventions, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act and other pertinent statutes.

Table 3K-3 summarizes birds of conservation concern for Bird Conservation Region 16 (Southern Rockies/Colorado Plateau), and lists potential occurrence in the project area.

¹⁴⁹ USDA Forest Service, 2008

¹⁵⁰ 66 Federal Register 3853

**Table 3K-3:
USFWS Birds of Conservation Concern**

Species	Occurrence on WRNF	Habitat Association	Occurrence in Project Area?
Gunnison Sage-grouse	No	Sagebrush, SW Colorado	No
American Bittern	No	Large wetlands with dense emergent vegetation	No
Bald Eagle	No, closest nest in Carbondale	Cottonwood/conifer nests adjacent to large rivers and lakes	No
Ferruginous Hawk	No	Prairie grasslands and shrub-steppe	Yes, but only during migration.
Golden Eagle	Yes, project area may be part of large hunting range; no local nests	Cliff or tree nests. Forage over grasslands, sagebrush, tundra.	Yes, foraging only.
Peregrine Falcon	Yes; closest eyrie 12 miles	Cliff nests. Hunt predominately over P-J, ponderosa, spruce/fir	No, too far from closest occurrence.
Prairie Falcon	No	Cliff nests. Hunt over grasslands, woodlands, shrublands.	No
Snowy Plover	No	Reservoir shorelines	No
Mountain Plover	No	Prairie grasslands	No
Long-billed Curlew	No	Shortgrass prairies	No
Yellow-billed Cuckoo	No	Deciduous Riparian	No
Flammulated Owl	Scattered records across WRNF	Aspen-mixed conifer forests, P-J woodlands, ponderosa pine; to 10,000' elevation	Yes
Burrowing Owl	No	Plains/grasslands	No
Lewis's Woodpecker	No	Riparian Cottonwood	No
Willow flycatcher	Likely in middle and high elevation willow carrs	Middle and high elevation willow and alder carrs	Yes
Gray Vireo	No	Open P-J woodlands	No
Pinyon Jay	No	P-J woodlands	No
Juniper Titmouse	No	P-J woodlands	No
Veery	No	Riparian thickets	No
Bendire's Thrasher	No	Rare spp. of arid areas	No
Grace's warbler	No	Ponderosa pine/scrub oak	No
Brewer's Sparrow	No	Sagebrush shrublands, mountain parks.	No
Grasshopper Sparrow	No	Prairie grasslands	No

**Table 3K-3:
 USFWS Birds of Conservation Concern**

Species	Occurrence on WRNF	Habitat Association	Occurrence in Project Area?
Chestnut-collared longspur	No	Prairie grasslands	No
Black Rosy-finch	Unknown	Uncommon wintering species in alpine	No
Brown-capped Rosy-finch	Likely	Alpine cliffs	No
Cassin's Finch	Yes	Conifers	Yes

Source: Kingery, 1998

Potential occurrences and habitat associations on the WRNF and Snowmass were verified by Jonathan Lowsky, Colorado Wildlife Science. Mr. Lowsky has extensive knowledge of Pitkin County birds and habitat associations.

More detailed information on the habitat requirements, status, distribution, abundance, and key habitat components of most species is on file at the Forest Service Supervisor's Office in Glenwood Springs, Colorado, and the USFWS Western Colorado Field Office in Grand Junction, Colorado, and is not reviewed here.

Species of Local Concern

The Forest Service selected American elk as a species that warrants individual analysis for this project due to public concern.

Elk

CPW estimates elk population and sets management objectives for elk in a Data Analysis Units (DAUs) Plan.¹⁵¹ The Snowmass SUP area is located within DAU E-15 (Avalanche Creek), which comprises portions of Pitkin, Gunnison, and Garfield counties. During the 1980s, the population objective for DAU E-15 was 2,500 elk. In 1988 Colorado Division of Wildlife (now CPW) raised the population objective to 3,300 elk. In the 1990s, the elk population in DAU E-15 peaked at over 9,000 animals.

The most current post hunt 2011 DAU E-15 population size estimated by CPW is 4,500 elk with a three-year sex ratio of 21 bulls to 100 cows.¹⁵² The population objective for DAU E-15 is 3,600 to 5,400 animals, with a sex ratio of 17 to 27 bulls to 100 cows; therefore, the Avalanche Creek herd is meeting objectives set by CPW.

Calf recruitment in the Avalanche Creek herd is slightly lower than the objective, suggesting that winter range conditions may have deteriorated after several years during which the population was above the

¹⁵¹ CPW, 2013

¹⁵² Ibid.

objective. Elevated recreation use within the Avalanche Creek herd's range is conjectured to be a contributing factor.

The 1994 Snowmass EIS identified a sub-population of the Avalanche Creek herd that specifically use the Snowmass SUP area as the Maroon Bells-Snowmass Wilderness herd, which in 1994 numbered about 340 animals.¹⁵³ Information presented in the 1994 EIS documented the areas utilized by the Maroon Bells-Snowmass Wilderness herd. CPW asserts that this information is likely to remain accurate in 2016.¹⁵⁴ A group of 40 to 50 elk summer on the eastern edge of the SUP area and adjacent private lands, between Snowmass and Buttermilk-Tiehack, in the Spring Creek and Owl Creek drainages. Another herd of about the same size summers in the West Willow Creek drainage to the south of Snowmass. Approximately 150 to 200 elk summer in the upper reaches of Main Willow Creek and adjacent drainages, after migrating through the Spring/Owl Creek corridor between the Snowmass and Tiehack Ski Areas. Due in large part to its inaccessibility to recreation, the main Willow Creek drainage provides secure summer range within the Maroon Bells-Snowmass Wilderness.

Almost two decades of observation and evaluation have shown that elk do not commonly utilize the Elk Camp area during the summer.¹⁵⁵ While it is likely that some elk calve during the spring in the Elk Camp area, after calving most individuals move on to summer range as described above. During the summer, elk require thermal cover in forested stands in the 30-to 60-acre size.¹⁵⁶ With a few exceptions, inter-trail tree islands at Snowmass are generally smaller than 30 acres. It is likely that elk prefer to utilize areas outside of the most developed portions of the SUP area because the availability of larger forest stands that provide more suitable security and thermal cover.

As is typical of most elk herds in Colorado, winter range is likely the most limiting habitat factor for the Maroon Bells-Snowmass Wilderness herd during years with deep snows. Wintering grounds for this herd extend from north of Owl Creek road, west of State Highway 82, east of Wildcat Reservoir and the Snowmass Creek Road, and south of Old Snowmass. Approximately 700 elk from various summer ranges, including those from the project area, use this winter range.

The area where elk are generally observed between winter and summer is considered to be transition range. In the spring, transition range is important as calving habitat. During the fall, elk build fat reserves on transition range that are important for winter survival. The Maroon Bells-Snowmass Wilderness herd utilizes the Spring, Owl, and Brush Creek drainages as transition range. The West and East Forks of Brush Creek provide secondary travel habitat during these periods, but are not used as heavily as Spring and Owl Creeks. This observation has been confirmed in studies conducted by Colfer and in previous studies of elk habitat use within the Snowmass SUP area. Distance, topography, and timing provide

¹⁵³ USDA Forest Service, 1994

¹⁵⁴ Colfer, 2016e

¹⁵⁵ Magnuson and Colfer 1997; Colfer 2003, 2004, 2005, 2006a, 2010, 2011, 2013, 2014, 2016

¹⁵⁶ Towry, 1987

separation between summer recreational activities at Elk Camp and the most heavily utilized transition range in the Spring and Owl Creek drainages east of Elk Camp.

To provide security for elk during calving season, the Forest Service has instituted a seasonal closure for the area east of Two Creeks Chairlift and the Elk Camp mountain road at Snowmass. The seasonal closure is in effect from May 15 through June 20.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Over the short term (less than twenty years), vegetation within the project area would remain much the same as described in Affected Environment. The project areas would continue to provide habitat for species that are present. Disturbance to these species would remain at current levels. Implementation of Alternative 1 would have no impact on threatened, endangered, Region 2 sensitive species, migratory birds, or elk.

Alternative 2 – Proposed Action

General Impact of Recreation on Wildlife Under Alternative 2

This discussion is intended to provide the effects of the Proposed Action on wildlife species not included in the lists of threatened or endangered, sensitive, migratory bird, or local concern species and not addressed specifically in this document. Examples include mule deer, black bear, ermine, red squirrel, hermit thrush, and snowshoe hare.

Under Alternative 2, 13.9 acres of forested wildlife habitat would be converted to non-forested habitat. Wildlife habitat conversion is a simple quantification; however, there is evidence that the impacts of summer recreation may extend for some distance outside of the immediate zone of physical habitat conversion. Additionally, the mere physical presence of trails fragments habitat, albeit to a very minor extent. Such fragmentation most likely affects small mammals to a greater extent than it does large animals.

Outdoor recreation has the perceived potential to disturb wild animals within a zone of disturbance.¹⁵⁷ Such disturbances have been theorized to result in increased energetic costs as animals flee a disturbance. Such increased energetic costs have the potential to affect an animal's fitness and, perhaps, survival.¹⁵⁸ Other research has suggested that wildlife may have the ability to habituate to human disturbances, exhibiting more apparent alarm to unpredictable encounters with humans, such as off-trail hikers, than they do to predictable encounters on developed, more heavily used trails.¹⁵⁹ Kays et al. concluded that

¹⁵⁷ The "Zone of Disturbance" as determined in empirical studies ranges from 200 meters (Taylor and Knight, 2003) up to 1,500 meters (Wisdom et al., 2005).

¹⁵⁸ Naylor et al., 2009

¹⁵⁹ Taylor and Knight, 2003; Courtemanch, 2014; Knight and Cole, 1995

most wildlife species do not, in fact, avoid hiking trails, and many predators positively selected them.¹⁶⁰ In the case of those species that do avoid areas used for recreation, the Kays et al. study concluded that the effect of summer recreation is relatively minor in comparison with the effects of land use and habitat fragmentation.

The timing of recreational disturbances may also affect the degree to which the fitness of animals is adversely impacted.¹⁶¹ Lift-served activities attract the majority of recreation activity during the summer at Snowmass, between 10:00 a.m. and 4:00 p.m. Under Alternative 2, night operations would be permitted during both the summer and winter seasons. The mountain coaster is the only proposed activity that would include a lighting component for nighttime use.

Under the baseline conditions, current visitors participate in a variety of recreational activities in the region served by the Elk Camp Gondola and Chairlift. With a few exceptions, the current proposal would keep summer recreation activities within the existing summer recreation footprint. The exceptions are the *Vista* trail re-route and portions of Trails 14, 15, and 18, which would be built beyond the periphery of the existing summer recreation footprint. Wildlife species that currently utilize habitat within the existing footprint already experience daytime recreational disturbance and may be habituated to disturbance. Night activities under the current proposal would extend the period of disturbance beyond the hours that the gondola currently operates. Extended operating hours would lengthen the period of time that wildlife is subject to human recreational disturbance.

Wildlife research has not defined “thresholds” of activity beyond which species respond to disturbance via avoidance activities, rather than becoming habituated. However, Cole and Landress suggest that the severity of most recreational impacts on animal habitat is influenced by the amount of use that occurs.¹⁶² Numerous studies show, however, that the relationship between amount of use and amount of impact is not linear; as use levels increase, additional use has less and less effect on amount of impact. This suggests that limiting recreation is effective in reducing indirect impacts only when usage can be virtually eliminated.

Therefore, the increased disturbance imposed upon wildlife communities if Alternative 2 is implemented may lead some species to avoid the zone of disturbance associated with each activity area. Night use would pose additional disturbance; however, the impact of night use may not be as great as the overall impact of the greater area subjected to recreational disturbance.

Therefore, additional disturbances posed by night use, over and above the disturbance that would occur with day use only (Alternative 3), would have additive disturbances to species within the zone of disturbance of each facility subjected to night activity. However, since additional impacts in recreation

¹⁶⁰ Kays et al., 2016

¹⁶¹ Knight and Cole, 1995

¹⁶² Cole and Landress, 1995

areas are not linear, the additive impact of night use may be less than the additive impact of daytime use of the recreation sites.¹⁶³

One section of proposed Trail 14 would be located outside the existing footprint of recreational activities. This section is adjacent to the Elk Camp summer maintenance road; the impact of this expanded recreation footprint would be lessened if wildlife in the area are habituated to disturbance by currently existing operations and maintenance. It is not likely that mountain biking would occur at night on this or any mountain biking trail due to safety hazards; night use of this or other mountain biking trails will not be evaluated under this alternative.

The currently proposed projects would increase the density of summer recreation within the existing footprint of the Elk Camp summer recreation area. Increased density of recreation would increase the frequency of human/wildlife contacts, increasing the level of disturbance to wildlife. The more frequent activity may lead to decreased utilization by some species that require undisturbed forest interior habitat, such as elk. Other species that may be able to habituate to increased human disturbance, such as red squirrel and mule deer, may not be adversely impacted.

The visual and noise disturbances associated with the new mountain biking and hiking trails, zip line canopy tour, mountain coaster, and zip line would be most likely to impact birds that may have started nesting in trees close to the passing recreationists. Summer operating hours would allow several undisturbed hours of foraging/feeding activity around dawn and dusk for those birds that may be nesting within a recreation corridor's zone of influence, thereby reducing potential adverse effects. Avian nesting and foraging effectiveness could be impaired adjacent to the activity corridors, and while some affected birds could experience reduced recruitment, such potential effects would be limited to a low number of individual birds, they would not measurably affect bird abundance or community composition in the Snowmass SUP area, and the effects would be insignificant at the scale of the WRNF.

Threatened and Endangered Species

Big River Fish

The proposed projects are projected to increase the number of annual summer season guests from the current estimated 25,000 to 45,000. The increase would result in a corresponding increase in summer consumptive use of water at the Elk Camp Restaurant, from the currently estimated 6,250 gallons (0.02 acre feet) up to a projected 15,750 gallons (0.05 acre feet), representing an increase of 9,500 gallons (0.03 acre feet) per year.¹⁶⁴

In 1995 the WRNF received a Biological Opinion (BO) from the USFWS relative to proposed depletions for snowmaking and on-mountain facilities that were included in Snowmass' Master Development

¹⁶³ Knight and Cole, 1995

¹⁶⁴ Resource Engineering, 2016a

Plan.¹⁶⁵ The BO concluded that the reasonable and prudent measures that were incorporated in the Master Development Plan would offset jeopardy to the endangered Colorado River fish. There were 84.2 acre feet of depletions authorized in 1995. To date, Snowmass has utilized only 47.2 acre feet (refer to Table 3K-4).

**Table 3K-4:
Snowmass Water Depletion**

Source	Estimated Depletion (acre feet)
Total depletions authorized in 1995 USFWS Biological Opinion	84.2
Current depletions for snowmaking on NFS lands	31.9
Current depletions from ponds and facilities on NFS lands	6.1
Total Current Depletions (as of November 8, 2016)	38.0
Approved depletions from ponds, facilities, and snowmaking remaining from that which was authorized in the 1995 USFWS Biological Opinion (84.2 acre feet–38.1 acre feet).	47.2

Sources: Colfer, 2016g and Resource Engineering, 2016b,c

Notes:

Depletions authorized for snowmaking and on-hill facilities: 70.2

Historic Depletions (depletions occurring prior to 1/22/1988): 14.0

Assumes 26% consumptive use for snowmaking utilization. CSCUSA Consumptive Use Model allows for consumptive percentages to range from 18 to 26% depending on site-specific climate data, WRNF applies a standard of 26% depletions as being the most appropriate biologically conservative assumption.

The depletion accounting demonstrates that Snowmass still has yet to utilize 47.1 acre feet of depletions to the Upper Colorado River watershed. Implementation of the proposed alternative would result in a 0.03-acre foot increase in depletions due to consumptive use of water in the Elk Camp Restaurant. This depletion was previously authorized in the USFWS 1995 Biological Opinion. Because this depletion has already been approved under the 1994 Biological Opinion, the project will have *No Effect* on the four Colorado River endangered fish.

Canada Lynx

Under Alternative 2, 10.1 acres of lynx habitat would be converted to non-habitat.¹⁶⁶ The physical modification of habitat associated with Alternative 2 summer activity components is minimal at the scale of the Snowmass LAU. However, there would also be additional noise and visual effects from many of the proposed activities (e.g., zip line, zip line canopy tour, mountain coaster, mountain biking and hiking trails, ropes challenge course, multi-purpose activity areas) extending into lynx habitat that have the potential to displace lynx during the operating period.

¹⁶⁵ USFWS, 1995a

¹⁶⁶ Impact acreages from individual projects are contained in the project file.

The greater impact associated with these facilities is the disruptive visual (guests passing quickly past/above, or through the forest canopy on zip lines and the zip line canopy tour, bikers rapidly riding along trails), and aural (guest making noise as they fly over or through the canopy, sounds of mountain bikes, mountain coaster, music and/or gatherings on multi-use platforms) effects on a lynx that might attempt a daybed below and in the vicinity (within 650 feet) of the activity corridors.¹⁶⁷

Most Alternative 2 proposed mountain biking trails, all hiking trails, and the zip line canopy tour would be built in areas within the SUP where existing habitat connectivity across the Snowmass' summer operational area has been negatively affected by historical fragmentation that resulted from the development of Snowmass as a winter recreation area, and by skiing that occurs in tree islands within the SUP area. The physical footprints of existing summer mountain biking and hiking trails have added only minimally to habitat fragmentation. The noise and visual effects of recreational use of these existing trails extends outward from the physical location of the trails, to areas that may provide daytime resting habitat for lynx. The combined effects of historic fragmentation, winter recreation, and summer recreation have limited the year-round value of these stands as lynx habitat.

The exceptions to the above paragraph include Trails 21, which would be built within the existing summer operations footprint, but also within portions of a mixed conifer stand that currently provides opportunity for lynx diurnal security. During the trail construction period and subsequent recreational use period, the zone of disturbance associated with this trail would reduce the amount of the stand providing daytime refugia to lynx during the summer. Opportunities for daytime refugia during the winter in this stand are currently limited by tree skiing and riding. As described in the lynx habitat baseline, tree-skiing and riding within this stand during the winter is likely to have further reduced the suitability of this stand as lynx winter or summer foraging habitat. While Trail 21 would additively reduce the quality of lynx habitat during the summer within this stand, the reduction is relative to a stand that currently provides diminished habitat effectiveness. All other proposed summer activity upgrades would occur within the existing, heavily-fragmented, heavily-recreated, summer operational boundary or sufficiently bordering high use areas such that lynx would not be expected to diurnally bed in those areas.

It is likely that lynx currently avoid travel within or across the Elk Camp area during daylight hours during the summer operating period. It is further likely that lynx avoid travel within or across the entire Snowmass SUP area during winter ski resort operations. Lynx use of the Elk Camp area at night during the winter and summer is more likely to occur as travel movements to and from areas of high quality habitat beyond the limits of the SUP boundary.

With approval of Alternative 2, lighted night activities at Elk Camp would extend from the upper gondola terminal to the top of the mountain coaster, a distance of approximately 2,500 feet. It is likely that lynx would avoid travel across this area while winter and summer night recreation activities are occurring.

¹⁶⁷ Sunde et al., 1998

However, night operations would be limited in duration. Once night recreation activities cease and lights are extinguished, travel habitat would remain in an equally suitable condition to that which currently exists.

Similarly, night use of Elk Camp Summit multi-purpose activity area would also likely cause lynx to avoid travel within the zone of disturbance of this site. The Elk Camp Summit area would be located at the divide between Willow Creek and Snowmass Creek watersheds. Night activities at Elk Camp Summit (which could potentially include amplified music or other activities with an extended noise signature) would likely create a barrier to a lynx moving between drainages. Once night activities cease, the Elk Camp Summit area would provide undisturbed lynx travel habitat. In other words, the multi-purpose activity area itself would not impede lynx movements, rather activities in the area at night would provide the impediment.

Proposed night activities under Alternative 2 would likely pose the greatest impact to lynx movements within and through the SUP area. However, when activities cease, habitat connectivity would be maintained throughout the project area at the currently existing level. Alternative 2 would increase the intensity of use within the project area, would convert lynx habitat to non-habitat, and would extend the operating period into night hours, potentially disrupting lynx travel while night operations are active. However, once activities cease, lynx travel opportunities would continue to be provided within the SUP area at current levels. Consequently, Alternative 2 *may affect, but would not likely adversely affect* Canada lynx. Alternative 2 is consistent with the Objectives and Standards of the Forest Plan including the Southern Rocky Mountains Lynx Amendment.¹⁶⁸

Region 2 Sensitive Species

Table 3K-5 summarizes the Region 2 sensitive wildlife species impact determination.¹⁶⁹

**Table 3K-5:
Region 2 Sensitive Wildlife Species and Determination Summary**

Species (Common Name/ Scientific Name)	Determination/Criteria	
	Alternative 2	Alternative 3
Spotted bat (<i>Euderma maculatum</i>)	NI. No habitat present.	NI. No habitat present.
River otter (<i>Lontra canadensis</i>)	NI. No habitat present.	NI. No habitat present.

¹⁶⁸ USDA Forest Service, 2008

¹⁶⁹ Detailed effects analyses by species are included in the Biological Evaluation, which is contained in the project file.

**Table 3K-5:
Region 2 Sensitive Wildlife Species and Determination Summary**

Species (Common Name/ Scientific Name)	Determination/Criteria	
	Alternative 2	Alternative 3
Marten (<i>Martes americana</i>)	MII. The combined effect of tree clearing in marten habitat and increased recreational use of marten habitat may reduce the carrying capacity of the area for martens.	MII. The combined effect of tree clearing in marten habitat and increased recreational use of marten habitat may reduce the carrying capacity of the area for martens.
Fringed myotis (<i>Myotis thysanodes</i>)	NI. No habitat present.	NI. No habitat present.
Hoary Bat (<i>Lasiurus cinereus</i>)	MII. The combined effect of tree clearing in hoary bat habitat and increased recreational use of marten habitat may reduce the carrying capacity of the area for hoary bat.	MII. The combined effect of tree clearing in hoary bat habitat and increased recreational use of marten habitat may reduce the carrying capacity of the area for hoary bat.
Townsend's Big-eared bat (<i>Plecotus townsendii townsendii</i>)	NI. No habitat. No caves or abandoned mines.	NI. No caves or abandoned mines.
Rocky Mountain bighorn sheep (<i>Ovis canadensis canadensis</i>)	NI. No habitat present.	NI. No habitat present.
Pygmy shrew (<i>Sorex hoyi</i>)	MII. Individuals could be crushed during project implementation.	MII. Individuals could be crushed during project implementation.
Northern goshawk (<i>Accipiter gentilis</i>)	NI. PDC allow for breeding during the year of implementation and the species is capable of finding suitable habitat over the long-term following construction	NI. PDC allow for breeding during the year of implementation and the species is capable of finding suitable habitat over the long-term following construction
Boreal owl (<i>Aegolius funereus</i>)	NI. PDC allow for breeding during the year of implementation and the species is capable of finding suitable habitat over the long-term following construction	NI. PDC allow for breeding during the year of implementation and the species is capable of finding suitable habitat over the long-term following construction
Sage sparrow (<i>Amphispiza belli</i>)	NI. No sagebrush habitat.	NI. No sagebrush habitat.
Ferruginous hawk (<i>Buteo regalis</i>)	NI. No grassland habitat.	NI. No grassland habitat.
Greater sage-grouse (<i>Centrocercus urophasianus</i>)	NI. No sagebrush habitat.	NI. No sagebrush habitat.
Northern harrier (<i>Circus cyaneus</i>)	NI. No habitat present.	NI. No habitat present.

**Table 3K-5:
Region 2 Sensitive Wildlife Species and Determination Summary**

Species (Common Name/ Scientific Name)	Determination/Criteria	
	Alternative 2	Alternative 3
Olive-sided flycatcher (<i>Contopus borealis</i>)	MII. The combined effect of tree clearing in flycatcher habitat and increased recreational use of flycatcher habitat may lead to disruption of breeding and potential nest abandonment.	MII. The combined effect of tree clearing in flycatcher habitat and increased recreational use of flycatcher habitat may lead to disruption of breeding and potential nest abandonment.
Black swift (<i>Cypseloides niger</i>)	NI. No waterfall habitat.	NI. No waterfall habitat.
American peregrine falcon (<i>Falco peregrinus anatum</i>)	NI. No habitat present.	NI. No habitat present.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	NI. No habitat present.	NI. No habitat present.
White-tailed ptarmigan (<i>Lagopus leucurus</i>)	NI. No habitat present.	NI. No habitat present.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	NI. No shrubland or grassland riparian habitat.	NI. No shrubland or grassland riparian habitat.
Lewis' woodpecker (<i>Melanerpes lewis</i>)	NI. No riparian forested habitat.	NI. No riparian forested habitat.
Flammulated owl (<i>Otus flammeolus</i>)	NI. PDC allow for breeding during the year of implementation and the species is capable of finding suitable habitat over the long-term following construction	NI. PDC allow for breeding during the year of implementation and the species is capable of finding suitable habitat over the long-term following construction
Purple martin (<i>Progne subis</i>)	NI. PDC allow for breeding during the year of implementation and the species is capable of finding suitable habitat over the long-term following construction	NI. PDC allow for breeding during the year of implementation and the species is capable of finding suitable habitat over the long-term following construction
Brewer's sparrow (<i>Spizella breweri</i>)	NI. No habitat present.	NI. No habitat present.
Columbian sharp-tailed grouse (<i>Tympanachus phasianellus columbianus</i>)	NI. No habitat present.	NI. No habitat present.
Boreal toad (<i>Bufo boreas boreas</i>)	NI. The closest known population exists over 1.75 miles from the project area in the Snowmass Creek drainage. This is beyond the known range of boreal toad migration movements.	NI. The closest known population exists over 1.75 miles from the project area in the Snowmass Creek drainage. This is beyond the known range of boreal toad migration movements.
Northern leopard frog (<i>Rana pipiens</i>)	NI. No known populations closer than Rifle District.	NI. No known populations closer than Rifle District.

**Table 3K-5:
Region 2 Sensitive Wildlife Species and Determination Summary**

Species (Common Name/ Scientific Name)	Determination/Criteria	
	Alternative 2	Alternative 3
Bluehead sucker (<i>Catostomus discobolus</i>)	NI. No large, western slope rivers impacted by project.	NI. No large, western slope rivers impacted by project.
Flannelmouth sucker (<i>Catostomus latipinnis</i>)	NI. No large, western slope rivers impacted by project.	NI. No large, western slope rivers impacted by project.
Mountain sucker (<i>Catostomus platyrhynchus</i>)	NI. No wetland or stream habitat disturbance.	NI. No wetland or stream habitat disturbance.
Roundtail chub (<i>Gila robusta</i>)	NI. No large, western slope rivers impacted by project.	NI. No large, western slope rivers impacted by project.
Colorado River cutthroat trout (<i>Oncorhynchus clarki pleuriticus</i>)	NI. No wetland or stream habitat disturbance.	NI. No wetland or stream habitat disturbance.
Great Basin silverspot (<i>Speyeria nokomis nokomis</i>)	NI. No impacts to wetland habitat.	NI. No impacts to wetland habitat.
Hudsonian emerald (<i>Somatochlora hudsonica</i>)	NI. No impact to boggy pond habitat.	NI. No impact to boggy pond habitat.

Notes:

NI = No Impact

MII = May impact individuals, but not likely to result in a lack of viability in the planning area, nor cause a trend towards federal listing or a loss of species viability range wide.

Migratory Birds

Migratory birds could be present within the study area, although no bird nests were detected in the project area during field surveys. Impacts to migratory bird species during construction would be avoided to the extent practicable.

Under this alternative, there would be 25.5 acres of vegetation removal and grading within potential nest habitat for migratory birds. PDC requires nest surveys to be conducted prior to construction. The project has been designed, to the extent practicable, to minimize incidental take during construction through the implementation of PDC. Construction may occur within the nesting period if surveys show no active bird nests present, or as otherwise approved by the Forest Service. However, it is possible that undetected active nests of migratory birds could occur in project areas during tree removal, possibly resulting in the incidental take of eggs, nestlings, or adults. Under such circumstances, the activities proposed under Alternative 2 would be consistent with the Forest Service/USFWS Migratory Bird MOU because of the requirements of PDC intended to avoid the incidental take of migratory birds.

Once construction is complete and summer recreational operations begin, the visual and aural disturbances associated with the new mountain biking and hiking trails, zip line canopy tour, mountain coaster, and zip line would be most likely to impact birds that may have started nesting in trees close to

the passing recreationists. Summer operating hours would allow several undisturbed hours of foraging/feeding activity around dawn for those birds that may be nesting within a recreation corridor's zone of influence, thereby reducing potential adverse effects. However, night activities proposed under Alternative 2 would preclude undisturbed dusk feeding activity.

Avian nesting and foraging effectiveness could be impaired adjacent to the activity corridors. While some affected birds could experience reduced recruitment, such potential effects would be limited to a low number of individual birds and would not measurably affect bird abundance or community composition in the Snowmass SUP area.

The proposed zip line canopy tour and zip line would be located below the canopy and would not impact areas that have a potential to attract birds that is greater than any other site in the Snowmass area. In general, while occasional bird strikes may occur; rare, random collisions would not be significant at the scale of Snowmass or the WRNF.

Species of Local Concern

Elk

The majority of elk use within the Snowmass SUP area during the spring, summer, and fall occurs to the east of the Elk Camp area. These areas are closed to recreational use during important calving season between May 15 and June 20. The closure would remain in place under both action alternatives. While it is likely that some elk calve occasionally in the Elk Camp area, summer operations would not begin until June 21 under either action alternative. Therefore, elk calving activities would not be impacted under either action alternative.

Following calving season, elk utilizing the SUP area move on to the Spring, Owl, Willow, and West Willow Creek summer ranges. During summer, elk use is low within the SUP area, including those areas within the zone of influence of the current and proposed summer operations. For these few individuals, the increased variety and distribution of recreational amenities proposed under Alternative 2 would increase the frequency and density of human activity, which would add to the overall zone of disturbance in the project area. The increased activity and disturbance would likely reduce the already low use of the area by elk. Night activities proposed under this alternative would extend the period during which elk are disturbed. Since most elk already avoid the ski area during the summer, and new day and night activity may further displace individuals, the summer recreation portion of the SUP area would see low visitation by elk. However, the effect of increased recreation would be minimal at the scale of the Maroon Bells-Snowmass Wilderness herd, and undetectable at the scale of DAU E-15. Sufficient habitat exists in the Spring Creek, Owl Creek, West Willow and Willow Creek drainages to provide for the life requisites of this herd.

Diurnal elk use of the Elk Camp area is more commonly observed during the spring and fall periods, mostly outside of the summer operating period. The proposed projects would have no impact on elk during the spring and late fall.

The *Vista* trail re-route, below the Elk Camp Gondola upper terminal, would be built within the area mapped by CPW as elk production range; however, the trail would remain closed to use between May 15 and June 20, to prevent disturbance to elk during the calving season. By the time the summer operating season begins, elk have typically moved on to higher elevation sites and impacts by hikers on the Vista trail would be mitigated due to the timing of the trail closure to allow for the primary calf production period.

Activities that involve amplified music or lighting that may potentially be offered at the Elk Camp Summit multi-purpose activity area may have the potential to disturb elk using a limited portion of the West Willow Creek drainage. Due to topography, it is not likely that noise or visual stimuli would extend to those animals utilizing the main Willow Creek drainage, nor to those in Owl or Spring Creeks. Because of the potential for noise and lighting at this facility, it is possible that the existence of this platform could lead elk in the West Willow Creek drainage to avoid the zone of disturbance associated with the platform. Such avoidance would only be likely to occur during use periods.

The negative effects on elk from all of the proposed projects at Elk Camp would not be measurable on habitat effectiveness for the Maroon Bells-Snowmass Wilderness herd, or elk population numbers within DAU E-15 because construction and use periods would be consistent with the timing of closures for elk calving and occurrence outside spring and fall, and the location of activities would be away from the critical areas of seasonal habitat use.

Alternative 3

General Wildlife

Under Alternative 3, 12.0 acres of forested wildlife habitat would be converted to non-forested habitat.¹⁷⁰ There is no significant difference in disturbed acreage between the two action alternatives.

The impacts to general wildlife species would be similar to those described for Alternative 2, with the following exceptions:

- Trail 21: The elimination of Trail 21 would reduce direct impacts by 0.24 acre, and indirect impacts within the interior of Stand 70. As a result, fewer disturbances to wildlife inhabiting the interior of Stand 70 would occur compared to Alternative 2.

¹⁷⁰ Impact acreages from individual projects are contained in the project file.

- Night Activities: Since nighttime activities would not occur at a greater frequency than existing operations, the duration of wildlife disturbance would be less and would facilitate dusk foraging for species inhabiting the zone of disturbance of the recreational amenities.

Threatened and Endangered Species

Big River Fish

Water depletions under Alternative 3 would be identical to Alternative 2. There is no difference between the two alternatives that would affect the four endangered fish in the Colorado River basin.

Canada Lynx

Under Alternative 3, the direct impacts of lynx habitat conversion would be slightly less than those of Alternative 2 (9.0 acres).¹⁷¹ The difference in direct impacts is not significant at the scale of the LAU and would not have an adverse effect on lynx.

Noise and visual effects for Alternative 3 would be similar to Alternative 2; however, this effect would be decreased under Alternative 3 by the elimination of Trail 21, which would leave a greater area of undisturbed forest within Stand 70. As a result, daytime refugia during the summer would continue to be provided within this stand to a greater extent than would occur under Alternative 2. This stand provides low to moderate effectiveness for lynx, due to low hare populations and low-moderate horizontal cover within the stand. During the winter, the presence or absence of Trail 21 would not affect lynx utilization or habitat effectiveness because the trail would not facilitate increased access by skiers and riders.

Night use of the amenities proposed under this alternative would be limited to that which currently occurs, with the addition of the mountain coaster remaining open on select evenings during the summer and winter. There would be no night use of the Elk Camp Summit multi-purpose activity area. The decreased night use of the mountain coaster and other amenities, in comparison with Alternative 2, would reduce the impact on the ability of lynx to utilize forest cover for travel in the Elk Camp area.

However, even with the absence of night use, Alternative 3 would increase the intensity of daytime use within the project area, convert lynx habitat to non-habitat, and increase the zone of disturbance within lynx habitat. As a result, implementation of Alternative 3 *may affect, but would not likely adversely affect* the Canada lynx.

Region 2 Sensitive Species

Determinations of impacts of both action alternatives to Region 2 sensitive species are presented in Table 3K-5.¹⁷²

¹⁷¹ Impact acreages from individual projects are contained in the project file.

¹⁷² Detailed effects analyses by species are included in the Biological Evaluation, which is contained in the project file.

Migratory Birds

Under Alternative 3, there would be 2.18 acres less construction disturbance within potential nest habitat for migratory birds. The same PDC described for Alternative 2 would attempt to avoid incidental take of eggs, nestlings, or adults. Under such circumstances, the activities proposed under Alternative 3 would be consistent with the Forest Service/USFWS Migratory Bird MOU because of the requirements of PDC intended to avoid the incidental take of migratory birds.

Daytime-only operating hours ending generally at 4:00 p.m. under this alternative would provide increased “disturbance-free” time during dusk and dawn for birds that may nest in the zone of influence of the various project areas. However, avian nesting and foraging effectiveness would still be impaired during daytime adjacent to the activity corridors. As a result, some affected birds may experience reduced recruitment. Such potential effects would be limited to a low number of individual birds and would not measurably affect bird abundance or community composition in the Snowmass SUP area. These impacts would be insignificant at the scale of the WRNF.

Because impacts around dusk would be less under this alternative, the indirect impacts would be less than those described under Alternative 2.

Species of Local Concern

Elk

Alternative 3 would eliminate Trail 21, replace it with Trail 16, and prohibit new night activities associated with the projects. Trail 17 and the beginner skills park would not be included with this alternative. Summer nighttime use of the proposed activities could potentially occur during special events (e.g., *Farm to Table* and/or *Valhalla Nights*); however, this would be subject to special permission from the WRNF and would not occur on a regular basis. The mountain coaster could be permitted to operate in the winter during *Ullr Nights* when guests are already located in the Elk Camp Restaurant and Elk Camp Meadows areas, but would require special permission from the WRNF. All other nighttime uses, and inclusion of amplified music, in the summer or winter season would require WRNF approval and would not exceed the existing frequency of guest presence in the Elk Camp vicinity.

Elk use in the Elk Camp area is currently low during the summer. Closure of the area during the spring calving period and fall migration period would reduce impacts to elk from the both action alternatives. Since elk are present during the summer operating periods in low numbers, selection of Alternative 3 over Alternative 2 would have no detectable benefit to the Maroon Bells-Snowmass Wilderness herd, in terms of improved survival or fecundity.

Since there would be no potential for nighttime activities at Elk Camp Summit multi-purpose activity area, Alternative 3 may have slightly less impacts on elk in the West Willow Creek drainage.

While selection of Alternative 3 would have negative effects on elk, those effects would not be measurable within the DAU or the Maroon Bells-Snowmass Wilderness herd.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are cumulatively expected to have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for wildlife extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for wildlife are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on wildlife resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Snowmass Planned Unit Development Amendment
- Past Snowmass Projects (Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement, Burnt Mountain Egress Trail, Summer Trails, New/Realigned Mountain Bike Trails, Winter Evening Activities Project, Sheer Bliss Pond Modification)
- Regional Projects (Snowmass Village Parks, Open Space, Trails, and Recreation Plan, Continued Build out of Town of Snowmass Village, Ajax Adventure Camp, Aspen-Sopris Ranger District Five Year Recreation Event Special Use Permit)
- Town of Snowmass Village Community Connectivity Plan
- WRNF Forest Plan – 2002 Revision

- WRNF Travel Management Plan
- Maroon Bells-Snowmass Wilderness Visitor Use Plan

Urban expansion and development has fragmented a naturally patchy distribution of general wildlife habitat in Colorado, including in Pitkin County. Valley floor development continually erodes the amount of non-forest habitats adjacent to lynx forested habitat. The expansion of homes and some municipal facilities up mountain slopes, into forests of aspen, lodgepole pine, and to a lesser degree spruce-fir, adds to the fragmentation of a naturally fragmented landscape. The cumulative effect of private land development and expansion of recreational facilities in and adjacent to wildlife habitat, and lynx habitat in particular, may reduce the ability of lynx to move throughout their home range, or interact with other individuals in the larger subpopulation.

Lynx

Across the Snowmass LAU, development will continue to take place outside of the Maroon Bells-Snowmass Wilderness. However, a significant portion of the mapped lynx habitat in this LAU occurs within the designated wilderness boundary, where development will not occur. Regardless, the lower portions of the Elk Range, beyond the limits of the Snowmass LAU, are located on private land. Development that includes 35-acre ranchettes, residential subdivision, and resort base area complexes will be likely to continue on private lands located directly adjacent to the Snowmass LAU for the foreseeable future. Such development may adversely affect the ability of lynx to move between LAUs beyond the limits of the Elk Mountains.

Development of the Town of Snowmass Village has been ongoing for forty years. Most of this development has occurred in aspen and mountain shrub vegetative communities that do not provide high quality lynx habitat in most cases. However, Brush Creek and its tributaries may have provided a corridor for lynx through otherwise unfavorable habitat. That opportunity has been largely decreased as a result of the development of Town of Snowmass Village. The Base Village improvements project is ongoing. It will include condos, townhomes, hotels, a 232-unit Westin Conference Hotel, new shops and restaurants, and an open-air gondola. All projects would be implemented on private land outside of any potential sites that currently provide lynx habitat.

The currently proposed projects would occur within the bounds of the existing Snowmass SUP area, where habitat has been previously fragmented as a result of ski area development and previous fires (Big Burn area and Burnt Mountain area). The project would not add significantly to the cumulative effects of snowshoe hare winter habitat loss that has occurred throughout the Snowmass LAU, Pitkin County, and the mountainous regions of Colorado. The effect of the project on the local snowshoe hare population, and thus on lynx foraging energetics, would not be detectable at the scale of the LAU and/or the permit area. The cumulative effects of this and other incremental losses in hare habitat have undoubtedly had an incremental effect on lynx energy expenditures while hunting. With each loss of habitat for a single hare,

there is an immeasurable cost to the energetics of foraging lynx. Cumulatively, these incremental losses become measurable, but have not been documented.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Tree removal related to summer development would represent an irretrievable effect to some habitat for some threatened and endangered, and Region 2 sensitive species within the SUP area. However, this is not considered an irreversible commitment because the habitat (vegetation) is a renewable resource.

L. SOILS AND GEOLOGY

SCOPE OF THE ANALYSIS

The analysis area for soil resources includes areas proposed for direct ground disturbance within the Woody Creek/Roaring Fork River watershed within the Snowmass SUP area. This analysis is based on a review of the Holy Cross Area Soil Survey, the WRNF Soils Dictionary, and WRNF Stability Model. No site-specific soil surveys were completed for this analysis, but would be required prior to implementation of any approved projects to ensure consistency with the Forest Plan Standards and Guidelines as determined by the Forest Service Soil Scientist or their representative.

FOREST PLAN DIRECTION

Both the Forest Plan and the WCPH provide soil management measures to guide land treatments within the WRNF. The following direction applies to the proposed projects analyzed in this DEIS.

Forest Plan

Management Area 8.25 Ski Areas – Existing and Potential

Soils Standard 1. Effective ground cover (mulch) upon completion of ground disturbing activities will meet minimum levels of pre-treatment habitat type (Aspen – 95 percent, Lodgepole Pine – 90 percent, Spruce-Fir – 95 percent).

Soils Guideline 1. Ground cover as a combination of revegetation and mulch applications, should meet the requirements in Table 3L-1, one and two years following completion of ground disturbing activities.

**Table 3L-1:
Soils Guideline 1 – Ground Cover Requirements**

Erosion Hazard Class	Year 1 Minimum Effective Ground Cover (%)	Year 2 Minimum Effective Ground Cover (%)
Low	20 to 30	30 to 40
Moderate	30 to 45	40 to 60
High	45 to 60	60 to 75
Very High/Severe	60 to 90	75 to 90

Soils

Guideline 1. Conduct an onsite slope stability exam in areas identified as potentially unstable. Potentially unstable land is described as having a “high” or “very high” instability ranking. Limit intensive ground-disturbing activities on unstable slopes identified during examinations.

Forest Service WCPH

Table 2-2 contains PDC outlined in the WCPH that would ensure compliance with this guidance.

Hydrologic Function

11.2 Manage land treatments to maintain enough organic ground cover in each activity area to prevent harmful increased runoff.

Riparian Areas and Wetlands

12.4 Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological function.

Sediment Control

13.1 Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of specific operations, local topography, and climate.

13.2 Construct all roads and other disturbed sites to minimize sediment discharge into streams, lakes, and wetlands.

13.3 Stabilize and maintain roads and other disturbed sites during and after construction to control erosion.

13.4 Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage.

Soil Quality

14.2 Maintain or improve long-term levels of organic matter and nutrients on all lands.

AFFECTED ENVIRONMENT

The analysis area is between the elevation of 8,500 feet and 11,300 feet above mean sea level. Much of the precipitation at Snowmass falls in the form of snow. Precipitation ranges from approximately 1.4 to 2.4 inches of water per month (20.4 inches annually), with precipitation falling as snow in the winter and rain in the spring.¹⁷³ The climate and elevation of the analysis area limit the rate of soil formation.

¹⁷³ Western Regional Climate Center, 2016

Geology

For a thorough description of the geologic characteristics of the Snowmass vicinity, including detailed geologic mapping, refer to the Affected Environment section of the 1994 Snowmass Ski Area FEIS, which is incorporated within this document by reference.¹⁷⁴ The bedrock geology of the Snowmass area is dominated by sedimentary units of Jurassic to Late Cretaceous age, including the siltstones and claystones of the Morrison Formation, the sandstone conglomerates of the Burro Canyon Formation, as well as the Dakota sandstone and the Mancos shale. Unconsolidated overlying units dating from the Pleistocene to Holocene ages are primarily comprised of poorly sorted glacial, landslide, talus, and colluvial deposits.

The WRNF developed a Stability Model to better understand the susceptibility of soils within an analysis area to irreversible damage to soil productivity from timber harvest activities. Slope stability ratings were developed through an evaluation of area geology, slopes and landslide risk (based on past landslide mapping). The Snowmass SUP area was compared with the WRNF Stability Model (refer to the WRNF Stability Model and Figure 3L-1 under Alternative 2). The stability ratings range from “slight” to “severe” within the SUP (although primarily the susceptibility is “slight” to “moderately low”). Approximately 165 acres of terrain across the SUP area (primarily outside the analysis area) is characterized as having “severe” susceptibility to irreversible damage to soil productivity. The risk to stability in these areas should be minimized by ensuring drainage is properly managed to reduce potential impacts to soils (also refer to the bare ground discussion). Additionally, damage to soil resources can be further reduced by maintaining and improving levels of soil organic matter, which contributes to retaining soil moisture and attenuating runoff. An assessment of bare ground at Snowmass was completed to identify areas that could benefit from receiving additional rehabilitation. For the bare ground assessment, WRNF specialists identified areas within the analysis area as having significant bare ground and low vegetative cover, (i.e., generally containing 1 to 25 percent vegetation cover and 30 to 70 percent rock cover). In these areas, pedestals, rills, and water flow patterns may be common indicating surface runoff; these soil conditions may be improved through soil rehabilitation and drainage management to minimize the potential increased risk to stability (refer to the results of the bare ground assessment in the following discussion).

Soils

Soil Map Units

Nineteen soil units were mapped in the Woody Creek/Roaring Fork Watershed within the Snowmass SUP area. These soils can be grouped into Leadville, Scout, Hechtman, Wetopa, Doughspon, Echemoor, Callings, Skylick, Handran, Eyre, Jerry, and Millerlake. Mapped miscellaneous land types include cirque, rubble and standing water. Table 3L-2 summarizes the general soil characteristics. Refer to the Figure 3L-1 for more information.

¹⁷⁴ USDA Forest Service, 1994

**Table 3L-2:
General Characteristics of Mapped Soil Units**

Map Unit/ Name	Area in SUP (acres)	Drainage Class	Available Water Capacity ^a	Runoff ^b	Effective Rooting Depth	kw
220 B	717					
Leadville		Well	Moderate	Moderate	>60"	.24
285D	72					
Scout		SE	Low	Moderate	>20"	0.08
Hechtman		SE	Low	Rapid	<20"	0.20
338B	604					
Wetopa		Well	High	Moderate	>60"	0.24
Doughspon		Moderate or Well	High	Moderate	>60"	0.22
Echemoor		Well	High	Moderate	>60"	0.32
347B	95					
Callings		Well		Medium to rapid	>20"	0.20
Skylick		Well Drained	High	Medium	>20"	0.20
351C	17					
Scout		SE	Low	Moderate	>20"	0.08
360C	396					
Leadville, sandstone substratum		Well	Moderate	Moderate	>20"	0.24
367 B	1,235					
Scout		SE	Low	Moderate	>20"	0.08
Leadville		Well	Moderate	Moderate	>20"	0.24
376C	133					
Callings		Well		Medium to rapid	>20"	0.20
380B	723					
Seitz		Well	High	Moderate	>60"	0.15
383B	85					
Wetopa		Well	High	Medium to rapid	>60"	0.24
385D	60					
Scout		SE	Low	Moderate	>60"	0.08
Hechtman		SE	Low	Rapid	<20"	0.20
446 C	< 1					
Handran		SE	Low	Moderate	>20"	0.10
Eyre		Well	Low	Moderate	<20"	0.15
932B	397					
Handran		SE	Low	Moderate	>20"	0.10
Eyre		Well	Low	Rapid	<20"	0.15
932D	1					
Handran		SE	Low	Moderate	>20"	0.10

**Table 3L-2:
General Characteristics of Mapped Soil Units**

Map Unit/ Name	Area in SUP (acres)	Drainage Class	Available Water Capacity ^a	Runoff ^b	Effective Rooting Depth	kw
Eyre		Well	Low	Moderate	<20"	0.15
Rubble Land		NA	Low	Slow	N/A	
AG66	4					
Jerry Loam		Well		Medium to Rapid	>20"	0.20
Millerlake Loam		Well		Medium to Rapid	>20"	0.20
AG9^c	37					
Ansel		--	--	--	--	0.37
Anvik		--	--	--	--	0.28
CQ	199					
Cirque land					N/A	
RL	220					
Rubble Land		NA	Low	Slow	N/A	
W	2					
Water		N/A	N/A	N/A	N/A	

Source: USDA Forest Service, 1998

Notes:

SE = somewhat excessively; N/A = not applicable

^a Available Water Capacity refers to the volume of water that should be available to plants if the soil, inclusive of rock fragments, were at field capacity.

^b Runoff refers to the degree to/rate at which precipitation, once interfaced with the soil, flows as a result of gravitational forces. Greater rates of runoff are generally consistent with greater erosion risk.

^c AG9 is included in the Snowmass SUP area but is outside the project area. This soil was surveyed as part of the Aspen Gypsum Soil Survey rather than the Holy Cross Area Soil Survey. Different criteria were used to characterize soils in this survey; therefore, AG9 is missing some of the data used characterize the remaining soil map units included in this table.

Drainage class ratings for these soils range from moderately to somewhat excessively drained. The soils have variable runoff potential (slow to rapid) and low to high available water capacity. Limitations to revegetation potential range from slight, where mulch applications would improve success by conserving soils moisture and protecting seedling establishment, to severe where slope, short growing season, low water capacity, high erosion hazard and shallow soils to bedrock characteristics hamper revegetation success. Road and trail limitations include moderate load bearing strength, seasonal mud, surface rutting, compaction, steep slopes and high erosion hazard.¹⁷⁵ Cut and fill stability will be discussed at length under the proposed alternatives.

Surface and subsurface soil erodibility is generally moderate within the analysis area including some areas with low and high erodibility potential. K-factor (K_w) values of surface soil horizons range from 0.08 at the low end up to 0.37.¹⁷⁶ Higher erosion risk ratings result from steep slopes, shallow depth to

¹⁷⁵ USDA Forest Service, 1998

¹⁷⁶ The K-factor represents the soil's susceptibility to erosion in their plot condition based on soil texture. Soils that are resistant to erosion have low K values (0.02 to 0.15); soils that display moderate erosion potential are in the

bedrock, and fine-grained material.¹⁷⁷ The whole soil K-factor (with the *w* subscript) best reflects natural soil conditions in the field because the whole soil factor considers rock fragments which serve to “armor” soil and make them less erodible overall.¹⁷⁸ Soil organic matter can also be related to soil erodibility as organic horizons allow infiltration and provide productive soils for stabilizing vegetation.¹⁷⁹ Maintenance of soil organic matter and surface O- and A-horizon integrity minimizes erosion, compaction, and hydrologic problems within the ski area.

Soil Disturbance and Bare Ground

The Woody Creek watershed covers most of the Snowmass SUP area. Previous disturbance in the watershed includes tree removal and grading associated with ski area infrastructure such as ski trails, mountain biking and hiking trails, lift installation, roads, and facilities. The Snowmass SUP area covers approximately 4,997 acres—in total nearly 2,000 acres of the Snowmass SUP area has been cleared for ski area development (an additional 450 acres occur above treeline). Generally, much of that area has been revegetated with herbaceous ground cover; however, a bare ground assessment completed in 2014 revealed approximately 230 acres of the analysis area could benefit from receiving additional rehabilitation by amending those areas that have not recovered with carbonaceous soil amendments. Since that time, Snowmass completed rehabilitation on 8 acres that were identified as priority. Included in these 230 acres is approximately 70 acres of terrain classified as having “severe” stability risk according to the Forest Service Stability model. Field surveys and project implementation teams would watch for and consider visible indicators of landscape instability such as tension cracks and rill/gully erosion. Appropriate erosion control and drainage management should be employed to maintain soil productivity and watershed condition under ongoing ski area management and operations.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Under the No Action Alternative, development related to new multi-season recreation projects would not occur. The resort would continue to operate under its current configuration and capacity. Because no ground disturbance is proposed under the No Action Alternative, there is no potential to affect geologic and soil resources within the analysis area. However, on-going ski area operations and maintenance affecting drainage would continue to require management to reduce erosion and loss of soil organic material within the Snowmass SUP area.

middle of the range (0.16 to 0.27); and highly erodible soils tend to have values greater than 0.28.
NRCS, 2008

¹⁷⁷ USDA Forest Service, 1998

¹⁷⁸ McCormick et al., 1982

¹⁷⁹ Franzluebbbers, 2002; McMullen, 2011

Alternative 2 – Proposed Action

Geology

Projects included in the Proposed Action were compared with the WRNF Stability Model (refer to Figure 3L-1). As previously mentioned, slope stability ratings were developed through an evaluation of area geology, slopes, and landslide risk (based on past landslide mapping). The proposed projects included in Alternative 2 were found to span the entire range of mass movement potential, overlapping areas with risks from “slight” to “severe.” However, the vast majority of the proposed project locations overlap areas of “slight” to “moderately low” mass movement potential (refer to Figure 3L-1).

Ground disturbance in Alternative 2, which includes grading and vegetation clearing (some areas will be graded and cleared simultaneously and will be described as such), is primarily associated with the proposed mountain biking trails. There is a segment of the proposed mountain biking trail network (Trail 14) that passes through areas with “moderately high” and “severe” mass movement potential (less than 0.5 mile). All of the other proposed projects included in Alternative 2 are located in areas rated as having “slight” to “moderately low” mass movement potential. These stability rankings are not limiting to the proposed projects, as these rankings are derived from a model rather than strictly empirical data. Field surveys and project implementation would monitor and consider visible indicators of landscape instability such as tension cracks and rill/gully erosion and appropriate erosion control and drainage management would be employed to maintain soil productivity and watershed condition.

Special design considerations would need to be taken into account when implementing the proposed mountain biking trail (Trail 14) that is located in areas of “moderately high” and “severe” mass movement potential.

Despite the relatively low risk to stability within the analysis area, measures will be taken to minimize potential impacts to geologic resources; therefore, PDC would ensure drainage is properly managed to minimize potential impacts from the projects to soils, and from stability issues on the project elements.

Soils

Soil Map Units

Alternative 2 would result in approximately 25.5 acres of overall ground disturbance within the mapped soil units of the Snowmass SUP area. The overall ground disturbance, which includes both temporary and permanent ground disturbance, would be approximately 8.3 acres of grading only, 3.7 acres of vegetation clearing only, and 13.5 acres of vegetation clearing and grading. Table 3L-3 details the overall ground disturbance associated with each of the project components by soil map unit. The K factor included in Table 3L-2 was used to determine the erosion potential for each soil map unit overlapped by the proposed projects.

**Table 3L-3:
Project Disturbance by Soil Map Unit**

Soil Map Unit/Project/Disturbance Type	Acres	Erosion Potential
220B (mountain biking and hiking trails, ropes challenge course, climbing wall, mountain coaster, multi-purpose activity areas)		Moderate
Grading	5.4	
Vegetation Clearing	1.7	
Vegetation Clearing and Grading	3.9	
Total	11.0	
285D (mountain biking trails)		Low-Moderate
Grading	0.1	
Vegetation Clearing and Grading	0.3	
Total	0.4	
338B (mountain biking and hiking trails, zip line canopy tour, zip line)		Moderate-High
Grading	0.9	
Vegetation Clearing	0.7	
Vegetation Clearing and Grading	1.4	
Total	2.9	
347B (mountain biking and hiking trails)		Moderate
Grading	0.1	
Vegetation Clearing and Grading	2.0	
Total	2.1	
360C (hiking trails)		Moderate
Vegetation Clearing and Grading	0.1	
Total	0.1	
367B (mountain biking trails)		Low-Moderate
Grading	1.0	
Vegetation Clearing and Grading	1.5	
Total	2.5	
376C (mountain biking trails and zip line)		Moderate
Grading	<0.1	
Vegetation Clearing	0.1	

**Table 3L-3:
Project Disturbance by Soil Map Unit**

Soil Map Unit/Project/Disturbance Type	Acres	Erosion Potential
Vegetation Clearing and Grading	0.3	
Total	0.4	
380B (mountain biking and hiking trails, zip line canopy tour, climbing wall)		Low
Grading	0.6	
Vegetation Clearing	1.3	
Vegetation Clearing and Grading	4.1	
Total	6.0	
446C (multi-purpose activity areas)		Low
Grading	0.1	
Total	0.1	
Undefined		N/A
Grading	<0.1	
Vegetation Clearing and Grading	<0.1	
Total	<0.1	
Overall Disturbance	25.5	

Table 3L-3 highlights that the majority of the proposed disturbance associated with Alternative 2 would occur in soils with “low” to “moderate” (including those listed as “low-moderate”) erosion potential. Only one soil type, 338B, was identified as having “moderate-high” erosion potential and overlaps 2.9 acres of disturbance associated with the proposed zip line canopy tour (and shelter), zip line, mountain biking trails, hiking trail re-routes, pedestrian access, and construction access included in Alternative 2. Special design considerations may need to be taken into account when performing the grading and vegetation clearing associated with the proposed project components included on this particular soil unit. These considerations will be determined on a site-specific basis as K factor ratings come from a forest-wide analysis of soil types and may not reflect the erodibility of the actual sites proposed for disturbance. For the entire analysis area, implementation of the soil management requirements and PDC would minimize erosion and loss of soil organic material (refer to Table 2-2). None of the areas impacted have high erodibility; therefore, it is not anticipated that any of the proposed projects included in Alternative 2 would result in irreversible damage to soil resources.

Additionally, the WRNF Soils Dictionary was used to further assess slope stability concerns and identify road and trail limitations associated with the soils overlapped by the proposed projects.¹⁸⁰ In particular, limitations related creating cut and fill slopes were assessed for each of the soil map units in the analysis area. Almost all of the soil map units were described as having “slight” or “moderate” limitations in regards to cut and fill stability. In all cases, limitations were related to varying presence of steep slopes or fine grained material within a soil map unit. Slopes with “slight” to “moderate” limitations are typically

¹⁸⁰ USDA Forest Service, 1998

compatible with the cut and fill processes that would be used to construct the proposed mountain biking trails as long as proper design and mitigation measures are followed. One of the soil map units, 376C, does have “severe” limitations to cut and fill stability and includes 0.3 acre of grading and vegetation clearing associated with mountain biking trails. The “severe” limitation rating, which is attributable to the steep slopes and presence of fine-grained material within the soil map unit, does not imply that map unit 376C is entirely unsuitable for cut and fill as associated with mountain biking trail construction. “Severe” limitations can be overcome with proper siting, design and mitigation measures, requiring additional attention when implementing the proposed trail in this location. Additionally, a “severe” rating may indicate that frequent maintenance and upkeep of erosion control measures would be required to control erosion and sedimentation to waterways. In general, “severe” limitations can be overcome by avoiding cliffs, unstable talus and very steep slopes.

Soil Disturbance and Bare Ground

As previously described under the Soil Map Units discussion, Alternative 2 would result in approximately 25.5 acres of overall ground disturbance within the Snowmass SUP area. Of the 25.5 acres of overall ground disturbance associated with Alternative 2, 14.0 acres would be considered a permanent disturbance, resulting in a loss of soil organic material within mapped soils units due to mountain biking trails, construction access or infrastructure. The 14.0 acres of permanent ground disturbance would result from 4 acres of grading, 3 acres of vegetation clearing, and 7 acres of vegetation clearing and grading. Permanent disturbance would occur in some degree across all of the aforementioned soil erodibility ratings, ranging from “low” to “moderate-high.” Table 3L-4 identifies and further describes the permanent disturbances associated each of the project components included in Alternative 2.

**Table 3L-4:
 Permanent Disturbances by Project Component**

Project Component	Soils Disturbed by Grading Only (acres)	Soils Disturbed by Vegetation Clearing/Grading (acres)	Soils Disturbed by Vegetation Clearing Only (acres)	Total Disturbance (acres)
Zip Line Canopy Tour	--	0.3	1.1	1.4
Zip Line Canopy Tour Shelter	<0.1	--	--	< 0.1
Zip Line	< 0.1	< 0.1	0.5	0.5
Ropes Challenge Course	--	0.1	0.3	0.4
Climbing Wall	0.1	< 0.1	--	0.2
Mountain Coaster	0.1	0.3	1.2	1.6
Mountain Biking Trail	2.6	5	--	7.7
Hiking Trails	< 0.1	0.6	--	0.6
Pedestrian/Cyclist Bridge	--	0.1	--	0.1
Multi-purpose Activity Areas	0.4	0.1	--	0.5
Construction Access	0.4	0.3	--	0.7
Pedestrian Access	0.3	< 0.1	--	0.3
Powerline Corridor	--	< 0.1	--	< 0.1
Total	4.0	7.0	3.0	14.0

Disturbance types would impact soil resources differently. The soil disturbance resulting from grading and grading/vegetation clearing would displace the organic layer and the soil surface layer, at a minimum. Soil disturbance would also result from areas of vegetation removal without grading, where some soil displacement would be inevitable. All vegetation would be removed and tree stumps would be cut flush to the ground.

The 14.0 acres of new permanent impacts as outlined in Table 3L-4 would need to be offset by a commensurate acreage of previously-disturbed ground identified in the bare ground digitization project, as well as by ski area and WRNF personnel. This collaborative approach to restoration of both current and past construction projects allows the ski area to meet soil and other resource protections and improve watershed, wildlife, and overall conditions on the ground. The remaining 11.5 acres of ground disturbance that would be considered temporary would not need to be directly offset but would require diligent adherence to soils-related PDC and BMPs to maintain levels of soil organic matter and re-establish vegetation in these areas.

Alternative 3

Alternative 3 includes all of the same project components as Alternative 2 with modifications to the proposed mountain biking trails and multi-purpose activity areas resulting in slight changes to the ground disturbance associated with each of these varying project components. Specifically, mountain biking Trail 21, Trail 17, and the beginner skills park area are not proposed under Alternative 3. An additional trail (Trail 16) was added to Alternative 3 (Trail 16 is not proposed under Alternative 2). Additionally, the

multi-purpose activity area proposed in Elk Camp Meadows is not included in Alternative 3. The remaining two multi-purpose activity areas proposed in Alternative 3 (Elk Camp Summit and Rayburn's Pond) are identical to the Alternative 2 description.

In general, impacts to soils under Alternative 3 would be similar to those discussed above under Alternative 2 with slight differences primarily related to ground disturbance of the varying project elements. The following discussion focuses on the differences between Alternatives 2 and 3 rather than re-addressing the commonalities between the two alternatives.

Geology

Similar to Alternative 2, the vast majority of the proposed project locations overlap areas of "slight" to "moderately low" mass movement potential. The same segment of proposed mountain biking trail that passes through areas with "moderately high" and "severe" mass movement potential (less than 0.5 mile) is included in Alternative 3. Mountain biking Trail 16, which is the only component of Alternative 3 not analyzed under Alternative 2, is located entirely in areas rated as having "slight" to "moderately low" mass movement potential. Alternative 3 would have almost an identical impact to geology as Alternative 2.

Soils

Soil Map Units

Alternative 3 would result in approximately 23.3 acres of ground disturbance within the mapped soil units of the Snowmass SUP area, approximately 2.2 acres less than the overall disturbance associated with Alternative 2 (25.5 acres). Ground disturbance, which includes both temporary and permanent ground disturbance, includes approximately 7.3 acres of grading only, 3.7 acres of vegetation clearing only, and 12.3 acres of vegetation clearing and grading.

All of the project components of Alternative 3 are located within the same soil map units as those described in Alternative 2. Trail 16, which is the only addition specific to Alternative 3, spans soil map units 367B and 220B, which have "moderate" and "low-moderate" erodibility ratings, respectively. When the addition of Trail 16 into these two-mapped soil units is considered with the removal of Trail 17 and beginner skills park, which also overlap 367B and 220B and have been excluded from Alternative 3, there would be no measurable difference to the erodibility potential described in Alternative 2. Differences in impacts to the potential erodibility associated with Alternative 3 when compared to Alternative 2 would be negligible. None of the modifications to project components that exist between Alternatives 2 and 3 would affect the limitations to cut and fill slope stability as none occur in the area of "severe" limitation.

Soil Disturbance and Bare Ground

The permanent disturbance associated with Alternative 3 does vary slightly from that associated with Alternative 2. As previously mentioned there are 23.3 acres of overall ground disturbance associated with Alternative 3; of this overall disturbance only 12.8 acres would be considered a permanent disturbance.

The 12.8 acres of permanent ground disturbance would result from 3.1 acres of grading only, 3.0 acres of vegetation clearing only, and 6.6 acres of vegetation clearing and grading; and would span the range of soil erodibility ratings from “low” to “moderate-high.”

Soils considered permanently disturbed are primarily those within the tread width of proposed mountain biking trails, areas to be converted to construction access, or those overlapped by permanent infrastructure associated with the proposed developed recreation project components. The permanent disturbances proposed in Alternative 3 are identical to those illustrated in Table 3L-4 except there is only a total of 6.6 acres of ground disturbance related to the proposed mountain biking trails (7.7 acres under Alternative 2), and only a total 0.3 acre of ground disturbance related to the multi-purpose activity areas (0.5 acre under Alternative 2). In both cases, the total disturbance of proposed mountain biking trails and multi-purpose activity areas is attributable to the combination of grading only and vegetation clearing and grading, as is also the case in Alternative 2.

The 12.8 acres of new permanent impacts associated with the selection of Alternative 3 would be offset by a commensurate acreage of previously-disturbed ground identified in the bare ground digitization project, as well as by ski area and WRNF personnel. This collaborative approach to restoration of both current and past construction projects allows the ski area to meet soil and other resource protections and improve watershed, wildlife, and overall conditions on the ground. The remaining 10.5 acres of ground disturbance that would be considered temporary would not need to be directly offset but would require diligent adherence to soils-related PDC and BMPs to maintain levels of soil organic matter and re-establish vegetation in these areas.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are cumulatively expected to have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for soils and geology extend from Snowmass’ inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for soils and geology are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on soils and geology resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Past Snowmass Projects (Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement, Burnt Mountain Egress Trail, Summer Trails, New/Realigned Mountain Bike Trails, Sheer Bliss Pond Modification)
- WRNF Forest Plan – 2002 Revision

Cumulative effects to soil resources would be associated primarily with potential soil loss from erosion and loss of soil productivity, largely stemming from soil organic matter displacement. Ski-related development within the analysis area has increased impermeable surfaces and soil compaction, and reduced soil productivity between pre-development and present conditions.

If PDC are properly implemented and maintained, onsite erosion and potential increases in sedimentation to waterways would be minimized.

The development of trails, lifts, infrastructure, and skier facilities on NFS lands in the Snowmass SUP area has occurred since the 1960s. Over five decades of development, there has been a loss of soil organic content (organic O and mineral A horizons) and increased impermeable surfaces within the soil map units. These past ski area activities have resulted in approximately 222 acres of bare ground that could be rehabilitated within the analysis area.¹⁸¹ Past projects from the approved MDP and other recently implemented projects have resulted in a loss of soil organic matter within the SUP. This loss requires identification of soil rehabilitation sites from the bare ground analysis to ensure consistency with Forest Plan standards, which are outlined in the Forest Plan and have been incorporated into this analysis of soil resources. The majority of previous disturbance has been revegetated; however, these sites require ongoing rehabilitation and management in order to address the impacts of vegetation removal and grading, return soil organic matter, and facilitate successful revegetation to the area.

Snowmass currently implements drainage management and erosion control such as waterbars and revegetation (as required by the Forest Service). The effectiveness of these management activities at stabilizing soils within the analysis area would be assessed during the site-specific field surveys. Approximately 25.5 acres and 23.3 acres of ground disturbance are included in Alternatives 2 and 3

¹⁸¹ This acreage of existing bare ground within the analysis area is based on a bare ground soils analysis completed in 2014, which showed 230 acres of bare ground minus 8 acres that Snowmass has since rehabilitated.

respectively; however, under both alternatives roughly half of this disturbance would be temporary and would be rehabilitated after construction. When these acreages are considered in addition to past ski area and county development, there have been considerable changes within the soil organic layer, an increase in soil compaction and decreased infiltration since Snowmass opened as a ski area. The ski area and Forest Service have been working together to minimize potential future impacts that could add to historic changes by identifying bare ground for rehabilitation, refining and improving revegetation plans, developing a Drainage Management Plan for the ski area and implementing ski area PDC. Future projects would be consistent with the above plans and criteria, which will minimize future losses to soil organic matter and work to reduce compaction and improve infiltration. A PDC contained in Table 2-2 requires that there would be no net loss of soil organic material. Snowmass and the Forest Service will use the results of the bare ground analysis to coordinate and implement future soil reclamation and rehabilitation projects (including soil amendments) to address past impacts.

If either action alternative were carefully managed with effective erosion control, considering the low erodibility of soil management units, projects could be implemented without significant impacts to the soils resource and would not affect the soil management unit as a whole. Current and future conditions of soils within the Snowmass SUP area are anticipated to maintain compliance with the Forest Plan and the WCPH. Innovative uses of newly available soil amendments that increase soil moisture, nutrient, and carbon storage could serve to not only offset impacts to soil resources from the selection of an action alternative, but also to improve baseline soil conditions at Snowmass.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Approximately 14.0 acres under Alternative 2 or 12.8 acres under Alternative 3 of soils would be lost due to the construction of mountain biking trails, access paths, and installation of permanent infrastructure. Although these losses would represent a minimal acreage within the soil map unit as a whole, soil is a very slowly renewable resource, as estimates for rates of soil formation range from 0.0056 cm to 0.00078 cm per year.¹⁸² Globally, rates of soil formation are not keeping pace with erosion, leading to widespread soil loss that in part owes to grading activities such as those associated with ski area development.¹⁸³ In this sense, soil loss from development for projects at Snowmass is an irreversible and irretrievable commitment of resources.

¹⁸² Alexander, 1998

¹⁸³ Wakatsuki and Rasyidin, 1992

M. WATERSHED

SCOPE OF THE ANALYSIS

The scope of the analysis for watershed resources focuses on riparian resources contained by drainage areas (the study watersheds) potentially affected by the proposed projects. The surface area comprised by the study watersheds totals approximately 3,484 acres. Surface runoff within these watersheds generally flows in a south-to-north direction and is tributary to Brush Creek in the Roaring Fork River basin. The study watersheds are described in more detail in the Affected Environment discussion in this section.

FOREST PLAN DIRECTION

Pursuant to the Forest Plan, as amended, stream health Management Measures (MM) and PDC are provided in the WCPH to ensure applicable federal and state laws are met on NFS lands in Region 2.¹⁸⁴ The WCPH contains several Management Measures that are environmental goals to protect aquatic and riparian systems. Management Measures of relevance regarding watershed resources are outlined below:

Applicable WCPH Management Measures

- MM-1. Manage land treatments to conserve site moisture and to protect long-term stream health from damage by increased runoff.
- MM-2. Manage land treatments to maintain enough organic ground cover in each activity area to prevent harmful increased runoff.
- MM-3. In the WIZ next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition.
- MM-4. Design and construct all stream crossings and other instream structures to provide for passage of flow and sediment, withstand expected flood flows, and allow free movement of resident aquatic life.
- MM-5. Conduct actions so that stream pattern, geometry, and habitats maintain or improve long-term stream health.
- MM-6. Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological function.
- MM-8. Manage water use facilities to prevent gully erosion of slopes and to prevent sediment and bank damage to streams.
- MM-9. Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of specific operations, local topography, and climate.

¹⁸⁴ USDA Forest Service, 2002a and 2005a

- MM-10. Construct roads and other disturbed sites to minimize sediment discharge into streams, lakes, and wetlands.
- MM-11. Stabilize and maintain roads and other disturbed sites during and after construction to control erosion.
- MM-12. Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage.
- MM-16. Apply runoff controls to disconnect new pollutant sources from surface and groundwater.

Relevant WCPH Definitions

Additionally, the WCPH provides definitions for some terms that are important to conveying information in this report:

- Concentrated-Use Site: Areas designed and managed for high density of people or livestock, such as developed recreation sites and livestock watering areas.
- Connected Disturbed Areas (CDAs): High runoff areas like roads and other disturbed sites that have a continuous surface flow path into a stream or lake. Hydrologic connection exists where overland flow, sediment or pollutants have a direct route to the channel network. CDAs include roads, ditches, compacted soils, bare soils, and areas of high burn severity that are directly connected to the channel system. Ground disturbing activities located within the water influence zone should be considered connected unless site-specific actions are taken to disconnect them from streams.
- 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.
- 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 aquatic biota.
- Stream Health Class: A category of stream health. Three classes are recognized in the Rocky Mountain Region: “Robust,” “At-risk,” or “Diminished.” These classes are recommended to be used for assessing long-term stream health and impacts from management activities.
- Stream Order: A method of numbering streams as part of a drainage basin network. The smallest unbranched mapped tributary is called first order, the stream receiving the tributary is called second order and so on.¹⁸⁵
- Swale: A landform feature lower in elevation than adjacent hill slopes, 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.
- Water Influence Zone (WIZ): 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.

AFFECTED ENVIRONMENT

Project Area Description

Snowmass is located in the Central Rocky Mountains of Colorado, approximately 170 miles west of Denver, Colorado. It is situated at elevations ranging from 8,200 and 12,300 feet, receiving most of its precipitation as snow during the winter months. Annual precipitation at Snowmass averages 28 inches, with approximately 19 inches (or 68 percent of the annual precipitation) occurring between November and April. Monthly mean temperatures range between 17°F and 26°F and between 48°F and 56°F during the winter and summer months, respectively.¹⁸⁶

The study watersheds are those drainage areas where the proposed projects would be implemented. Streams in the study watersheds generally flow in a south-to-north direction and are all tributaries to Brush Creek, which is a tributary of the Roaring Fork River. This analysis uses the Snowmass area watersheds as delineated and named by the WRNF. Refer to Figure 3M-1 for water resources within the analysis area.

¹⁸⁵ EPA, 1980

¹⁸⁶ PRISM Climate Group, 2013

The following are brief descriptions of the four study watersheds:

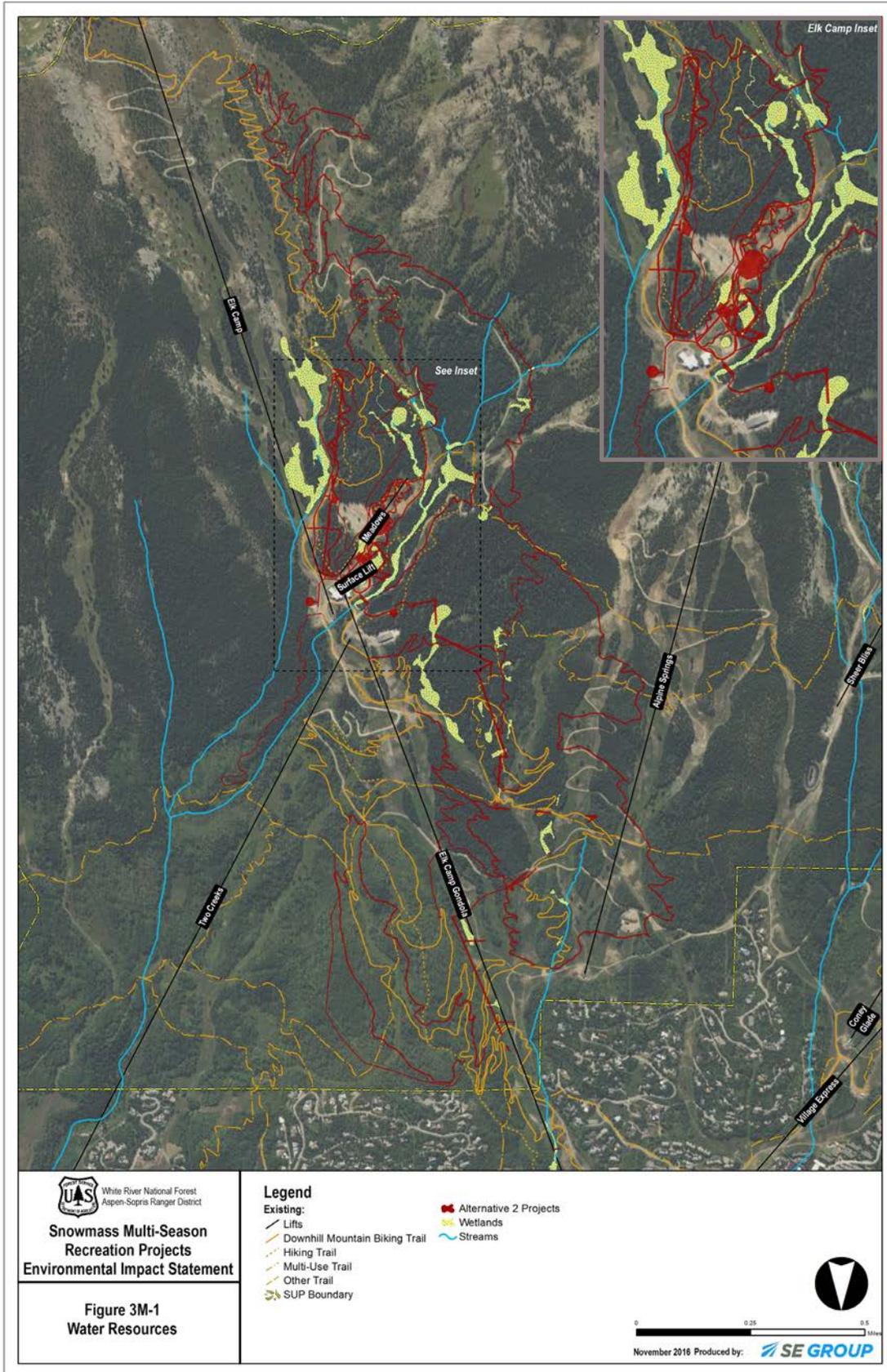
- *East Fork of Brush Creek*, a third-order watershed, is the easternmost and the largest of the study watersheds, containing 2,112 acres. Example projects for this watershed include the mountain biking and hiking trails, the mountain coaster, the ropes challenge course, and climbing wall.
- *Brush Creek Tributary #1* is a relatively small hillslope area of 342 acres, which drains directly into Brush Creek. It does not contain a live stream; in other words, most of the snowmelt and rainfall water infiltrates into the ground. Less than 2,000 feet of new mountain biking trails are proposed in this watershed.
- *Brush Creek Tributary #2* is a 633-acre first-order catchment adjacent to the East Fork of Brush Creek watershed. The zip line canopy tour and zip line projects are proposed to be constructed in this watershed, along with sections of the mountain biking and hiking trails.
- *Brush Creek Face #1* is a 401-acre hillslope catchment tributary to Brush Creek and tucked between the East Fork of Brush Creek and Brush Creek Tributary #2 watersheds. This watershed does not have a live stream channel. Mountain biking and hiking trails are proposed for this watershed.

All of the study watersheds have undergone some level of vegetation removal associated with construction of roads and housing developments. Ski area development, including snowmaking and ski trails has also occurred in the East Fork of Brush Creek and Brush Creek Tributaries #1 and #2. Table 3M-1 compares the acreage of existing forested areas relative to baseline, or pre-development, conditions. For the purposes of this analysis, it is assumed that all projects approved in the 2014 *Snowmass Ski Trail Enhancements and High Alpine Lift Replacement EA* have been implemented.¹⁸⁷

It is also important to note that none of the stream segments within the analysis area are listed on the Colorado State 303(d) list as impaired streams under the CWA.¹⁸⁸

¹⁸⁷ USDA Forest Service, 2014b

¹⁸⁸ CDPHE, 2012



**Table 3M-1:
Study Watersheds – Comparison of Baseline and Existing Conditions**

Watershed	Drainage Area (acres)	Forested Area		
		Baseline (acres)	Existing	
			(acres)	(% of Baseline)
East Fork of Brush Creek	2,112	1,994	1,446	73
Brush Creek Tributary #1	342	342	203	59
Brush Creek Tributary #2	633	633	372	59
Brush Creek Face #1	401	396	148	37

Watershed

Water Yield

Runoff hydrographs for the study watersheds were developed following the methodologies presented in the Forest Service’s *Water Resources Evaluation of Non-Point Silvicultural Sources (WRENSS) Procedural Handbook*, as updated by Troendle, Nankervis, and Porth, and supplemented by the Colorado Ski Country USA (CSCUSA) Handbook.¹⁸⁹ In summary, the WRENSS Model generates a water balance using seasonal precipitation and vegetation type and density (distributed by watershed aspect). The model then computes the amount of water potentially available for runoff. The water balance of the WRENSS model is coupled with a snowmaking hydrology computation process developed through the CSCUSA study. Together, these calculations produce estimates of water yield typical of subalpine mountain watersheds. For each study watershed, the WRENSS model distributes the calculated annual yield using simulated hydrographs based on hundreds of years of data recorded at several different gauging stations. The simulated hydrographs represent the normalized distributions of the annual yield in six-day intervals throughout the year. It is important to note that the computations do not include routing of runoff water through the watershed to the stream system. Thus, the water yield hydrographs do not represent streamflow per se, but rather basin-wide water yield to the receiving waters. In other words, the WRENSS hydrologic model was developed to simulate expected changes in streamflow as the result of silvicultural activities, not streamflow itself.

Water yields and distribution hydrographs were modeled for baseline, existing, and potential (Alternatives 2 and 3) 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 potential projects on the watersheds’ yield and peak flow. The baseline hydrographs modeled conditions prior to any human impacts, such as ski trail development, taking place in these watersheds.

Under current conditions, the study watersheds’ yields are affected by tree removal associated with ski area development, including the input of additional water in the form of snowmaking, and by construction of several homes within private lands. Water yields and peak flows calculated using the WRENSS model

¹⁸⁹ EPA, 1980; Troendle et al., 2003; CSCUSA, 1986

for each study watershed are summarized in Table 3M-2, for both baseline and current conditions assuming average precipitation and temperatures. Hydrograph plots that depict the temporal distribution of these water yields were also developed using the WRENS 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 consequence of the higher volume and rate of snowmelt due to decreased canopy interception and evapotranspiration, and increased solar radiation in cleared areas, and also due to the snowmaking water input (additional to natural precipitation) to the affected watersheds.

**Table 3M-2:
WRENS Model Output for Baseline and Existing Conditions –
Average Precipitation and Temperature**

Watershed	Baseline Conditions		Existing Conditions	
	Water Yield (acre feet)	Peak Flow (cfs)	Water Yield (acre feet)	Peak Flow (cfs)
East Fork of Brush Creek	979	8.3	1,818	33.0
Brush Creek Tributary #1	112	NA	282	NA
Brush Creek Tributary #2	336	2.9	729	8.1
Brush Creek Face #1	282	NA	322	NA

Stream Health

The WCPH defines stream health as the condition of a stream compared to the condition of a minimally disturbed reference stream of similar type and geology. Stream health is categorized as “Robust,” “At-risk,” or “Diminished” using numerical criteria for fine sediment loading, percentage of unstable banks, residual pool depths, and wood loading.

Stream Health Definitions

The Forest Plan adopted the WCPH for direction on projects that affect water resources. The WCPH mandates Management Measures regarding stream health and potential effects to water resources. 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. The definitions of Stream Health and Stream Health Class are provided in the Forest Plan Direction discussion.

The stream health classification is obtained by comparing metrics surveyed in a study reach against those surveyed in its corresponding reference reach. Reference stream reaches are located in watersheds with little or no development and represent natural conditions that are attainable for a given channel type, climate, geology, aspect, and slope. Reference stream reaches provide an analytical control against which to compare the conditions found in study reaches. Study reaches are located downstream from areas impacted by natural events (e.g., forest fires) or activities such as logging and ski area development.

Stream health classes are used for assessing long-term stream health and impacts from management activities. In this context, Management Measure 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. Definitions of relevant stream health metrics are listed below. Table 3M-3 summarizes the definitions of stream health classes.

**Table 3M-3:
Stream Health Classes for Attainment of Forest Plan Standards (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 suggests 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.

Notes:

^a For metrics that increase with decreasing stream health, such as fine sediment and unstable stream banks.

Potential Management Effects to Stream Health

Metric:

Unstable Banks: A streambank showing evidence of the following: breakdown (clumps of bank are broken away and banks are exposed); slumping (banks have slipped down); tension cracking or fracture (a crack visible on the bank); or vertical and eroding (bank is mostly uncovered, less than 50 percent covered by perennial vegetation, roots, rocks of cobble size or larger, logs of 0.1 meter in diameter or larger, and the bank angle is steeper than 80 degrees from the horizontal). Undercut banks are considered stable unless tension fractures show on the ground surface at the back of the undercut.¹⁹⁰

Causal Mechanism(s):

Increased Runoff: The WCPH lists increased runoff as one the major sources of stream impacts. Several investigators have demonstrated that increases in peak discharge and annual volume of runoff can negatively impact the stability of streambanks.¹⁹¹

¹⁹⁰ Overton et al., 1997

¹⁹¹ David, 2008

Impacts to Riparian Vegetation: Many land use activities can lead to accelerated bank erosion. Riparian vegetation provides internal bank strength. Removal of native riparian vegetation may lead to weakened internal bank strength and subsequent decrease in bank stability.¹⁹²

Channel Network Extension: Roadside drainages frequently connect directly to the stream channel and result in a net increase in the length of the existing channel network within the watershed. This increases the efficiency of flow routing within the watershed, increasing peak flows and subsequent erosion and sediment transport. The WCPH outlines the following PDC under MM-1: “In each 3rd order and larger watershed, limit connected disturbed areas so that the total stream network is not expanded by more than 10 percent. Progress toward zero connected disturbed area as much as feasible.” Roads are usually a primary source of channelized connection between disturbed soils and the stream channel. Because roadside drainage ditches provide an efficient mechanism for capturing runoff and frequently drain to a stream system, a direct link between the road-generated sediment source and the stream system is easily created. A second potential source of connected disturbance could be sparsely vegetated ski trails with drainage waterbars that connect directly to the stream system.

Connected Graded Terrain: In terms of the effect of proposed management activities upon bank stability conditions in affected stream reaches, ultimately the area of disturbance and/or snowmaking that is directly connected to the stream system is the variable of management concern. The WCPH clearly documents the relationship between CDAs and effects to peak flows in the associated stream system. Likewise, the effect of channel network extension and the increased efficiency of hydraulic routing have been well documented by several investigations, including references in the Zero Code of the WCPH.¹⁹³

Metric:

Percent Surface Fines: The effect of land disturbances such as roads, roadside ditches, ski trails, and utility corridors within forested watersheds tend to cause an increase in exposed and compacted surface soils; therefore, there is an increase erosion and sediment transport. An increase of sediment load input to the stream network of a watershed is often indicated by higher percentages of fine-grained particles on the channel bed. Fine sediment deposition can diminish habitat by aggradation, or filling in, of pool systems. Pools are important components of habitat for many fish species and other aquatic organisms. Filling by fines affects pool habitat by reducing volume, particularly during low flow conditions, and obliterating substrate cover.

Causal Mechanism(s):

CDA: High-runoff areas, like roads and other disturbed sites, having a continuous surface flow path into a stream or lake. Hydrologic connection exists where overland flow, sediment, or pollutants have a direct route to the channel network. CDAs include roads, ditches, compacted soils, bare soils, and areas of high

¹⁹² Rosgen, 2006

¹⁹³ Burroughs and King, 1989; Troendle and Olsen, 1994

burn severity that are connected to the channel system. Ground disturbing activities located within the WIZ should be considered connected unless site-specific actions are taken to disconnect them from the streams. CDAs provide a measure of the extent to which a stream reach is influenced by direct, channelized connections between disturbed soils and the stream network itself.

Metric:

Wood Frequency: Sustainable woody debris recruitment is recognized as an important riparian function in mountain channels. Standing dead trees provide habitat for nesting species in the riparian zone and contribute detritus and insects to streams. Once in streams, coarse woody debris helps maintain channel structure by storing sediment and encouraging pool scour. Large woody debris (LWD) reduces stream energy by interrupting the continuous slope of channel beds and creating turbulence. In streams supporting fisheries, LWD also helps provide stable fish habitat by retaining spawning gravel and by serving as rearing cover.

Causal Mechanism(s):

Vegetation Removal in WIZ: Recruitment of LWD is dependent upon maintenance of riparian vegetation structure and function. Removal of vegetation within the WIZ has been demonstrated to have a negative impact upon maintenance of adequate wood frequency.

Existing Stream Health

The WRNF evaluates stream health using a standard Forest Service physical habitat survey protocol.¹⁹⁴ Under this protocol streams that may be affected by proposed management activities are surveyed and compared to reference streams with similar morphology and geology. Reference streams represent natural conditions that are considered the best conditions attainable. For streams that are third-order and larger, stream health surveys are typically conducted downstream from proposed management activities in reaches that are considered to have the potential to respond to altered flow conditions or sediment loading upstream.¹⁹⁵ Quantitative stream health surveys are not routinely conducted on second order and smaller streams due to high natural variability in bed and bank characteristics; however, these smaller streams are often evaluated using qualitative observations of bed and bank characteristics, which may indicate localized erosion or sediment storage.

As mentioned in the Potential Management Effects to Stream Health discussion, disturbance of the WIZ has a direct effect on stream health metrics, such as LWD and fine sediments. The WCPH states the importance of the WIZ in the protection of interacting aquatic, riparian, and upland functions. Furthermore, Management Measure MM-3 includes PDC requiring that new concentrated-use sites be located outside the WIZ if practicable. Table 3M-4 compares the extent of the WIZ estimated for pre-

¹⁹⁴ Overton et al., 1997

¹⁹⁵ Montgomery and Buffington, 1998

development, or baseline, against existing conditions. Relative to baseline conditions, most of the tree removal within the WIZ has occurred in the East Fork of Brush Creek watershed.

Table 3M-4:
WIZ Forested Areas – Baseline vs. Existing Conditions

Watershed	Baseline (acres)	Existing (acres)	Existing (% of Baseline)
East Fork of Brush Creek	154	129	84
Brush Creek Tributary #1 ^a	NA	NA	NA
Brush Creek Tributary #2	23	14	61
Brush Creek Face #1 ^a	NA	NA	NA

Notes:

^a No perennial/intermittent stream channels were identified in these watersheds.

A stream health survey was completed for a third-order stream reach on the East Fork of Brush Creek on September 14, 2014. Four reference streams, surveyed in previous years, were used to characterize reference conditions for the evaluation of the East Fork Brush Creek. Based upon this survey, the East Fork Brush Creek is rated as “Robust” for fine sediment loading, residual pool depths and wood frequency, whereas bank stability is rated “Diminished.”¹⁹⁶ Although the exact cause of bank instability found in East Fork Brush Creek is not known, increased streamflow associated with tree removal, road construction, snowmaking and grading at ski areas can increase bank failures in streams.¹⁹⁷ However, bank instability can also be associated with natural sediment transport processes, particularly on alluvial fans where there is a transition from high sediment transport capacity upstream to low sediment transport capacity downstream.¹⁹⁸ Breaks in channel confinement and gradient breaks also affect the transport capacity within different stream segments or reaches, and this affects the way different stream reaches respond to sediment inputs.¹⁹⁹ It is likely that bank stability within the stream health survey reach on East Fork Brush Creek is affected both by natural factors relating to gradient, confinement and geology, as well as past ski area development. Although bank instability remains a concern in isolated portions of East Fork Brush Creek, the bank stability concerns are not widespread throughout the stream network.

Because the WRNF does not complete quantitative stream health surveys on streams smaller than third-order, a qualitative assessment of the Brush Creek Tributary #2 was completed during the summer field season of 2016. This first-order stream channel was inspected at three locations: just below the ski area road to Elk Camp; and above and below the Alpine Springs ski area road. No indications of unstable streambanks were observed on these reaches, and density of woody debris appeared to be abundant.

¹⁹⁶ Anderson, 2014

¹⁹⁷ David, 2008

¹⁹⁸ USDA Forest Service, 1992

¹⁹⁹ Montgomery and Buffington, 1998

However, fine sediment was found on the bottom of the stream channel near the Elk Camp road culverts and at the discharge of a ski trail waterbar (on the *Funnel* ski trail).

Existing Connected Disturbed Area

A field investigation completed during the summer of 2016 for the study watersheds provides important information regarding existing conditions related to stream health. Data collected during the field investigation, such as location and characteristics of graded areas, road-side ditches, and culverts was incorporated into a Geographic Information System (GIS) database in order to estimate the spatial extent of CDAs. In particular, the field investigation focused on the condition of roads and other disturbed areas within the SUP area and in the vicinity of stream channels to determine if such areas route flows directly to the stream system within each watershed. Disturbed areas where clear evidence of direct hydrologic connection to the stream system was observed were classified as CDAs. Generally, mountain roads in Snowmass were found to be in good condition; however, there exist sections of roads that are steep and/or located in close proximity to stream channels. Ruts, rill erosion, and evidence of road drainage flowing directly into the creek were observed in certain areas and thus were classified as connected. Results from this investigation that are relevant to the CDAs analysis are displayed in Tables 3M-5 and 3M-6.

**Table 3M-5:
 Connected Roads within the Study Watersheds – Existing Conditions**

Watershed	Natural Stream Channel Length^a (feet)	Road Drainage Connected Length^b (feet)	Percent Increase of Channel Length (%)
East Fork of Brush Creek	29,018	109	<1
Brush Creek Tributary #1 ^c	NA	NA	NA
Brush Creek Tributary #2	4,944	704	14
Brush Creek Face #1 ^c	NA	NA	NA

Notes:

^a Derived from GIS and field data analysis. Includes stream channels of Order 1 and higher.

^b Within NFS lands.

^c No perennial/intermittent stream channels were identified in these watersheds.

**Table 3M-6:
 Connected Disturbed Areas within the Study Watersheds – Existing Conditions**

Watershed	Existing Graded Areas^a (acres)	Connected Disturbed Areas (acres)	Percent Disturbed Areas that are Connected (%)
East Fork of Brush Creek	8.9	0.05	<1
Brush Creek Tributary #1 ^b	NA	NA	NA
Brush Creek Tributary #2	7.5	0.18	2
Brush Creek Face #1 ^b	NA	NA	NA

Notes:

^a Includes roads within NFS lands.

^b No perennial/intermittent stream channels were identified in these watersheds.

The WCPH provides Management Measures and design criteria to protect the hydrologic function of watersheds. PDC for MM-1 states that, “In each watershed containing a third-order and larger stream, limit CDAs so the total stream network is not expanded by more than 10 percent.” Direct connection of disturbances to the stream channel, such as roads via roadside ditches, results in a net increase in the length of the existing channel network within the watershed. Although the Brush Creek Tributary #2 watershed is of first-order, the concept of minimizing the length of connected roads still applies. Connected disturbed areas capture surface runoff and concentrate flows within the watershed, increasing both volume and peak streamflows. This, in turn, creates a direct link between the sediment generated in disturbed areas and the stream system. Thus, CDAs have a direct, negative impact in stream health metrics such as unstable banks and channel sedimentation.

As shown in Table 3M-5, the percent increase of channel length (due to connected roads) is relatively low as compared to the total length of the channel network. In fact, the percent increase of channel length is less than the 10 percent limit established in MM-1 for the East Fork Brush Creek watershed. Relative to the spatial extent of disturbed areas in the study watersheds (refer to Table 3M-6), the acreage of disturbed areas connected to the stream system is small. The overall good condition of the ski area roads and the relatively small acreage of CDAs has contributed to maintenance of a “Robust” classification for the percent of fine sediments and residual pool depth metrics determined for the East Fork of Brush Creek.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

Under the No Action Alternative, Snowmass would continue its current summer and winter operations. Additional tree removal or terrain grading would not occur with selection of this alternative. This alternative would have no direct or indirect effects on the watershed resources.

Alternative 2 – Proposed Action

The Proposed Action involves 17.2 acres of tree removal and 20.2 acres of grading. The total disturbance associated with the proposed projects would be 25.5 acres since both tree removal and terrain grading would occur on 13.4 acres. It is important to note that the proposed tree removal is mostly associated with “linear” projects such as zip lines and mountain biking trails. In other words, the Proposed Action would remove selected trees, as necessary, within 17.2 acres but would not clear-cut 17.2 acres of forests. For example, an 18- to 20-foot-wide corridor would be needed for a safe operation of the proposed zip line and zip line canopy tour; corridors required for the proposed mountain biking trails would range between 6 and 10 feet wide. Depending on the location, minimal removal of overstory vegetation would be required for the proposed projects as tree spacing in the project areas often exceeds 10 feet. An additional 1.5 acres of disturbance would occur as temporary grading for materials staging areas and a utility corridor; however, due to its temporary nature, and location within existing disturbed areas, this

disturbance would not affect the watershed resource. Refer to Section L – Soils and Geology for additional details about temporary disturbance and grading.

The proposed disturbance and associated projects for the study watersheds are summarized in Table 3M-7 (a more detailed description of the proposed impacts is included in the Stream Health discussion).

Table 3M-8 provides a comparison between pre-development, existing, and proposed forest acreage.

Table 3M-7:
Projects per Watershed – Alternative 2

Watershed	Proposed Projects Summary	Proposed Activity ^a		
		Tree Removal ^b (acres)	Terrain Grading (acres)	Total Disturbance (acres)
East Fork of Brush Creek	Climbing Wall; Mountain Biking and Hiking Trails; Mountain Coaster	8.6	12.0	13.7
Brush Creek Tributary #1	Mountain Biking Trails	0.4	0.4	0.4
Brush Creek Tributary #2	Mountain Biking and Hiking Trails; Zip Line Canopy Tour; Zip Line	7.4	6.8	8.8
Brush Creek Face #1	Mountain Biking and Hiking Trails	0.8	1.0	1.0
Total		17.2	20.2	23.9^c

Notes:

^a These acreages may differ slightly from the numbers presented in Chapter 2 due to rounding.

^b The reported acreage refers to the “activity envelope” where tree removal would take place. For example, tree spacing often exceeds the proposed mountain biking trail width of 6 feet.

^c There is an additional 1.5 acres of temporary grading in existing disturbed areas that is not included in this total disturbance, but is accounted for in Section L – Soils and Geology.

Table 3M-8:
Comparison of Forested Areas – Existing vs. Alternative 2 Conditions

Watershed	Baseline Forested Areas (acres)	Existing Forested Areas		Proposed Forested Areas (Cumulative)	
		Surface Area (acres)	Percent of Baseline Forest (%)	Surface Area (acres)	Percent of Baseline Forest (%)
East Fork of Brush Creek	1,994	1,446	73	1,437	72
Brush Creek Tributary #1	342	203	59	202	59
Brush Creek Tributary #2	633	372	59	365	58
Brush Creek Face #1	400	148	37	147	37

Water Yield

Hydrologic computations performed using the WRENSS hydrologic model show that water yields and peak streamflow rates originating from the study watersheds would increase between 0.2 and 2 percent relative to existing conditions. These potential changes in water yields and peak flow rates are a consequence of the proposed tree removal. 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. Tables 3M-9 and 3M-10 summarize the increases in annual water yield and peak runoff flow rates modeled for the Proposed Action under average climatic conditions.

**Table 3M-9:
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	Proposed		
East Fork of Brush Creek	979	1,818	1,827	0.5	87
Brush Creek Tributary #1	112	282	283	0.2	153
Brush Creek Tributary #2	336	729	740	2	120
Brush Creek Face #1	282	322	323	0.3	15

**Table 3M-10:
Estimated Changes to Peak Runoff – Alternative 2**

Watershed	Peak Runoff Flow (cfs)			Change Relative to Existing Rate (%)	Cumulative Change Relative to Baseline Rate (%)
	Baseline	Existing	Proposed		
East Fork of Brush Creek	8.3	33.0	33.2	0.4	299
Brush Creek Tributary #1 ^a	NA	NA	NA	NA	NA
Brush Creek Tributary #2	2.9	8.1	8.3	2	186
Brush Creek Face #1 ^a	NA	NA	NA	NA	NA

Notes:

^a No perennial/intermittent stream channels were identified in these watersheds.

Stream Health

As detailed in the Existing Stream Health discussion, the East Fork Brush Creek stream channel was determined to be “Robust” for the fine sediments, large woody debris, and residual pool depth metrics; the bank stability metric, on the other hand, was classified as “Diminished.” The Brush Creek Tributary #2 stream channel was found to be in good condition, although road and ski trail sediment was observed on sections of its channel.

Impacts to the WIZ

The Proposed Action would involve a small amount of tree removal and grading within areas of the study watersheds, including the WIZ. Specifically, construction of new mountain biking trails, zip line canopy

tour and ropes challenge course projects would require removal of selected trees within 0.6 acre of the East Fork Brush Creek WIZ and 0.04 acre in the WIZ of Brush Creek Tributary #2. 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. Tree removal within the WIZ could negatively affect the LWD stream health metric, depending upon the spatial extent of the activity. As stated above, most of the proposed tree removal is associated with “linear projects” such as construction of mountain biking trails. Impacts to the WIZ in terms of reduction of the basal area and/or forest cover density would be lower than the acreage identified above.²⁰⁰ Felling trees within the WIZ could lead to improvement of the LWD stream health metric. Stream crossings will be minimized; when stream crossings cannot be avoided, bridges or boardwalks would be constructed to avoid grading and minimize impacts in the WIZ.

Connected Disturbed Areas

Terrain grading may impact stream health in metrics such as unstable banks and channel sedimentation if graded areas are connected to the stream channel. In order to minimize impacts to the watershed resources and avoid the creation of additional CDAs as a result of the proposed projects, Snowmass should construct all stream crossings as simple bridges and/or raised boardwalks. Approach sections to stream channel crossings would be constructed with a reversed grade so that runoff and sediment could drain away from the stream. Snowmass would incorporate appropriate PDC to ensure impacts due to construction of the proposed projects are avoided or minimized (refer to Table 2-2).

Disturbance outside of the WIZ would result from implementation of the proposed projects. Approximately 81 percent of the total 20.2 acres of proposed grading would be associated with construction of mountain biking trails. Approximately 0.5 acre of the proposed grading associated with the construction of mountain biking trails (Trail 14) would overlap areas with “moderately high” and “severe” mass movement potential. This segment of proposed Trail 14 also includes two stream crossings within the vicinity of these potentially unstable soils. Soil stability rankings are not limiting to the proposed projects, as these rankings are derived from a model rather than strictly empirical data and would need to be verified in the field during project implementation. Special design considerations would need to be taken into account when constructing Trail 14 to ensure proper drainage and avoid increases in sedimentation. All of the other proposed mountain biking trails overlap areas rated as having “slight” to “moderately low” mass movement potential.

Although the vast majority of the proposed mountain biking trails would be located outside of the WIZ, all of the proposed trails should be constructed with waterbars and/or drain dips adequately spaced to

²⁰⁰ Basal area is the area of the cross section of a tree stem, including the bark, measured at breast height (4.5 feet above the ground). Forest cover density is an index, theoretically ranging from zero to less than one, which represents the efficiency of three-dimensional canopy system to utilize the energy input to transpire water. EPA, 1980

reduce velocities of surface runoff and minimize potential erosion and sediment transport. Furthermore, the trails should be sloped to drain runoff into well-vegetated areas and away from water bodies.

Construction of the required construction and operation access paths to the different projects would be designed and built to accommodate all-terrain vehicles. Access paths would be 12 feet wide and would be constructed in compliance with Forest Service specifications for this type of trail, including proper drainage features and BMPs for erosion and sediment control. All the proposed grading must be constructed following Forest Service guidelines and should include adequate design, implementation, and maintenance of BMPs for erosion and sediment control. Temporary disturbance of 1.5 acres within existing disturbed areas of Elk Camp would be required for materials staging areas and a utility corridor; these sites would be revegetated with native grasses following completion of construction. Refer to Section L – Soils and Geology for additional details about temporary disturbance and grading.

Except for the aforementioned segment of mountain biking trail, all of the other projects proposed in Alternative 2 overlap areas rated as having “slight” to “moderately low” mass movement potential. Proposed terrain grading, especially in areas of “high” and “severe” mass movement potential could impact stream health due to increased sedimentation; however, with proper siting, design and mitigation measures, stream health would be maintained. Bridges or boardwalks would be constructed to avoid grading and minimize impacts in the WIZ (refer to Section L – Soils and Geology for a complete discussion of potential impacts related to soil stability).

Forest Plan Consistency

Alternative 2 projects proposed for the study watersheds would require appropriate PDC in order to “maintain or improve” stream health in accordance with WCPH Management Measures. The relatively small areas of terrain grading, tree removal, and associated increases in watershed yield and peak flow that would result from construction of the Alternative 2 projects would not have a negative impact on the existing stream health of the study watersheds if implemented with the PDC listed in Table 2-2. These PDC were developed in coordination with the WRNF. Additional PDC were included in Table 2-2 as a result of the analysis of potential impacts to the watershed resources. Correct implementation of the PDC and proper maintenance of associated BMPs for erosion and sediment control would ensure consistency with the WCPH and would not adversely impact the health of the study watersheds.

Alternative 3

Alternative 3 was developed to respond to wildlife, visual, and recreation concerns. It includes most of the projects contained in the Proposed Action, except the beginner skills park area and Elk Camp Meadows multi-purpose activity area. In addition, Alternative 3 does not include the upper section of Hybrid Trail 17, and replaces Trail 21 by Trail 16. Chapter 2 includes additional detail regarding conceptual differences between the two action alternatives.

Potential impacts associated with Alternative 3 projects include tree removal within 16 acres, of which 12.3 acres would require grading. Grading would occur on 5.7 acres of existing ski trails. Compared to Alternative 2, Alternative 3 projects would require approximately 1.1 fewer acres of tree removal and approximately 2.0 fewer acres of terrain grading. An additional 1.5 acres of disturbance would occur as temporary grading for materials staging areas and a utility corridor; however, due to its temporary nature, and location within existing disturbed areas, this disturbance would not affect the watershed resource. Refer to Section L – Soils and Geology for additional details about temporary disturbance and grading. Table 3M-11 summarizes the different projects included in Alternative 3. Table 3M-12 displays a comparison between pre-development, existing, and Alternative 3 forest acreage. Table 3M-13 compares the potential terrain grading and tree removal acres for both action alternatives.

Table 3M-11:
Alternative 3 Projects per Watershed

Watershed	Proposed Projects Summary	Proposed Activity ^a		
		Tree Removal ^b (acres)	Terrain Grading (acres)	Total Disturbance (acres)
East Fork of Brush Creek	Mountain Biking and Hiking Trails; Mountain Coaster, Ropes Challenge Course, Construction Access	7.8	10.2	11.9
Brush Creek Tributary #1	Mountain Biking Trails	0.4	0.4	0.4
Brush Creek Tributary #2	Mountain Biking and Hiking Trails; Zip Line, Zip Line Canopy Tour, Construction Access	7.1	6.4	8.6
Brush Creek Face #1	Mountain Biking and Hiking Trails	0.8	0.9	0.9
Total		16.1	17.9	21.8^c

Notes:

^a These acreages may differ slightly from the numbers presented in Chapter 2 due to rounding.

^b The reported acreage refers to the “activity envelope” where tree removal would take place. For example, tree spacing often exceeds the proposed mountain biking trail width of 6 feet.

^c There is an additional 1.5 acres of temporary grading in existing disturbed areas that is not included in this total disturbance, but is accounted for in Section L – Soils and Geology.

Table 3M-12:
Comparison of Forested Areas – Existing vs. Alternative 3 Conditions

Watershed	Baseline Forested Areas (acres)	Existing Forested Areas		Proposed Forested Areas (Cumulative)	
		Surface Area (acres)	Percent of Baseline Forest (%)	Surface Area (acres)	Percent of Baseline Forest (%)
East Fork of Brush Creek	1,994	1,446	73	1,438	72
Brush Creek Tributary #1	342	203	59	202	59
Brush Creek Tributary #2	633	372	59	365	58
Brush Creek Face #1	400	148	37	147	37

**Table 3M-13:
Comparison of Potential Tree Removal and Terrain Grading – Alternative 2 vs. Alternative 3**

Watershed	Terrain Grading		Tree Removal ^a	
	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 2 (acres)	Alternative 3 (acres)
East Fork of Brush Creek	12.0	10.2	8.6	7.8
Brush Creek Tributary #1	0.4	0.4	0.4	0.4
Brush Creek Tributary #2	6.8	6.4	7.4	7.1
Brush Creek Face #1	1.0	0.9	0.8	0.8

Notes:

^a These surface areas do not represent clear-cut acreages; instead, tree removal would occur within the specified acreage.

Water Yield

Hydrologic computations by the WRENS model indicate that implementation of Alternative 3 projects would result in slight increases of watershed yield and peak flow rates between 0.2 and 1.6 percent as compared to existing conditions. As discussed under the Alternative 2 description, tree removal reduces the amount of water intercepted, stored, and transpired by the vegetation, which results in increases in watershed yield and changes in the time distribution and intensity of flow rates. Tables 3M-14 and 3M-15 display the calculated changes in annual watershed yield and peak runoff flow rates modeled for Alternative 3 under average climatic conditions.

Relative to existing conditions, the modeled increases in yield and runoff peak flow would be very small as compared to the natural variability of the study watersheds hydrology. As discussed in the Affected Environment description, during a typical wet year the study watersheds may produce an annual yield approximately 57 percent higher than the average. Also during a typical wet year, peak flows may increase more than 32 percent due to larger snowpacks.

**Table 3M-14:
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	Alternative 3		
East Fork of Brush Creek	979	1,818	1,826	0.5	87
Brush Creek Tributary #1	112	282	283	0.2	153
Brush Creek Tributary #2	336	729	740	1.6	120
Brush Creek Face #1	282	322	323	0.3	15

**Table 3M-15:
Estimated Changes to Peak Runoff – Alternative 3**

Watershed	Peak Runoff Flow (cfs)			Change Relative to Existing Rate (%)	Cumulative Change Relative to Baseline Rate (%)
	Baseline	Existing	Alternative 3		
East Fork of Brush Creek	8.3	33.0	33.15	0.4	299
Brush Creek Tributary #1 ^a	NA	NA	NA	NA	NA
Brush Creek Tributary #2	2.9	8.1	8.3	1.9	181
Brush Creek Face #1 ^a	NA	NA	NA	NA	NA

Notes:

^a No perennial/intermittent stream channels were identified in these watersheds.

Stream Health

The fine sediments, large woody debris, and residual pool depth metrics were surveyed to be well within the range for the “Robust” class for the East Fork of Brush Creek. A formal stream health survey was not conducted for Brush Creek Tributary #2 because this stream is a first-order channel. A qualitative assessment of this stream concluded that the Brush Creek Tributary #2 is in good condition: no indications of unstable streambanks were observed and the density of woody debris was deemed adequate. However, fine sediments were observed deposited on the stream channel near road culverts and at the discharge of a ski trail waterbar.

Impacts to the WIZ

Alternative 3 projects would require tree removal within areas of the study watersheds, including the WIZ. Tree removal in the WIZ would occur within 0.7 acre in the East Fork Brush Creek watershed while only 0.04 acre of tree removal would take place in the Brush Creek Tributary #2 WIZ. 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. Depending on its spatial extent, tree removal within the WIZ could negatively affect the LWD stream health metric. However, most of the proposed tree removal is associated with “linear projects” such as construction of mountain biking trails, zip lines, and zip line canopy tour. Such projects would require relatively narrow construction corridors, often not much wider than the existing tree spacing (refer to Alternative 2 for additional detail). Therefore, actual tree removal would be relatively small within the specified acreage and impacts to the WIZ in terms of reduction of the basal area and/or forest cover density would be much lower than the 0.74 acre identified above. Where a WIZ resides within an inter-trail island, recruitment of LWD could improve in the WIZ when trees are felled. Similar to Alternative 2, terrain grading would not occur within the WIZ of the study watersheds, as all stream crossings would be constructed as bridges and/or boardwalks.

Connected Disturbed Areas

Implementation of Alternative 3 projects would require terrain grading (outside of the WIZ) and tree removal. In total, 17.9 acres of terrain would be graded and tree removal would occur within 16.1 acres. As discussed above, terrain grading and tree removal activities are associated with linear projects (e.g., mountain biking trails, zip lines) with relatively narrow construction corridors. Terrain grading projects have the potential to impact stream health metrics such as stream bank stability and fine sediments. Alternative 3 projects must include appropriate PDC in order to minimize impacts and maintain or improve stream health. Specifically, all stream crossings must be constructed as bridges and/or boardwalks, and sections of trails approaching crossings must be constructed and maintained to drain runoff and sediment away from the wetlands and streams, in order to avoid creation of new CDAs. Adequate PDC, including drainage features and BMPs for erosion and sediment control must be developed for all ground disturbing activities. All ground disturbing activities must be constructed in accordance with Forest Service guidelines and should include design, implementation, and maintenance of adequate BMPs for erosion and sediment control. Temporary disturbance needed for materials staging areas and a utility corridor would occur on approximately 1.5 acres; these areas would be revegetated with native grasses following completion of construction.

Forest Plan Consistency

Alternative 3 projects proposed for the study watersheds would require that PDC be designed and implemented to “maintain or improve” stream health in accordance with WCPH Management Measures. The relatively small areas of terrain grading, tree removal, and associated increases in watershed yield and peak flow that would result from construction of the Alternative 3 projects would not have a negative impact on the existing stream health of these watersheds if implemented with the PDC listed in Table 2-2.

These PDC were developed in coordination with the WRNF. Additional PDC were included in Table 2-2 as a result of the analysis of potential impacts to the watershed resources. Correct implementation of the PDC and proper maintenance of associated BMPs for erosion and sediment control would ensure consistency with the WCPH and would not adversely impact the health of the study watersheds.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for watershed resources extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for watershed resources are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on watershed resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Past Snowmass Projects (Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement, Summer Trails, New/Realigned Mountain Bike Trails, Sheer Bliss Pond Modification)
- Continued Build out of Town of Snowmass Village
- WRNF Forest Plan – 2002 Revision

The stream health effects of increased watershed yield are most evident in the directly affected on-mountain streams. As discussed in the Affected Environment description, the study watersheds are directly tributary to Brush Creek, which is tributary to the Roaring Fork River. The Brush Creek Watershed (HUC 12 Code: 140100040602), from its headwaters to its confluence with the Roaring Fork River, totals 23,301 acres. The study watersheds, with a combined total of 3,484 acres, comprise roughly 15 percent of the Brush Creek Watershed.

The WRNF has completed an assessment of its watersheds per the Forest Service Watershed Condition Framework Implementation Guide.²⁰¹ The assessment rated the Brush Creek Watershed as “Functioning Properly.” Twelve indicators of watershed conditions were rated by the WRNF for the assessment. Table 3M-16 summarizes the ratings corresponding to the different indicators.

²⁰¹ USDA Forest Service, 2011a

**Table 3M-16:
Watershed Condition Indicators**

Indicator	Brush Creek Watershed Functioning Properly
Aquatic Biota	Good
Riparian/Wetland Vegetation	Good
Water Quality	Good
Water Quantity	Poor
Aquatic Habitat	Good
Roads and Trails	Poor
Soils	Fair
Fire Regime or Wildfire	Good
Forest Cover	Good
Forest Health	Good
Terrestrial Invasive Species	Good
Rangeland Vegetation	Fair

Compared to watersheds that are undeveloped, watersheds that are managed as ski areas exhibit cumulative changes to channel conditions. These changes are caused by increases in watershed yield and 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. Tables 3M-9 and 3M-14 in the Direct and Indirect Environmental Consequences discussion, compare the water yield calculated for baseline, existing, and proposed conditions for Alternatives 2 and 3, respectively.

Additional lift, trail, and infrastructure projects (not currently proposed) are considered reasonably foreseeable future actions. However, such projects would require site-specific NEPA analysis prior to approval or implementation; it is anticipated that said projects would include PDC and mitigation measures to offset potential impacts to watershed health.

CDAs have the potential to increase the intensity of surface runoff and constitute a source of sediment input into the stream system. Although a study of road connectedness at the spatial extent of the cumulative effects analysis was not completed, the Proposed Action includes PDC to reduce the extent of connected roads within the project area. Thus, the Proposed Action would not have an adverse, cumulative effect on road connectedness.

ASC and the Forest Service will continue to work collaboratively in order to decrease the extent of connected roads within the SUP area. Table 3M-5 shows that sections of existing mountain roads within the study watersheds were determined to be connected to the stream network (a total of 0.23 acre). This small acreage of CDAs could be further reduced with adequate design, implementation, and maintenance of BMPs for erosion and sediment control, similar to those listed in Table 2-2.

Residential and urban development may occur within the spatial extent of the cumulative effects analysis. Residential and urban development and the associated land use changes could have a cumulative effect on stream health and water quality of the Brush Creek Watershed. Residential and urban development would be required to conform to typical construction health and safety practices and applicable local, state, and/or federal environmental regulations, which would serve to uphold the integrity of surface and groundwater quality.

When considered with the effects of past development and future potential development, Alternative 1 would not cumulatively affect watershed resources. Considering the project effects in addition to past, present, and reasonably foreseeable future actions, implementation of either action alternative would maintain stream health through successful implementation of PDC. By maintaining the health of the streams, Alternatives 2 and 3 would not exhibit any negative influence upon watershed conditions in a cumulative context.

Past projects at Snowmass, including ski area and nearby residential developments, have resulted in impacts to the watersheds. Present and future ski area projects could result in additional impacts to the watershed resources. However, as discussed above, the action alternatives could result in minimal, temporary impacts to watershed resources within the study area. Since there are no permanent impacts, these projects would not contribute cumulatively to permanent watershed impacts.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Long-term impacts to watershed resources, including stream health, are not expected to occur because of implementation of the action alternatives analyzed in this report. Both action alternatives include PDC that would maintain or improve stream health. In summary, no irreversible or irretrievable commitments of watershed resources associated with any of the alternatives have been identified.

N. WETLANDS

SCOPE OF THE ANALYSIS

Snowmass is primarily located in the East and West Forks Brush Creek drainage, with the western-most portion draining to Snowmass Creek. Brush Creek is a tributary in the Roaring Fork River basin. Wetland mapping for this project focused on project component areas that would have potential disturbance, including proposed mountain biking and hiking trails, zip line, zip line canopy tour, and ropes challenge course station locations, mountain coaster alignment, multi-use activity areas, and buried utility alignments. The analysis area is approximately 1,000 acres within the greater Snowmass SUP area and encompasses all proposed projects. The wetland habitats described are based on field observation within the analysis area; however, these descriptions are typical of the wetland and riparian habitats found across

the Snowmass SUP area. For a more detailed discussion of wetlands assessment in the analysis area, refer to the technical report in the project file.²⁰²

FOREST PLAN DIRECTION

Pursuant to the Forest Plan, soils, aquatic, and riparian system Management Measures and PDC are provided in the WCPH to ensure applicable federal and state laws are met on NFS lands in Region 2.²⁰³

Applicable WCPH Management Measures

Hydrologic Function

11.1 Manage land treatments to conserve site moisture and to protect long-term stream health from damage by increased runoff.

Riparian Areas and Wetlands

12.1 In the WIZ next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition.

12.3 Conduct actions so that stream pattern, geometry, and habitats maintain or improve long-term stream health.

12.4 Maintain long-term ground cover, soil structure, water budgets, and flow patterns of wetlands to sustain their ecological function.

12.6 Manage water use facilities to prevent gully erosion of slopes and to prevent sediment and bank damage to streams.

EXECUTIVE ORDER 11990

Additional direction regarding wetlands management for the USACE and Forest Service is provided by EO 11990, Protection of Wetlands. 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, EO 11990 directs federal agencies to avoid new construction in wetlands unless there is no reasonable alternative. EO 11990 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 Section 404 of the CWA, avoidance and minimization measures must be considered through the planning process. Therefore, this section also identifies planning constraints with regard to terrain development.

²⁰² Colfer, 2016d

²⁰³ USDA Forest Service, 2002a

AFFECTED ENVIRONMENT

Wetland Descriptions

Approximately 21.2 acres of wetlands have been mapped in the analysis area since 2013, including 11.0 acres of palustrine scrub-shrub (PSS) wetlands and 10.2 acres of palustrine emergent (PEM) wetlands.

Wetlands within the project area are typical of subalpine and alpine wetlands of the Rocky Mountain Region. These wetlands occur in association with the headwaters of East Fork Brush Creek and West Fork Brush Creek, as well as with numerous seeps, springs, and small ponds that are mostly tributary to these headwaters. Refer to Figure 3M-1 for a map of the water resources analysis area.

Wetland hydrology in the project area is provided by groundwater seeping to the surface or by subsurface flow associated with perennial streams. The groundwater system is fed by precipitation recharge that occurs on the upper slopes of the Snowmass SUP area. Annual precipitation at Snowmass averages 28 inches, with approximately 19 inches (or 68 percent of the annual precipitation) occurring between November and April.²⁰⁴ In addition, snowmaking activities may increase the snowfall depths within some locations of the SUP. As snowmelt occurs, 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 seeps, springs, and streams. When soils along streambanks become saturated, fringe wetlands develop along stream banks and the adjacent floodplains. Finally, runoff from summer rains and pooled snowmelt are additional surface water sources to the wetland systems of the Snowmass SUP area.

PSS and PEM wetlands in forested areas are typically characterized by an overstory of Engelmann spruce with an understory of twinberry (*Lonicera involucrata*), gooseberry (*Ribes* spp.), arrowleaf groundsel (*Senecio triangularis*), heartleaf bittercress (*Cardamine cordifolia*), brook saxifrage (*Micranthes odontoloma*), and others. Scrub-shrub wetlands are comprised of planeleaf, Drummond, Scouler, mountain, and/or bareground willows (*Salix planifolia*, *S. drummondiana*, *S. scouleriana*, *S. monticola*, and *S. brachycarpa*) with an understory comprised of bluejoint reedgrass (*Calamagrostis canadensis*), marsh marigold (*Psychrophila leptosepala*), water sedge (*Carex aquatilis*) and heartleaf bittercress. Herbaceous wetland vegetation on ski trails is typically dominated by brook saxifrage, arrowleaf groundsel, chiming bells (*Mertensia ciliata*), and bluejoint reedgrass.

Wetland Functions and Values

Wetlands provide a suite of ecological services within the landscape where they exist. These services are known as wetland “functions and values.” Six primary ecological services, or functions, are typically recognized:

²⁰⁴ PRISM Climate Group, 2013

- *Dynamic Water Storage* is a wetland's ability to store water either derived from the wetland or from adjacent uplands.
- *Flood Flow Attenuation* is a wetland's ability to receive overbank flows from a stream or river and store that water for some period of time.
- *Nutrient and Pollutant Removal/Sediment Retention* is a wetland's ability to influence water quality.
- *Shoreline Stabilization/Sediment Control* relates to a wetland's ability to maintain a healthy stable channel and shoreline by maintaining stable riverbanks and lake shorelines.
- *Production Export* is a wetlands ability to provide the organic matter that is the base of the aquatic food chain.
- *Wildlife Habitat* is provided by wetlands for a wide variety of animals.

Individual wetlands do not always provide 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 assessment of wetland functions and values is an important tool in analyzing the effects of a proposed project on the Forest Plan goal of ecosystem health and in prescribing the Management Measures and PDC of the WCPH.

The ecological functions of wetlands were assessed using the Functional Assessment of Colorado Wetlands (FACWet) methodology. FACWet is an assessment method used to rate the functional condition of wetlands. It is a process of evidence gathering to develop and support a professional judgment as to the ecological condition of the assessment area and its surrounding landscape.

The methodology provides the user with: 1) a logical framework for making condition determinations based on the presence of stressors; 2) a systematic means of relating the evidence supporting determinations; 3) scoring guidelines to improve consistency between evaluators; and 4) an algorithm for rating the actual versus expected natural functioning based on the status of the nine state variables. The outcome of a FACWet evaluation is a best professional judgment rating of the level of wetland ecological functions being performed by the assessed wetland.

Brush Creek Channels

First- and second-order headwater streams in the East Fork and West Fork Brush Creek are typically small tributaries with a channel cross section no greater than 3 feet in width and in many cases only 1-foot-wide. Both perennial and intermittent headwaters are present. Fringe wetlands are PSS or PEM wetlands, with saturated and seasonally flooded water regimes. Overall, most of these wetlands and riparian habitats are functioning at or near the reference standard.

Wetlands on Ski Trails

Several areas of wetlands occur on ski trails that have had the overtopping forest vegetation cleared. In most cases, the clearing has allowed willows to increase in density, turning what may have been a PEM wetland within a forested site into a PSS or PEM wetland, with a saturated water regime. In some cases the scrub-shrub vegetation may be periodically pruned back to provide safe ski conditions. In general, the topography of the adjacent ski trail landscape was not graded during the clearing of ski trails. As a consequence, sediment contributions and elevated runoff has not degraded these wetlands, which are generally functioning at or near the reference standards.

Forested Wetland Seeps

Forested wetland seeps occur scattered throughout the project area and generally provide a net hydrological output to the Brush Creek headwaters. While these wetlands are located in a forested area, they are not classified as forested wetlands, because they are typically characterized as PEM wetlands surrounded by a fringe of conifers, or with conifers growing on elevated upland islands within the wetland. All seep wetlands in the project area are functioning at or near the reference standard.

DIRECT AND INDIRECT ENVIRONMENTAL CONSEQUENCES

Alternative 1 – No Action

The No Action Alternative would result in a continuation of existing operations and management practices at Snowmass without changes, additions or upgrades on NFS lands. Wetlands would continue to function at or near the reference standard.

Alternative 2 – Proposed Action

Under the Proposed Action, mountain biking trails would cross wetlands at 11 locations. Three activity access trails cross wetlands areas—one for the ropes challenge course, one for the uppermost zip line canopy tour access (which would be bridged), and one for the zip line. Two construction access routes also cross wetlands—one for the zip line and one for the zip line canopy tour. Finally, the beginner skills park and Elk Camp Meadows multi-purpose activity area overlaps with a wetland area. Together, these crossings sum to a total of 469 linear feet of wetland crossings. In compliance with EO 11990, attempts would be made prior to construction to field adjust the locations of each of these features, in order to avoid impacting wetlands. If the wetland area must be crossed, trails would be bridged or constructed with boardwalks set on helical piers through construction practices that require minimal maintenance, result in little ground disturbance, and avoid the use of fill material in wetlands.

Indirect impacts to wetlands may include the effects of shading from bridges or boardwalks on herbaceous wetland vegetation and the pruning back of scrub-shrub wetlands containing willows. Such impacts could potentially affect the species composition of small areas of wetlands, but would not change the overall wetland functions and values.

The project includes PDC that are intended to avoid or minimize offsite migration of sediment from mountain biking and hiking trails and all other projects under this proposal.

Forest Plan Consistency

Application of PDC will avoid or minimize direct impacts to wetland areas. With these PDC, the proposed project, under Alternative 2, is consistent with the WCPH and would avoid hydrologic alteration and the use of fill material in wetlands.

Alternative 3

Under Alternative 3, wetland impacts would be identical to those described for the Proposed Action, with the addition of five more wetland crossings associated with Trail 16. The total distance of wetland crossings under this alternative is 942 linear feet. In compliance with EO 11990, attempts would be made prior to construction to field adjust the trail locations to avoid impacting wetlands. If the wetland area must be crossed, trails would be bridged or constructed with boardwalks set on helical piers through construction practices that require minimal maintenance, result in little ground disturbance, and avoid the use of fill material in wetlands.

Forest Plan Consistency

Application of PDC will avoid or minimize direct impacts to wetland areas. With these PDC, the proposed project, under Alternative 3, is consistent with the WCPH and would avoid hydrologic alteration and the use of fill material in wetlands.

CUMULATIVE EFFECTS

Scope of the Analysis

The effects analyzed in the Cumulative Effects discussion apply to all alternatives, including the No Action Alternative. The following projects are expected to cumulatively have short- and long-term effects on overall multi-season recreational opportunities in the Snowmass SUP area and on adjacent NFS and private lands, as well as throughout Pitkin County, Colorado.

Temporal Bounds

The temporal bounds for this cumulative effects analysis for wetlands extend from Snowmass' inception as a resort in 1967 through the foreseeable future in which Snowmass can be expected to operate.

Spatial Bounds

The spatial bounds for this cumulative effects analysis for wetlands are limited to public and private lands in the vicinity of the Snowmass SUP area.

Past, Present, and Reasonably Foreseeable Future Projects

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 the document. Past ski area and county development projects have been incorporated and analyzed in this document as part of the Affected Environment. The following projects could have cumulative impacts on wetland resources and are analyzed below:

- Snowmass 2015 Master Development Plan
- Past Snowmass Projects (Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement, Summer Trails, New/Realigned Mountain Bike Trails)
- Continued Build Out of Town of Snowmass Village
- WRNF Forest Plan – 2002 Revision

Projects identified by the Forest Service and listed as reasonably foreseeable in Appendix A with relevance to waters of the U.S., including wetlands, are included in the cumulative effects analysis. Some of those projects are also reasonably certain, and their effects are considered in more detail in the technical report in the project file. Cumulatively, these projects have altered waters of the U.S., including wetlands, within the analysis area resulting in reduced watershed function and value.

Residential development resulting from projected population growth will occur on private lands within towns and in surrounding unincorporated subdivisions. Some of this development is likely to impact wetlands. Impacts to these wetlands would result in additional wetland losses; however, regulations that implement the CWA generally require mitigation for wetland impacts over 0.1 acre. Effective mitigation is intended to preclude a net loss of wetland acreage within the drainage basin where the impact occurs.

The Forest Plan includes mechanisms for the management of wetland resources forest-wide. While the Forest Plan includes numerous management prescriptions that could impact water and wetlands resources across the Forest, the application of Forest Plan standards and guidelines would ensure the water and wetlands quality is maintained or improved.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Under both action alternatives, and with PDC designed to minimize or avoid wetland impacts, the proposed project, would not represent an irreversible or irretrievable commitment of wetland resources.

Chapter 4

Consultation and Coordination

This page intentionally left blank.

4. CONSULTATION AND COORDINATION

A. PREPARERS

FOREST SERVICE TEAM

The following people participated in initial scoping, were members of the ID Team, and/or provided direction and assistance during the preparation of this DEIS.

Scott Fitzwilliams	White River National Forest Supervisor, Responsible Official
Karen Schroyer	Aspen-Sopris District Ranger
Roger Poirier	Mountain Sports Program Manager, Project Leader
TJ Broom	Mountain Sports Permit Administrator
Monte Lutterman	Snow Ranger
Matt Ehrman	Forest Planner
Kevin Warner	Planning Staff Officer
Phil Nyland	Wildlife Biologist
Donna Graham	Forest Landscape Architect
Cristina Weinberg	Archeologist
Kristen Pelz	Ecologist
Karen Vandersall	Fisheries Biologist
Tom Probert	Hydrologist
Lynn Khuat	Soil Scientist

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 CEQ in its “Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations” in question #17a.²⁰⁵ 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 Snowmass.

SE Group

Travis Beck	Director of Environmental Services/Project Manager
Kristen Carey	Assistant Project Manager
Caroline McHugh	Associate Environmental Analyst
Gabby Voeller	Associate Planner
Scott Prior	Environmental Analyst
Paula Samuelson	Document Production Specialist

Western Bionomics, LLC

Kelly Colfer	Wildlife Biologist/Botanist/Ecologist
--------------	---------------------------------------

Western Ecological Resource, Inc.

Rea Orthner	Botanist
-------------	----------

Resource Engineering, Inc.

Raul Passerini, P.E.	Water Resources Engineer
----------------------	--------------------------

²⁰⁵ CEQ, 1981

Metcalf Archaeological Consultants, Inc.

Melissa Elkins Principal Investigator, Project Manager
Cody Anderson Principal Investigator
Jenean Roberts Archeological Technician

Alpine Geophysics, LLC

James Wilkinson Senior Engineer

B. AGENCIES, ORGANIZATIONS, TRIBAL GOVERNMENTS, AND PERSONS CONTACTED

FEDERAL GOVERNMENT

Bureau of Land Management Advisory Council on Historic Preservation
U.S. Fish and Wildlife Service Environmental Protection Agency
U.S. Army Corps of Engineers

TRIBAL GOVERNMENT

Southern Ute Indian Tribe
Ute Indian Tribe
Ute Mountain Ute Tribe

STATE GOVERNMENT

Colorado Department of Transportation Colorado Parks and Wildlife
Colorado Department of Natural Resources Colorado State Forest Service
Colorado Division of Water Resources State Historic Preservation Office

LOCAL GOVERNMENT

Pitkin County Town of Basalt
Garfield County City of Glenwood Springs
Town of Snowmass Village City of Rifle

LOCAL MEDIA

Aspen Times
Daily Sentinel (Grand Junction)
Glenwood Post Independent

OTHER ORGANIZATIONS

Alliance for Sustainable Colorado	Colorado Trout Unlimited
Ark Initiative	Conservation Colorado
Aspen Center for Environmental Studies	National Wildlife Federation
Aspen Historical Society	The Nature Conservancy
Center for Native Ecosystems	Rocky Mountain Recreation Initiative
Colorado Environment Coalition	Rocky Mountain Wild
Colorado Mountain Club	Sierra Club
Colorado Ski Country USA, Inc.	Wilderness Workshop

INDIVIDUALS WHO COMMENTED DURING SCOPING OR WHO HAVE PARTICIPATED IN THE NEPA PROCESS

Debbie Cote	Richard Luczynski
Randy Egan	Delia Malone
Wayne Ethridge	Roz McClellan
Joe Flynn	Mike Pritchard
Patricia Jayne Keefer	Ellen Sassano
Susan H.	Philip Strobel
B. Ker	Mike Vandeman
Cristine Lindenfelser	Perry Will
Tim Lindenfelser	Julie Ann Woods FAICP/MLA
Mary Lou Flynn	

Chapter 5

References

This page intentionally left blank.

5. REFERENCES

In Text Citation	Reference
8 CCR 1206-2	8 CCR 1206-2. 2015. Code of Colorado Regulation. Rules Pertaining to the Administration and Enforcement of the Colorado Noxious Weed Act. Revised December 10, 2015.
40 CFR 1500–1508.28	40 CFR 1500–1508.28. 1978. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, as amended July 1, 1986.
66 Federal Register 3853	66 Federal Register 3853. 2001. Executive Order 13186 of January 10, 2001, Responsibilities of Federal Agencies To Protect Migratory Birds. 66FR11, 3853-3856.
16 USC 497	16 USC 497. 2011. Ski Area Recreation Opportunity Enhancement Act of 2011.
42 USC 7470-7479	42 USC 7470-7479. 2011. Public Health and Welfare: Air Pollution Prevention and Control.
42 USC 7475[a]	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]	42 USC 7479[1]. 2009. Prevention of Significant Deterioration of Air Quality: Definitions.
Abele et al., 2004	Abele, S.C., V.A. Saab, and E.O. Garton. 2004. Lewis’s Woodpecker (<i>Melanerpes lewis</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/lewisswoodpecker.pdf
Air Resource Specialists, 1993	Air Resource Specialists. 1993. IMPROVE Newsletter. Volume 2. Number 1. April 1993. https://www.vista.cira.colostate.edu/improve/publications/NewsLetters/apr_93.pdf
Alexander, 1998	Alexander, E. 1988. Rates of Soil Formation: Implications for Soil-Loss Tolerance. <i>Soil Science</i> 145:1.
Anderson, 2014	Anderson, J. 2014. Summary of Existing Stream Health Conditions for the Snowmass High Alpine Lift. Replacement Environmental Assessment. White River National Forest. November.
Anderson and Roberts, 2016	Anderson, C.M. and J. Roberts. 2016. A Class III Cultural Resource Inventory of the 2016 Proposed Summer Developments at Snowmass Ski Resort in Pitkin County, Colorado, USDA Forest Service Report No. R2016021500004. Metcalf Archaeological Consultants, Inc. for SE Group. March, 2016.
Andrews and Righter, 1992	Andrews, R. and R. Righter. 1992. Colorado Birds: A Reference to Their Distribution and Habitat. Denver Museum of Natural History, Denver, CO. 442 pp.

In Text Citation	Reference
APCHA, 2012	Aspen/Pitkin County Housing Authority. 2012. Strategic Review of Housing. Fall.
APCHA, 2015	Aspen/Pitkin County Housing Authority. 2015. Aspen/Pitkin County Employee Housing Guidelines. Amended and Approved October 2015.
ASC, 2014	Aspen Ski Company. 2014. 2012–2014 Sustainability Reports https://www.aspensnowmass.com/we-are-different/sustainability-reports . Accessed September 2016.
ASC, 2016a	Aspen Ski Company. 2016. Visitor Data and Project Implantation Data. (Confidential)
ASC, 2016b	Aspen Skiing Company. 2016. Environmental Policy Webpage. https://www.aspensnowmass.com/we-are-different/programs-and-practices/environmental-policy . Accessed September 2016.
ASC, 2016c	Aspen Skiing Company. 2016. Revised Carbon Footprints 2000–2015. https://www.aspensnowmass.com/~media/aspensnowmass/pdfs/environmental/sustainability-reports/carbon_dioxide_footprints_2015.ashx?la=en . Accessed September 2016.
ATC Group Services, 2016	ATC Group Services, LLC. 2016. Environmental Noise Monitoring. Prepared for Killington Resort.
Athearn, 1981	Athearn, Frederic. 1981. An Isolated Empire: A History of Northwestern Colorado. Cultural Resource Series no. 2. Bureau of Land Management, Denver.
Beauvais and McCumber, 2006	Beauvais, G.P. and J. McCumber. 2006. Pygmy Shrew (<i>Sorex hoyi</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/pygmymshrew.pdf
Beecham et al., 2007	Beecham, J.J. Jr., C.P. Collins, and T.D. Reynolds. 2007. Rocky Mountain Bighorn Sheep (<i>Ovis canadensis</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/rockymountainbighornsheep.pdf
Belica and Nibbelink, 2006	Belica, L.T. and N.P. Nibbelink. 2006. Mountain Sucker (<i>Catostomus platyrhynchus</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/mountainsucker.pdf
Boyle, 2006	Boyle, S. 2006. North American River Otter (<i>Lontra canadensis</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/northamericanriverotter.pdf
Broderdorp, 2016	Broderdorp, K. 2016. Personal communication with Kelly Colfer, Western Bionomics.
Buckles and Buckles, 1984	Buckles, W.G., and N.B. Buckles. 1984. Colorado Historical Archaeology Context. Colorado Historical Society, Denver.

In Text Citation	Reference
Burroughs and King, 1989	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 and Ruggiero, 1994	Buskirk, S.W., and Ruggiero, L.F. 1994. American marten. Pages 7–37 in L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski (eds). The scientific basis for conserving forest Carnivores. USDA Forest Service General Technical Report RM-254. 184 pp.
Center for Hearing and Communication, 2016	Center for Hearing and Communication. 2016. Common Environmental Noise Levels. http://chchearing.org/noise/common-environmental-noise-levels/
Colfer, 2003	Colfer, K. 2003. Campground lift reconstruction and clearing of two new ski trails – Biological Evaluation and Biological Assessment. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2004	Colfer, K. 2004. Snowmass Mountain Ski Area, Master Plan Amendment and Ski Area Improvement Projects – Biological Evaluation and Biological Assessment. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2005	Colfer, K. 2005. Snowmass Mountain Ski Area, Funnel Lift Replacement – Biological Evaluation and Biological Assessment. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2016a	Colfer, K. 2006a. Snowmass Mountain Ski Area, Elk Camp Beginner Park – Biological Evaluation and Biological Assessment. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2016b	Colfer, K. 2006b. Snowmass Mountain Ski Area, Canada Lynx Winter Foraging Habitat Conservation Project at Burnt Mountain – Implementation Report. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2010	Colfer, K. 2010. Snowmass Mountain Ski Area, Summer Activities 2010 – Biological Evaluation, Biological Assessment, and MIS Evaluation. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2011	Colfer, K. 2011. Snowmass Mountain Ski Area, Mountain Bike Trails – Biological Evaluation, Biological Assessment, and MIS Evaluation. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2013	Colfer, K. 2013. Snowmass Mountain Ski Area, Burnt Mountain Egress Trail – Addendum to the 2004 Botany Biological Evaluation and Assessment. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2014a	Colfer, K. 2014a. Snowmass Mountain Ski Area, New/Realigned Mountain Bike Trails Trails – Biological Evaluation, Biological Assessment, and MIS Evaluation. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2014b	Colfer, K. 2014b. Snowmass Mountain Ski Area, Expanded Winter Evening Activities Trails – Biological Evaluation, Biological Assessment, and MIS Evaluation. On file at the Aspen-Sopris Ranger District, Carbondale, CO.

In Text Citation	Reference
Colfer, 2014c	Colfer, K. 2014c. Snowmass Mountain Ski Area, Snowmass Ski Trail Enhancements and High Alpine Chairlift Replacement Trails – Biological Evaluation, Biological Assessment, and MIS Evaluation. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colfer, 2016a	Colfer, K. 2016a. Snowmass Multi-Season Recreation Projects – Biological Evaluation. On file at the White River National Forest Supervisor’s Office, Glenwood Springs, CO.
Colfer, 2016b	Colfer, K. 2016b. Snowmass Multi-Season Recreation Projects – Biological Assessment. On file at the White River National Forest Supervisor’s Office, Glenwood Springs, CO.
Colfer, 2016c	Colfer, K. 2016. Horizontal cover summary, 2010 – 2016. On file at the White River National Forest Supervisor’s Office, Glenwood Springs, CO.
Colfer, 2016d	Colfer, K. 2016. Snowmass Multi-Season Recreation Projects – Wetlands Technical Report.
Colfer, 2016e	Colfer, K. 2016. Personal communication with Kurtis Tesch, CPW Wildlife Officer.
Colfer, 2016f	Colfer, K. 2016. Personal communication with Rea Orthner, Botanist – Western Ecological Resource Inc. September.
Colfer, 2016g	Colfer, K. 2016. Snowmass Mountain Ski Area, Sheer Bliss Pond Construction – Biological Evaluation. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
Colorado Department of Agriculture, 2016	Colorado Department of Agriculture. 2016. County Weed Programs. https://www.colorado.gov/pacific/agconservation/county-weed-programs . Accessed October 2016.
Colorado Department of Local Affairs – State Demography Office, 2015	Colorado Department of Local Affairs – State Demography Office. 2015. Population Forecast for Pitkin County.
CDPHE, 2001a	Colorado Department of Public Health and Environment. 2001a. Revised PM ₁₀ Maintenance Plan for the Aspen Attainment/Maintenance Area. https://www.colorado.gov/pacific/sites/default/files/AP_PO_2010-PM10-Attainment-Maintenance-Plan.pdf
CDPHE, 2001b	Colorado Department of Public Health and Environment. 2001b. PM ₁₀ Redesignation Request and Maintenance Plan For The Aspen Area. https://www.colorado.gov/pacific/sites/default/files/AP_PO_Aspen-2003-PM10-Attainment-Maintenance-Plan.pdf
CDPHE, 2012	Colorado Department of Public Health and Environment. 2012. Colorado’s Section 303(D) List of Impaired Waters and Monitoring and Evaluation List. 2012. https://www.colorado.gov/pacific/sites/default/files/93_2016%2803%29.pdf
CDPHE, 2015	Colorado Department of Public Health and Environment. 2015. Colorado Air Quality Control Commission Regulation Number 9 Open Burning,

In Text Citation	Reference
	Prescribed Fire, And Permitting. https://www.colorado.gov/pacific/sites/default/files/5-CCR-1001-11.pdf
CDPHE, 2016	Colorado Department of Public Health and Environment. 2016. Open Burn Smoke Permits. https://www.colorado.gov/cdphe/openburn
CDOT, 2015	Colorado Department of Transportation – Online Transportation Information System. 2015. http://dtdapps.coloradodot.info/otis/ . Accessed October 3, 2016.
Colorado Office of Economic Development and International Trade, 2014	Colorado Office of Economic Development and International Trade. 2014. Economic Overview: Pitkin County.
CPW, 2013	Colorado Parks and Wildlife. 2013. Avalanche Creek Elk Herd E-15 Data Analysis Unit Plan. Colorado Parks and Wildlife, Glenwood Springs, CO.
CSCUSA, 1986	Colorado Ski Country USA. 1986. A Final Report on The Colorado Ski Country USA Water Management Research Project. Prepared by Wright Water Engineers, Inc. and Charles F. Leaf. Denver, CO. February.
CSCUSA, 2016	Colorado Ski Country USA. 2016. Colorado Ski Country USA – Snowmass website. http://coloradoski.com/resorts/snowmass . Accessed October 2016.
Colorado Ski History, 2016	Colorado Ski History. 2016. History of Snowmass Mountain. http://www.coloradoskihhistory.com/areahistory/snowmass.html . Accessed February 22, 2016.
CEQ, 1997	Council on Environmental Quality. 1997. Considering cumulative effects under the National Environmental Policy Act. Council on Environmental Quality, Executive Office of the President. Wash., D.C. 64 pp.
CEQ, 2016	Council on Environmental Quality. 2016. Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. Council on Environmental Quality, Executive Office of the President. Washington, D.C.
Cole, 1995	Cole, D.N. and P.B. Landres. 1995. In Knight, R.L. and K.J. Gutzwiller, eds., Wildlife and Recreationists – Coexistence through Management and Research. Washington, D.C.: Island Press, Chapter 11, 183–202.
Collins and Reynolds, 2005	Collins, C.P. and T.D. Reynolds. 2005. Ferruginous Hawk (<i>Buteo regalis</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/ferruginoushawk.pdf
Cowardin et al., 1979	Cowardin, L.M., V. Carter, F.C. Golet, and E.T. La Roe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. Pub. FWS/OBS-79/31, Washington, D.C., 103 pp.
Courtemanch, 2014	Courtemanch, A. 2014. Seasonal habitat selection and impacts of backcountry recreation on a formerly migratory bighorn sheep population in northwest Wyoming, USA. MS Thesis, University of Wyoming, Laramie.

In Text Citation	Reference
David, 2008	David, G.C.L. 2008. Effects of Ski Slope Development on Stream Channel Morphology in Colorado. Colorado Water Newsletter, The Water Center of Colorado State University, Fort Collins, CO. pp. 20–22.
Dean Runyan Associates, 2016	Dean Runyan Associates. 2016. Colorado Travel Impacts 1996–2015.
EPA, 1980	Environmental Protection Agency. 1980. WRENSS: An Approach to Water Resources Evaluation of Nonpoint Silvicultural Sources (A Procedural Handbook). EPA-600/8-80-012. Washington, D.C.
EPA, 2001	Environmental Protection Agency. 2001. Visibility in Mandatory Federal Class I Areas (1994–1998): A Report to Congress. Chapter 1. Introduction to Visibility Issues. November. www.epa.gov/visibility/report/CHAP01.pdf .
EPA, 2016a	Environmental Protection Agency. 2016. MOVES (Motor Vehicle Emission Simulator). https://www3.epa.gov/otaq/models/moves/index.htm . Accessed September 2016.
EPA, 2016b	Environmental Protection Agency. 2016. EHE Equivalencies Calculator. https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references . Accessed October 2016.
EPA, 2016c	Environmental Protection Agency. 2016. NAAQS Table. https://www.epa.gov/criteria-air-pollutants/naaqs-table . Accessed October 2016.
Felsburg Holt & Ullevig, 2015	Felsburg Holt & Ullevig. 2015. Snowmass Base Village Transportation Analysis and Parking Management Strategy 2015 Update.
Fenneman, 1946	Fenneman, N. 1946. Physical Divisions of the United States. United States Geological Survey, Reston, Virginia.
Fertig et al., 2005	Fertig, W., R. Black, and P. Wolken. 2005. Rangewide Status Review of Ute Ladies’-Tresses (<i>Spiranthes diluvialis</i>). Prepared for the USFWS and Central Utah Water Conservancy District. 101 pp.
Franzluebbers, 2002	Franzluebbers, A.J. 2002. Water Infiltration and Soil Structure related to organic matter and its stratification with depth. Soil & Tillage Research. 66 (2002): 197–205.
General Land Office, 1916	General Land Office. 1916. Extension Survey of T. 10S-R. 85W. BLM-General Land Office Records, Survey Plats and Field Notes. Electronic document. http://www.glorerecords.blm.gov/default.aspx . Accessed October 1, 2015
General Land Office, 1933	General Land Office. 1933. Independent Resurvey of T. 10S-R. 85W. BLM-General Land Office Records, Survey Plats and Field Notes. Electronic document. http://www.glorerecords.blm.gov/default.aspx . Accessed October 1, 2015.
Gordon & Ojima, 2015	Gordon, E. and Ojima, D. (eds). 2015. Colorado Climate Change Vulnerability Study: A Report by the University of Colorado Boulder and Colorado State University to the Colorado Energy Office.

In Text Citation	Reference
Gruver and Keinath, 2006	Gruver, J.C. and D.A. Keinath. 2006. Townsend's Big-eared Bat (<i>Corynorhinus townsendii</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/townsendbig-earedbat.pdf
Hall, 1895	Hall, F. 1895. History of the State of Colorado, Volume IV. The Blakely Printing Company, Chicago.
Halleran, 2005	Halleran, M. 2005. Historic Context for Irrigation and Water Supply: Ditches and Canals in Colorado. Colorado Center for Preservation Research, University of Colorado at Denver and Health Sciences Center.
Hayward, 1994	Hayward, G.D. 1994. Review of technical knowledge: boreal owls. In (G.D. Hayward and J. Verner, eds) Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. General Technical Report RM-253. Fort Collins, CO. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 213 pp.
Hoffman, 2006	Hoffman, R.W. 2006. White-tailed Ptarmigan (<i>Lagopus leucura</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/whitetailedptarmigan.pdf
Hoffman and Thomas, 2007	Hoffman, R.W. and A.E. Thomas. 2007. Columbian Sharp-tailed Grouse (<i>Tympanuchus phasianellus columbianus</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/columbiansharptailedgrouse.pdf
Holmes and Johnson, 2005a	Holmes, J.A. and M.J. Johnson. 2005. Sage Sparrow (<i>Amphispiza belli</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/sagesparrow.pdf
Holmes and Johnson, 2005b	Holmes, J.A. and M.J. Johnson. 2005. Brewer's Sparrow (<i>Spizella breweri</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://peabodytroutcreekreservoir.com/Content/Documents/References/Holmes%20and%20Johnson%202005.pdf
IMPLAN Group LLC, 2014	IMPLAN Group LLC. 2014. IMPLAN. Hunterville, North Carolina. http://implan.com/index.php?option=com_content&view=article&id=889&Itemid=1482
J.C. Brennan & Associates, Inc., 2010	J.C. Brennan & Associates, Inc. 2010. Environmental Noise Assessment. Prepared for Northstar-at-Tahoe.
Jennings, 1990	Jennings, W.F. 1990. Final Report. Species studied: <i>Spiranthes diluvialis</i> , <i>Sisyrinchium pallidum</i> . Report for the Nature Conservancy under the Colorado Natural History Small Grants Program. The Nature Conservancy, Boulder, Colorado. 29 pp.
Kays et al., 2016	Kays, R., A.W. Parsons, M.C. Baker, E.L. Kalies, T. Forrester, R. Costello, C.T. Rota, J.J. Milspaugh, and W.J. McShea. 2016. Does hunting or hiking affect wildlife communities in protected areas? J. App. Ecol. In press.

In Text Citation	Reference
Keinath, 2004	Keinath, D.A. 2004. Fringed Myotis (<i>Myotis thysanodes</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/fringedmyotis.pdf
Keinath and McGee, 2005	Keinath, D.A. and M. McGee. 2005. Boreal Toad (<i>Bufo boreas boreas</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/borealtoad.pdf
Kennedy, 2003	Kennedy, P.L. 2003. Northern Goshawk (<i>Accipiter gentiles atricapillus</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/northerngoshawk.pdf
Kingery, 1998	Kingery, H.E. 1998. Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife, Denver, CO.
Knight and Cole, 1995	Knight, R.L., and D.N. Cole. 1995. Factors that influence wildlife response to recreationists. <i>In</i> Wildlife and Recreationists: Coexistence through Management and Research.
Kotliar, 2007	Kotliar, N.B. 2007. Olive-sided Flycatcher (<i>Contopus cooperi</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/olivesidedflycatcher.pdf
Luce and Keinath, 2007	Luce, R.J. and D. Keinath. 2007. Spotted Bat (<i>Euderma maculatum</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/spottedbat.pdf
Lukas et al., 2014	Lukas, J., J. Barsugli, N. Doesken, I. Rangwala, K. Wolter. 2014. Climate Change in Colorado, A Synthesis to Support Water Resources Management and Adaptation, Second Edition – August 2014, A Report for the Colorado Water Conservation Board, Cooperative Institute for Research in Environmental Sciences.
Magnuson and Colfer, 1997	Magnuson, B. and K. Colfer. 1997. Snowmass Mountain Ski Area – Natural Resource Management Plan. On file at the Aspen-Sopris Ranger District, Carbondale, CO.
McCallum, 1994	McCallum, D.A. 1994. Flammulated Owl (<i>Otus flammeolus</i>). <i>In</i> The Birds of North America, No. 93, (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union. 24 p.
McCormick et al., 1982	McCormick, D.E., K.K. Young, and G.M. Darby. 1982. Rock Fragments and K Factor of the Universal Soil Loss Equation. Erosion and Productivity of Soils Containing Rock Fragments. Madison, WI: Soil Science Society of America. 73–81.
McMullen, 2011	McMullen, B. 2011. Draft Specialist Report – Soils and Geology of the North Thompson/Four Mile and Coal Creek Cattle & Horse Grazing Allotment. Soil Scientist, WRNF.
Mehls, 1984	Mehls, Steven F. 1984. Colorado Mountains Historic Context. Colorado Historical Society, Denver.

In Text Citation	Reference
Melilo et al., 2014	Melilo, J.M., T.C. Richmond, and G.W. Yohe (eds). 2014. Highlights of Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 148 pp.
Montgomery and Buffington, 1998	Montgomery, D.R. and J.M. Buffington. 1998. Channel Processes, Classification, and Response. <i>In</i> R. Naiman and R. Bilby (eds.) River Ecology and Management. Springer-Verlag, New York, pp. 13–42.
Naylor et al., 2009	Naylor, L.M., M.J. Wisdom, and R.G. Anthony. 2009. Behavioral Responses of North American Elk to Recreational Activity. <i>Journal of Wildlife Management</i> 73(3). 11p.
Navigate et al., 2016	Navigate LLC, Rees Consulting, and WSW Consulting. 2016. Policy Study Aspen/Pitkin County Housing Authority Affordable Housing Guidelines. February 2016.
NCDC, 2016	National Climatic Data Center. 2016. Annual Precipitation Normal – downloaded online from the Aspen Pitkin County Airport Station, Elev: 7,720 ft. Lat: 39.23° N Lon: 106.870°. www.ncdc.noaa.gov .
NRCS, 2008	Natural Resource Conservation Service. 2008. Highly Erodible Land Definitions. USDA. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/pr/soils/?cid=nrcs141p2_037282 . Accessed October 5, 2016.
Overton et al., 1997	Overton, C.K; S.P. Wollrab; B.C. Roberts; M.A. Radko. 1997. R1/R4 (Northern/Intermountain Regions) Fish and Fish Habitat Standard Inventory Procedures Handbook. General Technical Report INT-GTR-346. Ogden, UT: USDA Forest Service, Intermountain Research Station. 73 pp.
Pitkin County, 2013	Pitkin County. 2013. Pitkin County Public Health Improvement Plan.
Popovich, 2013	Popovich, S. 2013. Personal communication with Rea Orthner of Western Ecological Resource Inc. Acting Regional Botanist, Rocky Mountain Region Forest Botanist, Arapaho and Roosevelt National Forests and Pawnee National Grassland. Various correspondence dates.
PRISM Climate Group, 2013	PRISM Climate Group. 2013. Oregon State University. http://prism.oregonstate.edu . Created December 2009.
Ptacek et al., 2005	Ptacek, J.A., D.E. Rees, and W.J. Miller. 2005. Bluehead Sucker (<i>Catostomus discobolus</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/blueheadsucker.pdf
Radman, 2012	Radman, A. 2012. Noise Characterization and Exposure at a Ski Resort. Colorado State University.
Rees et al., 2005a	Rees, D.E., J.A. Ptacek, R.J. Carr, and W.J. Miller. 2005a. Flannelmouth Sucker (<i>Catostomus latipinnis</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/flannelmouthsucker.pdf
Rees et al., 2005b	Rees, D.E., J.A. Ptacek, and W.J. Miller. 2005b. Roundtail Chub (<i>Gila robusta robusta</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/roundtailchub.pdf

In Text Citation	Reference
Reed and Metcalf, 1999	Reed, A.D., and M.D. Metcalf. 1999. Colorado Prehistory: A Context for the Northern Colorado River Basin. Colorado Council of Professional Archaeologists, Denver, Colorado.
Resource Engineering, 2016a	Resource Engineering, Inc. 2016. Snowmass Summer Project EIS – Proposed Additional Water Needs Memo.
Resource Engineering, 2016b	Resource Engineering, Inc. 2016. Restaurant Water Depletions-Section 7. Unpublished Report. On file at the Aspen-Sopris Ranger District.
Resource Engineering, 2016c	Resource Engineering, Inc. 2016. Snowmaking Ponds Evap-Section 7. Unpublished Report. On file at the Aspen-Sopris Ranger District.
Rocky Mountain PBS News, 2015	Rocky Mountain PBS News. 2015. A Growing Colorado Anticipates a 2040 Population of 7.8 Million People. December.
Rosgen, 2006	Rosgen, D.L. 2006. River Restoration using a Geomorphic Approach for Natural Channel Design – Proceedings of the Eighth Federal Interagency Sedimentation Conference: Vol 1, pp. 394–401, Reno, NV: Subcommittee on Sedimentation.
SE Group, 2015	SE Group. 2015. Snowmass Master Development Plan.
SE Group, 2016	SE Group. 2016. Traffic Technical Report for the Snowmass Multi-Season Recreation Projects Environmental Impact Statement.
Selby, 2007	Selby, G. 2007. Great Basin Silverspot Butterfly (<i>Speyeria nokomis nokomis</i> [W.H. Edwards]): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/greatbasinsilverspotbutterfly.pdf
Siemers, 2009	Siemers, J.L. 2009. Pygmy shrew (<i>Sorex hoyi</i>) survey on the White River National Forest 2009. Colorado Natural Heritage Program, Colorado State University, Fort Collins, CO.
Slater and Rock, 2005	Slater, G.L. and C. Rock. 2005. Northern Harrier (<i>Circus cyaneus</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/northernharrier.pdf
Smith and Keinath, 2007	Smith, B.E. and D.A. Keinath. 2007. Northern Leopard Frog (<i>Rana pipiens</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/northernleopardfrog.pdf
Snider, 2011	Snider, E.A. 2011. Region 2 sensitive species evaluation form: Hoary bat, <i>Lasiurus cinereus</i> . http://www.fs.usda.gov/detail/r2/landmana_b5350842
Stiver et al., 2006	Stiver, S.J., A.D. Apa, J.R. Bohne, S.D. Bunnell, P.A. Deibert, S.C. Gardner, M.A. Hilliard, C.W. McCarthy, and M.A. Schroeder. 2006. Greater Sage-grouse Comprehensive Conservation Strategy. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.
Sunde et al., 1998	Sunde, P., Stener, S.Ø. & Kvam, T. 1998: Tolerance to humans of resting lynxes <i>Lynx lynx</i> in a hunted population. <i>Wildlife Biology</i> 4: 177–183.

In Text Citation	Reference
Taylor and Knight, 2003	Taylor, A.R. & R.L. Knight. 2003. Wildlife responses to recreation and associated visitor perceptions. <i>Ecological Applications</i> , 13(4), pp. 951–963.
Toretta, 2013	Toretta, R. 2013. Western Bumblebee Region 2 sensitive species evaluation form. On file at the WRNF Supervisor’s Office, Glenwood Springs, CO.
TOSV, 2010	Town of Snowmass Village. 2010. Town of Snowmass Village Comprehensive Plan.
TOSV, 2016a	Town of Snowmass Village. 2016. History. Electronic document. http://www.tosv.com/index.aspx?NID=253 . Accessed February 22, 2016.
TOSV, 2016b	Town of Snowmass Village. 2016. Parks, Open Space, Trails, and Recreation Plan.
Towry, 1987	Towry, R.K. 1987. Wildlife Habitat Requirements In Hoover, R.L. and D.L. Wills, eds, <i>Managing Forested Lands for Wildlife</i> . Colorado Division of Wildlife in cooperation with USDA Forest Service, Rocky Mountain Region, Denver, CO.
Troendle and Olsen, 1994	Troendle, C.A. and W.K. Olsen. 1994. Potential effects of timber harvest and water management on stream flow dynamics and sediment transport. USDA Forest Service, General Technical Report RM-247, Fort Collins, CO.
Troendle et al., 2003	Troendle, C.A., J.M. Nankervis, and L.S. Porth. 2003. The Impact of Forest Service Activities on the Stream Flow Regime in the Platte River. Final report submitted to the USDA Forest Service by MATCOM Corporation. Fort Collins, CO. 50 pp. plus Appendices.
Ubbelohde et al. 1995	Ubbelohde, C., M. Benson, D.A. Smith. 1995. <i>A Colorado History (Seventh Edition)</i> . Pruett Publishing Company, Boulder, Colorado.
U.S. Bureau of Labor Statistics, 2016	U.S. Bureau of Labor Statistics. 2016. Labor Force Statistics for Pitkin County and the State of Colorado August 2011 to August 2016.
U.S. Census Bureau, 2015	U.S. Census Bureau. 2015. State and County Quickfacts. http://quickfacts.census.gov/ . Accessed May 2016.
U.S. Department of Commerce, 2016	U.S. Department of Commerce. 2016. Bureau of Economic Analysis: Colorado. September 28, 2016.
USDA Forest Service, 1992	USDA Forest Service. 1992. Channel Type User Guide, Tongass National Forest, Southeast Alaska. USDA. Forest Service, Alaska Region, R10-TP-26, Juneau, Alaska. 179 pp.
USDA Forest Service, 1994	USDA Forest Service. 1994. Snowmass Ski Area Final Environmental Impact Statement. Glenwood Springs, CO.
USDA Forest Service, 1995	USDA Forest Service. 1995. Scenery Management System Handbook. AH 701-f.
USDA Forest Service, 1998	USDA Forest Service. 1998. White River National Forest Soils Dictionary for the Holy Cross Soil Survey.
USDA Forest Service, 2001	USDA Forest Service. 2001. The Built Environment Image Guide for the National Forests and Grasslands. December.

In Text Citation	Reference
USDA Forest Service, 2002a	USDA Forest Service. 2002a. White River National Forest Land and Resource Management Plan 2002 Revision. White River National Forest, Glenwood Springs. CO.
USDA Forest Service, 2002b	USDA Forest Service. 2002b. Final Environmental Impact Statement, Volume 1, for the White River National Forest Land and Resource Management Plan 2002 Revision. White River National Forest, Glenwood Springs. CO.
USDA Forest Service 2005a	USDA Forest Service. 2005a. FSH 2509.25 Watershed Conservation Practices Handbook – Draft Final. September 29, 2005. Region 2, Lakewood, CO.
USDA Forest Service, 2008	USDA Forest Service. 2008c. Record of Decision, Southern Rockies Lynx Amendment Management Direction. USDA Forest Service, Rocky Mountain Region. Denver, CO. October.
USDA Forest Service, 2010	USDA Forest Service. 2010. Field Guide to Diseases and Insects of the Rocky Mountain Region. Rocky Mountain Region, Forest Health Protection. Rocky Mountain Research Station.
USDA Forest Service, 2011	USDA Forest Service. 2011. FS-977 Watershed Condition Framework – A Framework for Assessing and Tracking Changes to Watershed Condition. May.
USDA Forest Service, 2012	USDA Forest Service 2012. Forest Service Handbook 1909.15 – National Environmental Policy Handbook. June 25.
USDA Forest Service, 2014a	USDA Forest Service. 2014. White River National Forest Management Status Plant Species. Obtained by Mr. John Proctor, Forest Botanist. February.
USDA Forest Service, 2014b	USDA Forest Service. 2014b. White River National Forest. Snowmass Ski Trail Enhancements and High Alpine Lift Replacement. USDA Forest Service, Glenwood Springs, CO.
USDA Forest Service, 2015	USDA Forest Service. 2015. FSM 2600 Wildlife, Fish, and Sensitive Plant Habitat Management, Chapter 2670 Threatened, Endangered and Sensitive Plants and Animals Supplement No: 2600-2015-1. Updated August 29, 2015. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3843364.pdf
USDA Forest Service and USFWS, 2008	USDA Forest Service and U.S. Fish and Wildlife Service. 2008. Memorandum of understanding between the US Department of Agriculture Forest Service and the USFWS to promote the conservation of migratory birds. FS Agreement # 08-MU-1113-2400-264, Washington, D.C.
USFWS, 1995a	U.S. Fish and Wildlife Service. 1995a. Biological Opinion for the Master Development Plan for the Snowmass Ski Area. On file at the Aspen-Sopris Ranger District, Carbondale, Colorado.
USFWS, 1995b	U.S. Fish and Wildlife Service. 1995b. Ute Ladies'-tresses (<i>Spiranthes dihuialis</i>) recovery plan. U.S. Fish and Wildlife Service, Denver, Colorado. 46 pp.

In Text Citation	Reference
USFWS, 2009	U.S. Fish and Wildlife Service. 2009. De minimis threshold for Platte River species depletions consultations. https://www.fws.gov/platteriver/deminimisRevNov2009.htm
USFWS, 2013	U.S. Fish and Wildlife Service. 2009. Modified Biological Opinion for Breckenridge Ski Resort’s proposed Peak 6 Improvement project. Grand Junction, CO. ES/CO: FS/WRNF/DillonRD, TAILS 06E24100-2012-F-0132, 65413-2009-B-0008, ES/GJ -6-C0-12-F -003.
USFWS, 2016	U.S. Fish and Wildlife Service. 2016. Information for Planning and Conservation (IPaC) website. https://ecos.fws.gov/ipac . Accessed September 2016.
USDOI BLM, 2013	USDOI Bureau of Land Management. 2013. Biological Assessment. Colorado River Valley Field Office Resource Management Plan Revision. Prepared by the Colorado River Valley Field Office, 2300 River Frontage Road, Silt, Colorado 81652. February.
USDOT FHA, 2015	USDOT Federal Highway Administration. 2015. Highway Traffic Noise Construction Noise Handbook (updated November 30, 2015).
Wakatsuki and Rasyidin, 1992	Wakatsuki, T. and A. Rasyidin. 1992. Rates of Weathering and Soil Formation. <i>Geoderma</i> 52(3), 251–263.
Western Ecological Resource, 2016	Western Ecological Resource, Inc. 2016. Biological Assessment/Biological Evaluation and Specialist Report. Snowmass Multi-Season Recreation Projects, Pitkin County, Colorado.
Western Regional Climate Center, 2016	Western Regional Climate Center. 2016. Monthly Climate Summary for the period of 1971 to 2000. Aspen, Colorado. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?coaspe . Accessed on September 28, 2016.
Wiggins, 2004	Wiggins, D. 2005. Black Swift (<i>Cypseloides niger</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182062.pdf
Wiggins, 2005	Wiggins, D. 2005. Purple Martin (<i>Progne subis</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/purplemartin.pdf
Wilkinson, 2016	Wilkinson, J. 2016. MOVES2014a Emissions Estimates Due to Snowmass Multi-Season Recreation Project.
Wisdom et al., 2005	Wisdom, M.J., A.A. Ager, H.K. Preisler, N.J. Cimon, and B.K. Johnson. 2005. Effects of Off-Road Recreation on Mule Deer and Elk. Pages 67–80 in Wisdom, M. J., technical editor, <i>The Starkey Project: a synthesis of long-term studies of elk and mule deer</i> . Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Alliance Communications Group, Lawrence, Kansas, USA.
Young, 2008	Young, M.K. 2008. Colorado River Cutthroat Trout (<i>Oncorhynchus clarkii pleuriticus</i>): a technical conservation assessment. USDA Forest Service, Rocky Mountain Region. http://www.fs.fed.us/r2/projects/scp/assessments/coloradorivercutthroattrout.pdf

This page intentionally left blank.

Chapter 6

Figures

This page intentionally left blank.

6. FIGURES

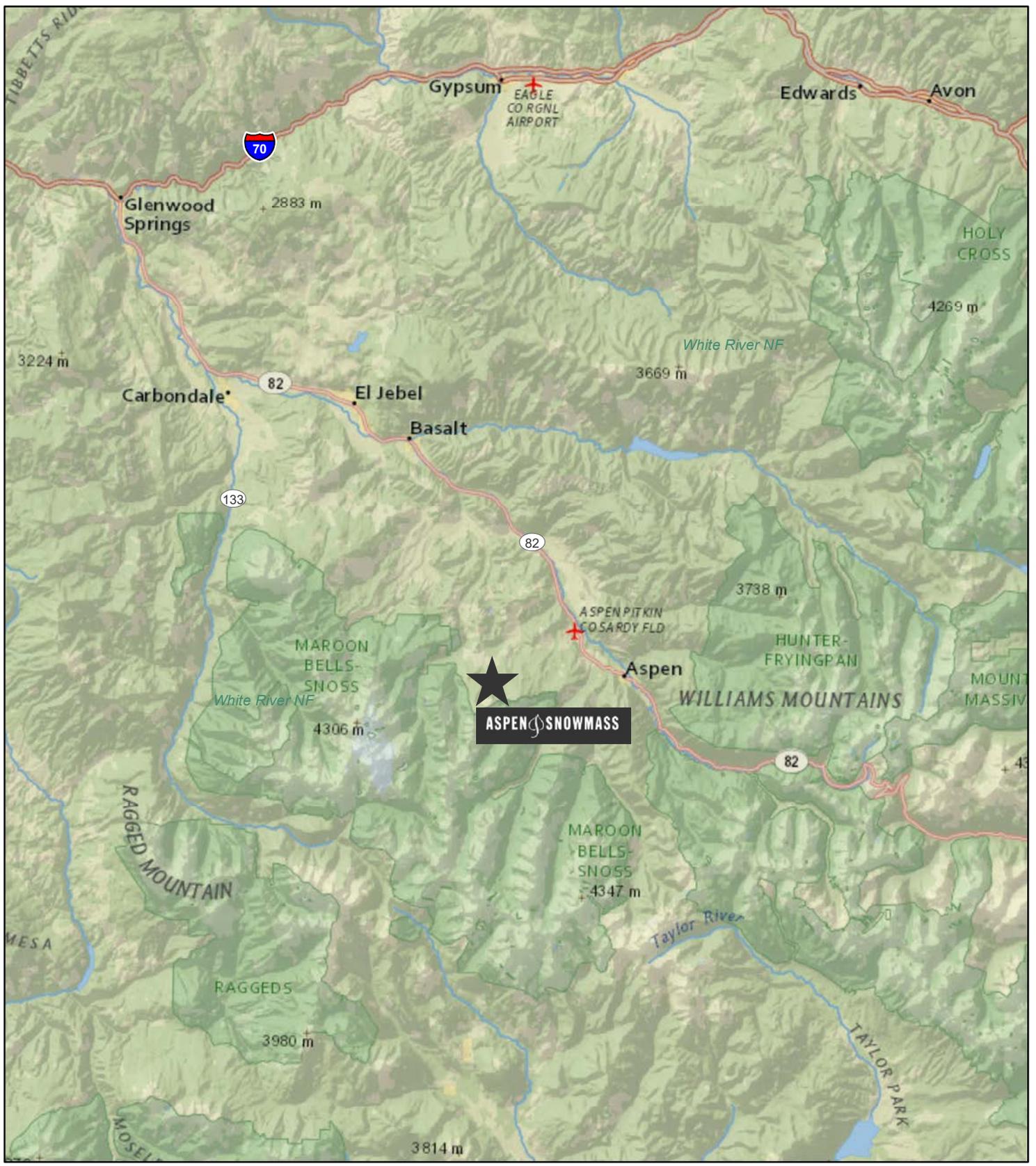
Vicinity Map

Figure 1: Alternative 1 – No Action

Figure 2: Alternative 2 – Proposed Action

Figure 3: Alternative 3

This page intentionally left blank.

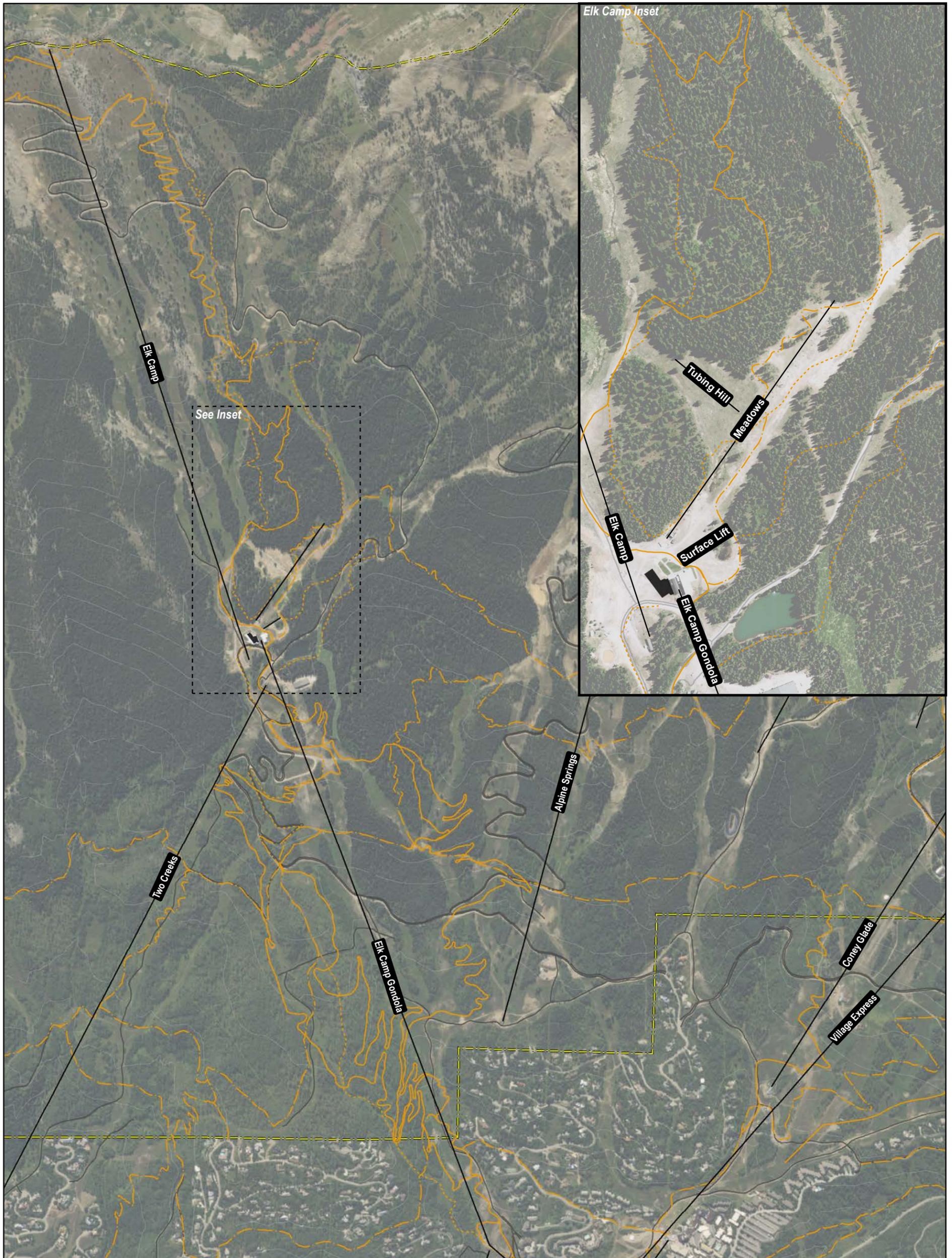


White River National Forest
Aspen-Sopris Ranger District

Vicinity Map



**Snowmass Multi-Season
Recreation Projects
Environmental Impact Statement**



White River National Forest
Aspen-Sopris Ranger District

**Snowmass Multi-Season
Recreation Projects
Environmental Impact Statement**

**Figure 1:
Alternative 1
No Action**

LEGEND

Existing:

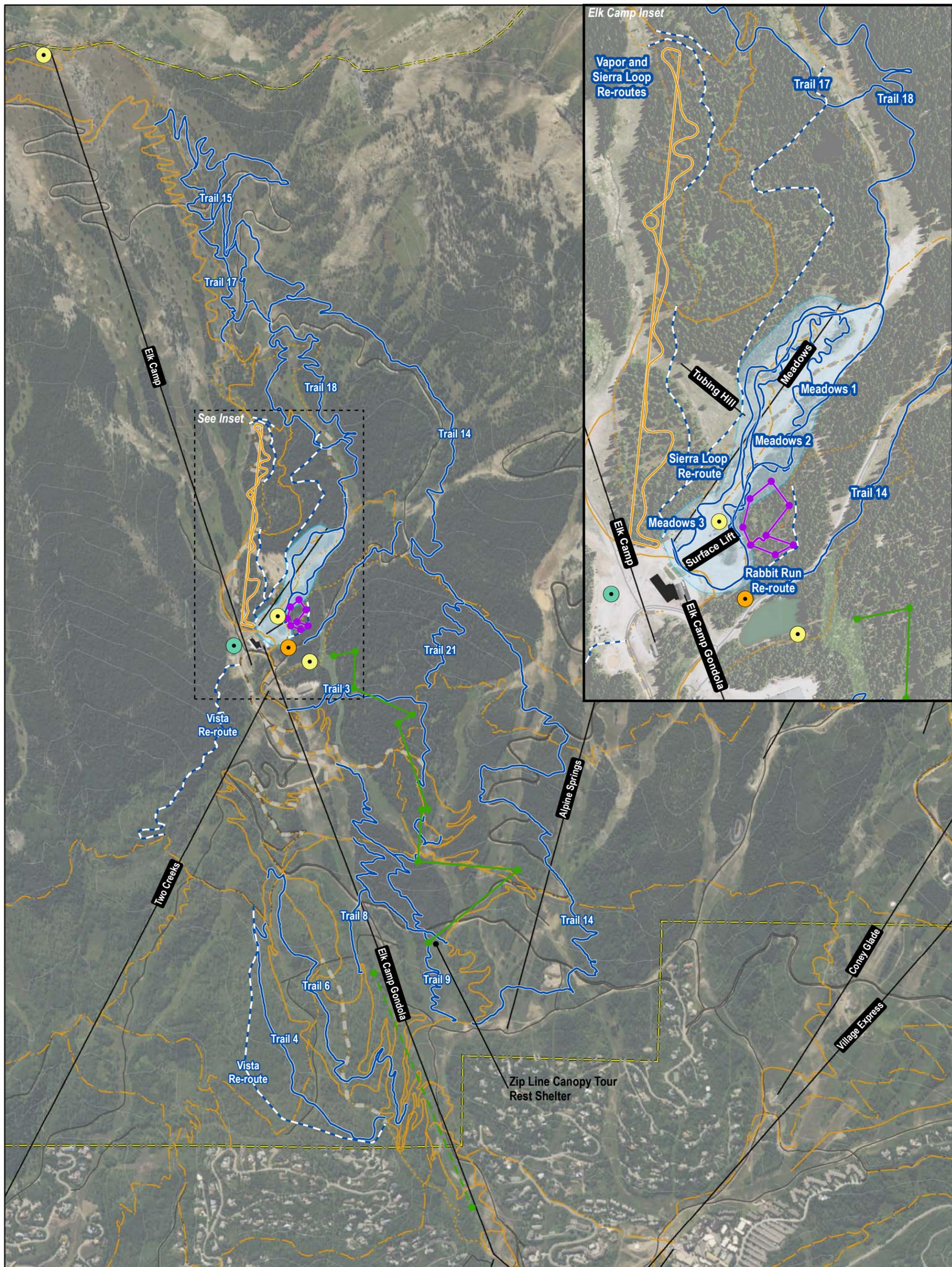
- Lifts
- Mountain Biking Trail
- Hiking Trail
- Multi-Use Trail
- Other Trail
- Mountain Roads

- Elk Camp Lower Bypass Trail
- SUP Boundary



0 0.25 0.5
Miles

November 2016 Produced by: **SE GROUP**




 White River National Forest
 Aspen-Sopris Ranger District
**Snowmass Multi-Season
 Recreation Projects
 Environmental Impact Statement**

**Figure 2:
 Alternative 2
 Proposed Action**

LEGEND

Existing:

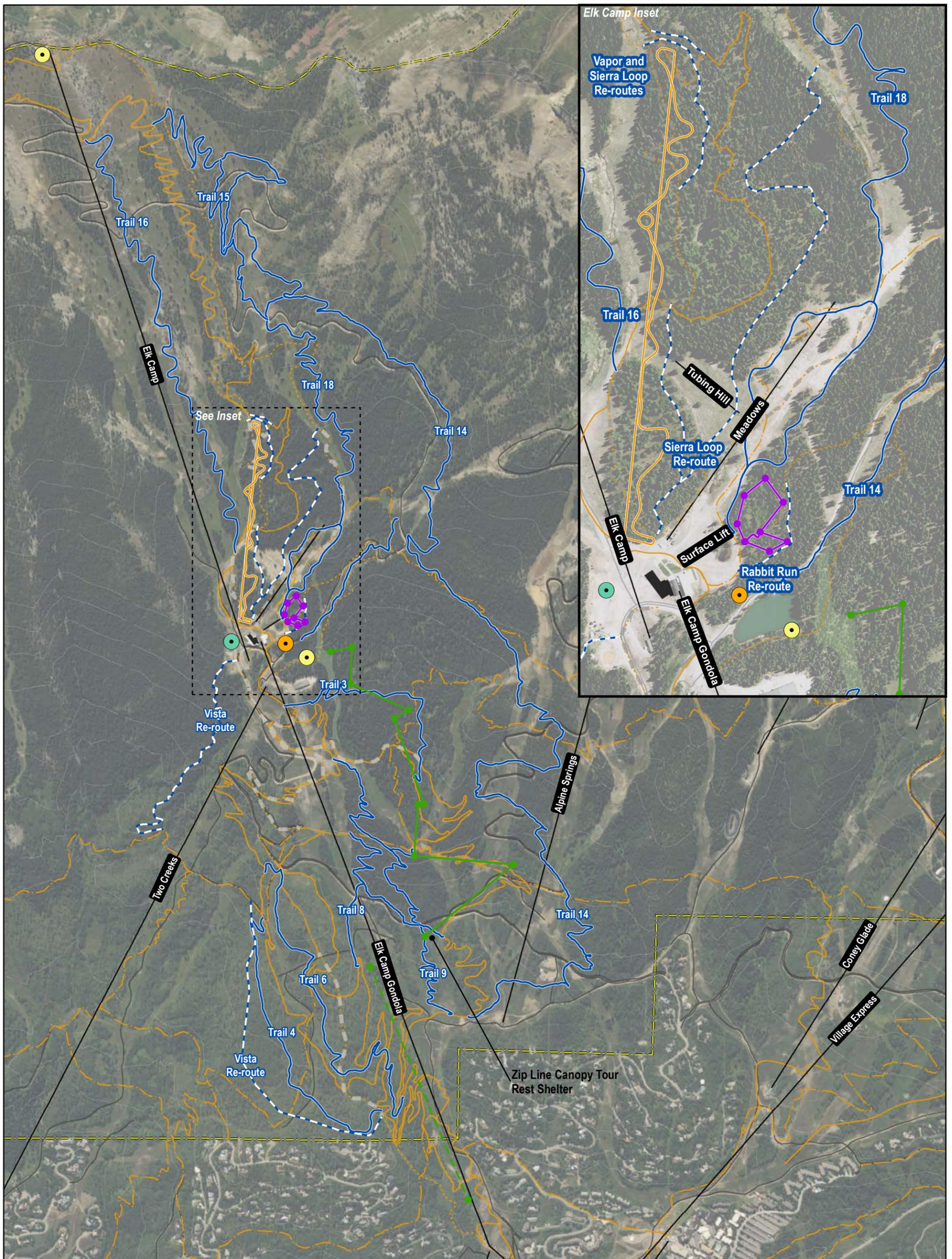
-  Lifts
-  Mountain Biking Trail
-  Hiking Trail
-  Multi-Use Trail
-  Other Trail
-  Mountain Roads
-  Elk Camp Lower Bypass Trail
-  SUP Boundary

Proposed:

-  Pedestrian/Cyclist Bridge
-  Climbing Wall
-  Multi-Purpose Activity
-  Mountain Coaster
-  Ropes Challenge Course
-  Zip Line Canopy Tour
-  Zip Line

-  Mountain Biking and Hiking Trail
-  Trail Re-route
-  Existing Trail to be Decommissioned
-  Meadows Skills Park Improvements





White River National Forest
Aspen-Sopris Ranger District

**Snowmass Multit-Season
Recreation Projects
Environmental Impact Statement**

**Figure 3:
Alternative 3**

LEGEND

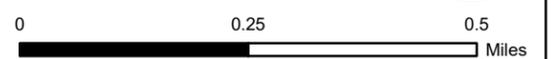
Existing:

- Lifts
- Mountain Biking Trail
- Hiking Trail
- Multi-Use Trail
- Other Trail
- Mountain Roads
- Elk Camp Lower Bypass Trail
- SUP Boundary

Proposed:

- Pedestrian/Cyclist Bridge
- Climbing Wall
- Multi-Purpose Activity
- Mountain Coaster
- Ropes Challenge Course
- Zip Line Canopy Tour
- Zip Line

- Mountain Biking and Hiking Trail
- Trail Reroute
- Existing Trail to be Decommissioned



Chapter 7

Glossary

This page intentionally left blank.

7. GLOSSARY

Ability Level: The relative rank to trails. The three ability levels for mountain biking and hiking trails are as follows: easier, more difficult, and most difficult.

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 Alternatives: Any alternative that includes upgrading and/or expansion of existing 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.

Alternative: One of several conceptual development plans described and evaluated in the EIS.

Analysis Area: The geographical area and/or physical, biological, and social environments that are analyzed for specific resources 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.

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 distance zone: A landscape viewing area visible to a viewer from approximately 3 to 5 miles to infinity.

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.

Biological Evaluation: An evaluation conducted to determine whether a proposed action is likely to affect any species which are listed as sensitive (Forest Service), candidate (Forest Service), or other special designations.

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.

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).

Climbing Wall: An artificial pitch with constructed hand and footholds designed to simulate a natural rock face and traditional rock climbing practice. Recreationalists utilize traditional climbing equipment including but not limited to, harnesses, helmets, and fixed cables to traverse the pitch.

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.

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 that 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 Visitor: Visitors that arrive in the morning and drive back home at the end of the day (as opposed to a “Destination Visitor”).

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.

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 mountain biking, hiking, 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.

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 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.

Erosion: The detachment and movement of soil from the land surface by wind, water, ice, or gravity.

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 distance zone: The landscape area visible to an observer from the immediate area to 0.5 mile.

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 WRNF Forest Plan was approved in 2002.

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.

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.

GPS: Global Positioning System, a satellite-based surveying system.

Grading: The practice of moving or re-contouring earthen materials to achieve a specified slope in the landform.

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 ticketing facilities, 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 type: A classification of the vegetation resource based on dominant growth forms. The forested areas are more specifically classified by the dominant tree species.

Habitat: The sum of environmental conditions of a specific place that is occupied by an organism, a population, or a community.

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.

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.

Management Area 8.25: According to the 2002 Forest Plan, is administered for “winter sports activities and other intensively managed outdoor recreation opportunities for large numbers of national and international visitors in highly developed settings.”

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 practice: A specific activity, measure, course of action, or treatment.

Master Development Plan (MDP): 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 distance zone: 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 coaster: Infrastructure and supporting facilities that utilize tubular tracks and bobsled-type cars to provide a thrill based experience in a natural setting. Mountain coasters allow limited direct physical access to the natural environment due to the self-confined nature of the bobsled-type car; however, they are typically designed to incorporate natural resource assets into the experience as users are transported.

Mountain Roads: On-mountain primary and secondary roads that provide summertime access to mountain buildings and lift terminal locations.

Multi-purpose activity areas: Areas designated, landscaped, and utilized to provide space for guests to meet for special events, temporary activities, and scenic viewing.

Multi-Season Recreation: Additional recreation uses of ski areas operating on NFS lands that provide other seasonal or year-round natural resource-based recreational activities and associated facilities, which extend beyond traditional snow-sports and winter operations.

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 that 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.

Overnight Visitor: A visitor that stays overnight within the resort community (as opposed to a “Day Visitor”).

Preferred alternative: The alternative selected from the range of alternatives that 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.

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., streambanks, lakeshores, etc.).

Ropes Challenge Course: A series of obstacles including but not limited to ladders, nets, swings, bridges, and zip lines that mimic traditional mountaineering activities in practice and equipment and are integrated into a natural setting.

Scenery management: The art and science of arranging, planning and designing landscape attributes relative to the appearance of places and expanses in outdoor settings.

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).

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.

Scoping process: A process that determines the issues, concerns, and opportunities that 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 Recreational Opportunity Enhancement Act (SAROE): A 2011 Act amending the National Forest Ski Area Permit Act of 1986 to clarify the authority of the Secretary of Agriculture regarding additional recreational uses of NFS land subject to ski area permits, and for other purposes. Among its provisions, SAROE expands the authority of the Secretary to authorize other seasonal or year-round natural resource-based recreational activities and associated facilities on National Forest System land subject to a ski area permit as the Secretary determines to be appropriate.

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.

Soil: A dynamic natural body on the surface of the earth in which plants grow, composed of mineral and organic materials and living forms.

Special Use Permit (SUP): A legal document, similar to a lease, issued by the 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.

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.

Standard: A course of action that must be followed; adherence is mandatory.

SUP area: Area of NFS lands encompassed within the SUP.

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.

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.

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.

Vehicle trips: The number of times vehicles use a segment of road.

Vehicles Per Day: The total two-way daily traffic volume on a section of roadway.

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.

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).

Zip Line Canopy Tour: A designated route through the overstory of a forested area that uses zip line cables, aerial bridges, and other features reminiscent of traditional mountaineering practices to transport recreationalists between a series of platforms built in trees. Reliance on natural attributes to accommodate the tour's platforms and designated route distinguish zip line canopy tours from other aerial activities that utilize zip line cables.

Zip line: Infrastructure related to zip line cables as used in various activities or as an activity itself. As an activity, recreationalists are transported between platforms, typically created from artificial structures that replicate the natural surroundings. Transportation utilizes the force of gravity to move recreationists along the zip line cable.

Chapter 8

Index

This page intentionally left blank.

8. INDEX

A

alpine tundra 2-39, 3-131
 Average Annual Daily Traffic 3-80, 7-1
 Average Daily Traffic 2-32, 3-80,
 3-82, 3-83, 3-85, 3-86, 7-1

B

bare ground 1-12, 2-45, 3-155,
 3-158, 3-164, 3-166, 3-167, 3-168
 Best Management Practice 1-11, 7-1
 Biological Assessment 3-103, 3-125
 biological diversity 3-108
 Biological Evaluation 3-103, 3-125, 3-130,
 3-143, 3-149, 7-1
 Built Environment Image Guide 1-8, 2-9, 2-25, 3-36,
 3-40, 3-42, 3-43, 3-45, 3-46, 3-47, 3-50

C

Canada lynx 1-11, 2-38, 2-39, 2-40,
 2-41, 3-126, 3-127, 3-128, 3-141, 3-142, 3-143, 3-149,
 3-152, 3-153
 CDPHE 3-90, 3-92, 3-95, 3-96, 3-172
 Class I areas 2-33, 3-90, 3-91, 3-93, 3-94
 Class II areas 2-33
 Clean Water Act 1-13, 1-20, 2-48, 3-172,
 3-193, 3-198, 7-1
 climate change 1-10, 2-35, 2-36, 3-98,
 3-99, 3-100, 3-101, 3-102
 climbing wall 1-2, 1-5, 2-6, 2-16, 2-18,
 2-27, 3-9, 3-16, 3-21, 3-24, 3-26, 3-29, 3-38, 3-39, 3-46,
 3-52, 3-54, 3-101, 3-118, 3-161, 3-162, 3-172
 Colorado Roadless Area 1-14
 connected disturbed area 1-13, 2-11, 2-46,
 2-47, 3-177
 Council on Environmental Quality 1-1, 1-15, 2-1, 3-1,
 3-2, 3-64, 3-98, 4-2, 7-2
 critical habitat 3-104
 cultural resource 1-9, 2-31, 3-71, 3-72, 3-74,
 3-75, 3-76, 3-77

D

decibel 3-51
 developed recreation 1-3, 2-23, 3-3, 3-9, 3-12,
 3-13, 3-16, 3-17, 3-21, 3-25, 3-27, 3-31, 3-40, 3-41,
 3-45, 3-46, 3-48, 3-50, 3-54, 3-166, 3-170, 7-2
 dispersed recreation 2-16, 3-3, 3-11, 3-16, 3-19

diversity 1-15, 2-9, 3-7, 3-16, 3-33,
 3-37, 3-62, 3-65, 3-66

E

Economic Impacts 3-57
 Elk Camp area 1-2, 1-3, 1-11,
 2-2, 2-6, 2-7, 2-11, 2-16, 2-18, 2-22, 2-24, 2-38, 2-47,
 3-2, 3-3, 3-4, 3-6, 3-10, 3-11, 3-18, 3-20, 3-21, 3-22,
 3-23, 3-25, 3-26, 3-27, 3-28, 3-29, 3-38, 3-39, 3-40,
 3-42, 3-43, 3-44, 3-52, 3-53, 3-54, 3-137, 3-142, 3-147,
 3-148, 3-149, 3-150
 Elk Camp Chairlift 2-6, 2-7, 3-4,
 3-10, 3-22, 3-28, 3-38, 3-39, 3-47
 Elk Camp Gondola 1-2, 1-3, 1-4, 1-5,
 2-2, 2-3, 2-5, 2-6, 2-7, 2-16, 2-18, 2-25, 2-28, 2-40,
 2-41, 2-42, 3-3, 3-4, 3-6, 3-9, 3-10, 3-11, 3-18, 3-19,
 3-22, 3-23, 3-25, 3-26, 3-27, 3-38, 3-39, 3-41, 3-43,
 3-44, 3-47, 3-50, 3-52, 3-54, 3-101, 3-103, 3-109,
 3-116, 3-118, 3-139, 3-148
 Elk Camp Meadows 1-2, 1-4, 1-5, 2-5,
 2-6, 2-7, 2-8, 3-9, 3-20, 3-22, 3-25, 3-27, 3-29, 3-30,
 3-38, 3-39, 3-41, 3-45, 3-46, 3-47, 3-48, 3-55, 3-88,
 3-97, 3-101, 3-150, 3-165, 3-185, 3-196
 Elk Camp Restaurant 1-2, 1-5, 2-2, 2-6, 2-7,
 2-20, 2-24, 2-28, 3-9, 3-10, 3-11, 3-21, 3-22, 3-23, 3-25,
 3-26, 3-30, 3-38, 3-39, 3-42, 3-45, 3-46, 3-47, 3-48,
 3-53, 3-56, 3-101, 3-110, 3-113, 3-127, 3-140, 3-141,
 3-150
 endangered species 7-3, 7-7
 Environmental Protection Agency 3-90, 3-91, 3-92,
 3-93, 3-94, 3-95, 3-98, 3-171, 3-174, 3-184, 4-3, 7-3,
 7-8
 erosion 1-12, 2-9,
 2-11, 2-13, 2-36, 2-43, 2-44, 2-45, 2-47, 3-35, 3-113,
 3-114, 3-115, 3-154, 3-157, 3-158, 3-159, 3-161,
 3-162, 3-163, 3-167, 3-168, 3-169, 3-170, 3-171, 3-177,
 3-178, 3-180, 3-185, 3-189, 3-191, 3-193, 7-3
 Executive Order 11990, Protection of Wetlands 1-14,
 2-49, 3-193, 3-196, 3-197
 Executive Order 12898, Environmental Justice 1-15,
 2-30, 3-64

G

gravity trails 3-4, 3-6,
 3-13, 3-14, 3-15, 3-28, 3-29
 greenhouse gas emissions 1-10, 2-35,
 3-95, 3-98, 3-100

H

hiking trails1-2, 1-4, 1-11, 1-13, 1-14, 2-1, 2-2, 2-3, 2-9, 2-19, 2-22, 2-25, 2-28, 2-40, 2-44, 2-46, 2-49, 3-7, 3-8, 3-10, 3-13, 3-15, 3-16, 3-26, 3-27, 3-31, 3-38, 3-41, 3-48, 3-54, 3-56, 3-109, 3-121, 3-122, 3-128, 3-139, 3-140, 3-141, 3-142, 3-146, 3-158, 3-161, 3-162, 3-172, 3-192, 3-197, 7-1

hydric soils..... 3-106

L

lynx analysis unit..... 2-38, 2-40, 3-127, 3-128, 3-141, 3-149, 3-152

M

Maroon Bells-Snowmass Wilderness..... 1-14, 2-6, 2-33, 2-38, 2-39, 2-41, 3-7, 3-22, 3-31, 3-36, 3-47, 3-72, 3-92, 3-93, 3-137, 3-147, 3-148, 3-150, 3-151, 3-152

Master Development Plan 1-2, 1-3, 3-3, 3-30, 3-49, 3-55, 3-71, 3-88, 3-89, 3-97, 3-115, 3-124, 3-141, 3-151, 3-167, 3-190, 3-198, 7-5

migratory birds 1-11, 2-38, 2-40, 3-125, 3-134, 3-138, 3-146, 3-150

mountain biking 1-2-1-4, 1-6, 1-7, 1-11, 1-12, 1-13, 1-14, 2-1, 2-2, 2-3, 2-4, 2-5, 2-9, 2-14, 2-16, 2-17, 2-18, 2-19, 2-20, 2-23, 2-25, 2-28, 2-38, 2-40, 2-43, 2-44, 2-46, 2-48, 2-49, 3-3, 3-4, 3-5, 3-6, 3-7, 3-10, 3-12, 3-13, 3-14, 3-15, 3-17, 3-23, 3-24, 3-25, 3-26, 3-27, 3-28, 3-29, 3-31, 3-37, 3-38, 3-40, 3-41, 3-42, 3-48, 3-52, 3-54, 3-56, 3-101, 3-109, 3-112, 3-114, 3-121, 3-122, 3-127, 3-128, 3-140, 3-141, 3-142, 3-146, 3-158, 3-159, 3-161, 3-162, 3-163, 3-164, 3-165, 3-166, 3-168, 3-172, 3-181, 3-182, 3-183, 3-184, 3-185, 3-186, 3-188, 3-189, 3-192, 3-196, 3-197, 7-1, 7-2

Mountain Pine Beetle..... 2-37, 3-120, 3-124

multi-purpose activity areas.....1-5, 2-8, 2-16, 2-19, 2-27, 3-16, 3-22, 3-23, 3-24, 3-25, 3-26, 3-27, 3-29, 3-47, 3-54, 3-101, 3-141, 3-161, 3-162, 3-164, 3-166

multi-season recreation1-3, 1-4, 1-7, 1-19, 2-2, 2-16, 2-17, 2-21, 2-23, 2-24, 2-25, 2-27, 2-33, 3-2, 3-3, 3-8, 3-11, 3-12, 3-16, 3-17, 3-22, 3-29, 3-30, 3-31, 3-38, 3-49, 3-55, 3-56, 3-70, 3-77, 3-85, 3-88, 3-89, 3-95, 3-97, 3-101, 3-102, 3-109, 3-115, 3-116, 3-122, 3-123, 3-124, 3-151, 3-158, 3-166, 3-189, 3-197

N

National Ambient Air Quality Standards 1-10, 2-33, 2-34, 3-90, 3-91, 3-93, 3-94, 3-95, 3-97

National Forest System Lands 1-2, 1-3, 1-4, 1-11, 1-16, 1-17, 1-18, 1-20, 2-10, 2-17, 2-18, 2-19, 2-21, 2-25, 2-50, 3-2, 3-3, 3-5, 3-7, 3-9, 3-10, 3-12, 3-15, 3-16, 3-17, 3-18, 3-19, 3-20, 3-21, 3-31, 3-32, 3-34, 3-37, 3-38, 3-41, 3-44, 3-49, 3-52, 3-56, 3-58, 3-67, 3-90, 3-141, 3-167, 3-169, 3-180, 3-193, 3-196, 7-5, 7-7

National Register of Historic Places.. 1-9, 2-9, 2-31, 3-71, 3-72, 3-74, 3-75, 3-76, 3-77, 7-5

non-attainment areas 3-91, 3-92

non-native weeds 3-116, 3-119, 3-121, 3-122, 3-123, 3-124

P

particulate matter.....2-33, 2-34, 3-90, 3-92, 3-93, 3-94, 3-96

prehistoric 2-9, 3-71, 3-72, 3-75, 3-76

project area 1-15, 2-9, 2-10, 2-11, 2-40, 2-41, 2-49, 3-30, 3-32, 3-33, 3-37, 3-38, 3-39, 3-44, 3-72, 3-73, 3-74, 3-75, 3-76, 3-93, 3-101, 3-125, 3-127, 3-128, 3-130, 3-131, 3-132, 3-134, 3-135, 3-137, 3-138, 3-143, 3-145, 3-146, 3-147, 3-149, 3-150, 3-157, 3-181, 3-191, 3-194, 3-196

Project Design Criteria 1-1, 1-6, 1-11, 1-20, 2-1, 2-8, 2-9, 2-37, 2-38, 2-41, 2-42, 2-44, 2-45, 2-46, 2-47, 2-48, 2-49, 3-13, 3-76, 3-103, 3-109, 3-111, 3-112, 3-113, 3-114, 3-122, 3-123, 3-144, 3-145, 3-146, 3-150, 3-154, 3-159, 3-162, 3-164, 3-166, 3-167, 3-168, 3-169, 3-177, 3-178, 3-181, 3-184, 3-185, 3-189, 3-191, 3-192, 3-193, 3-195, 3-197, 3-198, 7-6

proposed species 3-125

R

riparian habitat 2-49, 3-110, 3-113, 3-126, 3-132, 3-145, 3-192, 3-195

ropes challenge course 1-2, 1-5, 2-6, 2-16, 2-18, 2-20, 2-23, 2-49, 3-15, 3-16, 3-20, 3-21, 3-24, 3-26, 3-29, 3-39, 3-45, 3-46, 3-54, 3-101, 3-121, 3-122, 3-141, 3-161, 3-172, 3-184, 3-192, 3-196

S

Scenery Management System..... 3-33, 3-34, 3-35, 3-50

Scenic Integrity Objectives 1-8, 2-23, 2-24, 3-33, 3-34, 3-35, 3-37, 3-39, 3-40, 3-41, 3-42, 3-43, 3-45, 3-46, 3-47, 3-48, 7-6

Section 106 2-31, 3-71, 3-72, 7-5

sediment ..1-13, 2-11, 2-12, 2-13, 2-46, 2-47, 3-154, 3-169, 3-170, 3-175, 3-176, 3-177, 3-178, 3-179, 3-180, 3-181, 3-183, 3-184, 3-185, 3-189, 3-191, 3-193, 3-196, 3-197, 7-4

sedimentation..... 2-42, 2-44, 2-48, 3-113, 3-114, 3-115, 3-163, 3-167, 3-181, 3-184, 3-185

sensitive species..... 1-10, 2-9, 2-36, 3-104, 3-108, 3-111, 3-114, 3-116, 3-125, 3-130, 3-138, 3-149, 3-153

Ski Area Recreational Opportunity Enhancement Act of 2011 1-7, 1-17, 1-18, 1-19, 2-23, 3-17, 3-19, 3-20, 3-21, 3-36, 7-7

Snowmass 2015 Mountain Master Development Plan 1-2, 1-3, 3-28, 3-50

Snowmass Planned Unit Development

- Amendment**..... 3-30, 3-49, 3-50, 3-71, 3-151
- social services** 3-65, 3-66
- soil map units** 2-43, 2-44, 3-157, 3-162, 3-165, 3-167
- Southern Rockies Lynx Amendment**..... 3-125
- Special Use Permit** 1-2, 1-4, 1-7, 1-8, 1-9, 1-10, 1-11, 1-12, 1-13, 1-14, 1-20, 2-8, 2-16, 2-18, 2-19, 2-22, 2-22, 2-23, 2-24, 2-27, 2-28, 2-33, 2-34, 2-36, 2-38, 2-39, 2-41, 2-44, 2-45,3-2, 3-3, 3-4, 3-5, 3-6, 3-7, 3-8, 3-9, 3-10, 3-11, 3-12, 3-15, 3-16, 3-18, 3-19, 3-20, 3-23, 3-25, 3-26, 3-30, 3-31, 3-32, 3-33, 3-36, 3-37, 3-38, 3-39, 3-40, 3-41, 3-45, 3-46, 3-48, 3-49, 3-50, 3-51, 3-52, 3-54, 3-55, 3-56, 3-70, 3-71, 3-76, 3-77, 3-88, 3-90, 3-92, 3-93, 3-94, 3-95, 3-96, 3-97, 3-100, 3-101, 3-102, 3-103, 3-109, 3-115, 3-116, 3-117, 3-121, 3-122, 3-123, 3-124, 3-125, 3-127, 3-128, 3-136, 3-137, 3-140, 3-142, 3-143, 3-147, 3-150, 3-151, 3-152, 3-153, 3-155, 3-156, 3-157, 3-158, 3-161, 3-163, 3-165, 3-166, 3-167, 3-168, 3-180, 3-189, 3-190, 3-191, 3-192, 3-194, 3-197, 7-7
- Species of Local Concern**..... 1-10, 1-11, 2-9, 2-10, 2-36, 2-38, 2-39, 2-38, 2-40, 3-103, 3-108, 3-109, 3-110, 3-112, 3-113, 3-114, 3-116, 3-125, 3-136, 3-147, 3-150
- Species of Viability Concern** 2-9, 2-36, 2-37, 2-37, 3-103, 3-109, 3-110, 3-113
- Spruce Bark Beetle** 3-120, 3-121, 3-122, 3-123
- standards and guidelines** 1-2, 1-8, 1-17, 2-8, 2-24, 3-35, 3-50, 3-198, 7-4, 7-5
- State Historic Preservation Officer** 2-9, 2-31, 3-72, 3-75, 3-76
- stream health**..... 1-12, 1-13, 2-11, 2-12, 2-42, 2-46, 2-47, 2-48, 3-169, 3-171, 3-175, 3-176, 3-178, 3-179, 3-180, 3-181, 3-184, 3-185, 3-188, 3-189, 3-190, 3-192, 3-193
- survey**..... 2-9, 3-74, 3-75, 3-108, 3-125, 3-157, 3-178, 3-179, 3-188

T

- threatened and endangered species** 1-10, 2-36, 3-125
- threatened, endangered, and sensitive species** 2-10, 2-36

U

- U.S. Army Corps of Engineers**..... 1-20, 3-193, 4-3, 7-1
- U.S. Fish and Wildlife Service**..... 1-20, 2-38, 2-41, 3-103, 3-104, 3-111, 3-125, 3-127, 3-128, 3-134, 3-135, 3-136, 3-140, 3-141, 3-146, 3-150, 4-3, 7-7

V

- visitation** 1-9, 1-10, 2-18, 2-20, 2-21, 2-22, 2-30, 2-31, 2-32, 2-34, 2-35, 3-2, 3-9, 3-10, 3-11, 3-12, 3-22, 3-23, 3-25, 3-26, 3-29, 3-32, 3-51, 3-53, 3-54, 3-56, 3-57, 3-58, 3-59, 3-60, 3-66, 3-67, 3-68, 3-69, 3-71, 3-78, 3-82, 3-83, 3-84, 3-85, 3-86, 3-100, 3-102, 3-127, 3-147

W

- Water Influence Zone** 1-13, 2-11, 2-12, 2-46, 2-47, 2-48, 3-169, 3-171, 3-178, 3-179, 3-183, 3-184, 3-185, 3-188, 3-189, 3-193, 7-8
- water yield**..... 1-13, 2-46, 3-174, 3-175, 3-183, 3-191
- Watershed Conservation Practices Handbook** 1-13, 2-46, 3-153, 3-154, 3-168, 3-169, 3-170, 3-175, 3-176, 3-177, 3-178, 3-181, 3-184, 3-185, 3-188, 3-189, 3-193, 3-195, 3-197, 7-8
- White River National Forest Land and Resource Management Plan** 1-2, 1-8, 1-13, 1-16, 1-17, 2-9, 2-10, 2-24, 2-25, 2-46, 2-47, 3-31, 3-33, 3-34, 3-35, 3-36, 3-40, 3-49, 3-50, 3-56, 3-90, 3-109, 3-115, 3-116, 3-124, 3-125, 3-143, 3-151, 3-153, 3-167, 3-168, 3-169, 3-175, 3-176, 3-185, 3-189, 3-190, 3-193, 3-195, 3-197, 3-198, 4-1, 7-4, 7-5, 7-6
- White River National Forest**..... 1-2, 1-3, 1-5, 1-6, 1-10, 1-11, 1-16, 1-17, 1-20, 2-1, 2-7, 2-9, 2-10, 2-17, 2-24, 2-36, 2-37, 2-45, 2-46, -2, 3-3, 3-6, 3-8, 3-9, 3-12, 3-16, 3-17, 3-27, 3-30, 3-31, 3-33, 3-35, 3-36, 3-47, 3-49, 3-56, 3-72, 3-75, 3-90, 3-92, 3-94, 3-95, 3-104, 3-105, 3-108, 3-109, 3-115, 3-120, 3-124, 3-126, 3-130, 3-131, 3-132, 3-133, 3-134, 3-135, 3-136, 3-140, 3-141, 3-147, 3-150, 3-151, 3-152, 3-153, 3-155, 3-159, 3-160, 3-162, 3-164, 3-166, 3-167, 3-171, 3-178, 3-179, 3-185, 3-189, 3-190, 3-198, 4-1, 7-4

X

- XC trails** 3-4, 3-6, 3-14, 3-15, 3-28, 3-29

Z

- zip line** 1-2, 1-4, 1-6, 1-7, 1-8, 1-12, 2-1, 2-5, 2-6, 2-14, 2-15, 2-16, 2-18, 2-20, 2-22, 2-23, 2-26, 2-27, 2-28, 2-41, 2-43, 2-49, 3-16, 3-18, 3-19, 3-20, 3-21, 3-24, 3-26, 3-29, 3-38, 3-42, 3-43, 3-44, 3-45, 3-49, 3-50, 3-54, 3-55, 3-101, 3-121, 3-122, 3-127, 3-140, 3-141, 3-142, 3-146, 3-147, 3-161, 3-162, 3-172, 3-181, 3-183, 3-188, 3-189, 3-192, 3-196, 7-6, 7-8
- zip line canopy tour** 1-2, 1-4, 1-6, 1-12, 2-1, 2-5, 2-14, 2-16, 2-18, 2-20, 2-22, 2-26, 2-41, 2-43, 2-49, 3-16, 3-18, 3-19, 3-20, 3-21, 3-24, 3-26, 3-29, 3-38, 3-42, 3-43, 3-44, 3-54, 3-55, 3-101, 3-121, 3-122, 3-127, 3-140, 3-141, 3-142, 3-146, 3-147, 3-161, 3-162, 3-172, 3-181, 3-184, 3-188, 3-192, 3-196, 7-8

This page intentionally left blank.

Appendices

This page intentionally left blank.

Appendix A:
Cumulative Effects Projects

This page intentionally left blank.

APPENDIX A: CUMULATIVE EFFECTS PROJECTS

**Table A-1:
Cumulative Effects Matrix**

Project	Project Location (Straight Line Distance to Snowmass SUP Area)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	LAU where the Project is Located	Resources Potentially Affected that Apply to this EIS
Snowmass Ski Area Projects						
Snowmass 2015 Master Development Plan	Within the Snowmass SUP and on adjacent private lands within the ski area operational boundary	Snowmass prepared a MDP, which was accepted by the Forest Service in August 2015. The projects in the MDP that are not part of the Proposed Action and/or Alternative 3 would require site specific NEPA analysis prior to implementation but are considered reasonably foreseeable future actions.	Accepted in 2015	Areas within the 4,745 SUP area and on the 861 acres of private land owned or used under easement by Snowmass.	Snowmass	Fish and Wildlife Watershed Wetlands Scenery Social and Economic Recreation Vegetation Soils Traffic Air Quality Noise Climate Change
Snowmass Planned Unit Development Amendment	Within the Snowmass SUP and on adjacent private lands within the ski area operational boundary	Paralleling the NEPA process, Snowmass is currently applying to the Town of Snowmass Village to revise its PUD. The revised PUD will govern the allowable activities and structures within the operational boundary of Snowmass. Upon Town of Snowmass Village approval, the amended PUD would accommodate all developments proposed in this EIS.	Ongoing	Areas within the 4,745 SUP area and on the 861 acres of private land owned or used under easement by Snowmass.	Snowmass	Scenery Social and Economic Recreation

**Table A-1:
Cumulative Effects Matrix**

Project	Project Location (Straight Line Distance to Snowmass SUP Area)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	LAU where the Project is Located	Resources Potentially Affected that Apply to this EIS
Snowmass Ski Area Ski Trail Enhancements and High Alpine Lift Replacement	Within the Snowmass SUP	In 2014 an EA was prepared to analyze a proposal to replace and realign the High Alpine Lift, install snowmaking on Green Cabin and Trestle trails, perform six glading projects across 84 acres of terrain, and develop two new ski trails designed to improve skier circulation across the ski area. The Proposed Action included in the EA was approved in 2015.	Implemented 2015	Portions of the SUP area that include the realigned lift corridor, the 26 acres of terrain for snowmaking, and 84 acres of gladed terrain	Snowmass	Fish and Wildlife Watershed Wetlands Scenery Vegetation Soils Noise Climate Change
Snowmass Ski Area Burnt Mountain Egress Trail	Within the Snowmass SUP	In 2013 an EA was prepared to analyze a proposed trail segment providing egress from the gladed terrain on the eastern portion of Burnt Mountain to the existing Long Shot trail. The Proposed Action included in the EA was approved in 2013.	Implemented 2014	2.5 acres of full clearing, including 0.4 acre of grading within the SUP area	Snowmass	Vegetation Soils Climate Change
Snowmass Ski Area Summer Trails	Within the Snowmass SUP	An EA was prepared in 2010 to analyze the construction of three new trails (i.e., Funnel Single Track Trail, Upper Cross-Mountain Connector, and Freeride Trail). Each of the three trails would provide guests with a different style of trail to meet their individual riding goals. The Proposed Action included in the EA was approved in 2011.	Implemented 2011	52.5 acres of summer use trails within the existing SUP	Snowmass	Fish and Wildlife Watershed Wetlands Recreation Vegetation Soils Climate Change

**Table A-1:
Cumulative Effects Matrix**

Project	Project Location (Straight Line Distance to Snowmass SUP Area)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	LAU where the Project is Located	Resources Potentially Affected that Apply to this EIS
Snowmass Ski Area New/Realigned Mountain Bike Trails	Within the Snowmass SUP	The 2014 Decision Memo authorized various enhancements to the mountain bike trail network, including the construction of a new beginner flow trail, the re-route of two existing trails, and the construction of a mountain bike skills park	Implemented 2015	Areas proposed for construction and reconstruction within the existing SUP	Snowmass	Fish and Wildlife Watershed Wetlands Recreation Vegetation Soils Climate Change
Snowmass Ski Area Winter Evening Activities Project	Within the Snowmass SUP	In 2014 a Decision Memo authorized Snowmass to host various winter evening activities in the vicinity of Elk Camp. This approval allowed the addition of snow tubing infrastructure and additional lighting. Also approved were temporary winter evening activities to be offered on a permanent basis.	Implemented 2015	Areas in the vicinity of the Elk Camp area utilized for winter evening activities	Snowmass	Fish and Wildlife Recreation Noise Climate Change
Snowmass Ski Area Sheer Bliss Pond Modification Project	Within the Snowmass SUP	In 2016 a Decision Memo authorized Snowmass to modify the existing Sheer Bliss Pond in order to minimize resource impacts and continue utilization of this facility.	Approved 2016	4 acres of land within the existing SUP boundary	Snowmass	Watershed Vegetation Soils
Regional Projects						
Snowmass Village Parks, Open Space, Trails, and Recreation Plan (POSTR Plan)	Within the Town of Snowmass Village (0–5.8 miles)	The POSTR Plan is a long-range planning and implementation document to guide future development of the parks, open space, recreation, and trails within the Town of Snowmass Village.	Accepted 2016	16,000+ acres	N/A	Recreation

**Table A-1:
Cumulative Effects Matrix**

Project	Project Location (Straight Line Distance to Snowmass SUP Area)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	LAU where the Project is Located	Resources Potentially Affected that Apply to this EIS
Continued Build Out of Town of Snowmass Village	Within the Town of Snowmass Village (0–5.8 miles)	As stated in the Town of Snowmass Village 2010 Comprehensive Plan, the community is approaching buildout. There are relatively few areas for additional growth, requiring heightened attention to the impacts of future development and redevelopment.	Ongoing	16,000+ acres	N/A	Fish and Wildlife Watershed Wetlands Social and Economic Traffic Air Quality Noise Climate Change
Ajax Adventure Camp Special Use Permit	Aspen-Sopris Ranger District-wide	The WRNF is currently analyzing the issuance of a ten-year Priority Use Outfitter and Guide Permit (priority use permit) to Ajax Adventure Camp. Ajax Adventure Camp is a children’s summer camp based out of Aspen, CO.	Under Analysis	Varies by activity and location	Independence Pass	Recreation Noise
Aspen-Sopris Ranger District Five Year Recreation Event Special Use Permit	Aspen-Sopris Ranger District-wide	Issuance of five-year recreation event permits to authorize 11 recreation events to operate on the Aspen-Sopris Ranger District. Events have been authorized in prior years under temporary permits. Events are running, mountain bike, jeep, and ski activities.	Under Analysis	Varies per event	Snowmass/ Maroon Bells/ Independence Pass	Recreation Social and Economic Noise

**Table A-1:
Cumulative Effects Matrix**

Project	Project Location (Straight Line Distance to Snowmass SUP Area)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	LAU where the Project is Located	Resources Potentially Affected that Apply to this EIS
Transportation						
<p>Town of Snowmass Village Community Connectivity Plan</p>	<p>Within the Town of Snowmass Village (0–5.8 miles)</p>	<p>The Community Connectivity Plan focuses on enhancing the transportation network of walkways, bikeways, trails and public transportation for residents, visitors, and the workforce to utilize. The goal of the transportation network is to promote a walkable community and improve access to key destinations</p>	<p>Ongoing</p>	<p>16,000+ acres</p>	<p>N/A</p>	<p>Air Quality Traffic</p>
Forest Service Programmatic Projects						
<p>WRNF Forest Plan – 2002 Revision</p>	<p>Forest-wide</p>	<p>The decision approved Alternative K in the Final EIS as the 2002 Revised Land and Resource Management Plan. Alternative K sustains the capabilities of forest ecosystems while addressing social values and expectations, as well as managing for multiple resource outputs. Ecosystem components are actively managed to improve wildlife habitat, water quality and soil productivity. Management activities maintain or restore ecosystem structure, function and composition. Emphasis is placed on quality recreation experiences in a predominately natural setting. Recreation growth becomes more managed, while still allowing modest increases in use.</p>	<p>April 2, 2002, as amended</p>	<p>2,270,000 acres</p>	<p>Forest-wide</p>	<p>Fish and Wildlife Watershed Wetlands Scenery Recreation Vegetation Soils Noise Climate Change</p>

**Table A-1:
Cumulative Effects Matrix**

Project	Project Location (Straight Line Distance to Snowmass SUP Area)	Project Description	Project Approval/ Implementation	Project Area (acres/length)	LAU where the Project is Located	Resources Potentially Affected that Apply to this EIS
WRNF Travel Management Plan	Forest-wide	The Forest Service has approved a comprehensive travel management plan (TMP) for the WRNF. The TMP approved ways to accommodate and balance the transportation needs of the public and provide adequate access for forest and resource management, while still allowing for protection of natural resources.	Implementation: On-going	Project area includes 2,482,000 acres within the WRNF	Forest-wide	Wildlife Noise Climate Change
Maroon Bells-Snowmass Wilderness Visitor Use Plan	Within the Maroon Bells-Snowmass Wilderness Area (0–16 miles)	This plan seeks to create a visitor use management strategy that will restore and preserve the natural conditions by addressing biophysical impacts resulting from increasing overnight use within the Maroon Bells-Snowmass Wilderness. The plan will define an overnight visitor carrying capacity, and use this capacity to determine a threshold for which when exceeded will trigger a limited entry permit system.	Under Analysis	181,535-acres of wilderness	Snowmass/ Maroon Bells	Wildlife Recreation

Appendix B:
Forest Service Manual 2343 Screening Report

This page intentionally left blank.



MOUNTAIN SPORTS

WHITE RIVER NATIONAL FOREST MOUNTAIN SPORTS PROGRAM

ASPEN/SOPRIS | EAGLE/HOLY CROSS | DILLON | GLENWOOD SPRINGS

PROJECT PLANNING

Snowmass Ski Area – Multi-Season Recreation Projects Proposal

February 2016

FSM 2343 Screening – Additional Seasonal and Year-Round Recreation at Ski Areas

Introduction

The following table discloses how the proposed activities at Snowmass Ski Resort comply with Forest Service direction regarding the appropriateness of additional seasonal and year-round activities at ski areas permitted on National Forest System (NFS) lands.

The screening process for determining compliance with Forest Service Manual direction occurs at three separate stages of planning:

- (1) Master Development Planning – review of long-term, resort-wide plans for development.
- (2) NEPA Analysis – environmental analysis of site-specific proposed activities at the resort.
- (3) Post-Decision Engineering and Design Reviews – review of design documents that disclose final facility layouts and architectural design details.

As project activity details develop through these progressive planning phases, additional activity information is often necessary to ensure compliance with agency direction.

Upon acceptance of the 2015 Snowmass Mountain Master Development Plan Update, the ski area formally submitted a comprehensive proposal for summer activities and associated facilities on NFS lands within the Special Use Permit area. Proposed projects include:

- Mountain Bike Trail Improvements
- Mountain Coaster
- Mountain Bike Trails
- Zip Line/Canopy Tour
- Ropes Challenge Course
- Climbing Wall
- Multi-Purpose Activity Areas

Prior to accepting the proposal and beginning NEPA analysis, the agency has reviewed project information (general locations, disturbance footprints, general facility design and dimensions, and activity schematics) to screen the proposed activities in accordance with FSM 2343 direction.

A final determination for compliance with FSM 2343 direction will be made after the third and final review stage when the agency can fully evaluate final project details. The agency will utilize the Scenery Management System, Built Environment Image Guide, the Recreation Opportunity Spectrum, and other design and engineering reviews to ensure that these additional seasonal or year-round recreation activities and associated facilities are located and constructed to harmonize with the surrounding natural environment and meet agency direction.



FSM 2343.14 - Additional Seasonal and Year-Round Recreation at Ski Areas

Master Development Planning

Ski area Master Development Plans (MDPs) guide the placement and design of additional seasonal or year-round recreation activities. As part of the master development planning process, the following criteria must be met:

FSM Direction	Criteria	Findings
2343.14 (8)(a)	Establish zones to guide placement and design of additional seasonal or year-round recreation facilities, basing the zones on the existing natural setting and level of development to support snow sports	The 2015 Master Development Plan Update establishes four zones within the permit area. The design and location of these facilities and activities are consistent with the vision, zoning and proposed uses found in in the MDP.
(8)(b)	Depict the general location of the facilities	The general location of facilities has been included in the proposal.
(8)(c)	Establish an estimated timeframe for their construction	While a construction timeline has not been established, it is assumed that projects will be implemented within 1-3 years of a decision.

Proposed Activities and Associated Facilities

Apply the following additional criteria in initial screening of proposals for additional seasonal or year-round recreation activities and associated facilities. These activities and associated facilities must:

FSM Direction	Criteria	Findings
2343.14 (1)(a)	Not change the primary purpose of the ski area to other than snow sports	<p>The proposed activities will individually and collectively supplement existing summer visitation and will increase visitation by a small amount when compared to winter use visits. Revenue from snow sports activities exceed and are projected to continue to exceed revenue from summer uses.</p> <p>The proposed activities will not change the primary purpose of the ski area for snow sports.</p>
(1)(b)	Encourage outdoor recreation and enjoyment of nature and provide natural resource-based recreation opportunities	<p>The proposed activities provide opportunities to enjoy outdoor recreation, enjoyment of nature and natural resource-based recreation.</p> <p>Each of the activities will afford visitors scenic views of the surrounding mountain landscape and vegetation. The activities encourage outdoor recreation by being located outdoors in a natural setting and in close proximity to other numerous outdoor recreational opportunities.</p> <p>Many of the desired experiences and activities are dependent on a change in elevation (gravity-based) and engagement with a mountain forest setting. The design and location of the activities utilize the natural resource attributes of topography, mountain scenery (foreground and background views) and vegetation (layout and location within and adjacent to a forested stand).</p> <p>The zip lines are based in other traditional, natural resource-based recreation activities that occur on other NFS lands. The harnesses, zip lines, and activity itself replicates and is rooted in traditional climbing and mountaineering practices.</p>



FSM Direction	Criteria	Findings
(1)(c)	To the extent practicable, be located within the portions of the ski area that are developed or that will be developed pursuant to the master development plan	All activities and associated facilities will be located within the portions of the ski area that are planned for development in the master development plan. All activities would occur within the Special Use Permit boundary and the current developed winter operational boundary.
(1)(d)	Not exceed the level of development for snow sports and be consistent with the zoning established in the applicable master development plan	The level of development for snow sports will not be exceeded with these proposals. Summer uses would continue to be subordinate to the snow sports activities at the ski area. The design and location of these facilities and activities are consistent with the vision, zoning and proposed uses found in the 2015 Snowmass Mountain Master Development Plan Update.
(1)(e)(1)	To the extent practicable, harmonize with the natural environment of the site where they would be located by being visually consistent with or subordinate to the ski area's existing facilities, vegetation and landscape	Based on preliminary proposed locations and activity designs, the activities should be visually consistent with and subordinate to the ski area's existing facilities, vegetation and landscape. Mountain Bike Trails and Park Constructed mountain bike trail features should be appropriate in size and design for the setting, visually blend in with the site, and be constructed of natural materials. Climbing Wall Climbing wall will be situated adjacent to a forested stand and will be subordinate in height and massing to the surround landscape and vegetation. Canopy Tour Design: The tour is designed to minimize and avoid tree removal, blend with the forest canopy (towers), and utilize natural materials in its construction. BEIG concepts and criteria will be incorporated into final design. Location and Layout: The tour is situated in a discrete, forested locations located adjacent to and on the periphery of existing snow sports infrastructure. Tower stations should not be higher than the canopy in which they're located to blend towers from multiple viewpoints. Height and Massing: The tour operates within narrow corridors limiting its visual footprint and requiring limited tree removal. Zip line cables will be visible as they extend far above the canopy at times but are small in diameter and would be similar to appearance as the ski lift cables nearby. Tower stations may have guy wire re-enforcements. These guy wires would extend into forested areas and be subordinate to this vegetation. Mountain Coaster Design: The coaster and support facilities are designed to incorporate similar design and materials as existing ski area infrastructure (e.g. colored steel). BEIG concepts and criteria will be incorporated into final design. Location and Layout: The coaster is situated in a discrete, forested location which is on the periphery of existing snow sports infrastructure. The track location and design should utilize existing vegetation to visually screen from other



FSM Direction	Criteria	Findings
		<p>activities and enhance visitor experiences. Construction access should be designed to retain as much vegetation as possible. Layout conflicts with Vapor trail should prioritize trail reroute rather than coaster bridging options.</p> <p>Height and Massing: The coaster rail prism is narrow (less than an average ski trail) limiting its visual footprint and requiring limited tree removal. For a majority of the coaster length, its height is consistently low to the ground and the coaster is lower than and subordinate to surrounding vegetation.</p>
(1)(e)(2)	To the extent practicable, harmonize with the natural environment of the site where they would be located by not requiring significant modifications to topography to facilitate construction or operations	Minor grading will likely occur for construction of mountain bike trails, mountain coaster track, zip line towers, and multi-purpose activity areas. No significant modifications to topography are anticipated.
(1)(f)	Not compromise snow sports operations or functions	<p>All activities are designed and located to not compromise snow sports operations or functions resort-wide.</p> <p>The canopy tour is situated adjacent to and span existing ski runs. The mountain coaster is located in a forested setting adjacent to an existing ski run. These will result in no substantial change in snow sports operations. Tree skiing opportunities may be compromised in some forested areas but would have little effect on the winter sports user experience resort-wide. Coaster tracks, zip line towers, and associated guy lines and fences would have minimal footprints and would be avoided by skiers just as trees and fences are currently avoided.</p>
(1)(g)	Increase utilization of snow sports facilities and not require extensive new support facilities, such as parking lots, restaurants, and lifts	<p>Increased utilization of the existing Elk Camp Gondola is expected. Proposed facilities will not require extensive new support facilities.</p> <p>No additional parking lots, lifts, or lodges will be required for these activities.</p>

Other factors

FSM Direction	Screening Criteria	Narrative
2343.14 (4)	The degree to which visitors are able to engage with the natural setting, the extent to which the activities and facilities could be expected to lead to exploration and enjoyment of other NFS lands	<p>Activities and facilities provide for and encourage engagement with the natural setting. Accessible design will improve the extent to which visitors are able to engage and explore other accessible opportunities on NFS lands. Interpretive signage and employee training can enhance this engagement and contribute to the exploration of other NFS lands.</p> <p>Canopy Tour Visitors are able to directly engage with the natural setting to a moderate degree. Towers and cables are positioned within the canopy at key locations to provide guests with an intimate view of and closeness with the forest canopy and individual trees. The view from and natural setting of these activities would be unique from any other activity in the proposed suite of projects.</p> <p>The zip lines are based in other traditional, natural resource-based recreation activities that occur on other NFS lands.</p>



		<p>The harnesses, zip lines, and activity itself replicates and is rooted in traditional climbing and mountaineering practices.</p> <p>Mountain Coaster Mountain coasters and associated activities may expose new guests (non-skiing) to the outdoors. The mountain coaster is proposed to meet the needs of those guests seeking adventure and thrill-based experiences that require little specialized knowledge, skills or familiarity with the mountain environment.</p> <p>Natural resource attributes experienced may include natural scenery (foreground and background views of the Roaring Fork valley); mountains (closely following topography); and forests (close proximity and weaving in and out of forested stands).</p> <p>The mountain coaster allows limited direct physical access to the natural environment due to its self-confined nature but is designed and located to incorporate natural resource assets into the experience and users are transported through a natural setting.</p> <p>Mountain coasters may lead to further exploration of NFS lands adjacent to the activity area (within the Snowmass Ski Area SUP) as well as NFS lands outside the permit boundary. The coaster is part of a suite of activities that is partly designed to introduce new NFS lands guests to outdoor recreation and nature through a variety of settings, experiences, and activities.</p>
(5)	Interdependence of the visitor's experience with attributes common in National Forest settings	The visitor's experience is dependent upon the terrain, topography, vegetation and scenery common in National Forest settings. Proposed activities incorporate these attributes in their design.
(6)	Allow temporary activities that rely on existing facilities, such as concerts or weddings, even if they are not necessarily interdependent with a National Forest setting, provided they are enhanced by it. Do not authorize new permanent facilities solely for these activities.	No new permanent facilities (buildings) are planned solely for temporary activities.
(7)	Encourage holder to utilize existing facilities to provide additional seasonal or year-round recreation activities	<p>Guest access to the new activities will utilize the Elk Camp Gondola in addition to existing parking lots, restaurants, roads and trails. In all cases, the use of existing facilities will be prioritized over the construction on new ones (rest shelter, restrooms and storage buildings).</p> <p>The Multi-Purpose Activity Areas would be landscaped areas free of permanent constructed features or buildings (facilities) within existing footprints of the Elk Camp facility and developed site, Rayburn's Pond developed site, and Elk Camp Chairlift developed site.</p>
(9)	Utilize the Scenery Management System (FSM 2380), Built Environment Image Guide (Publication FS-710) and the Recreation Opportunity Spectrum (FSM 2310) to ensure that additional seasonal or year-round recreation activities and associated facilities are located and constructed to harmonize with the surrounding natural environment	Preliminary design appears to be consistent with scenery objectives. The environmental analysis and post-decision Building Design Review process will ensure activities and associated facilities are located and constructed to harmonize with the surrounding natural environment.



(10)	Authorization of additional seasonal or year-round recreation activities and associated facilities is subject to terms and conditions deemed appropriate by the Authorized Officer.	Proposed activities and facilities are subject to all appropriate agency direction. In addition to terms and conditions authorized in the White River Forest Plan (2002, as amended), ski area permit and annual resort operating plans, and the project environmental analysis and decision), activities are subject to FSM 7330 and will: <ul style="list-style-type: none">• Adhere to ASTM standard, or other equivalent standard as certified by a professional engineer,• Be reviewed by Ropeway Services Team, including monitoring of operations, maintenance, testing and evacuation; and• Need certification and inspection plan approved by Ropeway Services Team.
(11)	The acreage necessary for additional seasonal or year-round recreation activities and associated facilities may not be considered in determining the acreage encompassed by a ski area permit. Permit area expansions must be based on needs related to snow sports rather than additional seasonal or year-round recreation	N/A
(12)	Additional seasonal or year-round recreation activities and associated facilities that were authorized before November 7, 2011, and that do not meet the criteria in paragraphs 1 through 11 of FSM 2343.14 may continue to be authorized during the term of the current permit. When that permit terminates or is revoked, do not reauthorize additional seasonal or year-round recreation activities and associated facilities that do not conform to paragraphs 1 through 11 of this section.	N/A