Northwest Colorado Greater Sage-Grouse

Proposed Land Use Plan Amendment and Final Environmental Impact Statement

Volume IV: Appendices C, J, K, L, M, N, P

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
ACEC	area of critical environmental concern
ADH	all designated habitat (includes PHMA, GHMA, and LCHMA)
AUM	animal unit month
BER	Baseline Environmental Report
BLM	United States Department of the Interior, Bureau of Land Management
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
COA	condition of approval
CPW	Colorado Department of Natural Resources, Parks and Wildlife
CRVFO	Colorado River Valley Field Office
CSU	controlled surface use
decision area	public lands and mineral estate managed by the United States Department of the Interior, Bureau of Land Management, and public lands managed by the United States Department of Agriculture, Forest Service, Routt National Forest, that are within the planning area and are encompassed by all designated habitat (ADH)
EIS	environmental impact statement
ERMA	extensive recreation management area
ESA	Endangered Species Act
ESR	emergency stabilization and rehabilitation
federal mineral estate	subsurface mineral estate administered by the United States Department of the Interior, Bureau of Land Management
FLPMA	Federal Land Policy and Management Act of 1976
Forest Plan	United States Department of Agriculture, Forest Service, Land and Resource Management Plan
Forest Service	United States Department of Agriculture, Forest Service
FRCC	fire regime condition class
GH	general habitat
GHMA	general habitat management area
GIS	geographical information system
GJFO	Grand Junction Field Office
GRSG	Greater Sage-Grouse
HMA	herd management area
KFO	Kremmling Field Office
LCHMA	linkage/connectivity habitat management area
LSFO	Little Snake Field Office
LUP	land use plan

MIS	management indicator species
MOU	memorandum of understanding
MZ	management zone
NEPA	National Environmental Policy Act of 1969
NFMA	National Forest Management Act of 1976
NRHP	National Register of Historic Places
NSO	no surface occupancy
NTT	Sage-Grouse National Technical Team
OHV	off-highway vehicle
PDF	preferred design feature
PH	priority habitat
PHMA	priority habitat management area
planning area	Northwest Colorado District boundary, including all lands, regardless of land ownership
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PPH	preliminary priority habitat
project area	the United States Department of the Interior, Bureau of Land Management Northwest Colorado District boundary, including all lands, regardless of ownership
RDF	required design feature
RFDS	reasonable foreseeable development scenario
RMP	resource management plan
RMPA	resource management plan amendment
ROD	record of decision
ROW	right-of-way
SDF	suggested design feature
SGI	Natural Resources Conservation Service's Sage-Grouse Initiative
SO_2	sulfur dioxide
SRMA	Special Recreation Management Area
SRP	special recreation permit
SUA	special use permit
TL	timing limitation
US	United States
USC	United States Code
US EPA	United States Environmental Protection Agency
USFWS	United States Department of the Interior, Fish and Wildlife Service
VRM	visual resource management
WAFWA	Western Association of Fish and Wildlife Agencies
WRFO	White River Field Office
WSA	Wilderness Study Area

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Appendix C

Colorado Department of Natural Resources' Colorado Greater Sage-Grouse Conservation Plan: The Colorado Package

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COLORADO
DEPARTMENT OF NATURAL RESOURCES

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Colorado Package: Introduction

Background:

The U.S. Fish and Wildlife Service (FWS) is poised to propose a listing decision for the Greater Sage Grouse under the Endangered Species Act by 2015. Eleven states are host to habitat for the species, and the FWS has indicated its intent to make a single range-wide listing decision, rather than a state-specific determination. Federal, state, local, and private entities have become actively involved in activities to conserve GSG habitat in an effort to avert a listing. In 2008, the (then) Colorado Division of Wildlife (now Colorado Parks and Wildlife) developed a comprehensive *Colorado Greater Sage-Grouse Conservation Plan*. Among the components of that plan is a section entitled "Conservation Strategy," which identifies key issues facing GSG conservation. For each issue, objectives are listed that would contribute to mitigation of the issue; for each of these objectives, a number of specific strategies are described. Each strategy, in turn, includes a list of responsible parties with a lead agency identified where possible, an estimated timeline and an approximate cost associated with implementation. This Colorado Conservation Plan is available at:
http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/Birds/Pages/GreaterSageGrouseConsPlan2.aspx

Process:

The Colorado Package was assembled by the Department of Natural Resources (DNR) in conjunction with relevant county, state, federal, and private entities. For each strategy enumerated in the Conservation Plan, described above, DNR compiled information from those stakeholders.

The completed Colorado Package will be sent to the BLM for inclusion in its Northwest Colorado RMP revision, currently underway, as an Appendix, common to all alternatives being considered. Perhaps more importantly, the Package will be submitted to the FWS for its review in developing a listing decision. DNR expects to get preliminary feedback from FWS as to the adequacy of the work being done in Colorado. The state will then have the opportunity to tighten up the Package by providing any information that may be deemed incomplete.

This will be an iterative process. As stakeholders review the compiled material in the Package, they may notice gaps or inaccuracies. Those edits should be sent to Lisa Dale (lisa.dale@state.co.us) for inclusion, and revised versions of the document will be shared with FWS.

Acronym	Meaning
APD	Application for Permit to Drill
APHIS	Animal and Plant Health Inspection Services
ARNF	Arapaho-Roosevelt National Forest
ASAP	As soon as possible
BLM	Bureau of Land Management
BMP	Best Management Practice
CCP	Colorado Conservation Plan
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife *(now Colorado Parks and Wildlife)*
CO	Colorado
COA	Condition of Approval
COGCC	Colorado Oil and Gas Conservation Commission
CPW	Colorado Parks and Wildlife
CRP	Conservation Reserve Program
CSU	Colorado State University
DAU	Data Analysis Unit
DRMS	Division of Reclamation, Mining and Safety
DWM	District Wildlife Manager
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ES&R	Emergency Stabilization & Restoration
FO	Field Office
FSA	Farm Services Agency
FWS	U.S. Fish and Wildlife Service
GIS	Geographic Information Systems
GrSG	Greater Sage Grouse
GSG	Greater Sage Grouse
GuSG	Gunnison Sage Grouse
HAF	Habitat Assessment Framework
HPP	Habitat Protection Program
KFO	Kremmling Field Office
LSFO	Little Snake Field Office
LUP	Land Use Plan
LWG	Local Working Group
MP	Middle Park
MWR	Meeker White River
NAIP	National Agriculture Imagery Program
NEPA	National Environmental Policy Act
NESR	North Eagle/South Routt
NF	National Forest
NGO	Non-Governmental Organization
NP	North Park
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NSO	No Surface Occupancy

Acronym	Meaning
NTT	National Technical Team Report
NWCO	North Western Colorado
NWR	National Wildlife Refuge
O&G	Oil and Gas
OHV	Off-Highway Vehicles
PGH	Preliminary General Habitat
PJ	Pinon-Juniper
PPH	Preliminary Priority Habitat
PPR	Parachute-Piceance-Roan
PT	Part time
PVA	Population Viability Analysis
RMP	Resource Management Plan
ROW	Right of Way
RSO	Restricted Surface Occupancy
SAM	Species Activity Mapping
SCTF	Species Conservation Trust Fund
SLB	State Land Board
SOP	Standard Operating Procedures
SWA	State Wildlife Areas
SWH	Sensitive Wildlife Habitat
UCEPC	Upper Colorado Environmental Plant Center
USFS	United State Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAFWA	Western Association of Fish and Wildlife Agencies
WMP	Wildlife Mitigation Plan
WNV	West Nile Virus
WO	Washington Office
WRFO	White River Field Office
WRNF	White River National Forest
WUI	Wildland-Urban Interface
WY	Wyoming

Chapter 1. Agricultural Conversion

Issue 1.1	Converted rangelands don't provide adequate GrSG habitat.
Objective 1.1.1	Develop technologies and share information for establishing native vegetation suitable for GrSG habitat in CRP, cropland, and large monocultural non-native grass plantings. Encourage GrSG habitat restoration on private land.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
1.1.1.1	Evaluate whether past vegetation restoration applications in CRP, cropland, and large monocultural non-native grass plantings serve as suitable GrSG habitat. Produce a report that documents these efforts. **[See Research Strategy 21.1.2.1]**	Multiple Parties	Begin by 2015		
1.1.1.2	Design, plant, evaluate, and report on field trials for establishing desired vegetation to serve as GrSG habitat in CRP, cropland, and large monocultural non-native grass plantings.	Multiple Parties	Begin by 2010	**CPW: General -** This strategy is being achieved at a large scale through multiple partnership and individual agency efforts throughout the state. CPW, NRCS, UCEPC, UP, and energy companies have designed and planted many experimental plots and are currently monitoring plant establishment. CPW has completed construction of a native seed warehouse to encourage the development and to store produced native seed stocks. CPW has also hired two Habitat Coordinators that are active in furthering development of native seed trials on the western slope of Colorado. **MP, NP, NESR, PPR:** Crop land and CRP not issues.	
1.1.1.3	Arrange field trips for land managers to observe the results of different treatment methods in CRP, cropland, and large monocultural non-native grass plantings that may provide GrSG habitat.	NRCS	Begin by 2008	**NRCS:** 1) Meeker NRCS Field Office participated in Conoco Phillips Wildlife Management Plan meeting with other agencies (July 2012) 2) NRCS staff met with Conoco Philliops, CPW and landaowners (August 2012) 3) Districts hosted a tour for state and federal land managers, legislators, NGOS, and landowners to explore impact of wild horses in GSG habitat (July 2012). 4) NRCS range class for new biologist focused on property with summer GSG habitat. 5) District NRCS boards have met with CPW biologists 5 times to discuss GSG issues (June / July 2010, Nov. 2012).	**NRCS:** 1) 20 land managers attended meetings. Outcome = trial of service berry treatement in Piceance Basin. 2) Veg sampling conducted in preparation for juniper and service berry treatment. 3) 48 people attended tour. 4) Trainees prepared to manage for GSG on 2500 acres. 5) More landowner meetings planned for 2013.
1.1.1.4	Purchase and maintain equipment necessary for restoration of GrSG habitat in CRP, cropland, and large monocultural non-native grass plantings.	NRCS	2010 and ongoing		
1.1.1.5	Work with FSA to ensure CRP program policy supports improvement of enrolled land with developed technologies.	Multiple Parties	2008 and ongoing	**CPW: NWCO -** CPW has initiated habitat restoration efforts on CRP properties in partnership with FSA, NRCS, and the Routt County Soil Conservation District. Restoration includes tilling and reseeding CRP fields with GrSG suitable seed mixes. Restoration will allow these properties to compete advantageously for re-enrollment in the CRP program. **MP, NP, NESR, PPR**: Crop land and CRP not issues.	**CPW:** has initiated habitat restoration efforts on 5 CRP properties in Routt County, in partnership with FSA, NRCS, and the Routt County Soil Conservation District.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
1.1.1.6	Help design and fund sagebrush restoration projects (see "Habitat Enhancement" strategy, pg. 349 and CCP Appendix F, "Available Funding Opportunities for GrSG Habitat Conservation").	NRCS	Ongoing	**NRCS:** field office in Meeker implemented 110 acres of restoration. **CPW:** CPW has completed a number of habitat enhancement projects, alone and with partners, and has actively participated in designing and funding a number of additional projects. **See Appendix A: Habitat Treatments** **See Appendix B: Summary of Expenditures on GrSG in Colorado 2006-2012**	**CPW:** has secured approximately $1.4 million of SCTF funds for GrSG habitat enhancement projects. CPW hired a sagebrush steppe habitat coordinator in 2011 who provides additional project coordination, design, and implementation functions for CPW and partners.
ISSUE 1.2	Some CRP lands that are important to GrSG are not eligible for re-enrollment in the program, raising concern that those acres will be lost as GrSG habitat.				
OBJECTIVE 1.2.1	For CRP lands that are important to GrSG, pursue opportunities to keep the habitat intact for GrSG.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
1.2.1.1	CDOW and NRCS will work with FSA to have vacant/unknown, potential, and occupied GrSG habitat in Colorado designated as a priority area in the CRP. This will increase the probability that cropland will remain in CRP and will continue to serve as GrSG habitat.	CPW	2008 and ongoing	**CPW:** General - CPW has worked with FSA and NRCS to include GrSG habitats as a priority area for distribution of Farm Bill habitat funds. MP, NESR, NP, PPR - Crop land and CRP are not issues. **See Appencix C: SAFE Map**	**CPW:** In 2012, NRCS/FSA expanded the enrollment area for the CRP-SAFE program to include nearly all current CRP contracts within GRSG range in the NWCO population in Moffat and Rio Blanco counties.
1.2.1.2	When CRP lands become un-enrolled in the program, cooperating agencies will pool resources to offer monetary incentives to maintain those lands in similar condition as CRP and to provide GrSG habitat.	CPW	2008-2015	**CPW: NWCO** - The CRP enhancement work began in 2010 and will continue until at least 2014. Conducting enhancements increases likelihood of re-enrollment because the re-enrollment evaluation includes "wildlife points" awarded where monocultural or depauperate stands are diversified and seeded with species important for GRSG food and/or cover. **MP, NP, NESR, PPR**: Crop land and CRP not issues.	**CPW:** has cost-shared to enhance approximately 2,385 acres of sodbound CRP.

2. Disease and Parasites

ISSUE 2.1	WNV is lethal to GrSG, has been detected in Colorado, has caused GrSG mortality in Colorado, and thus presents a risk to GrSG.				
OBJECTIVE 2.1.1	Minimize the occurrence and impact of WNV if it threatens GrSG populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
2.1.1.1	Monitor GrSG and other species (through ongoing projects) for presence of WNV in GrSG counties; coordinate this effort with other research and management activities.	CPW	Ongoing	**CPW:** CPW's Wildlife Health Lab has received <5 carcasses/yr for exam in recent years. **NESR** - CPW collected and processed 17 GrSG mortalities in 2007 to test for WNV. Only 1 tested positive for WNV. CPW also worked with Routt County (2004-2006) to set up mosquito traps in GrSG habitat to test for WNV.	Colorado has not had a problem with WNV.
2.1.1.2	To protect GrSG in localized areas where WNV has been detected, control mosquitoes through applications of appropriate EPA-regulated larvicides and/or adulticides.	Multiple Parties	As needed		
2.1.1.3	Continue to support investigation of GrSG susceptibility to, and inheritance of, immunity to WNV.	Multiple Parties	Ongoing		
2.1.1.4	Determine the impact of wet conditions on mosquito production as it relates to the potential for catastrophic disease in GrSG. Determine the risk factors and potential of catastrophic disease in GrSG populations.	Multiple Parties	Begin by 2010 ongoing		
2.1.1.5	Encourage the design of water development structures to minimize WNV risk to GrSG	Multiple Parties	Now		
ISSUE 2.2	Diseases and/or parasites other than WNV have been shown to be lethal to, or to compromise the health of GrSG.				
OBJECTIVE 2.2.1	Minimize the occurrence and impact of diseases and/or parasites (other than WNV) if they threaten GrSG populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
2.2.1.1	If GrSG populations are infected with disease or parasites that threaten a population, (1) investigate, isolate, and control the source of disease or parasite; and (2) if possible, treat GrSG.	CPW	As needed	**CPW:** Statewide wildlife health monitoring program is in place for species including sage grouse; no reports of large-scale mortality events in recent years & <5 carcasses/yr submitted, but no systematic surveillance or monitoring is in place.	
2.2.1.2	Investigate the possible need to conduct standard disease screening on all game birds before they are imported into Colorado or moved within GrSG range in Colorado.	CPW	As needed	**CPW:** Existing regulations (0-007) require health certificate & limited disease screening prior to import but no requirements for within-state movement.	
2.2.1.3	Remain vigilant regarding the latest information and research regarding avian influenza and upland game birds.	CPW	On going	**CPW:** Statewide monitoring program is in place for species including sage grouse; problems targeted for monitoring are developed & modified based on published & online professional communications (e.g., on recurring or emerging diseases).	
2.2.1.4	Investigate the need to regulate intra- and inter-state movement of game birds by all parties.	CPW	2008	**CPW:** Current rules prohibit possession of nonnative grouse species (0-008-B-8) but allow release of various other "game birds" on private & some public lands with no permit, health, or monitoring requirements (0-009-B). Some local control of these activities has been recommended or attempted, but not yet adopted.	

3. Energy and Mineral Development

Issue 3.1	Disturbance to GrSG				
Objective 3.1.1	Current management, all industries except large-scale mining				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.1.1.1	Continue to avoid GrSG breeding and nesting seasons during oil and gas construction and drilling activities and small-scale mining in associated seasonal habitats (for seasonal habitat definitions refer to CCP Appendix B: "GrSG Disturbance Guidelines", or local conservation plans). To protect breeding habitat, negotiate appropriate Conditions of Approval (COAs) on federal estate or use voluntary application on private estates.	USFS, COGCC, BLM	Ongoing	**BLM:** BLM uses the Disturbance Guidelines in Appendix B as default recommendations on APDs and mine applications. **USFS**: Oil and gas leasing has not been an issue on any of the three National Forests (Routt, White River, Arapaho-Roosevelt) in GSG habitat. None of the three NFs has significant GSG habitat. **See Appendix D: COGCC 1200 Series Regulations**	
3.1.1.2	Restrict oil and gas development and production activities and small-scale mining during the GrSG lekking season within a buffer around leks (see CCP Appendix B, "GrSG Disturbance Guidelines"; see also strategies 3.3.3.10 and 3.4.2.1). If this is not possible, limit activities near active sage-grouse leks during the breeding season to portions of the day after 9:00 a.m. and before 4:00 p.m. to avoid times with peak lek attendance (for seasonal definitions refer to CCP Appendix B: "GrSG Disturbance Guidelines", or local conservation plans). Lek data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.	USFS, COGCC, BLM	Ongoing	**BLM:** See above. A .6 mi no surface disturbance buffer around a lek is typically applied to all surface disturbing activities thru Conditions of Approval. Once RMP's are revised or amended a .6 mi NSO stipulation will be available for new leases.	**BLM:** .6 mi represent the average male loafing distance surrounding a lek, and 4 mi represent 80% of the nesting locations expected near a lek (see CCP for references).
3.1.1.3	Gate field and facility service roads or otherwise limit regular public access on field and facility service roads in GrSG range, consistent with landowner wishes and direction.	USFS, Private Landowners, Industry, COGCC, BLM	Ongoing	**Tri-State:** Access is limited to mine employees or contractors only, due to locked gates. Only limited and designated mine employees or other authorized third party personnel are granted periodic access on field and facility service roads in GrSG range. **BLM:** This recommendation has been considered as appropriate on a case by case basis. **COGA**: Yes, 4 of 6 operators surveyed, who hold a total of 69% of the permits in GrSG SWH and operate a total of 24% of the wells in GrSG SWH or RSO	
3.1.1.4	Reduce noise impacts from compressor stations by locating stations at least 2,500 feet away from GrSG leks (or at an alternative distance as indicated by best available science: see CCP Appendix B, "GrSG Disturbance Guidelines"; see also strategies 3.3.3.10 and 3.4.2.1), or by using decibel reduction equipment, on a site-by-site basis.	USFS, Industry, COGCC, BLM	Ongoing	**BLM:** Compressor stations are located outside of the .6 mi buffer around an active GRSG lek. Additional noise reduction BMP's are analyzed and applied on a case by case basis. **COGA**: Yes, 3 of 6 operators surveyed, who hold a total of 3% of the permits in GrSG SWH and operate a total of 2% of the wells in GrSG SWH or RSO	
3.1.1.5	For all geophysical exploration, conservation measures to avoid important GrSG seasonal habitat-use periods should be encouraged on private lands and incorporated on federal lands.	USFS, SLB, Private Landowners, Industry, COGCC, BLM	Ongoing	**SLB:** Proposing to Board the preparation of a SLB GSG Conservation Action Plan to include rapid assessment of state trust lands in GSG habitat, consult with lessees, and make recommendations to the Board for habitat improvement. **BLM:** Timing Limitations are currently applied to geophysical exploration activities. **COGA:** Yes, 3 of 6 operators surveyed, who hold a total of 36% of the permits in GrSG SWH and operate a total of 13% of the wells in GrSG SWH or RSO	**BLM:** 4 mi represent 80% of expected nesting locations.
3.1.1.6	Encourage the use of technologies that reduce road traffic and daily visits to well pads to the extent possible in GrSG habitat (e.g., telemetric well monitoring, multi-phase pipeline gathering systems).	Industry	Ongoing	**COGA:** Yes, 5 of 6 operators surveyed, who hold a total of 69% of the permits in GrSG SWH and operate a total of 24% of the wells in GrSG SWH or RSO	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
Issue 3.2	Effects on GrSG habitat				
Objective 3.2.1	Oil, gas, and small-scale mining of energy and mineral resources				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.2.1.1	Encourage the use of effective BMPs, as identified by BLM or other sources, in order to reduce habitat fragmentation and the long-term footprint of energy and mineral development in GrSG habitat, across all ownership boundaries (see CCP Appendix I, "Suggested Management Practices Applicable for Oil and Gas Development within Lease Rights").	USFS, Industry, COGCC, BLM	Ongoing	**Tri-State:** Surface mining footprint at Colowyo is limited and reclamation activites closely follow mining to further minimize any regional or local impact that could lead to population fragmentation. BMPs are regularly implemented. **BLM:** BMPs are considered and analyzed based on action, location, local population and other factors. Many BMPs in CCP Appendix I had already been incorporated by BLM. **COGA:** Yes, 4 of 6 operators surveyed, who hold a total of 44% of the permits in GrSG SWH and operate a total of 14% of the wells in GrSG SWH or RSO	**BLM:** Individual BMPs are designed to minimize individual actions or potential impacts to SG - see CCP discussion. Limited mineral development has occurred in GRSG core/priority habitat since the CCP was signed. There has not been enough time or on the ground implementation to assess effectiveness of these cumulative actions.
3.2.1.2	In situations with federal lands and federal mineral estates, apply an NSO as a lease stipulation on new leases, or as a COA on drilling permits (see "Energy and Mining Leasing and Development Process", CCP Appendix G) around GrSG leks (see "GrSG Disturbance Guidelines", CCP Appendix B, and strategies 3.3.3.10 and 3.4.2.1). Encourage a similar approach on state and private lands.	USFS, SLB, Private Landowners, Industry, BLM	Ongoing	**USFS**: Leasing stipulations in place for the Routt NF and being developed for the WRNF. Very small portion of ARNF has GSG habitat. **SLB:** Works closely with CPW to identify SLB properties with leks. **BLM:** Leases within 'core' GRSG habitat (now GRSG PPH) have been deferred pending completion of RMP revisions/ now NW CO SG EIS Amend. APDs on existing leases have incorporated a .6 mi no surface disturbance COA around leks or modified pad placements within lease rights to avoid this buffer around leks. **NRCS:** Landowner in Piceance Basin coordinated with industry (2011-2012) to relocate a drilling rig away from a lek.	**SLB:** The board has deferred 11 parcels at the recommendation of CPW because of existing leks. Those parcels have not been leased. **NRCS:** Drilling rig relocated; lek undisturbed.
3.2.1.3	Avoid surface disturbing activities within a buffer of GrSG leks (see CCP Appendix B, "GrSG Disturbance Guidelines"; see also strategies 3.3.3.10 and 3.4.2.1). Locate surface-disturbing activities a minimum of 1,000 feet outside of riparian areas, or as far as practical and necessary to avoid influencing GrSG brood habitat function.	USFS, COGCC, BLM	Ongoing		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.1.4	If an energy or mineral development is planned in sagebrush habitats that are located within a 4-mile radius of a GrSG lek: - within a 1-mile radius of the proposed ground-disturbing activity, any seasonal habitats that may be impacted should be delineated and field-validated in coordination with CDOW, BLM, USFS, or private biologists, prior to project location and design (see "Habitat Monitoring Strategy" [pg. 354] and CCP Appendix C, "Sage-grouse Habitat Monitoring Protocol"). -This is a priority for mapping only. Appropriate strategies should still apply within the 4-mile radius of the lek site. Coordinate responsibility across lease boundaries for mapping purposes and to assess cumulative effects -See "GrSG Disturbance Guidelines" (CCP Appendix B) - Lek data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.	USFS, CPW, BLM	Ongoing	**BLM:** This strategy was intended to help field biologists determine seasonal habitats and associated timing/ other conservation measures in lieu of rangewide seasonal habitat mapping. CPW has since completed a PPH mapping effort that supercedes previous 'core' habitat mapping and encompasses all seasonal habitats. This strategy has only been completed on a very limited basis. **CPW:** General - Site specific seasonal habitats are evaluated by use of GIS information prior to site visit. Case-by-case habitat is not delineated on-the-ground prior to the time of a site visit; however, habitats are visually identified and confirmed at the time of the site visit. CPW Area biologist and Land Use specialists "consult" with BLM and energy operators on energy and mineral developments within Priority Habitat, which largely encompasses suitable habitat within 4 miles of GRSG leks. Seasonal habitat maps from CPW Research Section are available to reference and suitable habitat can largely be delineated from NAIP imagery, so field mapping and/or validation is rarely completed. Consultation with BLM and/or energy operators is done to minimize impacts to GRSG by recommending siting and/or timing criteria. NP - CPW implemented a radio-telemetry project in North Park to refine the seasonal habitat models for North Park. Data are currently being processed and seasonal habitat models for NP should be developed by early 2013. **NESR** - Currently, oil and gas development is not an issue. However there have been several gravel pit permit proposals within GrSG habitat in NESR. CPW provides recommendations to Routt County Planning. Recommendations include ways to avoid, minimize and mitigate impacts to GrSG habitats. The majority of GrSG habitat in Eagle County is BLM. MWR and MP - There is no active energy development. CPW does not expect increased lease sales in MP until after the completion of the BLM Kremmling FO RMP.	**BLM:** Effectiveness of this strategy has not been determined. **CPW:** CPW staff provides large scale habitat suitability data to operators. CPW staff is unaware of cross-lease coordination for mapping and cumulative analysis. DWMs, Land Use Specialists, Biologists and GIS prepare annual updates as information becomes available. **NESR:** Routt County denied a gravel pit proposal partially because of GrSG concerns.
3.2.1.5	Encourage and/or offer to have biologists attend notice of staking on-site visits on private lands, as well as state and federal mineral estates, to locate well pads and roads where they will have the least impact on GrSG habitat.	USFS, CPW, BLM	Ongoing	**CPW:** Land Use and Energy staff attempt to involve biologists at site visits. DWMs and biologists attend as time and workload permit. NWCO - Meeker Land Use position attends many on-site, including federal and private well pad locations. Grand Junction Land Use specialist and NW Energy Liaison attend on-sites, including federal and private well pad locations for most new permits, and all RSO's. CPW biologists are generally attending notice of staking on-site visits on Federal mineral estates. CPW biologists are usually involved with HB 1298 (Colorado OGCC Rules governing wildlife input) site visits. NESR, MWR and MP - There is no active energy development.	**BLM:** Effectiveness of this strategy has not been determined. **CPW:** Land Use Specialists, DWMs, and biologists participate in site visits when work load permits. CPW coordinates with BLM biologists. CPW biologists are generally not asked to attend notice of staking on-site visits on State or private mineral estates.
3.2.1.6	Use directional drilling to minimize the impact to GrSG habitat where biologically significant GrSG habitats are involved, if such techniques are technically feasible and cost-effective.	Industry, COGCC, BLM	Ongoing	**BLM:** Primary BMP considered for all APDs. **COGA:** Yes, 5 of 6 operators surveyed, who hold a total of 69% of the permits in GrSG SWH and operate a total of 24% of the wells in GrSG SWH or RSO	**BLM:** Minimize footprint and %surface disturbance.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.1.7	Minimize pad size and other facilities to the smallest extent practical in GrSG habitat, consistent with safety (note: where directional drilling is used, larger pads are needed for multiple wells).	USFS, Industry, COGCC, BLM	Ongoing	**BLM:** Primary BMP considered for all APDs. **COGA:** Yes, 5 of 6 operators surveyed, who hold a total of 69% of the permits in GrSG SWH and operate a total of 24% of the wells in GrSG SWH or RSO	**BLM:** See Above (3.2.1.6).
3.2.1.8	Limit facility footprint in sage-grouse habitat to that necessary for safe and effective development.	USFS, Industry, COGCC, BLM	Ongoing	**Tri-State:** Colowyo only develops new roads for new pit operations and reclaims existing roads when the intended use is completed. **BLM:** Primary BMP considered for all APDs. **COGA:** Yes, 5 of 6 operators surveyed, who hold a total of 69% of the permits in GrSG SWH and operate a total of 24% of the wells in GrSG SWH or RSO	**BLM:** See Above (3.2.1.6).
3.2.1.9	Plan and construct roads and pipelines to minimize duplication in GrSG habitat. Use existing roads and right-of-ways wherever possible, and design and construct all new roads to a safe and appropriate standard (no higher than necessary), to accommodate their intended use.	USFS, Industry, COGCC, BLM	Ongoing	**Tri-State:** Current roads located on Juniper / Pinyon hillsites to reduce raptor perches. **BLM:** Primary BMP considered for all APDs **COGA:** Yes, 4 of 6 operators surveyed, who hold a total of 34% of the permits in GrSG SWH and operate a total of 13% of the wells in GrSG SWH or RSO	**BLM:** See Above (3.2.1.6).
3.2.1.10	Cooperate with county weed programs to control noxious weed infestations associated with oil and gas development disturbances in GrSG habitat (see also "Weeds" strategy, pg. 425).	USFS, SLB, Private Landowners, LWGs, Industry, CPW, County Governments, BLM	Ongoing	**Moffat**: Co-founded NW Colorado Weed Partnership with BLM (2007). Money from donations, annual expenditures=$35-65,000 on 6000 acres interspersed throughout GSG habitat. Partnerhsip has conducted reseeding projects, hired a PT Coordinator to staff the effort, and worked with CSU in designing annual monitoring. Additional weed partnerships exist and use the Integrated Pest Management principles. Annual site visits assist these partnerships. **Jackson:** Established Noxious Weed Management Program in 1998. Money from county, private, state, and federal partners. Ave. annual expenditures=$51,200. Employs a PT coordinator and applicators, all licensed by the Dept of Ag. Available to assist state agencies at any time. **Tri-State:** Colowyo has a multi-year ongoing noxious weed spray program on reclaimed lands and off-site areas. **SLB:** Over $400K has been spent since 2004 to treat noxious weeds within GSG habitat areas. Newly proposed Conservation Plan will place special emphasis on assessing areas impacted by energy, with goal of 80% native species reclamation following mineral development. **BLM:** All field offices have agreements with county weed programs to assist in control of weed infestations (and would include historic energy development). Weed management specific to current O&G development is incorporated in Surface Use Plan of Operations for all development actions. **CPW:** COGCC 1000 Series Rules require oil and gas operators to manage weeds and comply with State weed Act. PPR - Wildlife Mitigation Plans (WMP's) signed with 4 companies that are developing energy within GrSG habitat include noxious weed management plans. **LWG:** NP LWG - Currently, noxious weeds are not a problem in NP. The Jackson County weed program is active in controlling any weeds that exist. NWCO and PPR LWGs-County officials are active in the LWGs but specific conversations about weed management have been limited. MP and NESR LWGs-do not have oil and gas development issues. **COGA:** 4 of 6 operators surveyed, who hold a total of 61% of the permits in GrSG SWH and operate a total of 22% of the wells in GrSG SWH or RSO.	**Moffat:** 95% control on Halogeton with no impact on sage brush or salt bushes. All treatments since 2008 conducted with new chemical recommendations (1/4 oz / acre of Tellar). **CPW:** CPW makes weed management recommendations. WMPs - CPW reviews progress in meeting weed management plan objectives at least annually.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.1.11	Incorporate BMPs to exclude wildlife from surface impoundments associated with oil and gas development.	USFS, Industry, BLM	2008	**Tri-State:** Surface runoff catch ponds are all fenced. **CPW:** CPW has developed a comprehensive list of BMPs for oil and gas development that are provided to industry and BLM. **BLM**: BLM requires 'practice' to exclude wildlife from surface water impoundments on all oil & gas development. Specific BMP may vary due to location, species, or coordination with CPW or FWS. **COGA:** Yes, 4 of 6 operators surveyed, who hold a total of 69% of the permits in GrSG SWH and operate a total of 24% of the wells in GrSG SWH or RSO	**BLM:** Reduce potential for direct mortality (see CCP). **CPW:** Portions of these BMPs have been included in WMPs and BLM planning documents.
Objective 3.2.2	Large-scale mining of energy and mineral resources				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.2.2.1	Avoid GrSG seasonal habitats when siting large-scale mining operations and oil shale development, where possible (see CCP Appendix B, “GrSG Disturbance Guidelines”).	USFS, Industry, DRMS, BLM	Ongoing	**BLM:** No new large- scale mining operations or oil shale development has been proposed since the CCP. This strategy is being analyzed during the ongoing plan revision process.	
3.2.2.2	Where GrSG habitats cannot be avoided when siting large-scale mining and oil shale development, mitigate impacts through strategies under Objective 3.3.4. See also "Off-site Mitigation of Impacts" discussion, pg. 299.	USFS, Industry, DRMS, BLM	Ongoing	**BLM:** 3.2.2.1. Off -site mitigation related to SG continues to be discussed in an interagency, interdisciplinary forum, specifically what criteria might be developed to identify 'effective' off- site mitigation and where it might be appropriate.	
3.2.2.3	Encourage the use of effective BMPs, as identified by BLM or other sources, in order to reduce habitat fragmentation and the long-term footprint of energy and mineral development in GrSG habitat, across all ownership boundaries (see CCP Appendix I, “Suggested Management Practices Applicable for Oil and Gas Development, within Lease Rights”).	USFS, Industry, DRMS, BLM	Ongoing	**BLM:** See 3.2.1.1. BMPs considered and analyzed based on action, location, local population and other factors. Many BMPs in CCP Appendix I have already been incorporated by BLM. **COGA**: Yes, 4 of 6 operators surveyed, who hold a total of 44% of the permits in GrSG SWH and operate a total of 14% of the wells in GrSG SWH or RSO	**BLM:** See Above (3.2.1.6).

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.2.4	When an energy or mineral development is planned in sagebrush habitats that are located within a 4-mile radius of a GrSG lek: • seasonal habitats that may be impacted within a 1-mile radius of the proposed ground-disturbing activity should be delineated and field-validated in coordination with CDOW, BLM, or private biologists, prior to project location and design (see "Habitat Monitoring Strategy" [pg. 354] and CCP Appendix C, "Sage-grouse Habitat Monitoring Protocol"). This is a priority for mapping only. Appropriate strategies should still apply within the 4 mile radius of the lek site. • coordinate responsibility across lease boundaries for mapping purposes and to assess cumulative effects • see CCP Appendix B, "GrSG Disturbance Guidelines" • Lek and telemetry data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management. When an energy or mineral development is planned in sagebrush habitats that are located within a 4-mile radius of a GrSG lek: • seasonal habitats that may be impacted within a 1-mile radius of the proposed ground-disturbing activity should be delineated and field-validated in coordination with CDOW, BLM, or private biologists, prior to project location and design (see "Habitat Monitoring Strategy" [pg. 354] and CCP Appendix C, "Sage-grouse Habitat Monitoring Protocol"). This is a priority for mapping only. Appropriate strategies should still apply within the 4 mile radius of the lek site. • coordinate responsibility across lease boundaries for mapping purposes and to assess cumulative effects • see CCP Appendix B, "GrSG Disturbance Guidelines" • Lek and telemetry data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.	USFS, Industry, CPW, BLM	Ongoing	**BLM:** Seasonal habitats have not been mapped within the 1 mile radius of proposed surface disturbing actions. CPW has completed a priority habitat model across all ownerships that includes all seasonal habitats and supercedes previously mapped core habitat. CCP Appendix B is currently being applied within the prescribed buffer areas for lek and breeding habitats. Sharing of sensitive Sage-grouse habitat or population data is conducted through a data use agreement with CPW. Location of surface disturbing activities are sited in coordination with CPW thru onsite field visits. **CPW:** General - DRMS involves CPW in review of new mine applications. Site specific seasonal habitats are evaluated by use of GIS information prior to site visit. Case-by-case habitat is not delineated on-the-ground prior to the time of a site visit; however, habitats are visually identified and confirmed at the time of the site visit. CPW Area biologist and Land Use specialists "consult" with BLM and energy operators on energy and mineral developments within Priority Habitat, which largely encompasses suitable habitat within 4 miles of GRSG leks. Seasonal habitat maps from CPW Research Section are available to reference and suitable habitat can largely be delineated from NAIP imagery, so field mapping and/or validation is rarely completed. Consultation with BLM and/or energy operators is done to minimize impacts to GRSG by recommending siting and/or timing criteria. Acquisition of lek and telemetry data requires a non-disclosure form to protect this sensitive data. NP - CPW implemented a radio-telemetry project in North Park to refine the seasonal habitat models for North Park. Data are currently being processed and seasonal habitat models for NP should be developed by early 2013. NESR - CPW provides recommendations to Routt County Planning. Recommendations include ways to avoid, minimize and mitigate impacts to GrSG habitats. Routt County Planning considers GrSG habitats and CPW recommendations in permit authorizations. MWR and MP - There is no active mining. **COGA:** Yes, 2 of 6 operators surveyed, who hold a total of 35% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO	**CPW:** CPW staff provides large scale habitat suitability data to operators. Site specific, project level mapping is not occurring by CPW staff. Most mining companies employee private biologists to conduct these site-specific surveys. CPW staff is unaware of cross-lease coordination for mapping and cumulative analysis. DWMs, Land Use Specialists, Biologists and GIS prepare annual updates as information becomes available.
3.2.2.5	For surface mining, above-ground facilities of underground mines, and oil shale development areas, minimize the area impacted and duration of impact on GrSG populations and habitat.	USFS, Industry, DRMS, BLM	Ongoing	**BLM:** No new surface or underground mines have been initiated since 2008. Modification of existing mine plans incorporates BMP's to minimize the footprint and/or duration of an action in Sage-grouse habitat.	
3.2.2.6	Limit facility footprint in sage-grouse habitat to that necessary for safe and effective development.	USFS, Industry, DRMS, BLM	Ongoing	**BLM:** See above (3.2.2.5). **COGA:** Yes, 5 of 6 operators surveyed, who hold a total of 69% of the permits in GrSG SWH and operate a total of 24% of the wells in GrSG SWH or RSO	
3.2.2.7	Cooperate with county weed programs to control noxious weed infestations associated with energy and mineral development disturbances in GrSG habitat.	USFS, SLB, Private Landowners,LWGs, Industry, CPW, County Governments, BLM	Ongoing	**BLM: 3.2.1.10** All field offices have agreements with county weed programs to assist in control of weed infestations. **CPW:** DRMS and federal mining regulations require management of weeds and comply with State Weed Act. CPW makes recommendations to reduce and address noxious weed infestations associated with mineral development. **LWG:** NP LWG - Currently, noxious weeds are not a problem in NP. The Jackson County weed program is active in controlling any weeds that exist. NWCO and PPR LWGs - County officials are active in the LWGs but specific conversations about weed management have been limited. MP and NESR LWGs - do not have current mining issues. **COGA:** Yes, 4 of 6 operators surveyed, who hold a total of 61% of the permits in GrSG SWH and operate a total of 22% of the wells in GrSG SWH or RSO	**BLM:** Many more acres of weeds are treated in coordination with county weed programs than through BLM alone. See CCP for discussion & references.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
Objective 3.2.3	Cumulative impacts of all industries				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.2.3.1	Identify key GrSG areas located within potential energy development areas, to better address cumulative impacts to sage-grouse.	CPW	2008	**SLB:** 80 state trust lands sections have been identified within GSG habitat. Those sections have been leased for grazing and mineral development. Another 115 sections leased for oil and gas development but not yet under development. **CPW:** General - In 2012, CPW updated priority habitat maps that includes lek locations and seasonal habitats. Known leks continue to be monitored while searches for new leks continue in populations, particularly in PPR as part of a research effort by CPW B. Walker. NP - CPW is refining seasonal habitat models for NP. NESR - GrSG habitats are currently mapped as low potential for energy development. At this point, oil and gas development is not an issue in the NESR Population.	**CPW:** CPW updates habitat maps annually or as new information becomes available. Tracking processes/tools to account for cumulative impacts have not been set up or implemented yet.
3.2.3.2	Maintain large blocks of undeveloped sagebrush habitat across the landscape. Locate facilities or design mitigation to maximize the size and continuity of undeveloped sagebrush habitat across the landscape.	USFS, CPW, BLM	Ongoing	**BLM:** Little Snake RMP identified and incorporated strategies to maintain large blocks of undeveloped sagebrush habitat in their 2011 RMP revision. The White River RMP Amendment (Parachute Piceance Roan GRSG population) does not consider a similar alternative due to pre-existing conditions (naturally fragmented landscape, pre-existing leases, large private land ownership). All other plans were analyzing an alternative with similar goals, and this is being carried forward into the NW CO SG EIS Amendment. **CPW:** General - CPW has prioritized maintenance of large blocks of sagebrush habitat in recommendations to BLM for the Little Snake, White River, and Kremmling FO RMP revisions. CPW consults with BLM, energy and mineral operators, and other entities on projects proposed within GRSG habitat. CPW offers analysis, siting suggestions, timing suggestions, and suggests BMPs to avoid, minimize, or mitigate affects to GRSG. CPW recommends use of shared infrastructure (roads, pipelines) at site visits and in consultation negotiations. CPW and BLM coordinate efforts to protect habitat in limited situations Wildlife Mitigation Plans, and Plans of Development. PPR - Some WMPs incorporate phased or clustered development in an attempt to maintain larger blocks of habitat. CPW has commented on the Kremmling Field Office RMP to recommend maintaining large blocks of sagebrush and to minimize fragmentation of the landscape. NESR - Currently, oil and gas development is not an issue. However there have been several gravel pit permit proposals within GrSG habitat in Routt County. CPW provides recommendations to Routt County Planning. Routt County Planning considers GrSG habitats and CPW recommendations in permit authorizations.	**CPW:** Little Snake final RMP incorporates measures that incentivize maintenance of large undeveloped blocks of sagebrush habitat. Draft White River and Kremmling RMPs also include protection of large sagebrush blocks in at least 1 alternative. Also, CPW attempts to maintain large blocks of habitat through the development of WMPs. At least 1 company with a WMP has implemented this strategy. CPW works with BLM when BLM develops Geographic Area Plans (GAPs). Routt County denied a

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.3.3	Where production phase drilling and development may occur, require a plan that evaluates the impacts to sage-grouse from the entire field development, not just from individual well development. Include the need for additional infrastructure and/or communication towers (e.g., to facilitate remote monitoring) that should be considered during the land-use planning process	USFS, SLB, BLM	Ongoing	**SLB:** All state trust lands are inspected at least once every ten years. New uses require new site inspections. Since 2002, nearly 16K acres (= 16% grazing leases in GSG habitat) were inventoried.	**SLB:** Range inventories often result in improved grazing management practices and treatment for noxious weeds.
3.2.3.4	In GrSG habitat, cluster the development of roads, pipelines, electric lines, and other facilities, and use existing, combined corridors where possible (see "Infrastructure"	USFS, CPW, BLM	Ongoing	**BLM:** Primary BMP considered for all APDs and related actions. Multi-state transmission lines are currently being analyzed and coordinated with CPW. Combined corrdiors are a primary factor in those analyses. **CPW:** General - CPW recommends use of shared infrastructure (roads, pipelines) at site visits and in consultation negotiations. Some Wildlife Mitigation Plans incorporate multiple pipes in a pipeline right-of way. PPR - WMP's (4 signed) with grouse habitat agreed to measures that cluster development where possible. NP and MP - CPW has commented on the Kremmling Field Office RMP to recommend maintaining large blocks of sagebrush and to minimize fragmentation of the landscape. NESR - CPW provides recommendations to Routt County Planning. Routt County Planning considers GrSG habitats and CPW recommendations in permit authorizations. The majority of GrSG habitat in Eagle County is BLM. CPW makes recommendations to BLM to conserve GrSG habitat. MP and MWR - There is no active energy development.	**BLM:** Minimize footprint & % surface disturbance. **CPW:** PPR - Through WMPs, several operators have clustered facilities through the use of centralized fluid collection sites and collocated pipelines.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.3.5	Investigate opportunities and provide incentives for phased energy development in key GrSG habitats.	USFS, CPW, BLM	Ongoing	**BLM:** LSFO incorporated non-monetary incentives in their RMP by rewarding operators who enter into a voluntary SG conservation agreement with an exception on big game timing limitations elsewhere. Focus is on limited % surface disturbance rather than phased development. **CPW:** Individual permitting lacks incentive or ability to protect landscape scale habitats and not all operators are interested in participating in a WMP. CPW has completed 5 WMPs that have incentive based phased or clustered development. CPW also collaborates with BLM on leasing decisions and management actions in Land Use Plans. The draft White River FO RMP includes measures that would incentivize phased development. NP - CPW has brought up the idea of phased development. However, companies claim that oil development in NP is in the "exploratory stage" and companies are not willing to discuss phased energy development at this point. NESR, MWR, and MP - At this point, oil and gas development is not issue.	**CPW:** PPR -Several WMP's have been signed with energy companies providing them with expedited well permits as a benefit of agreeing to implement mitigative measures. Several other WMP's have been started and are in various stages of completion. BLM also uses phased development (to some degree) in GAPs. Phased development is encouraged and used as opportunity and law allows. Four of these 5 operators (EnCana, Williams, Marathon, PDC, and Shell) have sage grouse habitat and have agreed to phased development in a WMP.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.3.6	Identify key sage-grouse areas that are not already leased for energy and mineral development. Investigate and implement alternatives to leasing for energy and minerals in these areas.	USFS, Industry, CPW, BLM	2011 and ongoing	**USFS**: Routt NF RMP revision in progress includes this provision. WRNF oil & gas RMP amendment also underway. **SLB:** 2012 inventory of lands with high conservation values to consider designation for the Stewardship Trust. Inventory covered 16K acres, comprising 4% of SLB-owned GSG habitat. **BLM:** LSFO has incorporated alternatives to maintain large blocks of undeveloped lands in their RMP revision (2010). All new leases have required stipulations that minimize %surface disturbance and fragmentation in the lease area. Three of the four remaining GRSG plans considered an alternative with no new leasing in core SG habitat. The White River RMP is already predominantly leased in the PPR GRSG population area. The NW CO SG EIS Amendment is analyzing an alternative that includes no leasing in GRSG PPH. **CPW:** CPW has identified Priority Habitat for GRSG statewide and has overlaid this with leased acreage to evaluate what areas are currently unleased. CPW has made recommendations to minimize oil and gas leasing in priority areas. CPW has collaborated with BLM to defer leasing until Land Use Plans are complete or until management of GRSG within energy development areas is better understood and managed. BLM is evaluating long-term lease deferrals in several RMP revisions and through their NTT/EIS process. CPW has supported long-term lease deferral alternatives in the White River, Kremmling and Colorado River Valley draft RMPS.	**BLM:** Minimize footprint & % surface disturbance. **CPW:** Alternatives to energy leasing would have to be voluntary pursued on the part of the mineral owner. Current federal practice is that the mineral estate must be leased and developed, with limited exceptions.
3.2.3.7	In areas or populations having intense energy development, encourage LWGs to aggressively pursue additional strategies, using an adaptive management approach, to address population sustainability (e.g., consult PVA analysis in CCP), including, but not limited to, the following options: • options for increasing GrSG female survival • short duration of energy development and expedited reclamation • % habitat disturbance cap, habitat disturbance acreage cap, planned distribution of disturbance areas • innovative area development plans (e.g., refuge approach, mitigation/conservation credit approach; see "Energy and Mineral Development: Avoiding and/or Mitigating Impacts", pg. 292) • see also all strategies under Issue 3.3, "Habitat Enhancement" strategy section, discussion under "Population Augmentation"	LWGs	ASAP	**LWG:** PPR LWG - originally acted as a spring board for developing actions such as these when writing the local PPR conservation plan. The working group now acts more as an information sharing outlet with such actions being implemented more on an agency-to-landowner/operator basis when possible. NP LWG - Energy development strategies are not included in the Local Plan signed in 2000. However, energy development has been discussed recently by the LWG. Members of the LWG do not agree that proposed oil and gas developments and potential for increased oil and gas development pose a threat to GrSG in NP, thus, the LWG has not developed strategies to address impacts from oil and gas. NWCO LWG - has not addressed this strategy. MP and NESR LWGs - do not have any active energy and mineral development activity.	
Objective 3.2.4	Reclamation, all industries				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.4.1	Use early and effective reclamation techniques, including interim reclamation, to speed the return of disturbed areas to use by sage-grouse (see "Habitat Enhancement" strategy, pg. 349). Develop and implement performance-based reclamation standards.	USFS, Industry, CPW, BLM	Ongoing	**BLM:** All FO's are incorporating early, interim and long term reclamation standards. The WRFO is focusing their RMP Amendment on minimizing the disturbance footprint and maximizing effective reclamation in PPH. Part of those standards include not allowing new development until previously disturbed sites meet established reclamation standards. **CPW:** CPW recommends early interim reclamation, minimal facility disturbance and performance-based reclamation standards. Also, COGCC Series 1000 Rules promote erosion control which may indirectly influence seed mixes that may be better suited for grouse habitat. CPW and BLM coordinate reclamation recommendations as much as possible. CPW comments on reclamation plans in BLM Land Use Plans and for county special use permits where applicable. In addition, reclamation of any energy or infrastructure projects on State Wildlife Areas is dictated and overseen by CPW. **COGA**: Yes, 6 of 6 operators surveyed, who hold a total of 69% of the permits in GrSG SWH and operate a total of 24% of the wells in GrSG SWH or RSO	**CPW:** COGCC regulates and enforces permitting regulations for reclamation. BLM regulates reclamation on federal surface. CPW has required stringent reclamation techniques (use of live plant materials, hydromulching, locally collected seed, etc.) on State Wildlife Areas. CPW has been successful in getting similar requirements applied to some BLM projects. PPR - WMPs incorporate reclamation standards and implementation is verified annually.
3.2.4.2	Practice reclamation techniques that speed the recovery of pre-existing vegetation in GrSG habitat (e.g., brush-beating of sagebrush for site clearance, retention of topsoil with native seed).	USFS, Industry,CPW, BLM	Ongoing	**BLM:** Some BMPs in this area are already being incorporated (retention of topsoil, use of native seed, etc), other BMPs such as use of mats for well pads may not be suitable for all places in CO. **CPW:** CPW does not have regulatory authority over oil and gas permitting or reclamation standards. CPW does recommend minimal facility disturbance and footprint. Recommendations for topsoil management are offered as well. Many techniques such as drilling mats, and minimizing grading, or vegetation mowing are not perceived as viable techniques for construction of a pad site by industry. Operators cite safety as a concern and a reason not to use these techniques. PPR- CPW Researcher, D. Johnston, is studying success of native plant establishment and competition with noxious weeds which may lead to faster reestablishment of native plants. NP - CPW has recommended techniques that speed the recover of sagebrush habitat. For mineral proposals, CPW provides recommendations to Routt County Planning. Recommendations include early and effective reclamation techniques. **COGA:** Yes, 5 of 6 operators surveyed, who hold a total of 62% of the permits in GrSG SWH and operate a total of 23% of the wells in GrSG SWH or RSO	**CPW:**Seed mixes are often not capable of achieving both goals. On private surface, the land owner is the decision maker on seed mix choice and use.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.4.3	Use reclamation seed mixes consisting of native bunchgrasses, forbs, and appropriate subspecies of big sagebrush in GrSG habitat. Avoid aggressive, non-native grasses (e.g., intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, smooth brome) in reclamation seed mixes (see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration", and Monsen 2005).	USFS, Industry, CPW, BLM	Ongoing	**BLM:** Reclamation seed mixes consist largely of native species of grasses and forbs in CO. **CPW:** CPW's oil and gas BMPS include this strategy. These BMPs are provided to industry and regulatory agencies. Also, COGCC Series 1000 Rules promote erosion control which may indirectly influence the use of seed mixes that do not promote quality grouse habitat. CPW and BLM coordinate reclamation recommendations as much as possible. NWCO - CPW comments on reclamation plans in BLM Land Use Plans. In addition, reclamation of any energy or infrastructure projects on State Wildlife Areas is dictated and overseen by CPW. NP - CPW provides recommendations of plant species to use for a variety of different situations specific to GrSG in Appendix D of the State Plan (Recommendations regarding plant species for use in GrSG habitat management and restoration). CPW has recommended the use of native grasses in reclamation. For mineral proposals, CPW provides recommendations to Routt County Planning. **COGA:** Yes, 5 of 6 operators surveyed, who hold a total of 44% of the permits in GrSG SWH and operate a total of 14% of the wells in GrSG SWH or RSO	**CPW:** The BLM and COGCC regulate reclamation at permitting stage. CPW BMPs encourage seed mixes that benefit grouse (e.g., CP-4D mixes). These recommendations are more likely to be adopted at final reclamation rather at the interim reclamation stage. Availability of native plant material continues to be a challenge.
3.2.4.4	Structure reclamation soil profiling and re-vegetation seed mixes to create high quality sage-grouse habitat as quickly post-development as possible see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration", and Monsen 2005.	USFS, Industry, DRMS, CPW, BLM	Ongoing	**BLM:** Interim reclamation of O&G development is required within 6 months of ground disturbance. No specific requirements for soil profiling, however ecological sites and associated vegetation types are known, recommended seed mixes can be provided by BLM or other local experts. Through the BLM Native Plant Materials Development Program, native seed mixes specific to re-vegetation in sage-grouse habitat are in use. These native seed mixes will be refined based on the evaluation of the establishment of the species at the site. **CPW:** CPW recommends minimal facility disturbance and footprint. CPW recommendations include topsoil management and seed mixes as well. PPR- CPW Researcher, D. Johnston, is studying a variety of soil management techniques which may lead to faster reestablishment of native plants. NP - CPW has recommended techniques that speed the recover of sagebrush habitat. For mineral proposals, CPW provides recommendations to Routt County Planning. Recommendations include early and effective reclamation techniques. **COGA:** Yes, 5 of 6 operators surveyed, who hold a total of 62% of the permits in GrSG SWH and operate a total of 23% of the wells in GrSG SWH or RSO	**CPW:** The BLM and COGCC require soil management actions in permit COAs. Interim reclamation is not focused on habitat establishment but rather soil stability and erosion control. This type of recommendation - grouse intensive reclamation -would likely occur at final reclamation in about 25 to 35 plus years out. CPW encourages operators to reclaim as much of the facility as possible to the final reclamation standard during interim reclamation.
3.2.4.5	Identify and implement incremental habitat reclamation objectives in GrSG habitat.	USFS, CPW, BLM	Ongoing	**BLM:** Interim and long term reclamation standards are currently being proposed on BLM.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.2.4.6	Develop and implement an evaluation and monitoring process for meeting reclamation objectives in GrSG habitat, using standard monitoring criteria (see "Habitat Monitoring" strategy, pg. 354, and CCP Appendix C, "Habitat Monitoring Protocol").	USFS, CPW, BLM	Ongoing	**BLM:** Current BLM monitoring and evaluation methods are used to determine success in meeting reclamation goals. **CPW:** General - Colorado specific structural habitat guidelines are known and described in the CCP (2008). These provide a potential starting point for development of reclamation monitoring guidelines. CPW comments on reclamation plans in BLM Land Use Plans and other project proposals. Reclamation of any energy or infrastructure projects on State Wildlife Areas is dictated and overseen by CPW. WMPs include agreements on monitoring standards for reclamation.	**BLM:** Not enough time or on the ground implementation has occurred to assess effectiveness of BMPs to date. **CPW:** Reclamation success in WMPs is evaluated annually against the standards specified in the WMP.
3.2.4.7	Discuss options for making state reclamation standards for oil and natural gas development similar to those for mining.	BLM	Begin in 2008	**BLM:** Although no formal attempt has been made to adopt mining reclamation standards for O&G development in BLM CO, WRFO & LSFO have adopted long term reclamation standards that include structural diversity. All O&G development on public land requires a Surface Use Plan of Operations which includes reclamation plans. COAs provide reclamation standards. All offices incorporate forbs into reclamation standards and sagebrush seed is included in current seed mixtures.	
Objective 3.3.1	Land management planning				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.3.1.1	Use the best available and applicable information to expand the extent and to enhance the utility of habitats available for sage-grouse (while continuing to develop additional Colorado-specific research regarding GrSG habitat and habitat-use: see strategies 3.4.3.7 - 3.4.3.10; see also "Habitat Enhancement" strategy, pg. 349 and "Habitat Linkages" strategy, pg. 352).	CPW	Ongoing	**CPW:** Research supports and provides feedback. CPW has worked with private landowners and on BLM-administered lands to conduct habitat enhancements by: 1) conducting pinyon-juniper encroachment projects, 2) seeding burned areas to accelerate recovery, 3) seed private lands to improve CRP stands. These projects have occurred in the general vicinity of energy development, but have not been specifically targeted to mitigate for the impacts of energy development. CPW Research Unit is conducting multiple studies on GrSG and their habitat within the PPR and NWCO populations.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.3.1.2	Evaluate the existence and adequacy of energy and mineral development guidance in federal, state, county, and local work group plans within GrSG habitats, including leasing decisions. Federal policy allows for leasing decisions to be revisited through the land-use planning process when significant new scientific information becomes available (see CCP Appendix G, "Energy and Mining Leasing and Development Background and Process"). Update guidance as needed.	USFS, CPW, BLM	By 2012	**USFS:** Planning revisions underway for Routt NF and White River NF. **BLM:** All new BLM RMP revisions/ amendments include language that allows for incorporation of new scientific information in ongoing federal actions as part of adaptive management processes. **CPW:** All the BLM RMPs have been/are being revised to strengthen protections for GrSG. CPW provides input and recommendation to federal resource management plans, environmental assessments, and geographic area plans. BLM is undergoing a review of adequacy under the GrSG EIS and CPW is a cooperator in all these projects.	**CPW:** The BLM does have the ability to use the best available science to amend lease conditions and stipulation by way of the Yates Decision. The Little Snake RMP incorporates components of the Yates Decision. The use of Working Group recommendations is voluntary and it is a guidance document not a regulatory or prescriptive document. CPW is actively involved in making recommendations for RMP updates and other planning and implementation documents.
3.3.1.4	Evaluate and implement specific mitigation and exception criteria during the land-use planning process in GrSG habitat. Attach the criteria to the lease as stipulations upon issuance.	USFS, BLM	As LUPs are revised	**BLM:** Proposed stipulations for O&G development in SG habitat are being analyzed during the planning process & through the NW CO SG EIS amendment.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.3.1.5	Encourage counties to consider and implement sage-grouse conservation plan recommendations (local and statewide) when planning land-use, and when processing land-use permits.	CPW, County Governments	Ongoing	**Moffat**: Planning & Zoning Commission require weed control plans developed with the consultation of county Weed & Pest Department for ground disturbing projects. Planning Dept may add stipulations to Conditional Use Permits if Commission deems it necessary. County has developed window stickers for vehicles working in on Entrega Interstate Pipeline to verify washed and weed free vehicles entering the county. **Grand**: All land use actions are sent for review to CPW for review. Written feedback recommendations are then incorporated into land use approval granted by the county. All land use actions require noxious weeds to be controlled in compliance with Grand County Noxious Weed program. **Jackson:** Has begun to consider amendments to the county Comprehensive Master Plan that would provide guidance to decision makers on Special Use Permits and other land use authorizations. **Routt:** Zoning regulations 3.6.2 including timing and seasonal limitations, mitigation techniques, and requirement for consultation with CPW. **CPW:** When appropriate CPW - Land Use Specialist, DWM and biologist encourage Counties to implement (state-wide or local working group) sage-grouse plan recommendations. CPW communicates with counties in the NW Colorado population primarily through the Local Working Group. The PPR Conservation Plan, which encourages consideration of numerous strategies that can benefit GrSG, was signed by several counties. There is no active energy development within the MWR Population boundary. CPW references local and statewide conservation plans and their recommendations in CPW comment letters written and provided to the county during planning phases. CPW does make comments or recommendations for local land use plans when local plans are updated. As appropriate, CPW recommends sage-grouse conservation measures in local land-use permitting comments.	**Moffat**: All companies operating in county have completed weed control requirements. 4 large-scale infrastructure projects added weed control stipulations to their permits. Penalties for non-compliance are enforceable by law. **Grand**: former county gravel pit off CR 340 was shifted to seasonal and timing restrictions in response to written request by CPW, to allow for lek activity in the area. **Routt:** County does not have a mechanism to confirm that mitigation stips on permits have been implemented. Field inspections in 2008 revealed 99% compliance rate.
3.3.1.6	Develop a map that reflects ownership of minerals and mineral potential in GrSG habitat in Colorado. Tabulate the acreage and identify blocks of areas with common mineral estate ownership.	USFS, BLM	2008	**BLM:** This has not been done by BLM CO, although the data is available thru COGCC.	
3.3.1.7	Clarify energy development stipulations and where they apply in GrSG habitat.	USFS, BLM	Ongoing	**BLM:** This is an ongoing process. Energy development stipulations are currently being updated, evaluated and applied through the NW CO SG EIS Amendment.	
3.3.1.8	Map energy development infrastructure within GrSG habitat to reflect current and historic development levels, patterns, and conditions (see also “Infrastructure” [pg. 383] and “Roads” [pg. 409] strategy sections.	Industry	Ongoing	**Tri-State:** Colowyo has mapped all infrastructure elements for both current and historic areas of the mine. **COGA:** Yes, 3 of 6 operators surveyed, who hold a total of 32% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.3.1.9	Recommend setting bonds sufficient to ensure that appropriate GrSG habitat reclamation is met.	USFS, DRMS, CPW, COGCC, BLM	Ongoing	**BLM:** This has not been done. **CPW:** COGCC and Federal agencies determine bond adequacy in most instances. CPW sets bonds for infrastructure projects affecting State Wildlife Areas. CPW has not recommended bond for projects involving other land management jurisdictions. At site visits, CPW has made comments to both COGCC and BLM that bonds may not be sufficient to cover true on-the-ground reclamation actions.	
3.3.1.10	Write energy development guidelines that take into account a variety of site-specific situations in GrSG habitat. Implementation of these guidelines should be determined on a site-by-site basis within the landscape context.	USFS, CPW, BLM	Ongoing	**BLM:** LSFO wrote performance based GRSG energy guidelines in their approved RMP revision. Similar stipulations or energy development criteria is being evaluated in the NW CO SG EIS Amendment. Any additional overarching energy guidelines will be discussed and/or developed through an interagency team in CO. **CPW:** At a statewide level, CPW has developed BMPs for oil and gas development in coordination with HB 1298 Rules. CPW was engaged in COGCC rule making. CPW provides comments on BLM Resource Management Plans and EAs. CPW, DWMs, Land Use Specialists and biologists make recommendations at site visits and federal Notice of Staking. CPW recommends site specific activities to minimize impacts to habitat. Implementation is up to operator. Companies enrolled in WMP's have implemented guidelines that consider site-specific situations in GrSG habitat. CPW has not written energy development guidelines in NP to date.	**BLM:** Minimize footprint and %surface disturbance.
3.3.1.11	Consider private property owner concerns when developing guidelines for energy and mineral development on split estates in GrSG habitat.	USFS, CPW, BLM	Ongoing	**BLM:** Private property concerns and comments are considered when applying stipulations designed to protect SG on split estate. BLM invites private landowners to attend APD onsites for all federal wells. **CPW:** CPW does make recommendations on private property but they are up to the landowner to accept or not.	
3.3.1.12	Require issue-specific monitoring plans and data reporting processes and standards for energy development projects in GrSG habitat.	USFS, Industry, BLM	Ongoing	**BLM:** This has not been formally done. Although periodic monitoring of noise or container ponds, for example, does occur in conjuction with permit requirements.	
3.3.1.13	Enforce and ensure compliance with conditions, stipulations, and reclamation for leases and permits in GrSG habitat.	USFS, DRMS, COGCC, BLM	Ongoing	**BLM:** Compliance with O&G permit conditions of approval is conducted.	**BLM:** Staffing may not be sufficient to keep up with the need.
Objective 3.3.2	Frameworks for voluntary participation				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.3.2.1	Review the effectiveness of existing industry incentive programs in wildlife habitat in other states (e.g., Pinedale/Jonah field in Wyoming).	BLM	2008	**BLM:** Review of WY incentive programs has been limited to what has been done, not how (or if) it has resulted in effective mitigation relative to impacts to SG.	
3.3.2.2	Develop incentives to encourage industry to implement beneficial development practices for GrSG, including restoration of old sites (energy development sites that have not been sufficiently reclaimed).	BLM	2008 and ongoing	**BLM:** LSFO RMP developed incentives to sign voluntary agreements to limit surface disturbance in priority SG habitat. No other incentives have been developed to date.	
3.3.2.3	Encourage industry to incorporate new and less invasive technologies to develop energy and mineral resources in GrSG habitats (see also strategy 3.2.1.5).	USFS, COGCC, BLM	Ongoing	**BLM:** Conversations with industry relative to innovative technologoies is an ongoing effort. These discussions occur on a case by case basis as opportunities arise.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.3.2.4	Conduct project design, review, and approval through a consultative process with industry, agencies, and others to assure that projects incorporate the most current sage-grouse data and development technology available.	BLM, CPW, COGCC, County Governments, DRMS, Industry, LWGs, SLB	Ongoing		
3.3.2.5	Define the opportunities and/or limitations associated with directional drilling or other energy development technologies in GrSG habitat (e.g., geologic, topographic, cost/benefit).	Industry	2008	**COGA:** Yes, 3 of 6 operators surveyed, who hold a total of 67% of the permits in GrSG SWH and operate a total of 22% of the wells in GrSG SWH or RSO	
3.3.2.6	Encourage operators to provide long-term financial commitments to support reclamation design, compliance, research, and monitoring in GrSG habitat.	COGCC, BLM	Ongoing	**BLM:** Industry has provided financial support for ongoing CPW & BLM efforts on a case by case basis.	
3.3.2.7	Locate site and design oil and gas facilities in cooperation with the operator and landowner to maximize opportunities for interim and long-term GrSG-oriented reclamation.	Private Landowners, LWGs, Industry, CPW, County Governments, COGCC	Ongoing	**Moffat**: County conditions all of its oil and gas facility permits with weed management criteria. County suggests that oil and gas companies consider grouse location sensitive siting. **Jackson:** Defers to the COGCC in regulation, siting and reclamation associated with drilling. **CPW:** CPW offers analysis, siting suggestions, timing suggestions, and suggests BMPs to avoid, minimize, or mitigate affects to GRSG. CPW makes recommendations as extensive as surface owner will allow. CPW does make site specific recommendations when permitting COGCC Form 2A permits, and with BLM at NOS site visits. Recommendations are developed with CPW, surface owner, and energy company representatives. CPW works with BLM, companies, and landowners to minimize overall disturbance. **LWG:** PPR LWG originally acted as a spring board for developing actions such as these when writing the local PPR conservation plan. The LWG now acts more as an information sharing outlet with such actions being implemented more on an agency-to-landowner basis when possible. NP and NWCO LWGs - CPW and BLM are involved with site design and interim and long-term reclamation; the LWG is not involved. **COGA:** Yes, 2 of 6 operators surveyed, who hold a total of 35% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO	**Moffat**: At least two operators have moved a well from a lek location based on a county request.
3.3.2.8	Encourage operators to provide long-term financial commitments to support reclamation design, compliance, research, and monitoring in GrSG habitat.	USFS	Ongoing		
Objective 3.3.3	Adaptive management approach				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.3.3.1	Develop and implement a valid monitoring plan to assess the impacts of energy and mineral development on sage-grouse.	USFS, BLM	2010 and Ongoing	**BLM:** Ongoing monitoring of SG movement and habitat use is conducted in several populations of SG by CPW, and continues to inform proposed development. BLM has adopted or proposed adaptive management processes for oil and gas development in the Little Snake final RMP and the White River draft RMP. CPW has been a cooperator.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.3.3.2	Develop and implement a valid monitoring plan for reclamation activities in GrSG habitat (see "Habitat Monitoring" strategy, pg. 354 and CCP Appendix C, "Habitat Monitoring Protocol").	USFS, CPW, BLM	2010 and Ongoing	**BLM:** BLM uses approved monitoring methodology to determine effectivenss of reclamation activities. **CPW:** BLM has adopted or proposed adaptive management processes for oil and gas development in the Little Snake final RMP and the White River draft RMP. CPW has been a cooperator. PPR - WMPs require monitoring of reclamation activities.	**CPW:** CPW reviews reclamation progress in WMPs annually.
3.3.3.3	Develop and implement a valid monitoring plan to assess GrSG habitat restoration and to measure success with respect to GrSG.	USFS, CPW, BLM	2010 and Ongoing	**BLM:** BLM uses approved monitoring methodology to determine effectivenss of reclamation activities. **CPW:** CPW has hired a habitat coordinator who is developing monitoring plans for tracking restoration of GrSG habitat.	**BLM:** Not enough time or on the ground implementation has occurred to assess effectiveness of BMPs to date.
3.3.3.4	Use and refine existing vegetation and other map data to develop a better understanding of piñon-juniper/mountain shrub, industrial, agricultural, and urban encroachment on GrSG habitat.	USFS, NRCS, CPW, BLM	2010	**BLM:** BLM is using the revised SG habitat maps that CPW developed in the analysis within the ongoing NW CO SG EIS Amendment. **CPW:** CPW has hired a habitat coordinator who is developing monitoring plans for tracking restoration of GrSG habitat. CPW Researcher, B. Walker, is studying habitat improvement through the removal of pinyon-juniper and has generated suitable habitat maps using models guided by telemetry locations. NP - CPW is digitizing disturbed habitats and refining mapping data for use in the NP seasonal habitat model. CPW is also developing an anthropogenic disturbance layer for use in GrSG modeling in NP.	**CPW:** Research results are preliminary; however, they indicate some use of treated areas by grouse.
3.3.3.5	Use remote sensing and other techniques to determine the current state of fragmentation in GrSG habitat.	USFS, CPW, BLM	2010	**BLM:** BLM has not implemented this to date. BLM is coordinating with CPW on ongoing remote sensing efforts. **CPW:** CPWs 2012 priority habitat map provides a measure of natural fragmentation at a landscape scale as unsuitable habitats are not priority habitat.	
3.3.3.6	Evaluate the adequacy and effectiveness of GrSG stipulations and BMPs related to mineral and energy development.	USFS, CPW, BLM	2015		
3.3.3.7	Assess the compliance, consistency, implementation, and cost of stipulations and/or COAs with respect to GrSG management, and report results.	DRMS, CPW, COGCC, BLM	Biennially	**CPW:** Since 2010, CPW has been tracking implementation of stipulations, COAs, and BMPs through the Form 2A permits. WMPs stipulations or BMPs are applied. **See Appendix E: Summary of Oil and Gas Permits in GrSG Habitats**	**CPW:** The application of stipulations or BMPs in WMPs is assessed annually by CPW, in some cases through formal audits.
3.3.3.8	Continue to update and adjust BMPs to reflect monitoring and research results in GrSG habitats. Promote use of updated BMPs across land ownership boundaries.	USFS, BLM	Ongoing	**BLM:** Minimal monitoring or research has been completed to indicate necessary changes to BMPs.	
3.3.3.9	Develop a mechanism to modify regulations or stipulations on federal mineral estates over time, based on monitoring and/or research results in GrSG habitat.	USFS, BLM	2008 and ongoing	**BLM:** Language is currently being incorporated into all RMP revisions to specifically acknowledge & authorize use of updated conservation measures or restrictions as needed and based on new science thru the adaptive management process. No other mechanism for changes in management has been identified.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.3.3.10	Evaluate alternatives to a radial buffer approach in GrSG habitat, such as incorporating local topographic conditions or habitat communities for defining geometry (see CCP Appendix B, "GrSG Disturbance Guidelines").	USFS, CPW, BLM	2008	**BLM:** CPW has refined the core habitat approach & updated priority habitat using some topographic & habitat data. The buffer approach is still used as a starting point to implement appropriate conservation measures. **CPW:** CPW recommends use of topography as one variable that can adjust radial buffers. NWCO and PPR - New seasonal habitat maps take into account habitat attributes in addition to lek buffers for defining seasonally important areas and Priority Habitat. CPW Researcher, B. Walker, has generated models that incorporate roughness of topology. CPW is refining the seasonal habitat models based on locations from a telemetry study. CPW will evaluate the refined seasonal habitat models compared to the lek buffer approach.	**CPW:** CPW- DWMs, Land Use Specialists, biologists and BLM often use topography to offset impacts or to improve buffering of development locations.
Objective 3.3.4	Mitigation, both current and future				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.3.4.1	Define what constitutes meaningful mitigation to meet site- and/or issue-specific GrSG population and/or habitat objectives.	CPW	2010	**CPW:**CPW and operators have agreed on mitigation when both parties develop a WMP.	**CPW:** Consultation - site visit - recommendations often reflect compromise of mitigation actions based on input from operators, CPW staff, and/or landowner.
3.3.4.2	Wherever possible, incorporate site-specific COAs (on-site mitigation measures) on proposed operations in GrSG habitat, consistent with lease rights, or as negotiated with operators.	USFS, BLM	Ongoing	**BLM:** This is consistently done during the APD process on a case by case basis with input from CPW.	
3.3.4.3	Evaluate the need for near-site and/or off-site mitigation to maintain sage-grouse populations during oil and gas development and production and energy and mineral development through mining.	CPW	Ongoing	**CPW:** CPW includes mitigation in WMPs and is in the preliminary stage of development on a Colorado Habitat Exchange for credit trading and mitigation banking. BLM has similar opportunity when GAP is proposed or required in mineral development plans.	**CPW:** Mitigation implementation in WMPs is evaluated by CPW annually against the standards specified in the WMP. Specifically, credit trading and mitigation banking have been utilized. CPW Researcher, B. Walker, is conducting research for possibilities for off site mitigation (pj removal).
3.3.4.4	Determine whether sage-grouse will move to mitigation areas as mine and energy development sites develop in active habitat. **[See Research Strategy 21.3.1.1]**	Universities, CPW	Begin by 2010	**CPW:** CPW Researcher, B. Walker, is conducting research on pj removal and subsequent use by GrSG.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.3.4.5	Identify potential locations where there may be opportunities for off-site mitigation for GrSG. Identify suitable mitigation practices within those areas (see also Strategy 3.3.4.9).	CPW	2010	**CPW:** CPW has identified some potential areas for mitigation at both the landscape and local scales. WMPs attempt to conserve large blocks of habitat suitable for mitigation efforts and include phased development as mitigation. Colorado Habitat Exchange will develop potential locations for off-site mitigation. Landscape scale priority habitat mapping identifies suitable habitat. Finer scale mapping for PPR and Hiawatha portion of NWCO provides locations to consider for off-site mitigation. CPW participated with the Nature Conservancy to identify areas suitable for mitigation in NWCO through Energy by Design modeling. NESR - CPW has made on- and off-site mitigation recommendations for gravel pit proposals. CPW continues to identify suitable mitigation practices for particular sites (e.g. conservation easements or pinyon juniper habitat enhancement projects). CPW research and monitoring data informs these decisions.	
3.3.4.6	Consider site capability and the timeline necessary to restore areas to suitable GrSG habitat, when determining which mitigation practices should be implemented on a site-by-site basis.	USFS, CPW, BLM	Ongoing	**BLM:** This is consistently done during the APD process on a case by case basis with input from CPW. **CPW:** CPW is working with industry to make recommendations based on current knowledge and best available information and site specific factors. CPW recommends habitat enhancement or restoration activities taking into account soil type, precipitation regime, land ownership, management practices, etc.	**CPW:** CPW- DWMs, Land Use Specialists, biologists incorporate these factors when making mitigation recommendations.
3.3.4.7	Conduct effective GrSG habitat enhancements (on- and off-site mitigation) in areas adjacent to or nearby energy development, in order to maintain sage-grouse population numbers (see "Habitat Enhancement" strategy, pg. 349).	USFS, CPW, BLM	Ongoing	**BLM:** Limited energy development, and thus site-mitigation, has occurred in GRSG priority habitat since the CCP. **CPW:** CPW is not able to do off site mitigation on individual 2A permits unless a surface owner volunteers to do so. CPW is able to do some off site mitigation in WMP documents. CPW has worked with private landowners and on BLM-administered lands to conduct habitat enhancements by: 1) conducting pinyon-juniper encroachment projects, 2) seeding burned areas to accelerate recovery, 3) seed private lands to improve CRP stands. These projects have occurred in the general vicinity of energy development, but have not been specifically targeted to mitigate for the impacts of energy development. CPW Research Unit is conducting multiple studies on GrSG and their habitat within the PPR and NWCO populations. The Colorado Habitat Exchange will indentify additional areas where oil and gas mitigation can occur.	**CPW:** Mitigation implementation in WMPs is evaluated by CPW annually against the standards specified in the WMP.
3.3.4.8	Encourage completion of mitigation measures prior to mine site development or expansion, or energy field development, where possible, to minimize sage-grouse population disruption.	USFS, Industry, BLM	Ongoing	**BLM:** No new mine sites or energy fields have been developed since the CCP.	
3.3.4.9	Investigate, evaluate, and implement mitigation trust/banking opportunities where appropriate in GrSG habitat. Develop incentives to ensure that mitigation areas remain undeveloped until original habitats are fully recovered and populations are re-established.	USFS, CPW, BLM	Ongoing	**CPW:** Colorado Habitat Exchange - CPW, CO Cattleman's Assoc. and the Envir. Defense Fund are currently developing a credit trading program and expect it to be completed by late 2013. Mitigation banking and credit trading have been utilized by a few operators to a small degree.	
Objective 3.4.1	Existing research				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.4.1.1	Evaluate existing research on energy and mining development impacts on GrSG regarding (1) its applicability to local situations; and (2) whether or not it has been peer-reviewed.	CPW	Dec. 2008	**CPW:** CPW has a strong research unit that conducts peer-reviewed research in CO relevant to GrSG and grouse habitats. CPW uses best available science to inform oil and gas recommendations. CPW researchers routinely meet with LWGs to ensure that research projects address local needs. CPW also conducts research in local populations e.g., telemetry project in NP in 2010. One objective was to gather information on GrSG demographics in NP prior to more extensive oil and gas development.	**CPW:** CPW staff are regularly up-dated on new and existing research (Biological In-Service and research reviews, etc.).
Objective 3.4.2	Determine effectiveness of existing stipulations and mitigation				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.4.2.1	Through research, determine the effectiveness of energy and mining mitigation actions, stipulations, and BMPs in maintaining GrSG populations and/or habitat across the landscape. **[See Research Strategy 21.3.1.1]**	Universities, CPW	Begin by 2010	**CPW:** CPW has started evaluations of mitigation actions but not BMP or stipulation effectiveness at the population level.	**CPW:** CPW researchers are conducting evaluations of some mitigation actions (e.g., PJ removal and plant establishment techniques).
Objective 3.4.3	Other needed research				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.4.3.1	Develop a timeline for implementation of research strategies (e.g., strategies 3.4.3.3 - 3.4.3.5; 3.4.3.7 - 3.4.3.10). **[See Research Strategy 21.2.1.3]**	USFWS, Industry, CPW, BLM	Begin by 2020		
3.4.3.2	Increase funding to conduct needed research on mining, energy development, and GrSG in Colorado. **[See Research Strategy 21.2.1.3]**	USFWS, Industry, CPW, BLM	Begin by 2020	**Tri-State:** Colowyo has funded numerous studies including Masters and Doctoral research. **BLM:** BLM continues to provide funding for ongoing research in CO for SG. **COGA:** Yes, 3 of 6 operators surveyed, who hold a total of 67% of the permits in GrSG SWH and operate a total of 22% of the wells in GrSG SWH or RSO	
3.4.3.3	Investigate the specific factors affecting GrSG population parameters (e.g., causes of female and chick mortality, effects of noise on sage-grouse habitat use or avoidance, wind direction, and topography influence on noise impacts), and how they are influenced by energy development. [See Research Strategy 21.2.1.3]	USFWS, Industry, CPW, BLM	Begin by 2020	**Tri-State**: Colowyo has been the site for GSG investigations, including the Collom Wildlife Monitoring Report (2006, 2007, 2008) and the Collom Raptor / Grouse Report (2011). **BLM:** BLM regularly reviews and shares ongoing research from other states, such as recent research in WY relative to impacts of noise on SG. **COGA**: Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	
3.4.3.4	Design and implement a research program (regarding energy/mining and GrSG) so that the duration of data is sufficient to answer GrSG management questions. Recognize the need and timeline necessary to integrate research data and results into planning cycles. [See Research Strategy 21.2.1.3]	USFWS, Industry,CPW, BLM	Begin by 2020		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.4.3.5	Study, monitor, and attempt to quantify impacts to sage-grouse from oil and gas development and mining operations (e.g., intensity, duration, and timing elements of PVA). **[See Research Strategy 21.2.1.3]**	USFWS, Industry, CPW, BLM	Begin by 2020	**COGA**: Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	
3.4.3.6	Incorporate stakeholder concerns into current and future research designs for GrSG studies. **[See Research Strategy 21.2.1.3]**	USFWS, Industry, CPW, BLM	Begin by 2020	**CPW:** Current research has evolved out of needs identified by the state and local Conservation Plans developed by a consortium of stakeholders. CPW researchers routinely meet with LWGs to ensure that research projects address local needs.	
3.4.3.7	Quantify habitat fragmentation effects on GrSG. **[See Research Strategy 21.1.1.1]**	BLM, CDA, CPW, Industry, LWGs, NGOs, NRCS, Other Research Institutions, Private Landowners, SLB, Universities, USFS, USFWS, USGS, WAFWA	Begin by 2010	**See 21.1.1.1**	
3.4.3.8	Determine habitat loss thresholds for GrSG populations using spatially explicit landscape models (i.e., how much habitat is needed to sustain a population). **[See Research Strategy 21.1.1.1]**	BLM, CDA, CPW, Industry, LWGs, NGOs, NRCS, Other Research Institutions, Private Landowners, SLB, Universities, USFS, USFWS, USGS, WAFWA	Begin by 2010	**See 21.1.1.1**	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.4.3.9	Identify the appropriate mix of sagebrush habitats and seral stages necessary for sustainable GrSG populations, consistent with site capabilities. **[See Research Strategies 21.1.1.1 and 21.1.1.3]**	BLM, CDA, CPW, Industry, LWGs, NGOs, NRCS, Other Research Institutions, Private Landowners, SLB, Universities, USFS, USFWS	Begin by 2010/2012	**See 21.1.1.1**	
3.4.3.10	Determine the sufficient minimum habitat patch size for GrSG, as it relates to habitat fragmentation. **[See Research Strategy 21.1.1.1]**	BLM, CDA, CPW, Industry, LWGs, NGOs, NRCS, Other Research Institutions, Private Landowners, SLB, Universities, USFS, USFWS, USGS, WAFWA	Begin by 2010	**See 21.1.1.1**	
Issue 3.5	Communication				
Objective 3.5.1	Improve communication				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
3.5.1.1	Develop a communication process to assist the energy industry to work with CDOW and LWGs in planning energy activity on non-federal surface-owned leases. **[See also Information, Communication, and Education Strategy 12.3.2.1]**	DNR, County Governments	2008	**Moffat**: monthly meetings with Shell Oil and "as needed" meetings with other operators.	
3.5.1.2	Present information and data about energy, mining, and GrSG so that it is readily understandable and accepted by stakeholders and the general public. **[See also Information, Communication, and Education Strategy 12.2.1.3]**	USFS, Industry, CPW, BLM	Ongoing	**BLM:** BLM presents current data in ongoing NEPA analysis and planning efforts that bridge GRSG habitat and threats discussion with proposed management actions. **CPW:** CPW researchers present research findings at LWG meetings and at CPW's semi-annual seminars for industry. All research projects have annual reports that are posted to the CPW public website. MP LWG has hosted 2 public presentation workshops over the last 4 years to update and educate landowners on current research and CPW activities concerning GrSG. **COGA:** Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.5.1.3	Share GrSG data among agencies, and with counties and industry to allow for better planning of mining and energy development, to minimize impacts to the species. Provide GrSG data to COGCC and DRMS to identify opportunities for coordination. Lek and telemetry data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management. [See also Information, Communication, and Education Strategy 12.3.2.2]	CPW	Ongoing	**BLM:** The public has opportunities to review and provide comments to all proposed energy & mineral leasing, development and conservation measures within RMP revisions (planning) during the BLM NEPA process. **CPW:** CPW routinely shares data with agencies, counties, and private entities. Lek and telemetry data are provided for development projects but are limited to the project area and require a non-disclosure agreement. CPW - DWMs, Land Use Specialists, biologists, Energy Liaison, research, and GIS coordinate efforts and data sharing. Annual LWG meetings update interested stakeholders with the most recent population counts, research findings, and GrSG related efforts on the ground. CPW has also provided information to COGCC in the HB 1298 rules that assist companies with oil and gas development planning.	
3.5.1.4	Share energy development plans with agencies ASAP to facilitate improved planning, analysis, and management of GrSG within sagebrush habitats, recognizing confidentiality sensitivities. Lek and telemetry data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management. [See also Information, Communication, and Education Strategy 12.3.2.2]	Industry	Ongoing	**COGA:** Yes, 3 of 6 operators surveyed, who hold a total of 35% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO	
3.5.1.5	Encourage counties, LWGs, conservation and sportsmen's groups, and private landowners to be involved in COGCC meetings in order to comment on well pad spacing densities, reclamation standards, and comprehensive planning within GrSG habitats. [See also Information, Communication, and Education Strategies 12.2.2.1 and 12.3.2.3]	LWGs, CPW	Ongoing	**CPW:** CPW has no formal process for notification. CPW provides its own comments based on staff recommendations. CPW does not actively promote participation in these activities but does inform stakeholders when such activities are up-coming or directly related to their operational interests. **LWG: PPR LWG -** Discussions encouraging stakeholders to attend COGCC meetings have not been held. **NP and NWCO LWGs** - At this point, not involved. **NESR and MP LWGs** - Currently, oil and gas development is not issue.	
3.5.1.6	Encourage open communication among companies to entertain opportunities to reduce impacts and/or maximize benefits to GrSG, at the local and landscape levels. **[See also Information, Communication, and Education Strategy 12.3.2.3]**	Industry	Ongoing	**COGA:** Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	
3.5.1.7	Encourage oil, gas, and mining companies to participate on local GrSG work groups. **[See Information, Communication, and Education Strategy 12.3.2.1]**	CPW	2008 and ongoing	**CPW:** LWG meetings are open to all interested parties and oil, gas, and mining companies are encouraged to participate and some company staff are involved in LWGs. NP LWG - EOG was added to the North Park LWG mailing list and invited them to be involved. NESR LWG - Gravel companies have been involved. PPR LWG - a number of oil and gas companies are active in the LWG (EnCana, Williams, Barrett, and others).	**CPW:** A variety of companies' staff participate in LWGs.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.5.1.8	Promote regular communication and continual coordination among agencies, industry, LWGs, and counties to improve energy and mineral-related planning and management of GrSG. **[See Information, Communication, and Education Strategy 12.3.2.3]**	Industry	2008	**CPW:** CPW conducts semi-annual seminars for industry to foster communications between entities. Additional formal and informal communications occur at annual meetings and site visits. CPW engages with oil and gas operators in long-range planning efforts by way of WMPs and long-range planning meetings. Annual LWG meetings are used to update interested stakeholders with the most recent population counts, research findings, and GrSG related efforts on the ground. CPW has coordinated with the NESR LWG and Routt County on issues relating to gravel pit proposals. **COGA:** Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	**CPW:** CPW is actively communicating and coordinating with industry (EnCana, Williams, Marathon, Shell, etc) regarding use of BMPs, and operational planning across their leases.
3.5.1.9	Promote and provide regular opportunities for public involvement to improve energy and mineral planning as it relates to management of GrSG and GrSG habitat. **[See also Information, Communication, and Education Strategy 12.2.2.1]**	LWGs, Industry, County Governments, BLM	Ongoing	**Moffat**: monthly Land Use Board meetings, monthly Planning Commission meetings, weekly County Commissioner meetings, all open to the public. **Jackson:** Active participation in North Park Sage Grouse Working Group, also open to the public. County representatives also hear from the public at a range of stakeholder meetings where GSG issues are discussed. **CPW:** CPW is active in public presentations on GrSG conservation efforts and energy development. LWGs provide opportunities for the public to be involved with mineral and energy development. LWG: NWCO LWG meets 2 to 3 times per year to share information and typically has guests present information on large scale issues (e.g.. BLM RMPs, transmission line EIS, etc), providing opportunity for stakeholders to be involved in GrSG conservation. PPR LWG - is open to public involvement and encourages public input. NESR LWG - Members of the NESR LWG participated in Routt County Commissioners meetings to discuss a proposed gravel pit in GrSG habitat. **COGA**: Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	**Moffat**: Members of the public attend every Land Use Board meeting when energy and sage grouse issues are considered. **CPW:** CPW invites industry and other stakeholders to participate in LWG meetings. CPW provides outreach to NGOs.
3.5.1.10	Communicate to affected publics the need to balance energy and mineral production with GrSG habitat and population requirements.	All Stakeholders	Ongoing	**CPW:** CPW conducts semi-annual seminars for industry to foster communications between entities. Additional formal and informal communications occur at annual meetings and site visits. The need to balance energy and mineral development with GrSG conservation is routine part of CPW interactions with stakeholders.	
3.5.1.11	Promptly and frequently update information related to energy and mineral development and GrSG to foster a better understanding of impacts to the species. **[See also Information, Communication, and Education Strategy 12.3.2.2]**	Industry, BLM	Ongoing	**BLM:** BLM regularly reviews and shares ongoing research from other states, such as recent research in WY relative to impacts of noise on SG. **CPW:** CPW routinely communicates and coordinates with the public regularly via the LWGs. CPW - DWMs, biologists, researchers and GIS update lek data as it becomes available. CPW research up-dates are routinely posted on CPW's public website. CPW includes recent research findings into BMP requests at on sites. MP LWG has hosted 2 public presentation workshops over the last 4 years to update and educate landowners on current research and CPW activities concerning GrSG. These presentations have included updates from research being conducted concerning interactions between GrSG and energy development. **COGA:** Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	**CPW:** CPW staff update grouse information annually, specifically lek maps.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
3.5.1.12	Improve the understanding, sharing, and acceptance of research and modeling efforts regarding GrSG and mining/energy development. Ensure that current management, reclamation techniques, and appropriate BMPs are shared with contractors and consultants to improve on-the-ground implementation. [See also Information, Communication, and Education Strategies 12.3.1.1 and 12.3.2.2]	CPW	Ongoing	**CPW:** CPW conducts semi-annual research up-date seminars for industry where current findings. CPW meets at least annually with each energy company involved in a WMP to review progress, incorporate recent research findings, and develop future plans. CPW updates lek data annually. CPW routinely consults with contractors, consultants, and energy operators to promote the implementation of the most up-to-date management and reclamation techniques. MP LWG has hosted 2 public presentation workshops over the last 4 years to update and educate landowners on current research and CPW activities concerning GrSG. These presentations have included updates from research being conducted concerning interactions between GrSG and energy development.	

4. Fire and Fuels Management

Issue 4.1	Fire and fuel treatments may impact GrSG				
Objective 4.1.1	Wildfire – impacts to habitat				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
4.1.1.1	Plan fire suppression response to potential wildfires in important GrSG habitat. Schedule annual coordination meetings and share fire response and GrSG seasonal habitat information with county, fire district, and federal fire fighting officials to plan and implement appropriate response to wildfires in these areas. Lek and telemetry data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.	BLM	Annually		
4.1.1.2	Train and use resource advisors to assist with considering sage-grouse conservation in prioritizing response to fire during multiple ignition episodes. Distribute sage-grouse information updates to fire dispatchers for initial attack planning. [See also Information, Communication, and Education Strategy 12.3.1.1]	BLM	Training: annually; Updates: as needed	**BLM:** BLM provides annual training to local resource advisors, and emphasizes SG conservation thru IM WO-2011-138. Resource advisors have access to the most current local SG data available.	
4.1.1.3	Burn-out/backfiring operations, dozer line construction, and other suppression activities in GrSG habitat should be conducted in a manner, and if possible in a location, that minimizes the loss of sagebrush, while still providing for public and fire crew safety.	BLM	As needed	**BLM:** SG occupied habitat is considered when identifying techniques and location for fire fighting efforts.	
4.1.1.4	Where practical, locate fire camps, staging areas, and helibases at least 2 miles away from GrSG leks, and preferably outside of GrSG habitat.	BLM	Annual discussion with FMOs	**BLM:** SG occupied habitat is considered when identifying high traffic areas for fire fighting efforts.	
4.1.1.5	Fire specialists and wildlife biologists should review and update area Wild Fire Management Plans in GrSG habitat every 5 years, or as necessary due to increased fire activity or risk.	BLM	Every 5 years	**BLM:** These fire plans are reviewed annually and signed by Field Office Managers following a review checklist. If SG issues are brought forward, additional review may occur.	
4.1.1.6	Manage habitat mosaics and fuel loads in and adjacent to GrSG habitats to minimize the possibility of catastrophic wildfires, while maintaining sage-grouse habitat quality (see CCP Appendix A, "GrSG Structural Habitat Guidelines".	BLM	Annually as crews available	**BLM:** Fuel projects under WUI (Wildland Urban Interface) or those proposed for SG habitat improvement consider SG habitat objectives in their design and implementation.	
4.1.1.7	Map all wildfire, prescribed burns, and fuel treatments in GrSG habitat within one year of occurrence, and develop a GIS layer of "vegetation modification" history (see "Habitat Monitoring" strategy, pg. 354; see also strategy 4.1.2.9). Track cumulative historic wildfire events under the umbrella of local fire management plans.	BLM	Annually	**BLM:** In January 2013, a national fire perimeter data call will be conducted bringing our fire map data (historic and current fires, > 10 ac) in line with national data standards. It will be updated on an annual basis after this.	
4.1.1.8	Conduct post-fire operation reviews/evaluations in areas where fires were large enough or intense enough to cause long-term degradation of GrSG habitat. The intent is to improve fire fighting priority setting, tactics, or resource availability in preparation for potential fires in sage-grouse habitat. The urgency of the review depends on when in the fire season the fire occurred, how typical or significant it was, and if there are clearly opportunities to identify and fix problems resulting from individual fires, and to learn important lessons.	BLM	Only as needed or warranted	**BLM:** One major fire has occurred on BLM in GRSG habitat since 2008. No issues were identified relative to fire fighting operations & procedures.	
4.1.1.9	At the wildland-urban interface bordering sagebrush habitats, increase public education and implement fuel reduction projects to reduce the risk of human-caused fires escaping into GrSG habitats (examples include pamphlets, news releases). [See also Information, Communication, and Education Strategy 12.2.1.3]	BLM	Annually and as needed during fire season	**BLM:** If issues are brought forward in the wildland - urban interface near SB habitat, a project is submitted under the WUI program.	
4.1.1.10	During annual training for fire fighting personnel, increase awareness of issues and potential impacts of fire and suppression activities in GrSG habitats. **[See also Information, Communication, and Education Strategy 12.3.1.1]**	BLM	Annually	**BLM:** Emphasis on SG management is part of the annual fire fighting training.	

4. Fire and Fuels Management

Objective 4.1.2	Prescribed burns and fuel treatments – impacts to habitat				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
4.1.2.1	Use prescribed burning and mechanical fuels treatments at an appropriate scale (i.e., smaller is better) to maintain or improve the quality and quantity of GrSG habitats. Consider fire scale, seasonality, and moisture regime from a GrSG habitat management perspective (as well as air quality issues, as guided by state regulations) in planning prescribed burns (see "Habitat Enhancement Strategy" [pg. 349] and Monsen 2005).	BLM	During project planning	**BLM:** All habitat and fuels projects conducted by BLM consider SG habitat objectives & site capability in their design, analysis and implementation.	
4.1.2.2	All prescribed burns or mechanical fuel treatments within sagebrush areas should have identified GrSG habitat objectives, and should consider existing sagebrush communities, site conditions, and site potential in treatment design (see "Habitat Enhancement Strategy" [pg. 349] and Monsen 2005).	BLM	Project - dependent	**BLM:** All habitat and fuels projects conducted by BLM consider SG habitat objectives & site capability in their design, analysis and implementation.	
4.1.2.3	In xeric (dry) occupied and potential GrSG habitat, design prescribed burns that are small, irregular in shape, and that encourage natural reestablishment of the native plant community. For burns that are larger than 5 acres in xeric sites in occupied or potential GrSG habitat, encourage sagebrush rehabilitation with appropriate seed mixture (see "Habitat Enhancement" strategy, pg. 349, and CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration").	BLM	As needed	**BLM:** All habitat and fuels projects conducted by BLM consider SG habitat objectives & site capability in their design, analysis and implementation.	
4.1.2.4	Avoid fire or mechanical fuel reduction treatments within GrSG habitat in areas susceptible to invasion by cheatgrass or other invasive plant species, except where they are part of a well-defined and aggressive restoration program (see "Habitat Enhancement" strategy, pg. 349).	BLM	As needed	**BLM:** All habitat and fuels projects conducted by BLM consider SG habitat objectives & site capability in their design, analysis and implementation.	
4.1.2.5	In areas where sagebrush is limited on the landscape, avoid the use of prescribed fire and other sagebrush reduction projects in areas that currently meet GrSG breeding or winter habitat requirements (see "Habitat Enhancement" strategy, pg. 349 and CCP Appendix B, "GrSG Disturbance Guidelines").	BLM	During project planning	**BLM:** All habitat and fuels projects conducted by BLM consider SG habitat objectives & site capability in their design, analysis and implementation.	
4.1.2.6	Protect sagebrush adjacent to riparian zones, meadows, lakebeds, and croplands that include important GrSG summer habitat.	BLM	During project planning	**BLM:** SG habitat objectives are considered before planning any treatment project in SG habitat. Therefore, important existing SB habitat adjacent to riparian areas that may provide brood rearing or summer habitat will be maintained.	
4.1.2.7	To avoid introduction of noxious weeds in GrSG habitat, wash vehicles and heavy equipment for fires and mechanical fuel reduction treatments prior to arrival at a new location (see "Weeds" strategy, pg. 425).	BLM	As needed	**BLM:** This is a BMP that is applied when appropriate through NEPA on projects in SG habitat.	
4.1.2.8	Consider recent drought events and their effects on GrSG habitat (e.g., understory vigor) when planning/implementing fire or fuel reduction treatment projects (see "Weather" strategy, pg. 423).	BLM	During project planning	**BLM:** All habitat and fuels projects conducted by BLM consider SG habitat objectives & site capability in their design, analysis and implementation.	
4.1.2.9	Map all burns and fuel treatments in GrSG habitat within one year of occurrence, and develop a GIS layer of "vegetation modification" history (see "Habitat Monitoring" strategy, pg. 354; see also strategy 4.1.1.7).	BLM	Annually	**BLM:** All Burns & fuel treatments will be mapped per National BLM data standards early in 2013.	
Objective 4.1.3	All fire and fuel treatments – direct impacts to GrSG				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

4. Fire and Fuels Management

4.1.3.1	Schedule prescribed burns and/or fuel treatment projects in sagebrush habitat to avoid, when possible, the GrSG seasonal use period for that area (e.g., breeding, winter; see also CCP Appendix B "GrSG Disturbance Guidelines").	BLM	During project planning	**BLM:** Timing limitations are placed on proposed habitat or fuels reduction projects in SG habitat to protect birds during the appropriate seasonal use period.	**BLM:** Limit disturbance to the bird. See CCP, disturbance guidelines for discussion & references.
4.1.3.2	When treating sagebrush areas to reduce fuels within 0.6 miles of a GrSG lek, maintain adequate canopy cover for sage-grouse (see "Breeding Habitat" in "GrSG Habitat Structural Guidelines", CCP Appendix A). Lek data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.	BLM	During project planning	**BLM:** Fuels treatments avoid the .6 mi area around a lek to protect the integrity and use of the lek site.	
Objective 4.1.4	Post-burn and -treatment habitat restoration				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
4.1.4.1	Monitor all wildfires or prescribed burns in the first 3 growing seasons post-fire, and then every 5-10 years for noxious or invasive weeds. Treat accordingly.	BLM	As needed per fire event	**BLM:** One major fire has occurred on BLM in GRSG habitat since 2008. It was treated (restoration seeding) thru the ES&R program which includes a minimum of 3 years subsequent monitoring. Additional monitoring is encouraged, and schedules are based on objectives & funding. Monitoring of smaller fires is typically conducted to determine if project objectives have been met. Schedules depend on objectives (short & long-term), staffing and funding.	
4.1.4.2	All wildfires or prescribed burns greater than 10 acres in size that are subject to cheatgrass invasion will be seeded with an appropriate seed mixture (i.e., avoid undesirable grass species; see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration" and Monsen 2005), to reduce the probability of cheatgrass establishment (see also "Habitat Enhancement" strategy, pg. 349).	BLM	As needed per fire event	**BLM:** All fires are evaluated to determine if reseeding is a desirable or necessary management tool.	
4.1.4.3	Annually evaluate all recent wildfires and prescribed burns (greater than 10 acres), and reseed if necessary to achieve GrSG habitat objectives (see "Habitat Enhancement" strategy, pg. 349).	BLM	Annually	**BLM:** All fires are evaluated to determine if reseeding is a desirable or necessary management tool.	
4.1.4.4	Ensure that GrSG habitat considerations are incorporated into restoration and burn rehabilitation plans. Use BMPs and grazing management alternatives (see CCP Appendix E, "Grazing Management Options for GrSG") for land management practices following wild and prescribed fire events (see also Monsen 2005, "Habitat Enhancement" [pg. 349], "Recreational Activities" [pg. 407] and "Grazing" [pg. 342] strategies).	BLM	During project planning	**BLM:** One major fire has occurred on BLM in GRSG habitat since 2008. It was treated (restoration seeding) thru the ES&R program with an emphasis on restoring SG habitat.	
4.1.4.5	Evaluate the response of GrSG habitat (see "Habitat Monitoring" strategy, pg. 354) to all burns and mechanical fuel reduction treatments (be certain to consider the need for weed control in the area).	BLM	Annually	**BLM:** Habitat projects on BLM are typically monitored to determine effectiveness in meeting the project objective. The schedule of monitoring is dependant on the objective (short & long term), staffing and funding.	

4. Fire and Fuels Management					
4.1.4.6	Incorporate ecologically appropriate sagebrush seed into fire rehabilitation seed mixtures as often as possible in GrSG habitat (see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration") and Monsen 2005.	BLM	During re-seeding plan	**BLM:** All ES&R plans, as well as, other reseeding projects in SG habitat incorporate the use of SB seed when appropriate.	
4.1.4.7	Encourage and strongly support the development of production and storage facilities for native seed in Colorado, including native seed banks, for use in reclamation efforts (see "Habitat Enhancement" strategy 7.1.1.5). Emphasize the use of native plants following burns/treatments in GrSG habitat whenever possible.	BLM	Annually	**BLM:** Although BLM has strongly supported and funded local native plant efforts thru the Uncompahgre Plateau Partnership and Meeker Plant Center over the last decade, we are not funding or developing a local storage facility. BLM is developing a new seed storage warehouse in Ely, Nevada. BLM has access to native seeds (including storage) at multiple national seed warehouse sites.	
4.1.4.8	When reseeding an area in GrSG habitat, use certified "weed-free" seeds (see "Habitat Enhancement" strategy 7.1.1.6 and "Weeds" strategy section, pg. 425).	BLM	During re-seeding plan	**BLM:** BLM policy requires the use of certified weed-free seed on all public lands managed by the BLM. Straws or mulches applied as part of seeding, stabilization, or restoration projects on public lands must be certified to be weed seed-free as part of this policy.	
4.1.4.9	Rehabilitate firelines or trails caused by equipment use during fire fighting activities in GrSG habitat (see "Habitat Enhancement" strategy, pg. 349).	BLM	Post-fire	**BLM:** Large scale fires are reclaimed using the ES&R program (Emergency Stabilization & Restoration). Small scale fires are reclaimed thru site specific NEPA on a cases by case basis. GRSG habitat needs are considered in both these actions where appropriate.	
4.1.4.10	Identify and secure funding to support post-fire restoration efforts in GrSG habitat.	BLM	Annually	**BLM:** BLM prioritizes restoration needs and ES&R funding on a National and State level. Important SG habitat is a priority for such efforts.	

5. Genetics

ISSUE 5.1	Research has found that the genetic and geographic distances segregate Colorado greater sage-grouse populations into at least 2 clusters (Oyler-McCance et al. 2005), which should be considered in any potential transplant.				
OBJECTIVE 5.1.1	Prevent the translocation of greater sage-grouse from the eastern part of the statewide distribution to the western part of the statewide distribution (or vice versa), to preserve unique genetic clusters.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
5.1.1.1	Conduct additional genetic sampling and analysis in GrSG populations that have not had genetic samples collected (PPR, MWR, NWCO - Zone 4B), or increase samples in appropriate populations.	CPW	5 years	**CPW:** Researcher, B. Walker, collected feather samples in the PPR and the Hiawatha portion of NWCO from 2007-2012. CPW is also collaborating with Exxon and CSU on a project to use non-invasive genetic mark-recapture data from genetic samples (feathers and pellets) in the PPR. Collection efforts are ongoing. Genetic analysis have not yet been conducted. CPW is part of the WAFWA Rangewide Connectivity Study and will be submitting samples after the 2013 lek season. Sample collection will be directed to specific areas. Previously, tissue (feather, blood, and/or fecal) samples have been collected opportunistically throughout the populations. A 2005 study by Oyler-McCance looked at genetic variation across the GrSG range.	**Thompson, T.R. 2012.** Dispersal ecology of greater sage-grouse in northwestern Colorado; evidence from demographic and genetic data. Ph.D. Dissertation, University of Idaho, Moscow, Idaho, USA. **Walker, B. L. 2012d.** Evaluation of Alternative Population Monitoring Strategies for Greater Sage-Grouse in the Parachute-Piceance-Roan Population of Northwestern Colorado. Colorado Parks and Wildlife annual progress report. **Apa, A.D. 2010.** Seasonal habitat use, movements, genetics, and vital rates in the Parachute/Piceance/Roan population of greater sage-grouse. Colorado Parks and Wildlife Final Report. Fort Collins, Colorado, USA. **CPW:** Birds from the PPR population do not appear to differ greatly from other GrSG sampled in CO.
5.1.1.2	If additional genetic testing indicates a genetic line of demarcation (north to south) between Colorado GrSG populations, all translocations should be north-south, and not east-west.	CPW	Ongoing		
ISSUE 5.2	Small isolated populations of greater sage-grouse may have low genetic diversity, which may facilitate inbreeding depression.				
OBJECTIVE 5.2.1	Monitor genetic diversity within the smaller isolated populations of greater sage-grouse in Colorado.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
5.2.1.1	To monitor the genetic diversity and isolation of GrSG populations, obtain blood and other tissue samples as GrSG are captured for other purposes, and submit for DNA testing (see also strategy 8.2.1.4).	CPW	By 2008 and ongoing	See 5.1.1.1.	
5.2.1.2	Continue to develop and refine, if it proves feasible, techniques to obtain DNA from sage-grouse fecal droppings so that genetic testing can be accomplished without capturing birds. **[See Research Strategy 21.7.1.1]**	CPW, Universities	Ongoing		
OBJECTIVE 5.2.2	Maintain genetic diversity present within individual Colorado populations of GrSG so that each small population contains 70% of the overall genetic diversity within Colorado (see also Issue 8.2, Objective 8.2.1).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
5.2.2.1	Increase genetic diversity (if found to be low) within small GrSG populations through augmentation with eggs, chicks, and/or adults.	CPW	5 years		
5.2.2.2	Develop and implement a genetic diversity monitoring plan and schedule for GrSG populations.	CPW, Denver University, USGS	2010		

6. Grazing

Issue 6.1	Lack of understanding of relationships among herbivory, GrSG populations, GrSG habitat				
Objective 6.1.1	Research - herbivore direct effects on GrSG				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
6.1.1.1	Conduct a literature review of herbivores and their effects on sage-grouse. **[See Research Strategy 21.2.1.1;** see also http://sagemap.wr.usgs.gov/ for a recently completed literature review**]**	BLM, CPW, Universities	Begin by 2020	**CPW:** Beck and Mitchell, 2000. Influences of livestock grazing on sage-grouse habitat. Wildlife Society Bulletin 28:993-1001. Cagney et al. 2010. Grazing Influence, Objective Development, and Management in Wyoming's Greater Sage-Grouse Habitat. BLM report.	
6.1.1.2	Evaluate the effects of herbivores on GrSG (e.g., nest trampling, changes in GrSG behavior, also positive effects). **[See Research Strategy 21.2.1.1]**	BLM, CPW, Universities	Begin by 2020		
Objective 6.1.2	Research - herbivory effects on GrSG habitat				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
6.1.2.1	Conduct a literature review of grazing systems and their effects on the vegetation parameters important to sage-grouse. **[See Research Strategy 21.1.2.2]**	BLM, CPW, CSU Extension, LWGs, NAGP, NRCS, Universities, USFS, WAFWA	Begin by 2015	**CPW:** Beck and Mitchell 2000. Influences of livestock grazing on sage-grouse habitat. Wildlife Society Bulletin 28:993-1001. Cagney et al. 2010. Grazing Influence, Objective Development, and Management in Wyoming's Greater Sage-Grouse Habitat. BLM report.	
6.1.2.2	Evaluate the effect of herbivores on the quality of sagebrush habitat (e.g., grass and forb abundance, diversity, and vegetative structure). **[See Research Strategy 21.1.2.2]**	BLM, CPW, CSU Extension, LWGs, NAGP, NRCS, Universities, USFS, WAFWA	Begin by 2015		
6.1.2.3	Provide incentives to private landowners to participate in research (e.g., strategy 6.1.1.2, 6.1.2.2) and monitoring actions (e.g., if a rancher is requested to rest a pasture for a research project). Develop grazing banks or help find other pasture to graze. Provide financial compensation such as fencing and water developments; however, water developments should be designed to minimize WNV risk to GrSG). [See Research Strategy 21.1.2.2]	BLM, CPW, CSU Extension, LWGs, NAGP, NRCS, Universities, USFS, WAFWA	Begin by 2015		
6.1.2.4	As results become available on research on herbivory and GrSG (e.g., strategy 6.1.1.2, 6.1.2.2), distribute them to local work groups. **[See also Information, Communication, and Education Strategy 12.3.2.1 and Research Strategy 21.1.2.2]**	BLM, CPW, CSU Extension, NRCS, USFS	Ongoing	**See 12.3.2.1**	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
Objective 6.1.3	Research - effects of GrSG habitat parameters on GrSG populations				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
6.1.3.1	Conduct a literature review of how GrSG populations respond to different habitat parameters. **[See Research Strategy 21.1.1.1]**	BLM, CDA, CPW, Industry, LWGs, NGOs, NRCS, Other Research Institutions, Private Landowners, SLB, Universities, USFS, USFWS, USGS, WAFWA	Begin by 2010	**See 21.1.1.1**	
6.1.3.2	Determine the relationship of GrSG habitat parameters to sage-grouse productivity, demographics, and population viability. **[See Research Strategies 21.1.1.1 and 21.1.1.3]**	BLM, CDA, CPW, Industry, LWGs, NGOs, NRCS, Other Research Institutions, Private Landowners, SLB, Universities, USFS, USFWS, USGS, WAFWA	Bein by 2010/2012	**See 21.1.1.1**	
Issue 6.2	Sagebrush - management of herbivores while considering GrSG habitat needs				
Objective 6.2.1	Domestic herbivore management				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
6.2.1.1	Identify GrSG seasonal habitat objectives for individual sites (dependent on site potential and environmental conditions; see CCP Appendix A, "GrSG Structural Habitat Guidelines").	BLM, CPW, LWGs, NPS, NRCS, Private Landowners, SLB, USFS, USFWS	Ongoing	**CPW:** NP - CPW, with support from the NP LWG, conducted habitat measurements at GrSG use and non-use sites across NP. The USFWS helped with funding technicians to conduct the habitat measurement. Local habitat measurement will be compared to seasonal habitat objectives. Data have been collected and currently being analyzed. A report will be provided to NP LWG. NWCO and NESR - CPW conducted habitat measurements at GrSG locations in various ecological sites. These data were compared to other GrSG structural guidelines and then used in the development of the Colorado GrSG Structural Habitat Guidelines. PPR - Partial - seasonal maps have been developed. MP - no mapping	
6.2.1.2	In cooperation with the local work groups, identify a specific menu of grazing management options (for examples, see Appendix E, "Grazing Management Options") that supports the local work group sage-grouse habitat objectives and will provide the flexibility needed for local site conditions; options should be compatible with the BLM's "Standards for Public Land Health" and "Guidelines for Livestock Grazing Management" (http://www.blm.gov/co/st/en/BLM_Programs/grazing/rm_stds_guidelines .html), as well as the "GrSG Structural Habitat Guidelines" (Appendix A). Encourage application of grazing management options for GrSG on a landscape scale, across ownership boundaries.	BLM, CSU Extension, LWGs, NRCS, SLB, USFS	Within next 2 years		
6.2.1.3	Use livestock grazing management options on private lands, where possible, and on public lands, as developed by land management agencies or LWGs, that are consistent with achieving GrSG habitat objectives. Explore the use of vacant federal allotments through the land-use planning process and CRP, to provide flexibility in grazing options recommended to achieve GrSG habitat objectives.	BLM	Ongoing	**BLM:** Grazing mangement practices on BLM are evaluated with respect to compatibility with achieving SG habitat objectives when grazing permits come up for renewal. No vacant federal allotments have been identified that could provide flexibility in grazing in SG habitat to date.	
6.2.1.4	Monitor the effectiveness of grazing management options. All stakeholders should be involved in the development of monitoring plans (see "Habitat Monitoring" strategy, pg. 354, and CCP Appendix C, "Habitat Monitoring Protocol").	BLM, CDOW, LWGs	Start within 5 years		
6.2.1.5	Use monitoring results (strategy 6.2.1.4) to adjust grazing management options (see "Adaptive Management", pg. 10).	BLM, CDOW, FSA, LWGs, NPS, NRCS, Private Landowners, SLB, USFS, USFWS	ASAP following monitoring results		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
6.2.1.6	Use results from research on grazing impacts on GrSG habitat and populations (strategies 6.1.1.2 and 6.1.2.2) to update and adjust grazing management options (see "Adaptive Management", pg. 10).	BLM	Ongoing	**BLM:** As research relative to impacts on SG or their habitat become available, that information is shared among agency biologists for use and consideration.	
6.2.1.7	Monitor (throughout the year as needed) GrSG habitat and total utilization (e.g., cattle, sheep, wild ungulates, wild horses, insects), and/or vegetation structure available during the important grouse use period, and adjust grazing management plans as necessary to achieve desired vegetation structure for GrSG. Monitoring protocol should provide data useful for determining if GrSG habitat and grazing objectives are being met (see CCP Appendix C, "Habitat Monitoring Protocol").	BLM, CPW, LWGs, NRCS, Private Landowners, USFS	Ongoing		
6.2.1.8	Evaluate the effectiveness of grazing management options in achieving GrSG habitat objectives used at the local level. Use monitoring results to adjust management options (see "Adaptive Management", pg. 10). It is critical for all stakeholders to be involved in the design of the monitoring plan.	BLM, CSU Extension, LWGs, NRCS, SLB, USFS	Within 5 years		
6.2.1.9	Evaluate the effects of grazing management changes made for GrSG on maintaining sustainable agriculture.	BLM, CPW, CSU Extension, LWGs, NRCS, Private Landowners,	Ongoing		
Objective 6.2.2	Wild herbivore management				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
6.2.2.1	Encourage the consideration of specific sage-grouse habitat objectives when revising DAU plans for deer, elk and pronghorn, particularly in revisions of big game population objectives.	BLM, CPW, LWGs, USFS	Ongoing	**CPW:** CPW staff encourage local ranchers and BLM through verbal communication to consider GrSG habitat. BLM considers GrSG habitat when analyzing grazing allotments. Several herd management areas have developed forage availability models that reserve 50% of net annual production for landscape health and wildlife habitat needs including GrSG. For example, NWCO - A combined model addresses mule deer, elk, pronghorn, and wild horses in 4 herd units that included the majority of the NWCO, NESR, and MWR populations. This model was used to set and validate big game population objectives in these herds. [Wockner et al. 2005. The Habitat Assessment Model: A tool to improve wildlife habitat management. CPW Report.] Similar forage availability/allocation models have been completed for all other portions of the range except the southwestern corner of NWCO (Blue Mountain) and southern portions of PPR. **See Appendix F: Big Game Populations in GrSG Habitat**	**CPW:** Elk populations have been reduced to or below population objectives in most portions of the NWCO, NESR, and MWR areas. For instance, elk populations in NWCO have been reduced by nearly half (from 108,959 in 2000 to 56,853 at the end of 2011-see attached table). Efforts to bring elk populations to objective continue in other areas. Populations of deer and pronghorn are generally below long-term objectives due to other environmental conditions. Forage availability/allocation models that facilitate consideration of GrSG habitat objectives when planning deer, elk and pronghorn population objectives have been completed for all portions of GrSG habitat in Colorado, with the exception of the southwestern corner of NWCO and southern portions of PPR.
6.2.2.2 (a)	Encourage the consideration of specific sage-grouse habitat objectives when revising BLM Wild Horse Herd Management Plans, where applicable.	BLM	Ongoing	**BLM:** The Sand Wash Wild Horse Herd Management Plan has not been revised since the CCP was completed. As wild horse issues are identified, SG habitat objectives will be considered when recommending appropriate management changes.	**BLM:** See CCP for discussion and references.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
6.2.2.2b				**CPW:** CPW harvest strategies are designed to meet DAU-specific population objectives for big game. The DAU planning process is open for public comment and is aimed to manage big game populations at sustainable levels and considers the total number of wild and domestic ungulates on the landscape. MP - No specific guidelines have been developed associated with GrSG habitat objectives and wild ungulate distribution and utilization. However, DAU plans (D-9) address deer management objectives for Middle Park. In theory, a healthy deer herd at or below objective should produce a healthy rangeland which would positively benefit GrSG habitat. PPR, NESR, NP - CPW has not developed specific GrSG habitat objectives with respect to wild ungulate distribution and Big Game DAU plans do not specifically address GrSG habitat objectives when determining appropriate herd population objectives.	
6.2.2.2	Develop guidelines to influence wild ungulate distribution and utilization levels in order to achieve GrSG habitat objectives.	CPW	2009		
6.2.2.3	Implement guidelines (where possible) to influence wild ungulate distribution and utilization levels in order to achieve GrSG habitat objectives.	CPW	2011 and ongoing	**CPW:** CPW revises herd management objectives on an approximate 10 year schedule. Many big game populations in sage-grouse habitat peaked in the early 2000's. CPW has aggressively reduced elk populations throughout GrSG range to bring these herds to desired objective levels.	**CPW:** Elk populations have been reduced to or below population objectives in most portions of the NWCO, NESR, and MWR areas. For instance, elk populations in NWCO have been reduced by nearly half (from 108,959 in 2000 to 56,853 at the end of 2011- see attached table). Efforts to bring elk populations to objective continue in other areas. Populations of deer and pronghorn are generally below long-term objectives due to other environmental conditions.
Issue 6.3	Funding and socioeconomic issues				
Objective 6.3.1	Identify funding, prioritize projects				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
6.3.1.1	Identify potential funding sources for GrSG habitat conservation (see CCP Appendix F, "Available Funding Opportunities for GrSG Habitat Conservation").	CCP SC	2008	**CPW:** The constituent agencies that make up the CCPSC have pursued new funding sources through their individual budget processes.	**CPW:** BLM has brought additional project money to CO. NRCS has designated funds specifically for habitat enhancement and conservation in CO. There are 3 jointly-funded private lands biologist that have been hired to administer these projects. CPW has secured $2.1 million of Species Conservation Trust Fund monies for GrSG habitat projects.
6.3.1.2	Assist local work groups in developing a process to evaluate management options and set priorities for funding habitat improvement projects.	CPW	As needed	**CPW:** General - CPW, BLM, NRCS, and private lands biologists meet routinely to plan and implement projects. Some LWGs are more involved in this process than others. CPW sagebrush habitat coordinator, hired 2011, will be developing landscape management plans and local implementation plans that will prioritize where to treat and what treatments will be most effective in our sagebrush ecosystem. MP and PPR -- CPW meets annually with LWGs where projects are proposed, discussed and reviewed. Funding is available for work on private land through NRCS programs; however many private lands tend to be in valley bottoms not used by grouse or are industry owned. The PPR LWG has not developed a process to annually review and implement habitat projects. NP and NESR - CPW meets bi-annually and annually (respectively) with the LWG and has requested habitat implementation project ideas. The BLM and CPW have initiated GrSG improvement projects. CPW and BLM consider GrSG habitat needs when deciding whether to implement a project for big game. The NP LWG has not developed a process to annually review and implement habitat projects. NESR - An influential LWG member initiated a habitat enhancement project on his private land. The LWG toured this project to get additional project ideas.	**CPW:** Communication between agencies and with the LWGs is frequent and available whenever the LWG wants.
Objective 6.3.2	Address indirect costs of responsible GrSG management				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
6.3.2.1	Assist local work groups in developing procedures to conduct cost-benefit analyses of the economic impact of different grazing management options that benefit GrSG.	BLM, CPW, CSU Extension, LWGs, NRCS, Universities, USFS, USFWS	Ongoing		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
6.3.2.2	Identify opportunities to compensate landowners for the cost of implementation of management options and facilitating practices to benefit GrSG (e.g., grazing banks, conservation easements and other options).	BLM, CPW, Land Trusts, NGOs, USFS, USFWS,	2008 and ongoing	**CPW:** Both traditional NRCS programs and the expanded Sage Grouse Initiative (SGI) funds are available to assist with the cost of implementing grazing systems. FWS's Partners for Fish and Wildlife also funds projects in GrSG habitat.	**CPW:** This process occurs annually.
6.3.2.3	Provide funding to private landowners and land managers to implement grazing management options developed in strategy 6.2.1.2.	BLM, CPW, Industry, NRCS, SLB, USFS, USFWS	Ongoing	**CPW:** General - Both traditional NRCS programs and the expanded Sage Grouse Initiative (SGI) funds are available to assist with the cost of implementing grazing systems. FWS's Partners for Fish and Wildlife also funds projects in GrSG habitat. NP - CPW, BLM, NRCS, USFS and USFWS work with Owl Mountain Partnership to implement grazing management improvements on private and public lands.	**CPW:** This process occurs annually.
6.3.2.4	Conduct a cost-benefit analysis of the economic impact on local communities when planning for the management of the wild ungulates.	CPW	As needed	**CPW:** Cost-benefit analysis for wild ungulates in relation to local communities has been conducted at large scales but not for PPR specifically. NP and NESR - The big game DAU plans for NP consider the economic costs and benefits with respect to wild ungulate management.	
6.3.2.5	Continue support for HPP and game damage programs that address wild ungulate herbivory on private land.	CPW	Ongoing	**CPW:** General - CPW continues its support and oversight of the Habitat Protection Program. HPP committees receive 5% of the big game license fees collected in their area to use for damage mitigation and habitat improvement. CPW monitors HPP projects to ensure that they do not impact GrSG populations. NWCO, MWR, MP, NP, PPR and NESR - All GrSG habitat has an active HPP committee.	
Issue 6.4	Lack of cooperation, communication, and respect among stakeholders				
Objective 6.4.1	Foster information sharing				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
6.4.1.1	Ensure that private land managers, permittees, conservation groups, and other interested publics are encouraged to be involved in land management planning (e.g., AMP planning, DAU plans) that involve sage-grouse habitats.	BLM, CPW, USFS	Ongoing	**BLM:** BLM conducts public scoping meetings and provides opportunites for public input during our planning process. During local project planning, all affected parties are involved in development of proposed management actions. The public is notified of proposed action and the BLM receives comments during the NEPA process. **CPW:** General - CPW harvest strategies are designed to meet DAU-specific population objectives for big game. The DAU planning process is open for public comment and is aimed to manage big game populations at sustainable levels and considers the total number of wild and domestic ungulates on the landscape. Public meetings are announced and held for the majority of CPW plans and proposed research projects. CPW is pursuing additional opportunities for input including web based surveys and to review documents on-line. CPW encourages participation from multiple parties on the LWGs. Various parties are represented on the LWG and are involved with GrSG habitats and planning.	
6.4.1.2	Develop a public outreach/education program about domestic and wild grazing and GrSG needs (e.g., create a traveling display to be used at schools, county fairs). Be certain that part of the educational material identifies the contribution of landowners to sage-grouse conservation. [See Information, Communication, and Education Strategies 12.2.1.1, 12.2.1.2, 12.2.1.3, and 12.2.1.4]	CPW	2009	**CPW:** Has not been done specific to grazing.	
6.4.1.3	Develop an internet website through which local work groups can share information. Include a link from the CDOW website. **[See Information, Communication, and Education Strategy 12.3.2.1]**	CPW	2008 and ongoing	**CPW:** CPW has all conservation plans, research, and basic information about GrSG posted on its website.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
6.4.1.4	Establish controlled or regulated tours to impart an understanding of the various aspects of GrSG habitat. Be certain that part of the educational material identifies the contribution of landowners and public lands to sage-grouse conservation. Have a training and/or education program for the people who lead lek-viewing tours. [See Information, Communication, and Education Strategies 12.2.1.1, 12.2.1.2, 12.2.1.3, and 12.2.1.4]	CPW	2009	**CPW:** NWCO - CPW has coordinated, helped coordinate, or participate in several private lands habitat tours over the past 4 years to look at land management practices in GRSG habitat, most recently as part of the WAFWA Sage and Columbian Sharp-tailed Grouse Workshop in summer 2012. Lek viewing tours in NWCO are conducted and regulated. MP - The Middle Park LWG has hosted several public habitat tours over the last decade, many of which highlighted habitat treatments that were conducted to improve GrSG habitat and livestock grazing. PPR - Several field trips to the PPR that discuss GrSG habitat, sagebrush, and mitigation have been conducted over the past 5 years. Lek tours are not given in the PPR population as most leks are too difficult to access. NP - Owl Mountain Partnership and NP HPP have led several tours (usually at least one per year) to discuss habitat improvement projects across public and private ownership boundaries. These tours generally discuss GrSG habitats as well as the importance of the mix of public and private land for conserving GrSG habitats. CPW has developed a watchable wildlife brochure for lek viewing in NP. NESR - CPW organized a LWG tour to review and discuss habitat improvement projects in NESR. Tour focused on private land and the importance of private land for the NESR GrSG population. CPW is not aware of lek viewing tours in NESR. The majority of leks are located on private land and landowners do not allow public access.	**CPW:** During these tours proper grazing is touted as a valuable contribution to GrSG conservation.
6.4.1.5	Develop elementary, middle, and high school curricula that include grazing and grouse management, to fit Colorado educational standards. **[See Information, Communication, and Education Strategies 12.2.1.2 and 12.2.1.4]**	CPW	2009	**CPW:** MP - During the summer of 2012 CPW and NRCS participated in the first NW Future Farmers of America school program to combine the principles of livestock grazing and natural resource management. Students were introduced to science principles practiced in grazing and wildlife management, specifically GrSG, in a field setting. Students were from high schools in Grand, Jackson and Moffat counties. This plans to be continued in future years.	

7. Habitat Enhancement

ISSUE 7.1	Improper design or implementation of vegetation enhancement treatments may not meet habitat objectives and may lead to degraded GrSG habitats.				
OBJECTIVE 7.1.1	Conduct proper planning for sagebrush, riparian, and wet meadow restoration and improvement projects that provide the structural habitat requirements in breeding, summer-fall, and winter sage-grouse habitats.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
7.1.1.1	Identify the sage-grouse habitat treatment objective(s) in a given population, sub-population, or population zone area, and review annually (see CCP Appendix A, "GrSG Structural Habitat Guidelines").	BLM, CPW, LWGs, NRCS, Private Landowners, SLB, USFS, USFWS	When project is proposed	**CPW: General -** Population scale habitat treatment objectives are in an early state, but project level identification of these objectives occurs routinely. CPW has hired a sagebrush steppe habitat coordinator who is beginning work to identify these population-wide objectives, starting in portions of the **NWCO** population. **NP** - CPW, BLM, NRCS, USFS and USFWS work with Owl Mountain Partnership and NP HPP to implement habitat improvement projects on private and public lands in NP. GrSG habitat requirements are considered when planning habitat improvement projects in NP.	The multiple parties listed here are reconsidering the effectiveness of sagebrush treatment projects as a GrSG habitat enhancement project in NP.
7.1.1.2	Identify the ecological site characteristics and sagebrush species associated with the project area in GrSG habitat.	BLM, CPW, LWGs, NRCS, Private Landowners, SLB, USFS, USFWS	When project is proposed	**CPW: General -** CPW and BLM identify the ecological site characteristics associated with projects in GrSG habitat. CPW and BLM attempt to identify the sagebrush species for projects in GrSG.	Strategy complicated due to the presence of sagebrush hybrids throughout much of Colorado GrSG habitat.
7.1.1.3	Consult Monsen (2005), and select appropriate treatment options suitable for the site characteristics and treatment objectives in GrSG habitat.	BLM, CPW, LWGs, NRCS, Private Landowners, SLB, USFS, USFWS	During project planning	**CPW: General -** Monsen (2005) and/or other valid treatment references are consulted by CPW biologists during treatment planning to determine appropriate treatment methods. CPW landscape scale treatment planning (Sagebrush Biome Habitat Coordinator) will also include assessments of the most appropriate treatment methodologies for areas of GrSG habitat.	
7.1.1.4	Conduct pre-project planning for treatment areas in GrSG habitat (e.g., project design, necessary archaeological clearances, EAs).	BLM, CPW, LWGs, NRCS, Private Landowners, SLB, USFS, USFWS	During project planning	**CPW: General -** Project pre-planning is a routine part of project level planning in GrSG habitat. **Portions of NWCO and PPR** have accomplished programmatic NEPA clearances for GrSG habitat activities (e.g., PJ removal), expediting project level planning. **NWCO** - Project planning and necessary clearances have been conducted for numerous PJ removal projects in Management Zones 5, 6, and 7. **MP** - Project planning was conducted prior to the PJ removal project completed summer 2012 on private lands. CPW, NRCS and FWS worked to identify the project boundaries, develop contract, and flag work areas. **PPR** - This is done by BLM to clear BLM lands for PJ treatments as a joint effort with CPW. **NP -** CPW, BLM, NRCS, USFS and USFWS work with Owl Mountain Partnership and NP HPP to implement habitat improvement projects on private and public lands in NP. The project proponents conduct the pre-project planning for treatment areas. **NESR** - CPW, BLM, NRCS, USFS and USFWS implement habitat improvement projects on private and public lands in NESR. The project proponents conduct the pre-project planning for treatment areas.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
7.1.1.5	Encourage and strongly support development of production and storage of native seed in Colorado, including native seed banks, for use in reclamation efforts in GrSG habitat (see also "Fire and Fuels Management" strategy 4.1.4.7.) Work cooperatively with the Uncompahgre Project (UP), Upper Colorado Environmental Plant Center (UCEPC), and other entities in the development and storage of native seed for restoration purposes.	BLM, CPW, LWGs, NRCS, SCDs, SLB, UCEPC, UP, USFS, USFWS	Ongoing	**Upper CO Environmental Plant Center** has conducted 8 Replicated Field Evaluation Plantings in CO since 2004. Intended to identify which native plants are most easily established. Some have been subsequently released as formal products to the commercial seed industry for reclamation. **CPW:** CPW completed the Seed Warehouse in Delta in 2012 as a storage repository for native seed to be used on habitat enhancement/restoration projects in western Colorado (e.g., rehabilitation of the 2012 Pine Ridge Fire on the SW side of PPR. Through multiple partners, a variety of native collections are being developed and the propagation of native species by commercial growers is continuing.	
7.1.1.6	When reseeding an area in GrSG habitat, use certified "weed-free" seeds (see "Fire and Fuels Management" strategy 4.1.4.8 and "Weeds" strategy section, pg. 425).	BLM, CPW, LWGs, NRCS, SCDs, SLB, UCEPC, UP, USFS, USFWS	Ongoing	**Upper CO Environmental Plant Center** develops, produces, sells and promotes the use of certified seed. Available since 1975. **CPW**: CPW recommends and uses certified weed free seed when possible. The CPW native seed storage facility should help with this action by providing storage for appropriate seed stocks. BLM, USFS, and NRCS require certified "weed-free" seeds on many projects.	
OBJECTIVE 7.1.2	Conduct and monitor restoration for improvement of the vegetation structural habitat requirements necessary for productive breeding, summer-fall, and winter sage-grouse habitats.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
7.1.2.1	Conduct pre-restoration monitoring using a recognized technique appropriate to measure the treatment objective(s) in GrSG habitat (see "Habitat Monitoring" strategy, pg. 354 and CCP Appendix C, "Habitat Monitoring Protocol").	BLM, CPW, LWGs, NRCS, Private Landowners, SLB, USFS, USFWS	During project planning	**CPW: General -** Standardized monitoring of GrSG habitat enhancement projects is still in development, but is being increasingly implemented for individual projects. CPW's Sagebrush Steppe Habitat Coordinator will assist with developing standardized monitoring protocols for CPW projects. **MP** - Conducted presence/absence surveys prior to the PJ removal treatment completed in 2012. **PPR** - BLM and CPW conducted veg transects in GrSG habitat before a prescribed burn was implemented. **NP -** CPW, BLM, NRCS, USFS and USFWS work with Owl Mountain Partnership and NP HPP to implement habitat improvement projects on private and public lands in NP. Pre-treatment monitoring transects have been conducted at the majority of sagebrush habitat enhancement projects in NP. **NESR -** Pre-treatment habitat measurement data are available for a small portion of the vegetation enhancement projects in NESR. However, only before photos are available for most of the PJ projects.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
7.1.2.2	Implement the appropriate treatment/restoration action(s) in GrSG habitat (Monsen 2005).	BLM, CPW, LWGs, NPS, NRCS, Private Landowners, SLB, USFS, USFWS	Project specific	**NRCS**: completed 8 conservation plans in GSG habitat that meet criteria of NRCS Conference Report. Completed through EQIP. **CPW:** General - Numerous treatment projects have been completed in GrSG habitat since 2004, including control of PJ encroachment, restoration of agricultural lands to suitable habitat, development of wet meadow sites, wildfire restoration/seeding, and understory restoration (reference number and acreage of treatments from table). NWCO - PJ removal projects have been completed in management zones 5, 6, and 7. MP - A GrSG habitat site with encroaching PJ at stage 1 and 2 was treated to remove PJ in the summer of 2012. NP - CPW, BLM, NRCS, USFS and USFWS work with Owl Mountain Partnership and NP HPP to implement habitat improvement projects on private and public lands in NP. GrSG habitat requirements are considered when planning habitat improvement projects in NP. The multiple parties listed above are reconsidering the effectiveness of sagebrush treatment projects as a GrSG habitat enhancement project in NP. NESR - CPW, BLM, NRCS, USFS and USFWS implement habitat improvement projects on private and public lands in NESR. GrSG habitat requirements are considered when planning habitat improvement projects in NESR. **See Appendix A: Habitat Treatments** **See Appendix B: Summary of Expenditures on GrSG in Colorado 2006-2012**	**NRCS:** 3,000 acres of private land in GSG habitat now in compliance with NRCS / USFWS Conference Report.
7.1.2.3	Monitor vegetation response to treatments in GrSG habitat using appropriate monitoring technique and timing for the treatment type (see “Habitat Monitoring” strategy, pg. 354 and CCP Appendix C, “Habitat Monitoring Protocol”).	BLM, CPW, LWGs, NPS, NRCS, Private Landowners, SLB, USFS, USFWS	Post-treatment + every 5 years	**CPW: General -** Standardized monitoring of GrSG habitat enhancement projects is still in development, but is being increasingly implemented for individual projects. CPW's Sagebrush Steppe Habitat Coordinator will assist with developing standardized monitoring protocols for CPW projects. **NP -** CPW, BLM, NRCS, USFS and USFWS work with Owl Mountain Partnership and NP HPP to implement habitat improvement projects on private and public lands in NP. Post-treatment monitoring transects have been conducted at several of the sagebrush habitat enhancement projects in NP. **NESR -** Post-treatment photos are available for the PJ projects in NESR. Post-treatment vegetation measurements are generally not available. **MP -** not completed.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
7.1.2.4	Evaluate the effectiveness of vegetation enhancement treatments on GrSG. **[See Research Strategy 21.1.2.1]**	BLM, CDA, CPW, LWGs, NRCS, Private Landowners, UCEPC, USFS, USFWS, USGS	Begin by 2015	**CPW: General -** Project level effectiveness in achieving vegetative goals can be determined by project monitoring. Systematic assessment of vegetation enhancement treatments, particularly their effect on GrSG populations will require a research project designed and funded to assess specific vegetation and/or GrSG objectives and exceeds the capability of local field studies. **PPR -** CPW/BLM PJ removal research by CPW Researcher B. Walker is using pellet transects to determine change in GrSG occupancy after treatment to assess effectiveness. **NP -** CPW, BLM, NRCS, USFS and USFWS work with Owl Mountain Partnership and NP HPP to implement habitat improvement projects on private and public lands in NP. GrSG habitat requirements are considered when planning habitat improvement projects in NP.	The multiple parties listed here are reconsidering the effectiveness of sagebrush treatment projects as a GrSG habitat enhancement project in NP. CPW is currently determining whether NP GrSG telemetry data can be used to evaluate the effectivemess of vegetaion treatements on GrSG in NP.

8. Habitat Linkages

ISSUE 8.1	Movement of GrSG is becoming increasingly limited by a reduction of suitable and available habitat linkages *within populations* .				
OBJECTIVE 8.1.1	Maintain or reestablish linkages within populations where fragmentation and isolation of occupied habitats has occurred (e.g., NESR, NWCO populations).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
8.1.1.1	Within GrSG population areas, prioritize and refine mapped intra-population linkages that are most important to GrSG movements and dispersal.	CPW	2008	**CPW:** CPW Researchers T. Apa and B. Walker have demonstrated several intra-population linkages in NWCO with radio telemetered GrSG. Specifically, GrSG linkages exist between Management Zones 1 and 2, 2 and 3a, 3a and 5, and 5 and 6 in the NWCO population. Management Zone 3a has been identified as a key linkage that maintains the opportunity for gene flow through much of the NWCO population.	**CPW:** GrSG linkages exist between Management Zones 1 and 2, 2 and 3a, 3a and 5, and 5 and 6 in the NWCO population. Management Zone 3a has been identified as a key linkage that maintains the opportunity for gene flow through much of the NWCO population.
8.1.1.2	In high priority GrSG intra-population linkages (see strategy 8.1.1.1), pursue opportunities to protect areas from permanent loss (e.g., management plans, easements, land exchanges, acquisitions).	BLM, CPW, Land Trusts, Counties, Private Landowners, SLB, USFS	2009 and ongoing	**CPW:** CPW is continually looking for opportunities to protect key intra-population linkages. CPW is pursuing several conservation easements in the NWCO intra-population linkage areas identified above. CPW also includes the need to protect these areas in land use comments to BLM and other entities. **PPR -** Maintenance of intra-population linkages is one of several management strategies employed in WMPs.	**CPW:** CPW closed a 15,156 acre conservation easement in the NWCO intra-population linkage between Management Zone 5 and 6 in 2012.
8.1.1.3	In high priority GrSG intra-population linkages (see strategy 8.1.1.1), pursue opportunities for improving GrSG habitat (e.g., piñon-juniper removal, protection/enhancement of existing sagebrush communities; see "Habitat Enhancement" [pg. 349] and "Piñon – Juniper Encroachment" [pg. 396] strategies).	BLM, CPW, LWGs, NRCS. Private Landowners, SLB, USFS	2009 and ongoing	**CPW:** CPW has conducted a number of PJ removal projects to maintain intra-population linkages. A number of additional areas would still benefit from vegetation treatment.	**CPW: NWCO -** PJ removal in the Peck Mesa portion of Management Zone 5 maintains linkage to MZ 2. **PPR -** PJ removal has occurred in North PPR to reconnect isolated areas of habitat.
ISSUE 8.2	Genetic interchange and movement of GrSG *between populations* may become increasingly limited by the lack of suitable linkages (see also Issue 5.2).				
OBJECTIVE 8.2.1	Pursue opportunities to develop and maintain linkages between GrSG populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
8.2.1.1	In linkage areas between GrSG populations, prioritize and refine mapped inter-population linkages that could offer GrSG movement opportunities and potential for genetic interchange. Address issues of isolated populations during the prioritization process.	CPW	2008	**CPW: General -** In 2012, CPW refined the habitat linkage areas between GrSG populations across the range in CO. These were originally developed in the CCP. It is assumed these linkages will allow for movements between populations and will decrease the probability of extinction. The linkage data is updated as information is available and during SAM mapping updates every 4 years.	**CPW:** These linkages are being considered "general" habitat in the BLM Sage-grouse EIS and will have the same level of protection as general habitat on BLM and Forest Service lands. Recent radio telemetry has demonstrated that GrSG use the linkage area between NP and MP.
8.2.1.2	In high priority GrSG inter-population linkage areas (see strategy 8.2.1.1) that are on public lands, work to protect and improve habitat characteristics for GrSG (see "Habitat Enhancement" strategy, pg. 349).	BLM	2009 and ongoing	**BLM:** No specific actions have been implemented to to improve habitat in linkage areas. Any management activities proposed in linkages do consider the potential implications to SG movement within and between populations.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
8.2.1.3	In high priority GrSG inter-population linkage areas (see strategy 8.2.1.1) that are on private lands, work with willing landowners to protect and enhance habitat characteristics for GrSG (e.g., management plans, conservation easements).	Counties, CPW, Land trusts, LWGs, NRCS, Private Landowners	2010 and ongoing	**CPW:** These linkages are being considered "general" habitat in the BLM Sage-grouse EIS and will have the same level of protection as general habitat on BLM and Forest Service lands. CPW is pursuing conservation easements in linkage areas between NWCO and MWR, between MWR and PPR, and between MP and NESR.	**CPW:** CPW has secured a conservation easement in the Yellow Jacket Pass area, a linkage between **NWCO and MWR**. **MP -** A 1,115 acre conservation easement was completed in the linkage between MP and NESR in 2008.
8.2.1.4	Using results of population genetic testing (see Strategy 5.2.1.1), review prioritization of inter-population linkages.	CPW	2008 and ongoing	**CPW:** Preliminary genetic evaluations presented in the CCP indicate some genetic separation of NP, NESR, and MP from the remaining populations. Additional, genetic work in relation to linkages has not yet been conducted, however, CPW will be participating with a multi-state genetic study beginning in 2013. These results will be used to inform linkage evaluations and potential future transplants of GrSG.	

9. Habitat Monitoring

ISSUE 9.1	Information on the location and condition of current seasonal habitats for GrSG in Colorado may not be adequate to effectively manage, maintain, and/or improve those habitats.				
OBJECTIVE 9.1.1	On a statewide basis, identify and delineate current GrSG habitat and track future changes in habitat.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
9.1.1.1	Develop inventory technique(s) (in conjunction with similar efforts for GuSG) for searching "vacant/unknown" habitat areas for sage-grouse use. Techniques should: (1) determine grouse presence and/or use; and (2) assist in delineating and distinguishing between "suitable vacant" areas and "suitable unknown" areas (using GIS mapping).	CPW	2008	**CPW: General -** CPW updates range maps for GrSG once every 4 years. Occupied range for GrSG was updated statewide in 2012 in conjunction with development of Priority Habitat maps. Vacant/unknown habitat polygons were also updated during this process, with some areas becoming occupied range and others being removed as unsuitable. **PPR** - Pellet transects were used to search for presence of GrSG on the Sunnyside area North and West of the Battlements. This area was vacant/unknown at the time but has now been changed to occupied (at least during extreme winters). CPW Researcher B. Walker has also used pellet transects to look at detection probability and occupancy. **NP and MP-** Inventory of vacant and unknown habitats is not an issue for NP or MP. The entirety of North Park and vast majority of Middle Park is GrSG habitat.	
9.1.1.2	In conjunction with efforts for GuSG, develop technique(s) to use in searching for new or previously unknown GrSG leks.	CPW	2008	**CPW Research:** CPW (Brett Walker) has been deploying solar GPS satellite transmitters on GRSG in the Hiawatha field (2010-2012) and in the PPR (2012) as part of a project evaluating lek-based monitoring and management strategies (Walker 2012a, Walker 2012b). Tracking morning locations of GPS males during the breeding season allows identification, confirmation, and counting of new GRSG leks. In addition, dual-frame sampling from helicopter has been conducted in four population zones in Colorado (North Park in 2009, Great Divide in 2010, and PPR in 2012). Dual-frame sampling includes surveying for GRSG leks within a spatially balanced random sample of 1 x 1 km cells (Walker 2012d). CPW Research: (1) Walker, B. L. 2012a. Using GPS Satellite Transmitters to Estimate Survival, Detectability on Leks, Lek Attendance, Inter-lek Movements, and Breeding-Season Habitat Use of Male Greater Sage-Grouse in Northwestern Colorado. Colorado Parks and Wildlife annual progress report. (2) Walker, B. L. 2012b. Evaluating Lek-Based Monitoring and Management Strategies for Greater Sage-Grouse in the Parachute-Piceance-Roan Population in Northwestern Colorado. Colorado Parks and Wildlife annual progress report. (3) Walker, B. L. 2012d. Evaluation of Alternative Population Monitoring Strategies for Greater Sage-Grouse in the Parachute-Piceance-Roan Population of Northwestern Colorado. Colorado Parks and Wildlife annual progress report. **CPW:** CPW staff note new leks found during lek counts each spring and lek data is updated annually. Ad hoc searches for new lek sites occur annual as time and conditions permit. Researcher B. Walker is currently using helicopter flights and dual-frame sampling techniques to discover new lek locations in PPR. Dual frame sampling has already been applied to NP and portions of NWCO.	**CPW Research:** Tracking males with GPS transmitters resulted in the discovery and confirmation of 5 new leks in the Hiawatha area in spring 2011 and 2012 (Walker 2012a). Dual-frame sampling from helicopter resulted in the discovery of 7 new GRSG leks in the PPR in spring 2012 (Walker 2012d).

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
9.1.1.3	Survey and search vacant/unknown habitat for GrSG use and leks.	CPW	2009 and ongoing	**CPW Research:** See 9.1.1.2 above. **CPW:** NWCO - There is only a small amount of mapped "vacant/unknown" habitat in the NW Colorado GRSG population area and it has not been searched. Survey work and searches have been conducted in mapped occupied range to fill in gaps in known lek distribution, resulting in the location of several new leks over the past 4 years. Dual Frame Sampling has been conducted in north-central and northwest portions of NWCO. MWR - Some areas with no known leks have been searched. No additional leks (beyond the one currently active lek) were found, but additional areas are yet to be searched. MP - Portions of the vacant/unknown habitat will be searched for leks in Spring 2013. Landowners were contacted in fall 2012. PPR - Dual Frame Sampling techniques currently being conducted in occupied range may be extrapolated to vacant/unknown areas if it proves to work well in occupied range. NP - CPW conducted Dual Frame sampling in NP to locate new leks, but did not locate any additional leks. CPW continually searches for new leks from the ground when conducting lek counts. NESR - In 2010, CPW conducted helicopter flights in historic habitat to search for new leks. CPW has not organized a robust survey of the suitable vacant/unknown habitat in NESR. CPW does follow-up on anecdotal sightings in vacant or unknown habitat.	
9.1.1.4	Update the CDOW habitat map using new GrSG habitat categories: “Suitable Occupied”, “Suitable Unknown”, “Suitable Vacant”, and “Potentially Suitable Habitat” *. Within the “Potentially Suitable Habitat” category, consider the relative restoration priority of each habitat area.	CPW	2008	**CPW:** These mapping definitions have been applied to CPW GrSG habitat mapping. CPW has produced several landscape scale habitat maps utilizing a variety of mapping and modeling techniques, as well as the 2012 priority habitat map. CPW GrSG maps were up-dated in 2012 to more accurately reflect areas currently occupied. In addition, these maps are revisited every 4 years and updates are made where needed. CPW has a working sense of the relative restoration priority of habitat areas. This will be more systematically defined as the Sagebrush Steppe Habitat Coordinator completes landscape habitat planning in GrSG habitat.	**CPW:** CPW GrSG maps now include these mapping definitions.
9.1.1.5	Review and update statewide GrSG habitat-related mapping efforts.	BLM, CPW	Every 10 years, or as necessary	**CPW:** CPW conducted a comprehensive review of GrSG overall range and seasonal habitat maps in 2012. CPW revised and updated the overall range map to accurately reflect vegetation conditions and recent telemetry results. Rangewide seasonal habitat maps for breeding, summer, and winter seasons were developed and used to formulate Priority Habitat polygons. In addition, fine scale seasonal habitat models are being developed in areas of high energy development potential (PPR and the Hiawatha portion of NWCO).	**CPW:** CPW conducted a comprehensive review of GrSG overall range and seasonal habitat maps in 2012.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
9.1.1.6	In conjunction with GuSG efforts, delineate sagebrush communities by species and/or groups of species using GIS modeling techniques.	CPW	2009	**CPW:** Sagebrush communities have been delineated from other shrub communities in some areas using GIS (Basinwide Vegetation Project) but not always to species. Further refinement of sagebrush species mapping has been explored with CPW/USGS. A "Sage Map" proposal was submitted for a portion of the GuSG range. The proposal was not funded due to limitations in current ability to utilize modeling or remote means to quantify sagebrush community composition at a scale that is useful to management. Current remote efforts are limited to total shrub cover, average shrub height, and bare ground measurements relating to land health indicators and not sagebrush community type. The Wyoming Basin Ecoregional Assessment produced several quality models to quantify sagebrush habitat quality relating to patch size, fragmentation, distance to human disturbance, etc. CPW is assessing the applicability of these models to Colorado.	
9.1.1.7	Develop and implement a process and standardized template for acquiring information on habitat projects, activities, and changes. Keep information requests with landowners focused and to a minimum.	CPW	2008	**CPW: General -** At present, CPW maintains a list of GrSG habitat treatments conducted that contains limited information regarding project type, location, etc. The CPW Habitat Coordinators are working on a standardized template/methodology for collecting habitat project data. CPW is evaluating the USGS LTDL program. **MP** - The MP LWG meets twice a year to review projects completed during the prior field season and to propose new GrSG projects. All projects (habitat, education, easements, etc) are recorded in a spreadsheet that contains project title, description, lead party, partners, cost, acres impacted, conception date and completion date. This information has been recorded by the LWG and incorporated in CPW reports forwarded to the FWS annually since 2004. **NP** - Kremmling BLM has been recording a GIS database of habitat improvement projects in NP.	
9.1.1.8	Create a central GIS database to track all sagebrush modification treatments and natural disturbances across GrSG range. This task will include database maintenance and updates.	CPW, BLM	2009	**BLM:** This has not been done for GRSG. All habitat treatment and fire data on public lands are available through individual program databases. **CPW:** See 9.1.1.7. CPW is assessing the USGS LTDL program. This database has not been created for GrSG but a similar one was created for GuSG and can now be used as a template.	
9.1.1.9	Define GrSG seasonal habitats and map them into the GIS database. Incorporate GIS modeling techniques such as slope and aspect, observational data, and habitat assessment data into the seasonal habitat definitions.	CPW	2008	**CPW Research:** See 3.2.3.1 above. **CPW:** General - These mapping efforts occur both at the local population level and rangewide level. Local biologists and district officer update seasonal habitats at least every 4 years during the CPW SAM updates. In September 2012, CPW's Research Section (M. Rice) completed seasonal habitat mapping for GrSG statewide. NP - CPW implemented a radio-telemetry project in North Park to refine the seasonal habitat models for NP. Data are currently being processed. PPR and portions of NWCO - Fine-scale seasonal habitat maps are being developed for the PPR at present (CPW Researcher B. Walker). These fine-scale seasonal habitat models incorporate vegetation types, landscape variables, and telemetry locations.	
9.1.1.10	Evaluate the amount and spatial arrangement of GrSG habitat in Colorado.	CPW	2015	**CPW Research:** See 3.2.3.1. Seasonal habitat maps for the PPR and Hiawatha could be used to estimate the amount of GRSG habitat in these areas, but this has not been done.	**CPW:** More current and higher resolution vegetation maps will be necessary to accomplish this at a meaningful scale and level of detail.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
9.1.1.11	Develop a method of reporting and archiving data that facilitates evaluation of the effectiveness of management programs and how they meet the habitat objectives outlined in this plan.	CCP SC	2008	**CPW:** In 2012, CPW initiated development of a habitat enhancement tracking system that will systematically track project parameters, costs, and spatial data. This will provide a place to collect monitoring data on these projects. CPW has hired a habitat coordinator for sagebrush systems who has been tasked with development and implementation of this system in concert with CPW GIS specialists and field biologists.	
9.1.1.12	Develop and apply landscape-level GrSG habitat monitoring guidelines.	CPW	2010	**CPW Research:** See 3.2.3.1 above. Seasonal habitat mapping analyses have allowed us to generate landscape-scale habitat guidelines for GRSG in the PPR (Walker et al. 2010a). These guidelines show the mean, variation, and range of values for different landscape features that can be considered suitable habitat for GRSG. **CPW:** Several habitat monitoring guidelines have been developed and are being utilized at individual population zones for habitat monitoring. BLM's Habitat Assessment Framework (HAF) is an attempt at this at large scales, but is more an "assessment guideline" than a true monitoring effort. CPW and BLM staff attended joint training on the HAF process in 2012. Monitoring guidelines from the GuSG and GrSG plans are being implemented on several projects. CPW's Sagebrush Steppe Habitat Coordinator is developing monitoring standards that can be implemented more holistically and that will allow comparison with data collected with BLM and NRCS methodologies.	
OBJECTIVE 9.1.2	On a local basis, identify and delineate current GrSG habitat and track future changes in habitat.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
9.1.2.1	Use the standard sage-grouse habitat assessment protocol that was developed through the GuSG Rangewide Conservation Plan to assess GrSG habitat conditions (CCP Appendix C, “Habitat Monitoring Protocol”), and compare results to the GrSG habitat structural guidelines (see CCP Appendix A, “GrSG Habitat Structural Guidelines”). This protocol identifies which habitat variables should be measured (e.g., grass height) and which techniques should be used to measure them.	BLM, CPW, LWGs, NRCS, SLB, USFS, USFWS	Ongoing	**CPW: General -** CPW research data from NWCO and NESR has been used to develop Colorado-specific habitat structural guidelines for GrSG and to create habitat models for seasonal habitat mapping. **NWCO -** GrSG habitat measurements have been taken at a large number of use and non-use sites during CPW research projects in several areas of the NWCO population. **NP** - CPW conducted habitat measurements at over 300 GrSG use and non-use sites in NP as part of the NP telemetry study. The habitat measurement protocol was developed in consultation with CPW Avian Research. The protocol used standard methods so that data would be comparable to the GrSG Habitat Structural Guidelines, as well as data collected in other areas in Colorado. **NESR -** CPW completed vegetation measurements in NESR between 2004 - 2007. CPW used a vegetation protocol developed by CPW Avian Research that was similar to other GrSG and GuSG research studies. The protocol included the standard measurements described in the GrSG Habitat Structural Guidelines. **MP -** Data collected in other Colorado populations has been used when needed in MP. These data and resulting habitat structural guidelines have been shared with other entities.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
9.1.2.2	Develop and implement habitat assessment training for LWGs, private landowners, and other land managers.	CPW	2008	**CPW: General -** Multiple efforts have been employed and additional efforts are ongoing. "Monitoring of Greater Sage-grouse Habitats and Populations", "Colorado Range Monitoring Guide", and many other products have been developed and distributed to the public at large throughout the state. CPW biologists attended a joint training session with BLM biologists on assessing GrSG habitat with the BLM Habitat Assessment Framework in 2012. **NWCO and MWR -**This has not been done in these populations by CPW, but other organizations have intermittently organized grazing management workshops for private landowners and land managers in northwest Colorado. **MP** - The Middle Park LWG hosted a grazing and habitat assessment workshop (Range School) for private and public land managers in November 2008. The workshop had approximately 30 participants. **PPR** - Habitat assessment field trips have been undertaken in the PPR. Attendance consisted mostly of agency personnel. **NESR** - This type of training has not occurred in NESR.	
9.1.2.3	Obtain funding sources to support habitat monitoring implementation on a statewide basis for local GrSG populations. **[See Research Strategy 21.1.1.1]**	BLM, CDA, CPW, Industry, LWGs, NGOs, NRCS, Other Research Institutions, Private Landowners, SLB, Universities, USFS, USFWS, USGS, WAFWA	Begin by 2010	**See** 21.1.1.1 **CPW**: NP - CPW obtained funding for a NP telemetry study and conducted habitat measurements at over 300 GrSG use and non-use sites in NP.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
9.1.2.4	Evaluate the impact of vegetation condition (see "GrSG Structural Habitat Guidelines", CCP Appendix A) on GrSG populations.	CPW	2015	**CPW:** Efforts to accomplish this strategy are ongoing. The population dynamics of GrSG populations and timeframes required for sagebrush communities to responded to management action, make quantifying population responses of GrSG to vegetation condition challenging. CPW will be conducting a research project on Columbian Sharp-tailed Grouse in Routt County to attempt to quantify how modifying habitat conditions and availability will impact populations of this grouse. Results of this project should inform efforts to evaluate vegetation effects on GrSG as well. **NWCO -** Extensive habitat and use data has been collected in several areas within NWCO that will ultimately inform this process. However, no specific cause and effect research assessing the impact of vegetation condition has been conducted to date. **MP** - CPW and BLM Kremmling Field Office are selecting sites to evaluate during the summer of 2013 within GrSG occupied range in Middle Park. **PPR -** Research by B. Walker and T. Apa has looked at the unique vegetation conditions found in the PPR in relation to distribution and success of GrSG in PPR. A current project by CPW Researcher B. Walker is attempting to define the effect of pinyon-juniper removal on reoccupation of sites by GrSG. **NP** - CPW conducted extensive vegetation measurements at over 300 GrSG use and non-use sites in NP. The vegetation data will be used to refine the NP seasonal habitat modeling products. The vegetation data are also being analyzed to compare with the GrSG Structural Habitat Guidelines. **NESR** - CPW conducted vegetation measurements at sage-grouse use sites and random sites in NESR. These data were incorporated into the GrSG Structural Habitat Guidelines.	

10. Housing Development					
Issue 10.1	GrSG permanent habitat loss				
Objective 10.1.1	Short-term strategies, in occupied habitats of 3 GrSG populations				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.1.1.1	Using GIS, identify occupied and seasonally important GrSG habitats and leks that are at highest risk of development (priority areas).	CPW	2008; update every 2 years	**CPW Research:** See 3.2.3.1 above. Seasonal habitat maps can be overlaid with layers of housing development risk to identify such areas, but this has not been done yet. **CPW: PPR** - Telemetry data leading to vegetation modeling has been conducted by CPW Researchers B. Walker and T. Apa and has subsequently been used to identify new leks as well as refine seasonal maps for GrSG in the PPR population. **NP** - Little housing development is occurring in NP. However, an important lek complex area was subdivided and houses placed in breeding habitat. A house was built almost directly on a lek site. Counts on the lek have decreased by approximately 50 -70% since the early 2000s on this lek. **NESR** - Not done at the local level in GIS; however, CPW monitors proposed housing developments.	**CPW: General -** The highest value GRSG habitats have been identified using GIS tools that encompass habitat conditions and breeding bird density. Local knowledge is then applied in determining which areas of highest value GRSG habitat are at risk of development.
10.1.1.2	Identify areas, within priority areas, for potential conservation actions to benefit GrSG (e.g., management plans, conservation easements, leases, Farm Bill programs, land exchanges, acquisition), and share this information with interested stakeholders.	CPW	2008 and ongoing	**CPW:** cooperates with TNC, NRCS, and other Land Trusts to identify and protect important GrSG habitat through conservation easements. CPW has also written letters of support for conservation easements. **MP -** Key areas have been identified and shared with local land trust and NRCS. Effective because Middle Park Land Trust has protected some of these habitats and NRCS uses this information to encourage private land protections and better land management. An example of on-going efforts includes two properties totaling over 3,300 acres that were submitted for protection to CPW Habitat Protection Program in 2012. Also, CPW closed on a 1,120 acre easement (Gunsight Pass) in GrSG habitat in 2012 in Grand County. **PPR -** Research from CPW Researcher B. Walker has generated maps of suitable habitat that will be available to stakeholders to help guide future actions that benefit GrSG. **NESR -** CPW funded a 2,050 acre Conservation Easement that includes extremely valuable GrSG habitat.	**CPW: General -** CPW consistently works with landowners and conservation partners to implement conservation actions within priority areas as opportunities arise. CPW has completed a number of conservation easements and/or management plans in priority GrSG habitat since 2004 (see attached conservation easement table).

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.1.1.3	Incorporate benefits to sage-grouse into existing easements and management plans, as opportunities arise.	CPW	2008 and ongoing	**CPW: General -** All recent conservation easements held by or funded (in whole or part) by CPW that include GrSG habitat include language in both the CE and associated Management Plan to protect and/or enhance GrSG habitat. CPW incorporates the newest and best available information in CPW easement management plans. **PPR -** Wildlife Mitigation Plans for 4 energy companies have been signed that incorporate similar ideas. **MP -** The Skylark easement was an existing easement obtained in the 1980's that was not created for GrSG but is now managed for the species. CPW in MP has protected over 7,700 acres in easements for GrSG and added approximately 950 acres of GrSG range to the existing Hot Sulphur SWA. **NESR -** CPW will be updating an existing management plan for a CE on extremely important GrSG habitat. CPW annually monitors the CE in NESR GrSG habitat and works with the landowner to improve GrSG habitat.	**CPW: General -** All recent conservation easements held by or funded (in whole or part) by CPW that include GRSG habitat include language in both the CE and associated Management Plan to protect and/or enhance GRSG habitat. CPW incorporates the newest best available information in CPW easement management plans.
10.1.1.4	Identify and pursue funding sources for protection of identified GrSG areas (identified in strategy 10.1.1.2), and encourage collaborative conservation funding opportunities.	CPW	2008 and ongoing	**CPW: General -** CPW has pursued regular funding for conservation easements and other land protection strategies through the CPW Habitat Protection Program. NRCS, USFWS Section 6, The Nature Conservancy, and local land trusts have been approached to combine funding possibilities to obtain partner easement funding. CPW has also written letters of support for other conservation easements. CPW writes letters of support for conservation easements when opportunities arise. **See Appendix B: Summary of Expenditures on GrSG in Colorado 2006-2012**	**CPW: General -** Funding for CPW's conservation easement program has ranged from $10 million to $15 million annually since 2005. Protection of GrSG habitat has been a program target in each of these years. NRCS, USFWS Section 6, The Nature Conservancy, and local land trusts have been approached to combine funding possibilities to obtain partner easement funding. **NWCO and MWR -** CPW has partnered with land trusts, NRCS, and other entities to protect approximately 32,000 acres (~15,000 acres in Moffat and Rio Blanco counties, ~17,000 acres total in Routt County) acres of GrSG habitat in NWCO and 14,300 acres in MWR (~30% of overall range for this population) through perpetual Conservation Easements in the last 8 years. **MP -** CPW has protected over 7,700 acres in easements for GrSG and added approximately 950 acres of GrSG range to the existing Hot Sulphur SWA. **NP -** CPW funded a 2,240 acre conservation easement in NP that closed in December 2011. Another 1,750 acre conservation easement has been approved for CPW funding and is expected to close in early 2013. **NESR -** CPW funded a 2,050 acre CE that includes extremely valuable GrSG habitat.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.1.1.5	Within priority GrSG areas (strategy 10.1.1.1), set specific goals for the amount of habitat to protect from housing development.	CPW, LWGs	2010; update every 3 years	**CPW:** CPW is in the process of assessing the acreage needed to conserve current populations of GrSG in each population in Colorado (expected completion in spring 2013). This assessment will factor in the need to private land conservation (including conservation easements and other land protection strategies) in the context of public lands in each population. Population specific goals have not yet been established. **NP -** Currently, housing development is not occurring at a rapid pace. The majority of land is still in large ranches. However, there has been some subdivision that has impacted an important GrSG lek complex and breeding habitat. **PPR -** Housing development is not a major concern.	
10.1.1.6	Pursue opportunities to protect identified GrSG areas (strategy 10.1.1.2) with interested landowners (e.g., CCAAs, land exchanges and acquisition, and management plans and easements that incorporate benefits to sage-grouse).	CPW, LWGs	2010 and ongoing	**CPW: General -** CPW has prioritized the protection of GrSG habitat in its annual conservation easement Request for Proposals (Colorado Wildlife Habitat Protection Program). Each conservation easement acquired under this program includes a management plan to conserve/manage GrSG habitat on the property in perpetuity. CPW has also pursued GrSG habitat management commitments in WMPs with energy companies. CPW has not entered into any CCAAs in GrSG habitat. CPW has also written letters of support for other conservation easements. **MP** -CPW submitted 2 properties totaling 3,300 acres for protection in 2012 application process. The MP LWG supports protecting lands with easements or fee title acquisition and cooperates with agencies and land trusts to identify properties. **NP -** The NP LWG has discussed supporting funding proposals for CEs; however, members do not unanimously support CEs as a tool to protect GrSG habitat. **NESR -** Members of the NESR LWG have pursued opportunities to protect GrSG habitat through conservation easements. Routt County has a Purchase of Development Rights program for conservation easements. CPW easement management plans incorporate benefits to GrSG.	**CPW: NWCO and MWR -** CPW has partnered with land trusts, NRCS, and other entities to protect approximately 32,000 acres (~15,000 acres in Moffat and Rio Blanco counties, ~17,000 acres total in Routt County) acres of GRSG habitat in NWCO and 14,300 acres in MWR (~30% of overall range for this population) through perpetual CE in the last 8 years. **MP -** In 2012, CPW completed a 1,120 acre easement (Gunsight Pass) of GrSG habitat in Grand County. **PPR -** WMPs for 4 energy companies have been signed that incorporate these strategies. **NP -** In 2011, CPW funded a 2,240 acre conservation easement. Another 1,750 acre conservation easement has been approved for CPW funding and is expected to close in early 2013. **NESR -** CPW funded a 2,050 acre CE that includes extremely valuable GrSG habitat .

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.1.1.7	Establish a mechanism for tracking conservation easements that include protection for sage-grouse.	CPW	2009	**CPW: General -** CPW maintains a conservation easement database for all easements held by CPW. COMaP is a statewide protected areas map for CO that tracks easements by other entities. COMaP is maintained at the Colorado Natural Heritage Program (CNHP), in partnership with the Geospatial Centroid at CSU. Current financial support for COMaP comes from the USGS Gap Analysis Program and Great Outdoors Colorado (GOCO). At the population level, both the Meeker and Steamboat Springs CPW Wildlife Biologists maintain a shapefile/database of existing conservation easements within the NWCO and MWR.	**CPW: General -** CPW has a conservation easement database for all easements held by CPW. COMaP is a statewide protected areas map for CO that tracks easements by other entities.
10.1.1.8	Investigate impacts of housing on GrSG, due to noise, pets, and increased activity. Use data to assist with planning and future housing development. **[See Research Strategy 21.2.1.1]**	BLM, CPW, Universities	Begin by 2020		
Objective 10.1.2	Long-term strategies, in occupied habitats of all GrSG populations				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.1.2.1	Reevaluate and identify occupied and seasonally important sage-grouse habitats and leks that are at highest risk of development.	CPW	2015 and ongoing	**CPW: General -** Mapped overall range for the NW Colorado population was updated/refined in 2012 based on radio telemetry data and distribution of modeled suitable habitat. Occupied and seasonal maps have been updated/created for all populations to use when referencing proposed development so that informed decisions can be made. Risk of housing development is assessed in the CCP (2008), but has not been updated/re-evaluated since 2008.	
10.1.2.2	For protection of identified GrSG areas (strategy 10.1.1.2), obtain funding from sources identified in strategy 10.1.1.4.	BLM, CPW, GOCO, Land Trusts, NGOs, USFS, USFWS	2015 and ongoing	**CPW: General -** CPW has prioritized the use of conservation easement acquisition funds available through the CPW Habitat Protection Program to protect GrSG habitat. NRCS and local land trusts have also been approached to combine funding possibilities to obtain partner easement funding.	**CPW: General -** CPW has prioritized the use of conservation easement acquisition funds available through the CPW Habitat Protection Program (~$10 million to $15 million available annually since 2005) to protect GrSG habitat.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.1.2.3	Protect identified GrSG areas (strategy 10.1.1.2) from housing development by continuing implementation of short-term actions (e.g., strategies 10.1.1.3 and 10.1.1.6), through voluntary agreements (e.g., conservation easements, leases) with willing landowners.	BLM, CPW, County Governments, Land Trusts, LWGs, NGOs, federal agencies, USFS, USFWS	2015 and ongoing	**CPW: General -** CPW has prioritized the use of conservation easement acquisition funds available through the CPW Habitat Protection Program to protect GrSG habitat. NRCS and local land trusts have also been approached to combine funding possibilities to obtain partner easement funding. Routt County has a Purchase of Development Rights program that provides funding for conservation easements. **Appendix G: Conservation Easement Strategy**	**CPW: General -** CPW has prioritized the use of conservation easement acquisition funds available through the CPW Habitat Protection Program (~$10 million to $15 million available annually since 2005) to protect GrSG habitat. Routt County has a Purchase of Development Rights program that provides funding for conservation easements. Numerous conservation easements protecting GrSG habitat have been completed and others are in progress.
10.1.2.4	Review, monitor, and update short-term actions (strategies 10.1.1.1 - 10.1.1.7).	CPW	2015 and ongoing	**CPW: General -** CPW will continue to refine land protection programs for GrSG habitat, including the number of easements/acres needed, the highest priority locations for these easements, and the most effective land management practices that should be included in management plans.	
10.1.2.5	Monitor and track land-use changes and infrastructure development in relationship to occupied and seasonally important GrSG habitats and leks (see "Infrastructure" strategy, pg. 383).	CPW	2015 and ongoing	**CPW: MP -** field staff track and provide comments via land use comments to local government and entities during project planning. **NP -** CPW is currently digitizing housing development and infrastructure in NP. This layer will be used in the NP seasonal habitat modeling process. The GIS mapping is occurring during the winter 2012 - 2013.	
Issue 10.2	Reduced GrSG habitat effectiveness (quality)				
Objective 10.2.1	Short-term strategies, in occupied GrSG habitat, habitat fragmentation				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.2.1.1	Identify and map areas where new (proposed and potential) housing development could potentially fragment existing GrSG populations (in conjunction with strategy 10.1.1.1).	CPW	2010	**CPW: General -** Areas most at risk of development are known locally by CPW staff. **MWR -** Areas of highest importance to GrSG in the MWR population were elucidated through a 2-year radio telemetry study, identifying areas were additional housing development would most negatively impact this population. These areas are known to local CPW staff and are identified in a project completion report (January 2013). **NP -** There is relatively little housing development occurring currently in NP. CPW is continually monitoring and identifying area of potential risk. **PPR -** Housing development is not a concern.	**CPW** does not currently have a systematic method of mapping these areas on a range-wide scale. **Jackson County** does not have process for requesting CPW recommendations during the land use permitting process.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.2.1.2	Monitor leks and other seasonally important sage-grouse habitat in jeopardy of fragmentation due to development.	CPW	2008 and ongoing	**CPW: General -** All known active (and some inactive/historic) leks are monitored by CPW annually, regardless of risk of fragmentation.	
10.2.1.3	Meet with land management agencies and local developers to address and recommend management actions to mitigate adverse fragmentation impacts to sage-grouse habitat. **[See also Information, Communication, and Education Strategies 12.2.1.3 and 12.3.1.1]**	LWGs	2009 and ongoing	**General** - LWG members consist of agency personal and private landowners who meet regularly and make recommendations on actions to mitigate adverse impacts to GrSG habitat. They are open to any individual who wishes to attend. Energy industry representatives attend some LWGs, but land developers are not currently active with any of the LWGs. **NESR** - Some members of the NESR LWG have been engaged in development planning within NESR GrSG habitat. **PPR -** not impacted by housing development activity.	
10.2.1.4	Create guidelines or recommendations to address the effects of habitat fragmentation (due to housing and related infrastructure) on sage-grouse populations.	CPW	2013	**CPW: General -** Local land use comments are generally handled by local CPW staff. No statewide/GrSG range-wide guidelines or recommendations have been developed.	
10.2.1.5	Discourage adverse impacts to sage-grouse habitat by conversion of sagebrush lands to 'park space' in developments (e.g., lawns, golf courses). Encourage natural, native landscaping to reduce water consumption and conversion of sagebrush habitats.	Counties, CPW, County Governments, LWGs, Private Landowners	Ongoing	**CPW: General -** CPW local staff provides comments about the impacts of altered native habitats and impacts to GrSG via land-use comment letters. CPW has an advisory, not a regulatory, role in these developments. **MP -** Few large developments with 'open space' have been occurring in Grand County over the last few years. The one active project is the former Orvis-Shorefox property. CPW has been in discussion with new developer and town of Granby concerning GrSG impacts with the proposed redesign. It is not yet certain if CPW recommendations to protect GrSG habitat will be adopted by the town of Granby.	
Objective 10.2.2	Long-term strategies, in occupied and potential GrSG habitat, habitat fragmentation				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.2.2.1	Conduct research to determine (1) sage-grouse habitat patch size and configuration needs; and (2) fragmentation impacts on GrSG movements and population isolation. **[See Research Strategy 21.1.1.1]**	BLM, CPW, Universities	Begin by 2010	**See 21.1.1.1**	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.2.2.2	Prioritize sage-grouse habitat areas (including from a statewide perspective) to protect from or to reduce impacts from habitat fragmentation due to housing and related development.	CPW, LWGs	2015 and ongoing	**CPW: General -** In 2012, CPW created Priority and General habitat maps, based on seasonal habitat suitability and distribution/concentration of GrSG, that identify areas most important to GrSG and that identify areas where private lands habitat protection is most warranted.	
10.2.2.3	Encourage local governments to develop land-use recommendations or guidelines to reduce GrSG habitat fragmentation from housing and related development (see also strategy 10.2.1.3).	CPW, LWGs	2015 and ongoing	**CPW, LWGs: General** - CPW staff comment on land use proposals in Moffat, Rio Blanco, and Routt counties that could affect GrSG habitat. Comments are not always adopted by local governments or planners.	**CPW's** authority is limited to making requests of local governments. These requests are then up to those entities to implement on a voluntary basis. Implementation is inconsistent.
10.2.2.4	Develop predictive models to monitor and assess impacts of habitat fragmentation in sage-grouse habitat. **[See Research Strategy 21.1.1.2]**	CCP SC, CPW, NGOs, Other Research Institutions, Universities	Begin by 2009	**CPW: General -** The CCP includes an assessment of areas most likely to be affected by housing development in the future. This assessment is based on research conducted by NREL/CSU. It has not been updated for GrSG habitat since the completion of the CCP in 2008.	
10.2.2.5	Where housing development is occurring in or near sagebrush habitat, encourage underground utilities (where feasible) along road ROWs to reduce raptor perches and the potential for wire-strikes by GrSG (see "Infrastructure" strategy, pg. 383).	County Governments, Utility Companies	Ongoing	**Moffat**: No proposed housing developments in GSG habitat. **Grand**: No applications for development in GSG habitat. Standard plat note on all development proposals in the county requires that all utilities must be placed underground. **Jackson:** Little housing development in the county that has included new infrastructure.	**Grand**: Since 2000, all developments require underground utility placement, which prevents fragementation of GSG habitat.
Objective 10.2.3	Short-term strategies, invasive plants and contaminants				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.2.3.1	Identify potential contaminants associated with housing developments (e.g., household chemicals, fertilizers, sediments) that could impact sage-grouse.	CPW	Complete by 2009		
10.2.3.2	Develop informational materials regarding the impacts of invasive plants and contaminants on sage-grouse (see "Weeds" strategy, pg. 425). **[See Information, Communication, and Education Strategy 12.2.1.1]**	BLM, CPW, Universities	Begin by 2010		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.2.3.3	Recommend seed-mix guidelines that are beneficial to sage-grouse (see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration" and "Habitat Enhancement" strategy, pg. 349). [See also Information, Communication, and Education Strategy 12.3.1.1]	CPW	2008 and ongoing	**CPW: General -** CPW collaborates with NRCS, the HPP program, and other entities where seeding and/or reclamation projects are being undertaken in GrSG habitat. Local CPW staff have provided a seed mixture list to landowners and for use in WMP's. CPW has provided seed for specific private land projects. **NESR -** Routt County Planning considers GrSG habitats and CPW recommendations in permit authorizations. The majority of the GrSG habitat in Eagle County is located on BLM; BLM routinely considers GrSG habitat needs when conducting reseeding efforts.	**MP** - In 2011, a private/county gravel pit, which includes a lek site, was going to be reclaimed. Local CPW staff met with the landowner and provided a recommended GrSG seed mixture for the site.
10.2.3.4	Recommend management and revegetation techniques to decrease noxious and invasive weeds in disturbed areas of GrSG habitat (see "Habitat Enhancement [pg. 349] and "Weeds" [pg. 425] strategies). [See also Information, Communication, and Education Strategy 12.3.1.1]	CPW	2008 and ongoing	**CPW: General -** CPW regularly comments on land use proposals including proposed energy/infrastructure developments, gravel pits, etc. These comments include recommendations for reclamation of disturbed areas to suitable GrSG habitat when applicable.	
Objective 10.2.4	Long-term strategies, invasive plants and contaminants				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.2.4.1	Encourage local governments to formally adopt revegetation requirements (including seed type recommendations beneficial for sage-grouse, strategy 10.2.3.3) for sites disturbed by housing development and related infrastructure (see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration").	LWGs	2015 and ongoing	**NWCO LWG**- Local government (Moffat County) has an active representative on the LWG. This representative conveys important issues affecting GRSG to county government, with some intent to reduce GRSG habitat fragmentation when evaluating land use proposals with a county nexus. **MP -** The MP LWG has not completed this strategy since the completion of the MP Plan in 2001. **PPR LWG -** Not Applicable because the PPR population is not impacted by housing development activity.	
10.2.4.2	Develop and implement ongoing outreach program for homeowners (e.g., workshops, brochures) regarding the potential effects of noxious/invasive weeds, fuels management, and contaminants on GrSG. [See Information, Communication, and Education Strategies 12.2.1.1 and 12.2.1.3]	CPW	2009		
Objective 10.2.5	Improve GrSG habitat in existing developments				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.2.5.1	Reduce fragmentation of sage-grouse habitat by encouraging low-impact siting of roads and utilities, as opportunities arise in existing developed areas (see "Infrastructure [pg. 383] and "Roads" [pg. 409] strategies).	County Governments, CPW, Utility Companies	2015 and ongoing	**CPW: General -** CPW regularly comments on land use proposals including proposed energy/infrastructure developments, gravel pits, etc. **PPR -** Currently there are 4 signed WMPs in grouse habitat that have agreed to measures that cluster development, where possible. **NP** - Very little housing development is occurring. **NESR** - CPW provides recommendations to Routt County Planning. Routt County Planning considers GrSG habitats and CPW recommendations in permit authorizations. The majority of the GrSG habitat in Eagle County is located on BLM. CPW works with BLM on travel management.	**CPW** comments and recommendations are not always adopted.
10.2.5.2	Prioritize areas for increasing sage-grouse habitat effectiveness (quality) within and adjacent to existing developments.	CPW, LWGs	2015 and ongoing	**CPW: General -** In 2012, CPW completed a Priority and General Habitat map for GRSG which can be used to prioritize habitat in need of protection/enhancement/etc within and adjacent to existing developments. **MWR** - CPW has identified important seasonal use areas for GRSG within the MWR population area via a 2-year management study using radio telemetry. This work has led to prioritization of areas where habitat protection and/or improvement will be most effective and implementation of one habitat restoration project. **NP** - Very little housing development is occurring.	**CPW: MWR -** CPW has identified important seasonal use areas for GRSG within the MWR population area via a 2-year management study using radio telemetry. This work has led to prioritization of areas where habitat protection and/or improvement will be most effective and implementation of one habitat restoration project.
Issue 10.3	Disturbance to GrSG				
Objective 10.3.1	Reduce disturbance to GrSG				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.3.1.1	Recommend seasonal closures or restrictions on recreational uses on public lands within sage-grouse habitat, in areas in close proximity to housing developments (see "Recreational Activities" strategy, pg. 407).	BLM, USFS	2009 and ongoing	**USFS**: Routt NF has seasonal and permanent road closures on NFSR 150 and NFSR 154 in part to protect grouse habitat.	**BLM:** Seasonal closures in important SG habitats will be considered & analyzed as travel management planning is completed.
10.3.1.2	Work with local governments to encourage homeowner associations and individual homeowners to adopt and enforce pet control measures in and near sage-grouse habitat.	CPW, County Governments, LWGs	2009 and ongoing		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.3.1.3	Incorporate information about the impacts of human disturbance on sage-grouse in other outreach efforts to homeowners (see Issue 10.6). Include information on effects of open garbage on GrSG through an increase in some predators (e.g., skunks and raccoons). [See Information, Communication, and Education Strategy 12.2.1.3]	CPW	2009	**MP -** Local CPW and NRCS staff discuss the impacts of human disturbances (houses, out buildings, fences, some ag practices) with local landowners on a regular basis.	**CPW:** MWR - CPW contacted and requested compliance from one landowner whose dogs were suspected harassing GRSG.
Issue 10.4	Planning of housing developments				
Objective 10.4.1	Address GrSG needs in planning development				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.4.1.1	Provide information to local, state, and federal governments on sage-grouse habitat requirements and the status, location, and possible effects of different land-uses (including right-of-way and inholding access across public lands and land trades) on sage-grouse. Include discussion of issues and state statute regarding 35-acre parcels and estate taxes, and the need for additional incentives for large landowners to not develop lands. Analyze statutes for unforeseen impacts on sage-grouse (e.g., 3-mile annex annually, "leapfrogging" of cities). Discourage disposal of public lands in sage-grouse habitat. [See also Information, Communication, and Education Strategies 12.2.1.3 and 12.3.1.1]	CPW	Ongoing	**CPW: NWCO, MWR, NESR -** CPW regularly collaborates/consults with BLM and Moffat, Routt, and Rio Blanco counties on land use proposals that could affect GrSG. This has included educating parties on local GrSG habitat use and distribution, as well as offering siting and timing recommendations to decrease negative affects on GrSG. **MP** - Local CPW staff provide information via public meetings, land-use comment letters, landowner meetings, project planning meetings, etc. **NP and PPR** - Housing development not a major issue. **NESR -** The majority of GrSG habitat in Eagle County is located on BLM. CPW works closely with BLM to retain unfragmented GrSG habitat.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.4.1.2	Work with county planners and commissioners to develop and modify land-use and zoning plans to protect sage-grouse habitats (e.g., cluster development, density credits, special zoning overlay districts, development rights transfers). Provide updated GrSG GIS layers to county governments, as data become available.	CPW, LWGs	Ongoing	**CPW: General-**CPW provides updated GrSG habitat mapping & Priority Habitat areas to county govts upon request. **NWCO**-Moffat County has active rep on NWCO LWG. This rep conveys important issues affecting GrSG to county govt. **MWR-**CPW has provided updated Priority & General habitat data, as well as maps showing GrSG general distribution and seasonally important areas (obtained from radio telemetry work) to Rio Blanco County & their contracted surveyors. **MP-**Local county GIS staff are informed when GIS layers have been updated by CPW staff & should be downloaded. No modifications have been made by the county to modify land-use zoning to protect GrSG. **PPR-**WMP's (4 signed) with grouse habitat have agreed to measures that cluster development where possible. **NP-**CPW has encouraged Jackson County to develop a land use planning process to minimize fragmentation from housing development. CPW has provided Jackson County with GIS data. **NESR-**CPW provides recommendations to Routt County Planning, including ways to avoid, minimize and mitigate impacts to GrSG habitats. Routt County Planning strongly considers GrSG habitats & CPW recommendations in permit authorizations. Routt County maintains CPW GrSG GIS mapping in the county database & County Planning considers GrSG habitats in permit authorizations. Routt County has a Purchase of Development Rights program for conservation easements as well as a program designed to cluster developments. The majority of the GrSG habitat in Eagle County is located on BLM.	
Issue 10.5	Increasing human water demand: changing water use				
Objective 10.5.1	Address GrSG habitat needs in water use decisions				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.5.1.1	Identify areas of overlap between seasonally important sage-grouse habitat and aquatic and riparian ecosystems.	2009 and ongoing	CPW	**CPW: General -** Via GIS data layers, overlap between GrSG habitats and riparian systems could be identified as part of the CPW seasonal habitat modeling process. CPW has developed seasonal habitat models and is refining a **NP-**specific seasonal habitat model. The models can be used to identify overlap with riparian systems. **PPR -** Mapping products have been developed for PPR this year (2012) and should be available to use in identifying areas of overlap between these habitats in the near future. A specific **NESR** seasonal habitat model will be developed in the future.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.5.1.2	Stay informed about and provide input regarding Colorado Water Conservation Board actions regarding water rights or uses that might affect sage-grouse habitat, referring to areas identified in strategy 10.5.1.1 (e.g., get on mailing list, attend hearings).	As Needed	CPW	**CPW: General -** CPW closely monitors CWCB actions and other water projects. **MP -** CPW was an active participant in commenting on and making mitigation recommendations for the Moffat and Windy Gap firming projects (front range water supply issues), ending in 2011.	
10.5.1.3	Work with water development interests to seek avoidance of, changes to, or mitigation for water projects that could affect sage-grouse.	As Needed	CPW	**CPW: NWCO, MWR** - No significant water development (large reservoir) projects have progressed beyond the proposal stage within GrSG habitat in the past 4 years. **MP** - CPW works with local ranches to maintain the use of water rights on the property for the benefit of wildlife including GrSG and provides support for local ranchers who are working with Water Boards to keep water in the basin. CPW easements require that water rights remain on the ranch to maintain habitat conditions. All easements obtained by CPW in MP have also constrained associated water rights. CPW was an active participant in commenting on and making mitigation recommendations for the Moffat and Windy Gap firming projects (front range water supply issues), ending in 2011. **NP, PPR** - Have not implemented any management related to this action. **NESR** - As proposals are developed, CPW will provide recommendations relating to water development interests.	
10.5.1.4	If a large reservoir project appears likely near sage-grouse habitat, consider the potential impacts to sage-grouse from indirect effects such as recreation, real estate development, and road realignment.	As Needed	CPW	**CPW: NWCO, MWR -** No significant water development (large reservoir) projects have been proposed within GRSG habitat in the past 4 years. **NP, PPR** - Have not implemented any management related to this action. **NESR -** As proposals are developed, CPW will provide recommendations relating to water development interests.	**MP** - From 2007 through 2011, CPW staff was involved in comments for the Windy Gap Firming Project. A proposed new reservoir site was located near the town of Granby and in known GrSG habitat. CPW commented that this site would remove limited existing habitat available for GrSG in east Grand County. The reservoir site was not selected as an alternative.
10.5.1.5	During regional and statewide water planning efforts provide information on relationships between sage-grouse habitat and water uses.	As Needed	CPW	**CPW: NP -** CPW was engaged in the non-consumptive water use planning for NP. GrSG habitats were considered as a non-consumptive use.	
Objective 10.5.2	Provide for adequate water in GrSG habitat				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.5.2.1	Work with willing landowners and public agencies to keep water rights tied to existing uses in local areas in GrSG habitat. Explore incentives to accomplish this task, including filing objections with the water court on any change of use.	CDWR, LWGs, NGOs	As Needed	**CPW: MP -** All easements closed in MP include associated water rights that will be tied to the property in perpetuity. CPW in MP has protected over 7,700 acres in easements for GrSG and added approximately 950 acres of GrSG range to the existing Hot Sulphur SWA. Included in the acreage above is the 1,120 acres easement (Gunsight Pass) that was closed in 2012. **NESR -** CPW and other organizations in the Upper Yampa River basin are working to maintain water rights within the basin. **NP LWG** is active in attempts to keep water rights in the North Park basin.	**CPW: General -** All conservation easements closed with CPW require that sufficient water rights remain tied to the property to maintain the habitat values in perpetuity.
10.5.2.2	Work with willing landowners to develop or maintain GrSG brood-rearing habitat, or replace lost or impacted habitats.	CPW, LWGs, NRCS, USFWS	As Needed	**CPW: General -** Development and maintenance of brood-rearing habitats is one of the habitat enhancement techniques pursued by CPW and partner agencies (particularly the NRCS and USFWS). A number of successful wet meadow developments have been completed in GrSG habitat (see the habitat enhancement project table in that chapter for a listing of completed projects). **MP -** This strategy has not been completed in MP outside of easement protection. **NP -** CPW, NRCS, and USFWS work with willing landowners to improve brood-rearing habitat in NP. **NESR -** CPW, NRCS, and USFWS have worked with a LWG member to develop brood rearing habitat on private land.	
Issue 10.6	Lack of awareness of GrSG				
Objective 10.6.1	Educate public about GrSG				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
10.6.1.1	Compile existing information and guidelines pertaining to housing development-associated impacts on sage-grouse.	CPW	2009		
10.6.1.2	Develop key messages, focused on different types of development (e.g., high or low density rural housing, clustering), to include in informational materials about GrSG (strategy 10.6.1.3). [See Information, Communication, and Education Strategies 12.2.1.1 and 12.2.1.3]	CPW	2009		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.6.1.3	Prepare and distribute informational materials about sage-grouse to land-use planners, developers, landowners, realtors, utility companies, and housing residents. Conduct outreach program to get materials to second homeowners and 35-acre ranchette owners. [See Information, Communication, and Education Strategies 12.2.1.1 and 12.2.1.3]	CPW	2009	**CPW: General -** CPW distributes GRSG data to land-use planners and other entities upon request. **NESR -** CPW has worked with the Community Ag Alliance in Routt County and include this organization on NESR GrSG LWG mailings and issues. The Community Ag Alliance conducts an outreach program to second homeowners and small-acreage homeowners. **PPR and NP -** Housing development is not a major issue.	
10.6.1.4	Develop and implement an ongoing outreach program for homeowners regarding housing development impacts on sage-grouse (e.g., provide workshops and information on the potential effects of fuels management, noxious weeds, and pets on sage-grouse). Contact homeowner associations and landowner cooperatives. [See Information, Communication, and Education Strategies 12.2.1.1 and 12.2.1.3]	CPW	2009		
10.6.1.5	Encourage local agencies, landowners, groups, and interested parties to gain local representatives' support of decisions regarding sage-grouse conservation actions.	LWGs, NGOs	As Needed	**MP LWG -** This strategy has been completed in MP through the support provided by county commissioner and state representative for CPW easement protection. **NP LWG -** Local representatives (County Commissioner and County Administrator) are active on the NP LWG and engaged in GrSG issues. **NESR LWG -** Routt County Commissioners have been engaged in the NESR LWG and are aware of GrSG issues.	
10.6.1.6	Install sage-grouse information signs (e.g., road crossing signs, kiosks) where appropriate.	CPW	As Needed	**CPW: MP** - This has not been identified as a need within the MP population. In addition, there are local concerns with increasing awareness and attracting the public to areas where grouse are known to use or concentrate but are threatened by human impacts. An example is on BLM lands near the town of Granby. CPW, BLM and the MP LWG had discussed putting up a sign for the public to limit off road activity (walking dogs off leash) because of a known lek. There was concern that signing would attract the public by identifying a lek site. **PPR -** CPW has participated with some energy companies in developing and placing GrSG road crossing signs on gas field access roads, generally in association with speed limits to reduce collisions with GrSG.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
10.6.1.7	Promote and expand the "Guide to Rural Living" to include the impacts of housing, pets, lawns, and other housing-associated issues on sage-grouse. Work with homeowners, homeowner associations, county commissioners, and chambers of commerce on impacts of housing to sage-grouse and the importance of leks, nesting, winter and brood-rearing habitat.	CPW, County Governments, LWGs	2009 and ongoing		
10.6.1.8	Encourage county commissioners, planning departments, and other planning groups to include local sage-grouse working groups in discussions regarding housing prioritization and planning at the local landscape (population) level, to minimize adverse impacts to sagebrush habitats.	CPW, County Governments, LWGs	2008 and ongoing	**CPW: NP -** Local representatives (County Commissioner and County Administrator) are active on the NP LWG and engaged in GrSG issues. **NESR -** Routt County Planning and Routt County Commissioners are engaged with the NESR LWG. CPW makes recommendations to Routt County to avoid, minimize and mitigate impacts to GrSG habitats. Routt County Planning seriously considers CPW recommendations during permit authorizations. **MP -** This strategy has not been completed in MP.	
10.6.1.9	Continually look for new partners and educational opportunities. Develop a central location for interested parties to become involved.	CPW, County Governments, LWGs	ongoing	**CPW/LWGs: General -** LWG meetings are open to all interested parties and all meetings are public. **MP** - LWG has hosted 2 public presentation workshops over the last 4 years to provide information on GrSG habitat and life stages needs, as well as research updates. These presentations were directed more toward the large ranch owner than the urban housing development owner or ranchette owner. Local CPW staff works with Middle Park Land Trust to help educate landowners about GrSG and other wildlife habitat needs. **NP -** The County Administrator is the Chairman on the LWG and his office is a central location for anyone wishing to be involved.	

11. Hunting

ISSUE 11.1	There is a perception that GrSG populations cannot sustain sport hunting, or that sport hunting is inappropriate.				
OBJECTIVE 11.1.1	Influence the perception about the status of GrSG populations by providing accurate information about GrSG populations, their management, and the sustainability of sport hunting.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
11.1.1.1	Inventory all existing education and awareness materials regarding GrSG population status and management (e.g., brochures, posters). **[See Information, Communication, and Education Strategies 12.2.1.1 and 12.2.1.2]**	CPW	2009		
11.1.1.2	Conduct initial and annual reviews of information and all materials regarding GrSG. Review for accuracy and information gaps, and produce new materials if necessary. **[See Information, Communication, and Education Strategy 12.2.1.1]**	CPW	2009		
11.1.1.3	Develop an integrated communication strategy about upland bird sport hunting to inform and educate the non-hunting public about sport hunting. **[See Information, Communication, and Education Strategies 12.2.1.1 and 12.2.1.3]**	CPW	2009	**CPW:** CPW has presented information regarding the effect and sustainability of GrSG harvest to the Parks and Wildlife Commission on several occasions. Hunters and non-hunters alike are present at those public meetings.	**CPW:** The 2010 USFWS listing decision regarding GrSG is specific that continued sport harvest of GrSG is well regulated by the states and is not believed to constitute a threat to the long-term viability of the species. This finding has also been articulated in a 2012 letter from USFWS to the states. **See Appendix H: Hunting Letter from USFWS**
11.1.1.4	Encourage and coordinate with LWGs to initiate articles in local newspapers and electronic media about their activities and successes with GrSG. **[See Information, Communication, and Education Strategy 12.3.2.1]**	CPW	2009		
ISSUE 11.2	There is a lack of rigorous research on the harvest rate at which sport hunting of GrSG becomes additive and could result in population declines.				
OBJECTIVE 11.2.1	Foster and support the research and the collection of data to gain knowledge about additive and compensatory mortality thresholds and sport harvest in GrSG.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
11.2.1.1	Initiate experimental field research designed to specifically address appropriate and sustainable harvest levels for GrSG (the harvest level at which mortality due to hunting becomes additive and causes populations to decline). Collaborate with other westerns states that hunt GrSG. [See Research Strategy 21.6.1.1]	CPW	Begin 2009, Continue 5 - 10 years		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
ISSUE 11.3	There is concern regarding the quality of GrSG hunter and harvest information.				
OBJECTIVE 11.3.1	Foster and support the collection accurate information on hunters and GrSG harvest.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
11.3.1.1	Identify and implement more effective techniques to collect GrSG hunter statistics.	CPW	2009	**CPW:** CPW has implemented sampling strategies to improve the precision of GrSG hunting statistics through the Hunter Information Program (HIP), including specific online survey questions pertaining to the hunting of GrSG. CPW has considered implementation of a GrSG-specific hunting permit, but has not determined the need to do so to date.	
11.3.1.2	Evaluate the efficacy of implementing a required free permit, a sage-grouse stamp, a limited sage-grouse license, and/or an improved phone survey for GrSG hunters.	CPW	2009		
11.3.1.3	Using local communities and LWGs, provide educational materials to ensure that hunters accurately identify sage-grouse in the field. **[See also Information, Communication, and Education Strategy 12.3.1.1]**	LWG's	2008	**CPW:** Wildlife identification is a part of standard hunter education courses. Field law enforcement efforts have not identified significant issues with misidentification of GrSG. CPW has not implemented this strategy with any LWG. **PPR, MWR, and NESR** are not open to hunting.	
11.3.1.4	Evaluate, and if needed, improve the wing receipt (wing barrel) program and assess its accuracy for reporting GrSG harvest statistics.	CPW	2009	**CPW:** CPW continues to collect GrSG and other grouse wings in wing barrels during hunting seasons to gain harvest data and population demographic data. Wing barrel location is reviewed periodically to obtain the best possible sample of harvested birds. GrSG harvest is low enough in most locations that insufficient wings are collected for effective application of statistical techniques.	
11.3.1.5	Educate hunters about the importance of wing receipt data and harvest reports in GrSG management. **[See Information, Communication, and Education Strategy 12.3.1.1]**	CPW	Annually beginning in 2008		
ISSUE 11.4	There is concern regarding the relationship between the GrSG hunting public and landowners.				
OBJECTIVE 11.4.1	Foster and support a strong relationship between the GrSG hunting public and landowners.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
11.4.1.1	Encourage GrSG hunters to participate in LWG and statewide plan implementation.	CPW, CWF, LWGs	Ongoing	**CPW:** GrSG LWG meetings are open to the public. GrSG hunters have not generally participated in LWG-sponsored meetings/events in any of the LWG areas to great extent. However, sportsman's funds, applied by CPW, are used towards GrSG conservation.	
11.4.1.2	Contact hunting groups and organizations (e.g., sportsmen's councils) to encourage participation in sage-grouse conservation. **[See Information, Communication, and Education Strategy 12.2.2.1]**	CPW	2010	**CPW:** Several sportsman's organizations (e.g., Quail Unlimited, Pheasants Forever) have funded GrSG conservation efforts in portions of the range.	
ISSUE 11.5	There is a concern that the CDOW's system for annually setting GrSG hunting regulations (e.g., season length, bag limits, open/closed areas) cannot adapt and respond quickly enough to potential changes in GrSG populations.				
OBJECTIVE 11.5.1	Develop a system for adjusting season lengths, bag limits, and areas of closure or re-opening that is rigorous, predictable, and responsive to changes in sage-grouse populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
11.5.1.1	Develop a biologically-based adaptive GrSG statewide harvest management system that responds to the current LWG trigger systems to close or open areas to GrSG hunting.	CPW, LWGs	2010	**CPW:** Completed. **General -** CPW reviews the hunting season in each open hunting area following the completion of lek counts each spring. The Parks and Wildlife Commission makes final decisions on open/closed units and bag limits each July, based on whether local GrSG populations are meeting the triggers contained in the LWG conservation plans. Triggers are contained in the **NP and NWCO** Local Conservation Plans and have been used to modify bag limits, season length, open or closed units since 1998 in NWCO and 2001 in NP. **PPR, MWR, and NESR** have been closed to GrSG harvest for many years.	**CPW:** The 2010 USFWS listing decision regarding GrSG is specific that continued sport harvest of GrSG is well regulated by the states and is not believed to constitute a threat to the long-term viability of the species. This finding has also been articulated in a 2012 letter from USFWS to the states.
11.5.1.2	Implement an intensive monitoring system of GrSG population and harvest to refine the adaptive harvest model periodically, to affect season length and bag limit.	CPW, LWGs	2010	**CPW: General -** GrSG hunting decisions are based on 3-year running averages of lek counts. If lek counts do not occur in a hunted population, no hunting occurs in that population. **NWCO -** Per the LWG conservation plan, each hunting unit is open only where >= 100 male GrSG are counted on leks in the unit. **NP -** season length and bag limit are reduced when lek counts for the basin as a whole fall below 850 males, with a lower threshold for closing the season outright. **PPR, MWR, and NESR** have been closed to GrSG harvest for many years.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
11.5.1.3	Create a procedure for rapid-response adjustments in GrSG hunting season to address potential risks in GrSG populations (e.g., late-season discovery of WNV in population).	CPW	2009	**CPW: General -** The Parks and Wildlife Commission establishes small game hunting seasons, including GrSG, for three years at a time. However, the Commission annually reviews lek data prior to making final hunting season decisions (season length, bag limit, open/closed) each July, prior to approving the final regulations for each year's hunting season. Late breaking population effects from a West Nile Virus outbreak or other cause of mortality can also be addressed at that time.	
11.5.1.4	Consider reducing the length of the sage-grouse falconry season to eliminate overlap with the GrSG strutting season (i.e., March).	CPW	By 2012	**CPW:** A reduction in the GrSG falconry season has been considered, but CPW has decided not to implement a change at this time. Harvest from falconry season is very low and is not believed to constitute a significant cause of mortality.	

12. Information, Communication, and Education

Issue 12.1	Need for information and education central coordination				
Objective 12.1.1	Establish GrSG information, communication, education program				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
12.1.1.1	Identify and earmark funding resources to cover personal services and operating expenses for an interagency statewide sage-grouse education and communication coordinator.	CPW	2008	**CPW: General -** CPW has hired a Grouse Conservation Coordinator, based in Grand Junction to coordinate CPW programs for GrSG, Gunnison sage-grouse and Columbian sharp-tailed grouse. This individual's duties do not extend to interagency management or I and E efforts, but CPW's grouse coordinator routinely interacts with other entities active in GrSG conservation. CPW has determined that sufficient funds are not currently available for the broader coordination envisioned in this strategy. For now, these duties remain with local CPW staff.	
12.1.1.2	Recruit and hire an interagency statewide sage-grouse education and communication coordinator and assign tasks to this person across institutional and local work group boundaries (ombudsman, interagency, independent).	CPW	2008		
12.1.1.3	Assign tasks to the sage-grouse education and communication program, including all strategies under Objective 12.2.1.	CPW	2008 budget process		
Issue 12.2	General public and those not involved in GrSG conservation need information				
Objective 12.2.1	Inform general public and those not involved in GrSG conservation				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
12.2.1.1	Gather information and develop programs for informing groups (those not already involved in GrSG conservation) whose activities may potentially impact GrSG and/or their habitat about the species' requirements, management, and conservation. Facilitate similar ongoing informational programs.	CPW	2009	**CPW: NP -** CPW conducts GrSG educational talks with NP Chamber of Commerce lek viewing program.	
12.2.1.2	Gather information and develop programs for informing school groups about GrSG requirements, management, and conservation.	CPW	2009	**CPW: MWR, NP and NESR -** CPW has worked with the schools to include information on GrSG. Information is presented through classroom presentations and discussions.	
12.2.1.3	Present, and facilitate presentation of, information about GrSG requirements, management, and conservation to groups (those not already involved in GrSG conservation) whose activities may impact the species and/or its habitat.	CPW	2009	**CPW: NP -** CPW conducts GrSG educational talks with the NP Chamber of Commerce lek viewing program. **NESR** - CPW presents GrSG information at Routt County Planning and Routt County Commissioner meetings.	
12.2.1.4	Present, and facilitation presentation of, information about GrSG requirements, management, and conservation to school groups.	CPW	2009		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
Objective 12.2.2	Involve general public and those not already involved in GrSG conservation				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
12.2.2.1	Focusing on the general public and those not already involved with GrSG conservation, facilitate communication with and pursue opportunities to engage them in the conservation process.	CPW	2010	**CPW: NP -** CPW conducts GrSG educational talks with NP Chamber of Commerce lek viewing program. **MP -** CPW has hosted 2 public forums in the past 4 years to present information about GrSG conservation.	
Issue 12.3	Those already involved in GrSG conservation: need for data sharing, information dissemination, better communication				
Objective 12.3.1	Provide information and training to those involved in GrSG conservation				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
12.3.1.1	Provide accurate and timely information and training opportunities (and facilitate the same) to those already involved in GrSG conservation. Facilitate ongoing efforts in these areas.	CPW	Annually beginning in 2008	**CPW: General -** CPW routinely provides accurate and timely information to a variety of groups and individuals, particularly through the LWGs. CPW is in regular contact with public land management agencies, hunters, conservationists, energy operators, and other constituencies regarding GRSG management and conservation. CPW regularly includes GrSG information in internal biological in-services. CPW hosts a semi-annual workshop where current CPW research results (including GrSG) are presented to industry partners. CPW research reports are available on CPW's public website.	
Objective 12.3.2	Facilitate local work group process, data sharing, communication among those involved in GrSG conservation				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
12.3.2.1	Pursue all opportunities to support and facilitate the GrSG local work group process, including professional facilitation of work group meetings, as requested by LWGs.	CPW	2008 and ongoing	**CPW: General -** CPW staff coordinates each of the LWGs. These meetings are held regularly to facilitate information sharing and stakeholder involvement. CPW organizes, coordinates, and records minutes for LWG meetings. **NP -** When developing the priority issues for NP to be included in the Statewide Implementation Plan, CPW hired professional facilitation. **MWR -** No LWG.	
12.3.2.2	Among those already involved in GrSG conservation, facilitate and promote sharing of data relevant to GrSG management and conservation.	Industry, CPW	2008	**COGA:** Yes, 2 of 6 operators surveyed, who hold a total of 32% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO **CPW:** General - The LWG meetings promote information sharing and CPW routinely shares GRSG data with a variety of groups and individuals. CPW regularly includes GrSG information in internal biological in-services. CPW hosts a semi-annual workshop where current CPW research results (including GrSG) are presented to industry partners. CPW research reports are available on CPW's public website.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
12.3.2.3	Promote and facilitate communication among those already involved in the GrSG conservation process.	Industry, CPW	2008	**COGA:** Yes, 2 of 6 operators surveyed, who hold a total of 32% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO **CPW:** General - CPW staff coordinates each of the LWGs. The LWG meetings facilitate communication among all parties. CPW is in regular contact with public land management agencies, hunters, conservationists, energy operators, and other constituencies regarding GRSG management and conservation.	

13. Infrastructure					
ISSUE 13.1	Utility corridors or other structures (excluding fences: see Issue 13.3) may increase opportunities for predation on GrSG in an area.				
OBJECTIVE 13.1.1	Minimize the potential of increased predation pressure on GrSG as a result of human infrastructure (see also "Predation" strategy, pg. 401).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
13.1.1.1	Where technically & economically feasible, locate new utility corridors, communication towers, wind turbines, & other above-ground facilities outside GrSG seasonal habitats as defined by this plan (as per CCP "GrSG Disturbance Guidelines", Appendix B), with particular attention to lek sites. (Lek data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.) Where this is not feasible, consider the following options: • route new utility corridors & locate new surface facilities as far from key habitat sites (e.g., leks) as possible • use topographic relief to reduce predator perch potential when designing new utility corridors & facilities • encourage utility burial when feasible where key habitat sites (e.g., leks) cannot be avoided for new utilities Where technically & economically feasible, locate new utility corridors, communication towers, wind turbines, & other above-ground facilities outside GrSG seasonal habitats as defined by this plan (CCP as per "GrSG Disturbance Guidelines", Appendix B), with particular attention to lek sites. (Lek data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.) Where this is not feasible, consider the following options: • route new utility corridors & locate new surface facilities as far from key habitat sites (e.g., leks) as possible • use topographic relief to reduce predator perch potential when designing new utility corridors & facilities • encourage utility burial when feasible where key habitat sites (e.g., leks) cannot be avoided for new utilities Where technically & economically feasible, locate new utility corridors, communication towers, wind turbines, & other above-ground facilities outside GrSG seasonal habitats as defined by this plan (CCP as per "GrSG Disturbance Guidelines", Appendix B), with particular attention to lek sites. (Lek data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.) Where this is not feasible, consider the following options: • route new utility corridors & locate new surface facilities as far from key habitat sites (e.g., leks) as possible • use topographic relief to reduce predator perch potential when designing new utility corridors & facilities • encourage utility burial when feasible where key habitat sites (e.g., leks) cannot be avoided for new utilities Where technically & economically feasible, locate new utility corridors, communication towers, wind turbines, & other above-ground facilities outside GrSG seasonal habitats as defined by this plan (CCP as per "GrSG Disturbance Guidelines", Appendix B), with particular attention to lek sites. (Lek data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.) Where this is not feasible, consider the following options: • route new utility corridors & locate new surface facilities as far from key habitat sites (e.g., leks) as possible • use topographic relief to reduce predator perch potential when designing new utility corridors & facilities • encourage utility burial when feasible where key habitat sites (e.g., leks) cannot be avoided for new utilities	BLM, CPW, Industry, LWGs	Ongoing	**Tri-State:** Uses comprehensive, GIS based siting & routing process when planning new transmission lines. Tri-state acquires new data including GSG habitat info when conducting planning effort. Objective to site new infrastructure wherever possible in proximity to existing linear features & to minimize overall impacts. Lek sites are identified & excluded during planning. **CPW:** CPW managers, biologists, & land use specialists routinely work with regulatory agencies to site these facilities outside of GrSG habitat, where possible or to minimize impacts (i.e., avoid leks, priority or seasonally important habitat). NWCO & MWR - When contacted &/or made aware of such projects in GRSG habitat, CPW consults with project proponents & submits formal comment letters to appropriate permitting entities on the design/scope/siting/timing of infrastructure projects in order to avoid, minimize, or mitigate impacts to GRSG. MP - Local MP staff provide written comments to local towns, county governments & utility companies to encourage protection of GrSG habitat from disturbance from new or maintaining infrastructure. PPR - Local PPR staff out of the Gr& Junction & Meeker offices provide written comments to local towns, county governments & utility companies to encourage protection of GrSG habitat from disturbance from new or maintenance infrastructure. Four WMP's signed by energy companies incorporate such BMP's. NP - All of North Park is priority GrSG habitat so it is not possible to locate new infrastructure outside of GrSG habitat. CPW has recommended installing raptor perch deterrents. NESR - CPW provides recommendations to Routt County Planning. Recommendations include ways to avoid, minimize & mitigate impacts to GrSG habitats. The majority of the GrSG habitat in Eagle County is located on BLM. CPW recommendations include perch deterrents. **LWG:** The NWCO LWG has been very involved in evaluating the potential impacts of recent electrical transmission line proposals, & has made recommendations to project proponents on many aspects of the project, including siting, construction timing, means to compensate for habitat loss, etc. The MP LWG recognized infrastructure concerns in the March 2012 Scoping EIS letter sent to BLM. The PPR LWG did consider Infrastructure, specifically related to energy development, as a serious concern when ranking issues as part of an Implementation Plan Effort. NESR LWG - CPW, BLM, & Utility companies are members of the NESR LWG. Routt County Planning considers GrSG habitats in permit authorizations. CPW makes recommendations to minimize the negative effects of infrastructure where feasible. NP LWG - CPW & BLM (as members of the NP LWG) make recommendations to minimize the impacts of infrastructure in NP. **COGA:** Yes, 3 of 6 operators surveyed, who hold a total of 59% of the permits in GrSG SWH and operate a total of 21% of the wells in GrSG SWH or RSO	**CPW:** CPW has limited authority in the siting of facilities. **NWCO - CPW, BLM, & LWGs** have been successful in eliminating the most impactful route alternatives through GrSG priority habitat proposed by 2 interstate transmission lines (TransWest & Gateway South). NP - In a recent case, Mountain Parks Electric moved an existing powerline from GrSG habitat & installed the line directly adjacent to a well travelled county road. The company agreed to install perch deterrents. Burial of utility lines is not considered an option in NP.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.1.1.2	Design new powerlines & other above-ground facilities to minimize use of the structures by avian predators. Install appropriate perch deterrents where appropriate, in consultation with CDOW, using the most current science regarding the use & application of deterrent devices.	BLM, CPW, Industry, LWGs	Ongoing	**Tri-State:** Uses perch deterrents. **CPW:** All populations - When contacted &/or made aware of such projects in GRSG habitat, CPW consults with project proponents & submits formal comment letters to appropriate permitting entities on the design/scope/siting/timing of infrastructure projects in order to avoid, minimize, or mitigate impacts to GRSG. These recommendations include tower design, spacing between adjacent lines, & perch deterrents. **LWG:** The MP LWG recognized infrastructure concerns in the March 2012 Scoping EIS letter sent to BLM. NESR LWG - CPW, BLM, & Utility companies are members of the NESR LWG. Routt County Planning considers GrSG habitats in permit authorizations. CPW generally recommends installing perch deterrents on new powerlines. Routt County Planning strongly considers CPW recommendations when authorizing permits. NP LWG - CPW & BLM (as members of the NP LWG) make recommendations to minimize the impacts of infrastructure in NP, including installing perch deterrents. The local rural electric association is a member of the LWG & has agreed to install perch deterrent devices on some proposed projects. **COGA:** Yes, 2 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	**Tri-State:** Experience with perch deterrents shows minimal success as raptors find ways to perch on strcutures even with various types of deterrents in place. **CPW**: NP - CPW has recommended installing raptor perch deterrents. In a recent case, Mountain Parks Electric moved an existing powerline from GrSG habitat & installed the line directly adjacent to a well travelled county road. The company agreed to install perch deterrents.
13.1.1.3	Encourage retrofitting of existing powerlines & other overhead structures (e.g., communication towers, wind turbines) to deter raptor perching where utility corridors impact GrSG seasonal habitats as defined by this plan (as per CCP "GrSG Disturbance Guidelines", Appendix B). Prioritize areas identified in need of retrofitting, using the most current science regarding the use & application of deterrent devices. Encourage burial of the utility where predation effects are high, predation cannot be otherwise mitigated, &/or key habitat sites (e.g., leks) are involved. All design & location recommendations should be based on the most current science. Because of the inherent limitations with burying power lines, this approach could only apply to certain project scenarios & line voltages.	CPW, Industry, LWGs	Ongoing	**Tri-State:** BMPs for retrofitting powerlines to prevent raptors from perching on the cross arms have been implemented at the Colowyo mine. **CPW:** CPW local staff encourages these actions through comment letters, verbal communications, & on-site visits with entities. **LWG:** The MP LWG recognized infrastructure concerns in the March 2012 Scoping EIS letter sent to BLM.	**Tri-State**: Data from utiliies operating throughout the GSG range have shown perch deterrents do not prevent perching & actually increase electrocution risk to raptors. Tri-State has not retrofitted any existing lines & is unlikely to do so unless a more effective device can be designed & research indicates that predation from powerlines is a signficant source of mortality to GSG. **CPW:** BMP's, comment letters, & on-site visits by CPW staff make these recommendations which may or may not be adopted.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.1.1.4	In new pipeline construction, encourage reclamation practices that reduce predator effectiveness in the pipeline corridor. To reduce the linear habitat effect of pipelines, consider reclamation & management techniques including: • feathering edges of vegetation cleared along the line • planting of sagebrush patches within the right of way • bridging the pipeline clearing with sagebrush patches at appropriate intervals • use least surface disturbing technique suitable for necessary development	Industry	Ongoing	**COGA:** Yes, 2 of 6 operators surveyed, who hold a total of 35% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO	
13.1.1.5	Encourage the use of vegetation establishment techniques in *existing* pipeline corridors to reduce predator effectiveness.	Industry	Ongoing		
13.1.1.6	Coordinate the location & design of utility corridors & sage-grouse species conservation efforts with management of other species within occupied GrSG habitat.	Industry	Ongoing	**COGA:** Yes, 2 of 6 operators surveyed, who hold a total of 35% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO	
ISSUE 13.2	Utility corridors, wind turbines, communication towers (including those associated with remote monitoring of oil & gas development), or other structures may increase the potential for disturbance to or direct mortality of GrSG, & may adversely impact GrSG habitats				
OBJECTIVE 13.2.1	Minimize (1) the direct adverse impacts on GrSG; & (2) fragmentation of GrSG habitat resulting from the development of infrastructure related to mineral, utility, energy, & housing development (see also "Energy & Mineral Development" [pg. 313], "Housing Development" [pg. 358], & "Roads" [pg. 409] strategies).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
13.2.1.1	Identify & map existing utility corridors, wind turbines, communication towers, & designated utility corridors in GrSG habitat.	CPW	Begin by 2008	**CPW:** NP - CPW is collecting GIS information to map existing utility corridors in NP as part of the NP seasonal habitat modeling effort. PPR, MP, NESR, NWCO, MWR-Mapping of such developments has not yet been accomplished.	
13.2.1.2	For placement of new utility corridors or other infrastructure, GrSG seasonal habitats should be mapped, prioritized, & avoided where possible. If seasonal habitats are not mapped, prioritize the areas to avoid by using the buffers described in CCP "GrSG Habitat Disturbance Guidelines", Appendix B. Consider l& tenure options such as l& exchanges or easements to minimize conflicts with leks & other key seasonal habitats.	County Governments, CPW, Industry	Ongoing	**Grand:** Has dedicated GIS Coordinator who uses CPW data to create maps of habitat for local users. **Tri-State:** This is standard practice for siting new utilities. **CPW Research:** See 3.2.3.1 above. Seasonal habitat maps can be overlaid with proposed or existing infrastructure layers to identify avoidance areas. **CPW:** General - In 2012, CPW created updated seasonal habitats & priority habitat areas for GRSG throughout Colorado. These maps are available for reference when evaluating infrastructure projects & provide supplemental information to the buffers described in the "GrSG Habitat Disturbance Guidelines" in the CCP. Where local habitat information is available it is substituted for the App. B buffers. Portions of NWCO [Hiawatha] & PPR - finer scale seasonal habitat maps are being developed through our research unit (B. Walker).	**Grand:** all GSG habitat currently mapped.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.2.1.3	Cluster development of new roads, utility corridors, & other infrastructure facilities & use existing, combined corridors, ROWs, or previously disturbed areas, where possible; consider safety issues associated with high-voltage power lines & high pressure oil & natural gas lines in the same corridors. Place new structures & infrastructure outside of key GrSG seasonal habitats as defined by this plan (see CCP "GrSG Disturbance Guidelines", Appendix B) whenever possible to minimize loss & fragmentation of habitat. Use the least surface-disturbing technique suitable for necessary development. Balance the benefits of clustered developments against the potential impact of wider disturbed corridors on GrSG movements. Consider road closures &/or signing following development.	BLM, County Governments, CPW, Industry	Ongoing	**Jackson:** County encourages cluster development. Rural L& Use Process authorizes cluster development. **Tri-State:** Transmission program encourages siting & routing of new facilities within existing corridors. Does not share ROW due to federal safety requirements, but does share corridors & access roads. **BLM:** Limited energy & utility development projects have been implemented since the CCP was completed. These type of BMPs are considered & analyzed during NEPA for all projects proposed in SG habitat. **CPW:** CPW managers, biologists, & land use specialists routinely work with regulatory agencies to site these facilities outside of GrSG habitat, where possible or to minimize impacts (i.e., avoid leks, priority or seasonally important habitat). CPW's BMPs for energy development include recommendations to cluster oil & gas infrastructure. When contacted &/or made aware of such projects in GRSG habitat, CPW consults with project proponents & submits formal comment letters to appropriate permitting entities on the design/scope/siting/timing of infrastructure projects in order to avoid, minimize, or mitigate impacts to GRSG. Recommendations include ways to avoid, minimize & mitigate impacts to GrSG habitats. In PPR, 4 WMPs (signed) with grouse habitat have agreed to measures that cluster development when possible. **COGA**: Yes, 3 of 6 operators surveyed, who hold a total of 42% of the permits in GrSG SWH and operate a total of 13% of the wells in GrSG SWH or RSO	Transwest & Gateway South interstate high voltage power line routes were re-located based on CPW mapping information. Those routes now go around GSG habitat.
13.2.1.4	Encourage appropriate marking of structures &/or altering tower features to minimize GrSG collisions with wind turbines, communication towers, powerlines, other overhead structures, & associated guy wires, in identified or potential collision areas near leks & other important seasonal GrSG habitat (see CCP "GrSG Disturbance Guidelines", Appendix B).	BLM, CPW, County Governments, Industry, LWGs, Private L&owners, SLB, USFS	Ongoing	**USFWS:** provided recommendations for two communication towers, one SW of Rifle & one just east of there. **CPW:** CPW managers, biologists, & land use specialists routinely influence regulatory agencies to site these facilities outside of GrSG habitat, where possible or to minimize impacts (i.e., avoid leks, priority or seasonally important habitat). CPW has not developed marking protocols. MP - CPW provide written comments to local towns, county governments & utility companies to encourage protection of GrSG habitat from disturbance from new or maintaining infrastructure. PPR - BMP's, comment letters, & on-site visits by agency staff make these recommendations. NP - There are few communication tower or other such structures in NP. CPW & other interested parties have not identified collision areas near leks or in other seasonal habitat. **NESR** - CPW makes recommendations to Routt County regarding infrastructure in GrSG habitat.	**USFWS:** Status of FCC approval for Rifle tower unknown. BLM approved site of second tower in the Arapaho National Wildlife Refuge in Jackson County, modifying the access road placement & implementing a timing restriction.
13.2.1.5	Cooperatively plan construction & routine maintenance of utility corridors, wind turbines, or other infrastructure to avoid critical periods & sensitive areas, where technically & economically feasible. Emergency maintenance & repairs are not subject to any timing restrictions.	Industry	Ongoing	**Tri-State**: Regularly implements seasonal buffers during new construction & routine maintenance. **COGA**: Yes, 1 of 6 operators surveyed, who hold a total of 0.2% of the permits in GrSG SWH and operate a total of 0.1% of the wells in GrSG SWH or RSO	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.2.1.6	Encourage effective off-site mitigation (see descriptive process in "Energy" strategy, Objective 3.3.4), when infrastructure impacts cannot be mitigated or avoided on site.	BLM, CPW	Ongoing	**BLM:** This has not been completed to date. **CPW Research:** See 3.2.3.1 above. CPW (Brett Walker) & TNC (Holly Copeland) generated a breeding habitat map for GRSG for all of Moffat Co. specifically to help identify potential areas of off-site mitigation for the proposed Hiawatha Regional Energy Development Project area. **CPW:** NWCO & MWR - CPW is a cooperating agency to several current projects proposed within GRSG range in northwest Colorado (e.g. large electrical transmission lines). Encouraging off-site mitigation is one component of our consultation on these projects. PPR - Near or off-site mitigation has been implemented by operators that have signed a WMP with CPW.	
13.2.1.7	Where GrSG habitat disturbances occur that require reclamation or habitat restoration, the potential vegetation community should be identified (Winward 2004) & a diverse seed mixture of native shrubs, grasses, & forbs should be used where ever possible (see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management & Restoration", Monsen 2005, & "Habitat Enhancement" strategy, pg. 349).	BLM, CPW, Industry	Ongoing	**BLM:** All reclamation activities consider site capability, & incorporation of an appropriate diverse seed mixture. **CPW:** CPW managers, biologists, & land use specialists routinely work with regulatory agencies to reclaim these facilities. CPW's BMPs for energy development include recommendations for reclamation with native plant materials. NWCO, MWR, NP, & MP - CPW consults with project proponents & submits formal comment letters to appropriate permitting entities on the design/scope/siting/timing of infrastructure projects in order to avoid, minimize, or mitigate impacts to GRSG. PPR - CPW local staff encourages regeneration of disturbed areas with native plants through comment letters, verbal communications with entities, & WMP's signed with 4 companies. NESR - CPW provides recommendations to Routt County Planning. Recommendations include habitat reclamation with appropriate seed mixes. **COGA**: Yes, 2 of 6 operators surveyed, who hold a total of 35% of the permits in GrSG SWH and operate a total of 11% of the wells in GrSG SWH or RSO	CPW has no regulatory authority over the adoption of its recommendations.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.2.1.8	Use early & effective reclamation techniques, including interim reclamation, to speed the return of disturbed areas to use by sage-grouse. Develop & implement performance-based reclamation st&ards that include coordinated weed management. Recognize that reclamation &/or weed control are continual & long-term efforts.	BLM, CPW, Industry	Ongoing	**BLM:** Interim reclamation is already implemented as part of the Surface Use Plan of Operations on federal leases. Performance based (% surface disturbance caps) reclamation st&ards have only been developed in the White River & Little Snake FO to date. **CPW:** CPW managers, biologists, & land use specialists routinely work with regulatory agencies to reclaim these facilities. CPW's BMPs for energy development include recommendations for use of interim reclamation & integrated weed management. NWCO & MWR - When contacted &/or made aware of such projects in GRSG habitat, CPW consults with project proponents & submits formal comment letters to appropriate permitting entities on the design/scope/siting/timing of infrastructure projects in order to avoid, minimize, or mitigate impacts to GRSG. MP - CPW local staff encourages regeneration of disturbed areas through comment letters & verbal communications with entities. There is no performance-based reclamation standards implemented or practiced. NP - CPW has recommended interim reclamation. **COGA**: Yes, 3 of 6 operators surveyed, who hold a total of 42% of the permits in GrSG SWH and operate a total of 13% of the wells in GrSG SWH or RSO	PPR - Research by CPW researcher D. Johnston is studying the most efficient & effective reclamation techniques in the PPR with an emphasis on control of cheatgrass while establishing native plants.
13.2.1.9	Recommend setting bonds sufficient to ensure that appropriate GrSG habitat reclamation is met.	BLM, COGCC, CPW, DRMS	Ongoing	**CPW:** General - CPW sets bonds for infrastructure projects affecting State Wildlife Areas. CPW has not recommended bond for projects involving other land management jurisdictions. **OGCC:** See 3.3.1.9. When the data is compiled from 3.3.3.7 this should be readdressed to determine if the financial assurance levels need to be modified.	
13.2.1.10	Enforce & ensure compliance with conditions, stipulations, & reclamation for leases & permits in GrSG habitat.	BLM, COGCC, DRMS	Ongoing	**BLM:** Compliance with O&G permit conditions of approval is conducted. **OGCC**: This is being done, see 3.3.1.13.	**BLM:** staffing may not be sufficient to keep up with the need.
13.2.1.11	Evaluate the need for restoration of previously reclaimed infrastructure sites. Prioritize areas in need of additional restoration efforts & identify potential funding sources.	BLM, CPW, LWGs	Ongoing	**BLM:** All previously reclaimed sites have not been evaluated or prioritized for future actions. However, if issues are identified in the field they are addressed as soon as possible.	
ISSUE 13.3	*Fences may adversely affect GrSG & their habitats.*				
OBJECTIVE 13.3.1	Minimize the potential for adverse impacts of *fences* on GrSG.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.3.1.1	GrSG seasonal habitats should be mapped prior to fence construction, in coordination with CDOW. When feasible, new fences should not be constructed within a buffer around active leks (see CCP Appendix B, "GrSG Disturbance Guidelines"). Lek & telemetry data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management.	CPW	Ongoing	**SLB**: maps all of its leases with PPH & PGH habitat. Grazing & multiple use leases impacted in whole or in part by GSG habitat total over 393K acres. Of those, 49% fall within PPH & 18% are within PGH, leaving 32% not directly important. Fencing on SLB properties within GSG habitat includes 166 miles of woven wire fence & 439 miles of barbwire fence, which means there is approximately 1 mile of fence per section. **CPW Research**: See 3.2.3.1 above. Seasonal habitat maps can be used to recommend avoidance areas for fencing (or fence marking) projects. **CPW:** General - In 2012, CPW created updated seasonal habitats & priority habitat areas for GRSG throughout Colorado. These maps are available for reference when evaluating infrastructure projects & provide supplemental information to the buffers described in the "GrSG Habitat Disturbance Guidelines" in the CCP, Appendix B. Where local habitat information is available it is substituted for the App. B buffers. Portions of NWCO [Hiawatha] & PPR - finer scale seasonal habitat maps are being developed through our research unit (B. Walker). Lek data are provided for development projects but are limited to project area & require a non-disclosure agreement. CPW makes fence construction recommendations to avoid sensitive habitats, & if not possible, then to mitigate to minimize impact of the fence (marking fence to make more visible). NP - BLM is conducting a fence inventory of NP & plans to document problematic fences in GrSG habitat. NESR - CPW has worked with willing l&owners to construct wildlife friendly fences & to avoid particularly sensitive areas near leks. CPW has worked with NRCS to remove old fences and install wildlife friendly fences in a lek complex area in NESR. **USFS:** There are no active leks or lek buffers on any of the three USFS National Forests in range. Very small portion of forests has habitat.	
13.3.1.2	If fences are constructed within the recommended buffer for leks (see CCP Appendix B, "GrSG Disturbance Guidelines"), or within other known GrSG seasonal habitats where significant collision issues are identified through LWGs, consider the following options to minimize the possibility of GrSG collisions: • place fences to use topographic features to minimize the possibility of GrSG collisions • clearly mark fences in strategic locations to increase visibility • discourage the use of net-wire fencing to allow easier movement of grouse under fences, where feasible • if fences are needed for seasonal livestock use, consider using let-down fences that can be put down during times of non-use	BLM, Private L&owners, SLB, USFS	Ongoing	SLB: Standard Grazing Agreement, section 11.G for lessees m&ates that lessees have responsibility for keeping & maintaining the fences on the properties they lease. BLM: New fence constructions would follow these recommendations (not many- if any have been constructed).	
13.3.1.3	Timing of fence construction on public l& should be scheduled according to the GrSG seasonal habitat in the area & the timing guidelines provided in CCP Appendix B, "GrSG Disturbance Guidelines".	BLM, SLB, USFS	Ongoing	**BLM:** Fence construction follows the recommended timing limitations.	**BLM:** Limit disturbance to the bird.
13.3.1.4	Minimize the width of cleared areas along fences to reduce predator effectiveness.	BLM, Private L&owners, SLB, USFS	Ongoing	**BLM:** Fence construction would disturb the smallest area necessary for completion.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.3.1.5	Where habitat disturbances occur that require reclamation or habitat restoration, the potential vegetation community should be identified (Winward 2004) & a diverse seed mixture of native shrubs, grasses, & forbs should be used wherever possible (see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management & Restoration", Monsen 2005, & "Habitat Enhancement" strategy, pg. 349).	BLM, Private L&owners, SLB, USFS	Ongoing	**USFS**: Forest revegetation policy designed with native species in mind. Sagebrush Enhancement Project underway on Eagle / Holy Cross Ranger District in the WRNF. Sagebrush seed mix in use across the WRNF. **BLM:** All reclamation activities consider site capability, & incorporation of an appropriate diverse seed mixture.	
13.3.1.6	In consultation with permittees or private l&owners, relocate or redesign site-specific segments of existing fences where significant adverse effects on GrSG have been documented, as opportunities arise, to reduce the impacts to GrSG. Identify potential funding sources to assist private l&owners in modifying or marking existing fences.	BLM, SLB, USFS	Ongoing	**BLM:** To date, no significant adverse effects have been identified related to SG & Fences in Colorado. Fences at risk for SG are being idetified & marked in the KFO & LSFO (Stevens et al., 2012), & this model will be completed for the entire state as fenceline data becomes available.	
13.3.1.7	Minimize duplication of fences & facilitate removal of abandoned fences within GrSG habitat.	BLM, Private L&owners, SLB, USFS	Ongoing	**BLM:** BLM already strives to minimize duplication of necessary fences, & removes hazardous abandoned fences. Other abandoned fences will be removed as priorities & workloads allow.	**BLM**: See Stevens et al. 2012
ISSUE 13.4	Effects of human infrastructure on GrSG are poorly understood.				
OBJECTIVE 13.4.1	Evaluate & quantify the effects of human infrastructure on GrSG.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
13.4.1.1	Evaluate the impact of utility corridors, communication towers, wind turbines & other infrastructure on predator effectiveness & resulting effects on GrSG populations. [See Research Strategy 21.4.1.3]	APHIS, BLM, CPW, Universities, USFWS, USGS	Begin by 2015	**See 21.4.1.3**	
13.4.1.2	Evaluate the impacts of utility corridors on GrSG habitats (i.e., fragmenting effects on habitat). **[See Research Strategy 21.1.2.3]**	CPW, CCP SC, LWGs, Universities	Begin by 2015		
13.4.1.3	Evaluate the impacts of communication towers, wind turbines, & associated infrastructure on GrSG (both disturbance impacts & habitat fragmentation impacts). [See Research Strategies 21.1.2.3 & 21.2.1.2]	CPW, CCP SC, LWGs, Universities	Begin by 2015		
13.4.1.4	Evaluate the impact of fences on GrSG populations (both disturbance impacts & habitat fragmentation impacts), & identify options to minimize those impacts. [See Research Strategies 21.1.2.3 & 21.2.1.2]	CPW, CCP SC, LWGs, Universities	Begin by 2015		
13.4.1.5	Develop effective methods to mark various types of infrastructure to increase visibility & minimize sage-grouse collisions. [See Research Strategy 21.2.1.2]	CPW, Industry, LWGs, Universities	Begin by 2015		
ISSUE 13.5	There is a lack of communication among agencies, industry, & affected publics involved with human infrastructure development, resulting in misunderst&ing & less effective management for GrSG.				
OBJECTIVE 13.5.1	Improve communication among agencies, industry, & affected publics involved with human infrastructure development, to facilitate improved trust, working relationships, planning, & more effective management of GrSG & their habitats.				

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
13.5.1.1	Present information & data about infrastructure development & GrSG so that it is readily underst&able to stakeholders & the general public. [See also Information, Communication, & Education Strategies 12.2.1.3 & 12.3.1.1]	BLM, CPW, Industry	Ongoing	**Tri-State:** Colowyo mine permitting is a multi-year process with input from state & federal agencies. Information & data available to the public upon request. **CPW:** CPW researchers present research findings at LWG meetings & at CPW's semi-annual seminars for industry. All research projects have annual reports that are posted to the CPW public website. **COGA**: Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO **BLM**: Few infrastucture projects have been completed recently. BLM presents data concerning SG habitat, threats, & infrastructure during the planning & NEPA process for the public to review.	
13.5.1.2	Share GrSG data among agencies, & with counties, private l&owners, & industry to allow for better planning of infrastructure development to minimize impacts to the species. Lek & telemetry data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management. [See also Information, Communication, & Education Strategy 12.3.2.2]	CPW	Ongoing	**CPW:** CPW routinely shares data with agencies, counties, & private entities in order to foster better planning of infrastructure development. Lek & telemetry data are provided for development projects but are limited to the project area & require a non-disclosure agreement.	**CPW:** Many entities incorporate this information while developing planning efforts.
13.5.1.3	Share infrastructure development plans with agencies ASAP to facilitate improved planning, analysis, & management of GrSG within sagebrush habitats, recognizing confidentiality sensitivities. Lek & telemetry data are considered sensitive information by CDOW. Limit data distribution to the extent necessary for effective management. [See also Information, Communication, & Education Strategy 12.3.2.2]	Industry	Ongoing	**Tri-State:** Colowyo provides these plans to agencies as part of permitting process. **COGA**: Yes, 4 of 6 operators surveyed, who hold a total of 60% of the permits in GrSG SWH and operate a total of 21% of the wells in GrSG SWH or RSO	
13.5.1.4	Encourage open communication among companies to entertain opportunities to reduce impacts &/or maximize benefits to GrSG. [See also Information, Communication, & Education Strategy 12.3.2.3]	BLM, CPW, Industry	Ongoing	**CPW:** CPW conducts semi-annual seminars for industry to foster communications between entities. CPW encourages entities to minimize duplication of infrastructure through our WMP process.	
13.5.1.5	Encourage infrastructure companies to participate in local GrSG work groups. [See Information, Communication, & Education Strategies 12.3.2.1 & 12.3.2.3]	CPW, Industry	2008 & ongoing	**Tri-State:** Has attended working group meetings. Interested in continued participation. **CPW:** NWCO - The NWCO LWG has encouraged the participation of infrastructure/utility companies, & recently (2011) hosted presentations by proponents of the TransWest Express transmission line project. Utility companies are engaged in the LWGs in PPR, NWCO, NESR, & NP. MP - There has not been energy development in MP. The few infrastructure projects that arise are handled individually with the different entitities. **COGA**: Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.5.1.6	Promote regular communication & continual coordination among agencies, industry, LWGs, & counties to improve infrastructure-related planning & management of GrSG. [See Information, Communication, & Education Strategy 12.3.2.3]	CPW, Industry	2008	**Tri-State:** Colowyo a member of its Local Working Group for GSG. **CPW:** CPW conducts semi-annual seminars for industry to foster communications between entities. CPW encourages entities to minimize duplication of infrastructure through our WMP process. **COGA:** Yes, 1 of 6 operators surveyed, who hold a total of 0.2% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	
13.5.1.7	Promote & provide regular opportunities for public involvement to improve infrastructure planning as it relates to management of GrSG & GrSG habitat. [See also Information, Communication, & Education Strategy 12.2.2.1]	BLM, County Governments, Industry, LWGs	Ongoing	**Moffat:** Holds monthly land use meetings, monthly Planning Commission meetings, & weekly County Commissioner meetings. GSG issues are common, & the public is invited to attend all of these meetings. **Grand**: Every land use action requires a hearing before the Planning Commission & one before the BCC. All hearings open to the public. Mineral extraction operations require SUP that is reviewed at these meetings too. Public notice placed in county newspaper to encourage public input. Each proposal also sent to CPW for comment. **Jackson**: Public notice given for hearings. Notice published in newspapers, & written notice provided to adjacent landowners. Zoning Resolution requires extensive outreach. **BLM:** Public involvement on infrastructure projects usually occur during the NEPA process. **CPW:** LWG Meetings are open to the public & often provide comments on projects. Much infrastructure development is occurring on private lands owned by energy companies or on BLM lands. The BLM provides public commenting periods for any actions requiring an EIS. The NWCO LWG has been very involved in the planning of recent transmission line projects. **COGA**: Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	**Counties:** Good turnout from the public at these meetings.
13.5.1.8	Communicate to affected publics the need to balance infrastructure development with GrSG habitat & population requirements. [See Information, Communication, & Education Strategy 12.2.1.3]	CPW	2009	**CPW:** CPW routinely communicates & coordinates with the public often via the LWGs.	**CPW**: In 2012, for example, information was presented at the following meetings: WAFWA Technical Meeting, Coal & Water Conference, Colorado Mining Association, State Board of Land Commissioners, Boards of County Commissioners (each county in GrSG range), CPW's semi-annual industry seminar, & LWG meetings.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
13.5.1.9	Promptly & frequently update information related to infrastructure development & GrSG to foster a better underst&ing of impacts to the species. [See also Information, Communication, & Education Strategy 12.3.2.2]	BLM, CPW, Industry	Ongoing	**BLM:** Few infrastucture projects have been completed recently. As research is reviewed or completed it is shared with agency biologists for their consideration. CPW: CPW routinely communicates & coordinates with the public often via the LWGs. COGA: Yes, 1 of 6 operators surveyed, who hold a total of 25% of the permits in GrSG SWH and operate a total of 10% of the wells in GrSG SWH or RSO	**CPW**: In 2012, for example, information was presented at the following meetings: WAFWA Technical Meeting, Coal & Water Conference, Colorado Mining Association, State Board of L& Commissioners, Boards of County Commissioners (each county in GrSG range), CPW's semi-annual industry seminar, & LWG meetings.
13.5.1.10	Improve the underst&ing, sharing, & acceptance of research & modeling efforts regarding GrSG & infrastructure development. Ensure that current management, reclamation techniques, & appropriate BMPs are shared with contractors & consultants to improve on-the-ground implementation. [See also Information, Communication, & Education Strategies 12.3.1.1 & 12.3.2.2]	CPW	Ongoing	**CPW:** CPW conducts semi-annual research up-date seminars for industry where current findings on impacts of infrastructure on GrSG & appropriate mitigations techniques are shared. CPW meets at least annually with each energy company involved in a WMP to review progress, incorporate recent research findings, & develop future plans.	**CPW:** 4 WMPs in GrSG habitat are in effect. CPW conducts semi-annual research up-date seminars.

14. Lek Viewing

ISSUE 14.1	The disturbance from lek viewing may be impacting the breeding success of GrSG.				
OBJECTIVE 14.1.1	Minimize disturbance to GrSG at leks while allowing for public viewing of lek activity.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
14.1.1.1	Develop and implement a lek-viewing protocol for guidance in managing lek-viewing activities to minimize the impacts to GrSG. Include activities such as monitoring visitors to leks, and providing an opportunity for the public to view leks without disturbing the birds (e.g., lease of private property, signs, viewing blinds, defining parking areas).	CPW, LWGs	2008	**NP - CPW** developed a lek viewing brochure for NP and directs lek viewers to specific leks on State Land. **MP -** Public, organized lek viewing does not occur in MP and is not encouraged. All known leks in MP are regularly checked by CPW staff and so it would be known if public view was occurring. **NESR** - no public viewing.	
14.1.1.2	Develop public lek-viewing areas in consultation with CDOW and land management agencies to minimize disturbance to GrSG. Encourage local communities to develop and implement a managed lek-viewing opportunity.	LWGs	2008	**NP** - The NP LWG has discussed the need for managed lek viewing in NP. Commercial lek viewing tours are completed in NP, despite the fact that the BLM has not permitted these tours through special use permits. There is large public desire for additional lek viewing opportunities. The LWG and CPW cooperate with the NP Chamber of Commerce to provide lek viewing educational programs. CPW has designated a lek on a State Wildlife Area as a Watchable Wildlife Site. **NESR -** CPW does not recommend lek viewing opportunities in this population. Private landowners do not allow lek viewing on private property. **MP and PPR -** LWGs do not promote or encourage lek viewing of leks. In PPR, most leks are on private land or inaccessible due to weather. **NWCO -** strategy not occurring.	Commercial lek viewing is not currently managed well.
14.1.1.3	Manage lek viewing on developed sites to minimize the impacts to GrSG. Encourage managed lek-viewing (using protocols) on private lands as a revenue source for landowners, or provide incentives, if possible.	CPW	2008	**NWCO -** There is only one known "developed" lek viewing site that CPW knows of in the NWCO population and it is on private land. CPW has let a private organization borrow a lek-viewing trailer and requested that certain conditions be met to minimize adverse impacts to breeding GRSG as a condition of loaning the trailer. **MWR** - There is currently only one known active lek within the MWR population. It is located on private land and is not viewable by the general public or visible from a public road.**NP -** CPW has worked with BLM to assess the amount of non-permitted commercial lek viewing in NP. There is extensive commercial lek viewing in NP; however this activity is technically illegal because BLM has not issued any special use permits. CPW works with the NP Chamber of Commerce to provide managed lek viewing tours on State land. CPW is currently working with a private landowner to provide a lek viewing opportunity on private land in NP. There is a huge desire for lek viewing in NP. Current lek viewing is not effectively regulated or monitored. **MP and PPR** - Public, organized lek viewing does not occur and is not encouraged. **NESR** - NESR has very few leks and CPW does not encourage public lek viewing sites in NESR. There are no public lek viewing sites in NESR. Most of the leks are on private land and the private landowners do not allow access. The leks on BLM in Eagle County are protected through a seasonal closure to protect winter wildlife.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
14.1.1.4	Limit the number of managed lek viewing sites for each GrSG population, and encourage the public to use developed sites. Encourage agencies to develop a remote lek-viewing opportunity (e.g., “webcam”).	CPW	2008	**NWCO -** There is only one known "developed" lek viewing site that CPW knows of in the NW Colorado population area. MWR - There is currently only one known active lek within the MWR population. It is located on private land and is not viewable by the general public or visible from a public road. MP - Public, organized lek viewing does not occur in MP and is not encouraged. The public is directed toward tours in NP, an hour north of Granby. All known leks in MP are regularly checked by CPW staff and so it would be known if public view was occurring. NP - CPW has attempted to limit he number of leks used as viewing sites through the development of a NP lek viewing brochure that directs lek viewers to a specific lek on State land. CPW is also working with BLM to try and reduce the amount on non-permitted commercial lek viewing on BLM. CPW does not share the vast majority of lek locations with the public. PPR - none. NESR - NESR has very few leks and CPW does not encourage public lek viewing sites in NESR. There are no public lek viewing sites in NESR. Most of the leks are on private land and the private landowners do not allow access. The leks on BLM in Eagle County are protected through a seasonal closure to protect winter wildlife.	
14.1.1.5	Educate the GrSG viewing public about ethical viewing and photography of GrSG (e.g., provide information in viewing guides, internet sites focused on bird watching, brochures). **[See Information, Communication, and Education Strategy 12.2.1.3]**	CPW	2009	**General - CPW** has released a watchable wildlife brochure detailing grouse biology with suggestions for viewing to limit negative impacts.	
14.1.1.6	Educate commercial bird watching tour guides and photographers about ethical GrSG lek-viewing protocol. **[See Information, Communication, and Education Strategy 12.2.1.3]**	CPW	2009	**General - CPW** has released a watchable wildlife brochure detailing grouse biology with suggestions for viewing to limit negative impacts. **NP -** CPW has discussed ethical lek viewing with some commercial tours. However, the vast majority of commercial tours in NP are non-permitted and CPW generally does not have the opportunity to meet with commercial tours.	
14.1.1.7	As appropriate, encourage local volunteers (e.g., Audubon Society, Chambers of Commerce) to help with lek counts to increase educational opportunities. Ensure that all volunteers are trained about the sensitivity of lek location information.	CPW	2008	**NWCO - CPW** has encouraged a private organization that runs a commercial viewing operation on private land to share GRSG lek count data to improve monitoring. **NP** - CPW works with the NP Chamber of Commerce to organize lek viewing tours. Counts from these tours are included in the CPW lek count database. **NESR -** NESR has very few leks and CPW does not use volunteers to help with lek counts.	
14.1.1.8	Evaluate the impact of lek viewing on GrSG. **[See Research Strategy 21.2.1.5]**	CPW, Other Research Institutions, Universities	Begin by 2020		
14.1.1.9	Treat lek locations as “sensitive information”, i.e, not published on the web or in books. Lek locations need to be available for planning purposes to appropriate agency or private consultant biologists.	BLM, CPW, LWGs, NRCS, SLB, USFS, USFWS	2008	**CPW:** considers lek locations sensitive information and requires a non-disclosure agreement prior to release of the information for all agencies that require the information for specific project planning purposes. Local CPW staff protect location information and does not share this with the general public.	
14.1.1.10	Monitor and quantify the effects of viewing on lek attendance patterns. **[See Research Strategy 21.2.1.5]**	CPW, Other Research Institutions, Universities	Begin by 2020		

15. Pesticides

ISSUE 15.1	Some herbicide use recommendations for sagebrush treatment in GrSG habitat are obsolete.				
OBJECTIVE 15.1.1	Update recommendations on sagebrush herbicide treatment methods that reduce adverse impacts to and/or improve GrSG habitat.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
15.1.1.1	Conduct research on the effects of various herbicide treatments on GrSG habitat. **[See Research Strategy 21.1.2.1]**	BLM, CDA, CPW, LWGs, NRCS, Private Landowners, UCEPC, USFS, USFWS, USGS	Begin by 2015	**UCEPC** installed a native seed mix in 2012 in GSG habitat in a post-herbicide treated area. Used site as source of information on which species respond positively to herbicide application and revegetation success, compared with non-treatment areas.	
15.1.1.2	Using an interagency team approach, develop recommendations for methods of sagebrush herbicide treatments that reduce adverse impacts to and/or improve GrSG habitat.	BLM, CPW, LWGs, NRCS, USFS, USFWS	2008	**CPW: General -** CPW biologists interact regularly with BLM, NRCS, and private lands biologists to plan GrSG enhancement projects. CPW routinely comments on project proposals to improve their benefit or reduce their impact on GrSG.	
ISSUE 15.2	Sagebrush herbicide treatment methods that have fewer adverse impacts to GrSG habitat can be more expensive than traditional methods.				
OBJECTIVE 15.2.1	Encourage the use of non-traditional sagebrush herbicide treatments that have fewer adverse impacts to GrSG habitat.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
15.2.1.1	Provide monetary incentives to promote the use of non-traditional herbicide treatments where appropriate in GrSG habitat (see "Habitat Enhancement" strategy, pg. 349).	CPW , NRCS, USFWS	Ongoing	**CPW: NWCO -** CPW, BLM, and NRCS designed and implemented (with cost-share funding for landowners) several non-traditional sagebrush herbicide treatments on Cold Spring Mountain to replace plans for large scale spraying with small, random treatment areas by varying the distribution of herbicide.	**CPW: General -** CPW provides project funding (including cost share with other agencies) for GrSG enhancement projects. Use of the funding requires that projects be designed to improve GrSG.
ISSUE 15.3	Land managers are not informed about the various herbicide treatment methods and associated impacts to GrSG habitat.				
OBJECTIVE 15.3.1	Inform land managers about sagebrush herbicide treatment methods and the associated impacts to GrSG habitat.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
15.3.1.1	Conduct local field trips to observe the results of different herbicide treatment methods in GrSG habitat. **[See also Information, Communication, and Education Strategies 12.2.1.3 and 12.3.1.1]**	CPW, CSU Extension, LWGs, NRCS, Private Landowners	2008	**CPW: NWCO -** CPW has participated in several field trips in central Moffat County to evaluate herbicide applications, including "thinning rate" treatments where varying amounts of herbicide were used.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
15.3.1.2	Provide technical assistance and information to land managers regarding herbicide treatment design and application methods that minimize adverse impacts to GrSG habitat.	BLM, CPW, NRCS, USFWS, USFS	2008	**CPW: General -** CPW staff routinely provides technical assistance with herbicide (and other GrSG habitat treatment) design. CPW's recently hired sagebrush steppe habitat coordinator's role includes providing technical assistance with project design, both inside and outside the agency. CPW provides part of the salary of 3 private lands biologists housed in NRCS offices who also provide technical assistance with project design.	
ISSUE 15.4	Insecticide used for Mormon cricket control has the potential to impact GrSG.				
OBJECTIVE 15.4.1	Avoid using Mormon cricket treatments that are harmful to GrSG.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
15.4.1.1	Provide information on (1) important GrSG areas to avoid; (2) best timing for applications; and (3) least toxic methods of control, to aerial applicators of insecticides used to control Mormon crickets.	CPW, CSU Extension	Ongoing	**CPW: NWCO -** CPW has provided guidance during Mormon cricket outbreaks on areas to avoid during baiting operations to minimize effects on GrSG (particularly chicks). CPW's recommendations include the use of less toxic and less persistent baits.	

16. Piñon-Juniper Encroachment

ISSUE 16.1	In some areas of Colorado, loss of GrSG habitat can be attributed to piñon-juniper expansion and encroachment into sagebrush communities.				
OBJECTIVE 16.1.1	Reduce the encroachment of piñon-juniper in those portions of NESR, NWCO, and PPR GrSG populations identified in Fig. 30, pg. 182.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
16.1.1.1	For each of the 3 GrSG populations, prioritize areas (Fig. 30, pg. 182) where removal of piñon-juniper to enhance GrSG habitat is needed (see "Habitat Enhancement" strategy, pg. 349). Focus should be on sites having appropriate characteristics (e.g., soil characteristics, sagebrush understory; also review historic photos) to support sagebrush communities, due to increased probability of success and reduction in cost. Identify options, schedules, and funding opportunities for specific projects.	BLM, CPW	2008	**CPW: General -** CPW has identified a number of areas (including areas noted in Figure 30 of the CCP) where piñon-juniper encroachment of sagebrush habitat has occurred. In the 3 areas identified as priority areas in the CCP (**NWCO, PPR and NER**) options, schedules and funding opportunities have been indentified. In the 2 other populations **(MWR andMP),** not identified in the CCP, PJ removal projects have also occurred. **NP -** Piñon-Juniper encroachment is not an issue. **See Appendix A: Habitat Treatments** **See Appendix B: Summary of Expenditures on GrSG in Colorado 2006-2012**	**CPW: General -** Prioritized areas have been identified and treatments have been implemented. See 16.1.1.4.
16.1.1.2	Identify ecological site characteristics and sagebrush species (Winward 2004) associated with GrSG habitat project areas identified in strategy 16.1.1.1 (Monsen 2005).	BLM	2008 and ongoing	**CPW: General -** Determination of site characteristics, including sagebrush species is a standard part of CPW project planning.	
16.1.1.3	Conduct pre-project planning (e.g., necessary archaeological clearances, EAs) and pre-restoration monitoring for sites selected for treatment in GrSG habitat in strategy 16.1.1.1.	BLM, USFS	Begin 2008, and ongoing	**USFS:** Completed as part of Standard Operating Procedure. **CPW:** General - CPW has conducted a number of PJ encroachment treatments on public lands. Necessary pre-project planning has been conducted as required by the land owning agency, sometimes at CPW expense and sometimes at the land owning agency's expense. The Little Snake and White River BLM Field Offices have developed programmatic Environmental Assessments that have streamlined the design and implementation of PJ encroachment projects in those Field Offices.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
16.1.1.4	Implement appropriate treatment/restoration action(s) (Monsen 2005) for selected sites (identified in strategy 16.1.1.1) in GrSG habitat, as funding/personnel levels allow. Treatment options include, but are not limited to: prescribed fire, mechanical treatments (such as roller chopping, hydro-axing, or chaining), and reseeding, if necessary.	BLM,USFS	Begin 2008, and ongoing	**USFS:** Routt NF has conducted re-seeding in the California Park Area. White River NF has conducted on the Eagle / Holy Cross Ranger District and Rifle RD. **CPW:** General - CPW has implemented a number of treatments in the prioritized areas where piñon-juniper encroachment of sagebrush habitat has occurred. Projects have been implemented in the 3 areas identified as priority areas in the CCP (NWCO, PPR and NER)sa well in the 2 other populations (MWR andMP) not identified as priority areas. NP - Piñon-Juniper encroachment is not an issue. **NWCO** - CPW has implemented 6 different piñon-juniper encroachment projects totaling approximately 2,600 acres in the NW Colorado population since 2008. Additional projects are in the planning stages. **NESR** - In 2011 and 2012, CPW funded the removal of 898 acres of piñon-juniper with a hyrdo ax in an historic lek area. This area is also a travel corridor and winter area for GrSG in the NESR population. In 2012, BLM funded an additional 263 acres of hand-cutting of piñon-juniper in the same area. MWR and MP - While the MWR and MP population areas were not identified in the CCP as populations where PJ Encroachment was an issue, CPW has implemented 3 small projects in MWR on the Oak Ridge SWA totaling about 50 acres to benefit GRSG. and in 2012, MP CPW, USFWS Partners for Fish and Wildlife, and NRCS partnered to removed 500 acres of PJ encroaching on private lands north of Kremmling. The sites in MP are Level 1 and 2 PJ sites.	**CPW:** General - CPW has secured approximately $900,000 of SCTF funds that have/can be used for treatment of PJ encroachment. PPR - CPW Researcher B. Walker is studying the effectiveness of using PJ removal to grouse occupancy using telemetry. Several study plots in the North PPR have been established on BLM lands and PJ was removed with a Hydroax. Monitoring of these plots for GrSG use will continue over the next couple of years. This project is a joint effort with the BLM. **See Appendix A Habitat Treatments for details of projects completed.**
16.1.1.5	Monitor vegetation response to treatments in GrSG habitat (implemented in strategy 16.1.1.4), and evaluate treatment success (Monsen 2005).	BLM,USFS	Post-treatment	**USFS:** Occurring or planned in restoration areas across the Routt and WRNF.	**CPW:** PPR - CPW Researcher B. Walker is studying the effectiveness of using PJ removal to grouse occupancy using telemetry. Several study plots in the North PPR have been established on BLM lands and PJ was removed with a Hydro ax. Monitoring of these plots for GrSG use will continue over the next couple of years.
16.1.1.6	Reseed if necessary in areas treated in GrSG habitat (strategy 16.1.1.4), to reestablish understory shrubs and herbs using methods outlined in Monsen (2005). See also CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration".	BLM,USFS	Ongoing	**USFS: R**estoration plan developed and implemented in Routt NF. This is also part of the Sagebrush Enhancement Project on Eagle / Holy Cross RD. **CPW:** General - Supplemental seed has not been necessary in projects conducted to date, except in a limited basis where equipment was trailed, etc.	
16.1.1.7	Re-treat areas in GrSG habitat (identified in strategy 16.1.1.1), as necessary, to control re-invading trees.	BLM,USFS	Post-treatment, every 5-10 years	**USFS:** Ongoing in WRNF. **CPW:** General - PJ encroachment treatments conducted by CPW have not yet reached the point where re-invasion has occurred.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
ISSUE 16.2	In some areas of Colorado, loss of GrSG habitat can be attributed to piñon-juniper expansion and encroachment into sagebrush communities.				
OBJECTIVE 16.2.1	Refine and regularly update mapping of piñon-juniper encroachment areas within occupied and potential GrSG habitat in all populations.				
Reference Number	**Conservation Strategy**	**Responsible Partie**	**Timeline**	**Implementation**	**Effectiveness**
16.2.1.1	Re-evaluate and update (for accuracy and currency) existing maps of piñon-juniper distribution in GrSG habitat (Fig. 30, pg. 182).	CPW	Every 5 years or as needed	**CPW: General -** No comprehensive effort to update areas of piñon-juniper encroachment has been undertaken. Recently developed seasonal habitat models may have some utility in looking at PJ encroachment across landscape scales. **PPR -** Habitat suitability maps generated by CPW Researcher B. Walker are based on birds with radio transmitters and could be used to determined areas where PJ might be reduced to improve GrSG habitat. However, no specific maps have been developed that depict PJ distribution across the PPR specifically.	

17. Population Monitoring and Targets

ISSUE 17.1	It is important to assess GrSG population size and trends, but current methods of estimating population size from lek counts make many untested assumptions.				
OBJECTIVE 17.1.1	Assess GrSG population size and trends and provide for the long-term monitoring of GrSG.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
17.1.1.1	Maintain consistent current GrSG lek count protocols (include searching for new leks), but use research results to establish protocols for future population monitoring and record keeping, including mechanisms to assure consistent implementation and reporting. [See also Research Strategy 21.8.1.1]	CPW	Ongoing	**CPW: General** - Lek counts follow state protocols (leks are counted at least 3 times annually within certain date ranges to incorporate early, mid, and late season lek attendance). All data is compiled for each population and provided to the statewide grouse coordinator and the GIS Specialist. Searches for new lek sites and rechecks of historic lek sites occur with variable frequency depending on the population. CPW is evaluating the use of Dual Frame sampling to search for new leks and to estimate the proportion of leks that are counted during standard lek counts. Dual Frame sampling has been investigated in north-central and northwestern NWCO, NP and PPR. CPW Researcher B. Walker is evaluating male GrSG movements and lek attendance during the breeding season to better understand some of the variability inherent in lek counts. **PPR** - Due to difficult counting conditions from the ground, active leks in the PPR are flown at least three times during the breeding season using a helicopter. Inactive leks are generally visited at least once to document any if any renewed activity is occurring. **NP** - CPW has consistently counted leks in NP for 40 years and provides one of the best long-term data sets in GrSG range.	Consistent lek count protocols have been in place and fully implemented since 1997 in all populations. All lek data is housed in CPW's GIS data base and with the CPW Grouse Coordinator therefore consistent reporting is also achieved across all populations.
17.1.1.2	Consider and implement conservation actions to achieve the GrSG male population targets outlined in this plan (see "Colorado GrSG Population Management Zones", pg. 248).	CPW	Ongoing	**CPW:** General - CPW uses lek counts (3-year running averages of high male counts by population and/or management zone (in NWCO)) as the primary indicator of population trend and the need for, or adequacy of, conservation actions. These trend data are updated for each population each year. NP, MP, and NESR are currently within the population target zones in the CCP. NWCO, MWR, and PPR are currently below the population target zones. CPW has implemented a number of conservation actions to conserve populations, including protecting and enhancing habitat, and conducting more intensive monitoring to determine important use areas, seasonal movements, etc., via radio telemetry. All actions are reported in various chapters of this document.	**See Appendix I: Population Trends**
17.1.1.3	Develop statistically defensible methods to estimate GrSG population size and/or trends. **[See Research Strategies 21.8.1.1, 21.8.1.2, 21.8.1.3, and 21.8.1.5]**	CPW, Universities	Begin by 2010	**CPW/CSU: NWCO, PPR -** CPW Researcher B. Walker and graduate student are evaluating methods to better estimate GrSG population sizes through intensive radio-telemetry of male GrSG, including male movements and lek attendance during the breeding season, and intensive Dual Frame sampling in the PPR to compare results to traditional lek counts.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
17.1.1.4	Coordinate with private landowners to gain access to expand GrSG lek search areas.	CPW	Ongoing	**CPW: General -** CPW works with many private landowners on a annual basis to monitor known active, inactive, and historic lek locations. CPW has access to the vast majority of known leks. CPW annually collaborates with private landowners to conduct expanded lek searches in areas of high quality modeled habitat as the opportunity arises and staff time allows. **PPR -** Most lek counts in the PPR are conducted by helicopter flights. CPW Researcher B. Walker is studying the use of Dual Frame sampling and lek count accuracy and has permission from private landowners to access leks so that required double counts can be performed.	CPW has access to or is able to monitor from nearby roads on at least 98% of known leks.
17.1.1.5	Develop a single, statewide, standardized lek data base for all Colorado GrSG population, and update data annually.	CPW	2008 and update annually	**CPW: General -** CPW has compiled population-specific lek data into statewide totals for many years. CPW instituted updated procedures to standardize the collection and reporting of lek data, through the use of a standard reporting spreadsheet in 2011. CPW biologists have also worked with the CPW GIS section to increase the accuracy and completeness of spatial lek data in recent years, including the annual correction of lek locations, activity status, and high male count.	
ISSUE 17.2	Population targets are based on current population estimates and potential habitat conditions, but habitat conditions and availability are expected to change over time.				
OBJECTIVE 17.2.1	Reevaluate population targets as habitat conditions change and knowledge increases with regards to GrSG behavior and population dynamics.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
17.2.1.1	Use adaptive management approach (see pg. 10) to re-evaluate current population management zones.	CPW	2010	**CPW: General -** CPW uses lek counts (3-year running averages of high male counts by population and/or management zone (in NWCO)) as the primary indicator of population trend and the need for, or adequacy of, conservation actions. The current running average is compared to the targets annually for each population.	

18. Predation

ISSUE 18.1	Public misunderstanding of the role of predation in GrSG populations can make GrSG predation management challenging.				
OBJECTIVE 18.1.1	Improve the public's understanding of the role of predation on GrSG populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
18.1.1.1	Actively provide accurate information to the general public and stakeholders to improve their understanding about the relationship between predation and GrSG. **[See Information, Communication, and Education Strategies 12.2.1.3 and 12.3.1.1]**	CPW	2009- Annually beginning in 2008	**CPW: General -** CPW provides information to interested publics through a variety of formal and informal methods. The effect of predation on GrSG is a regular part of this communication and seeks to differentiate between the fact of predation (that it occurs in all populations) from the effect of predation (if and where it constitutes an unnatural/unsustainable cause of excess mortality).	
ISSUE 18.2	Information is lacking on the role of predation on GrSG populations.				
OBJECTIVE 18.2.1	Conduct research and monitoring to investigate the role of predation on GrSG populations in Colorado.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
18.2.1.1	Conduct a thorough review of the existing literature on the relationship between predation and GrSG populations and habitat. **[See Research Strategy 21.4.1.1]**	APHIS, BLM, CDA, CPW, LWGs, USFS, USFWS, USGS	Begin by 2010	**See 21.4.1.1**	
18.2.1.2	Establish a process to develop GrSG predation research priorities within Colorado, and encourage innovative and progressive research questions. **[See Research Strategy 21.4.1.1]**	APHIS, BLM, CDA, CPW, LWGs, USFS, USFWS, USGS	Begin by 2010	**See 21.4.1.1**	
18.2.1.3	Document and monitor current predator population levels in GrSG habitat. **[See Research Strategy 21.4.1.1]**	APHIS, BLM, CDA, CPW, LWGs, USFS, USFWS, USGS	Begin by 2010	**See 21.4.1.1**	
18.2.1.4	Evaluate relationships among GrSG predator species, including how GrSG predator species population levels change relative to each other. **[See Research Strategy 21.4.1.2]**	APHIS, BLM, CDA, CPW, Universities, USFWS, USGS	Begin by 2015		
18.2.1.5	Investigate and evaluate the natural variability in GrSG predator populations. **[See Research Strategy 21.4.1.2]**	APHIS, BLM, CDA, CPW, Universities, USFWS, USGS	Begin by 2015		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
18.2.1.6	Investigate the effects of predation on all GrSG life stages. **[See Research Strategy 21.4.1.1]**	APHIS, BLM, CDA, CPW, LWGs, USFS, USFWS, USGS	Begin by 2010	**See 21.4.1.1** **CPW:** General - While CPW has not conducted specific research to experimentally test the effect of predation on GrSG life stages, CPW has maintained hundreds of radio-marked GrSG (male, female, adults and chicks) over many years in NWCO, NP, NESR, MWR, and PPR. At no time, and in no population, have demographic rates been detected that differ markedly from expected levels found elsewhere in the range of GrSG.	**CPW:** At a coarse level, this evidence is strong indication that excessive predation of GrSG is not occurring in Colorado.
18.2.1.7	Investigate the influence of GrSG habitat on predation rates. **[See Research Strategy 21.4.1.3]**	APHIS, BLM, CDA, CPW, Universities, USFWS, USGS	Begin by 2015	**See 21.4.1.3**	
18.2.1.8	Investigate how predation rates on GrSG are influenced by the natural temporal and spatial variability in sagebrush ecosystems (e.g., plant age class, fire intervals). **[See Research Strategy 21.4.1.3]**	APHIS, BLM, CDA, CPW, Universities, USFWS, USGS	Begin by 2015	**See 21.4.1.3**	
18.2.1.9	Investigate the quantity of habitat (i.e., patch size) needed to sustain GrSG. **[See Research Strategies 21.1.1.1 and 21.4.1.3]**	APHIS, BLM, CDA, CPW, Universities, USFWS, USGS	Begin by 2010 / Begin by 2015	**See 21.1.1.1 and 21.4.1.3**	
18.2.1.10	Investigate how invasive weed species impact predation rates on GrSG. **[See Research Strategy 21.4.1.3]**	APHIS, BLM, CDA, CPW, Universities, USFWS, USGS	Begin by 2015	**See 21.4.1.3**	
18.2.1.11	Investigate the influence of habitat quality (e.g., nutrition, forb/insect quality and quantity) on GrSG chick vulnerability to predation. **[See Research Strategies 21.1.1.1 and 21.1.1.3]**	APHIS, BLM, CDA, CPW, CSU Extension, Industry, LWGs, NRCS, Private Landowners, USFS, USFWS, USGS	Begin by 2010 /2012	**See 21.1.1.1**	
18.2.1.12	Evaluate the impact of infrastructure, powerlines, roads, and fences on predation rates in GrSG populations. **[See Research Strategy 21.4.1.3]**	APHIS, BLM, CDA, CPW, Universities, USFWS, USGS	Begin by 2015	**See 21.4.1.3**	
18.2.1.13	Investigate the roles of and relationships between native and non-native predators in the sagebrush ecosystem. **[See Research Strategy 21.4.1.2]**	APHIS, BLM, CPW, Universities, USFWS, USGS	Begin by 2015		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
18.2.1.14	Evaluate whether vegetation treatments improve GrSG habitat in a way that affects GrSG population parameters, such as nest success. **[See Research Strategy 21.1.2.1]**	BLM, CDA, CPW, LWGs, NRCS, Private Landowners, UCEPC, USFS, USFWS, USGS	Begin by 2015		
ISSUE 18.2	Information is lacking on the role of predation on GrSG populations.				
OBJECTIVE 18.2.2	Secure funding for research on predation and GrSG populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
18.2.2.1	Identify funding sources for research on predation and GrSG. **[See Research Strategy 21.4.1.1]**	APHIS, BLM, CPW, LWGs, USFS, USFWS, USGS	Begin by 2010	**See 21.4.1.1**	
18.2.2.2	Secure funding for research on predation and GrSG. **[See Research Strategy 21.4.1.1]**	APHIS, BLM, CPW, LWGs, USFS, USFWS, USGS	Begin by 2010	**See 21.4.1.1**	
ISSUE 18.3	Although predation has always occurred in GrSG populations, increases in numbers or types of specific predators may affect sage-grouse population numbers.				
OBJECTIVE 18.3.1	Encourage timely, innovative GrSG predation management strategies (including adaptive predator management and monitoring), to assist in achieving GrSG population targets (see “Colorado GrSG Population Management Zones”, pg. 248).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
18.3.1.1	Identify appropriate types of predator control for GrSG populations and coordinate potential actions locally and regionally.	APHIS, CDA, CPW, LWGs	2008	**CPW:** CPW has maintained hundreds of radio-marked GrSG (male, female, adults and chicks) over many years in NWCO, NP, NESR, MWR, and PPR. At no time, and in no population, have demographic rates been detected that differ markedly from expected levels found elsewhere in the range of GrSG. At a coarse level, this is strong indication that excessive predation of GrSG is not occurring in Colorado. Per the CCP, active predator control will only be considered in areas where documented excessive predation is occurring. However, other types of management actions to deter predators (e.g., perch preventers, removal of piñon-juniper trees, etc) are being implemented and are detailed in other chapters (e.g., Infrastructure and Piñon-Juniper Encroachment).	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
18.3.1.2	Implement GrSG predator control, as necessary and appropriate and coordinate activities locally and regionally.	APHIS, BLM, CPW, County Governments, LWGs,	2009	See 18.3.1.1.	
18.3.1.3	When applying predation management techniques, abide by existing laws, including: • Colorado Amendment 14 • Bald and Golden Eagle Protection Act • Migratory Bird Treaty Act	APHIS, CPW, USFWS	As Needed		
18.3.1.4	Design an effective and consistent monitoring program to determine if predation management actions are achieving desired results in GrSG populations.	CPW	ASAP		
18.3.1.5	Work with implementing parties to ensure that GrSG predation management monitoring results are reported.	CPW	As Needed		
18.3.1.6	Establish an annual meeting to coordinate reporting of LWG progress towards implementation of predation management strategies (in both local and statewide conservation plans), and to encourage communication among LWGs regarding predation management. [See Information, Communication, and Education Strategy 12.3.2.1]	CPW	2008 and ongoing		
18.3.1.7	Encourage and allow risk-taking (e.g., experimental predator control in limited areas) so that implementers and collaborators have the flexibility to conduct adaptive GrSG predation management.	CPW	Ongoing		
18.3.1.8	Report predation management strategy results to GrSG steering committee.	LWGs	Annually		
18.3.1.9	Educate interested publics regarding which management actions are most biologically and cost-effective in increasing reproductive success in GrSG populations. **[See Information, Communication, and Education Strategy 12.3.1.1]**	CPW	Annually beginning in 2008		
ISSUE 18.4	Funding is needed to support predation strategies (in both local plan and statewide GrSG conservation plans).				
OBJECTIVE 18.4.1	Identify and secure the funding needed to implement predation strategies (in both local plan and statewide GrSG conservation plans).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
18.4.1.1	Identify potential funding sources for predation management strategies.	CPW	2008		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
18.4.1.2	Secure funding for predation management strategies.	BLM, CPW, Industry, LWGs, Private Landowners, NRCS, USFS, USFWS	2008		
18.4.1.3	Develop a process to allocate funding for LWG predation strategies.	CPW	2008		
18.4.1.4	LWGs identify local plan funding needs and submit proposals within funding process framework (see strategy 18.4.1.3).	LWGs	2008 and annually		
ISSUE 18.5	Special consideration regarding the implementation of predator management may be required in small isolated GrSG populations.				
OBJECTIVE 18.5.1	Protect GrSG small populations from excessive predation when populations (3-year average) fall to either of 2 "trigger" levels: (1) below 25 birds in the spring breeding population; or (2) to 25% of the long-term average goal for the population.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
18.5.1.1	Identify relevant predator species within local GrSG populations that meet the established trigger(s).	BLM, CPW, LWGs, Other Research Institutions, Universities, USFS, USFWS	2009	**See 18.3.1.1.**	
18.5.1.2	Determine age-specific mortality and identify relative risks from avian and mammalian predation within local GrSG populations meeting the described trigger(s).	BLM, CPW, LWGs, Other Research Institutions, Universities, USFS, USFWS	2009	**See 18.3.1.1.**	
18.5.1.3	Evaluate whether predator management aimed at a specific predator species is an effective management tool that increases production and recruitment of sage-grouse in local populations that meet the established trigger(s).	BLM, CPW, LWGs, Other Research Institutions, Universities, USFS, USFWS	2009	**CPW:** CPW has recently tested the effectiveness of predator control in improving recruitment in a small population of Gunnison sage-grouse.	**CPW:** Evaluation of the effectiveness of this project will be completed in 2013. The results of this project may shed light on the effectiveness of predator control in small GrSG populations as well.
18.5.1.4	If predator control is likely to be effective, then develop and implement predator management strategies designed for specific GrSG population that is in accordance with CPW and federal regulations and policies.	BLM, CPW, LWGs, Other Research Institutions, Universities, USFS, USFWS	2009	**CPW:** Predator management strategies (beyond perch preventers, removal of piñon-juniper trees, etc.) is not needed at this time.	

19. Recreational Activities

ISSUE 19.1	Recreational activities may cause a potential impact to GrSG.				
OBJECTIVE 19.1.1	Use experimentally designed studies to evaluate the cause and effect of recreational activity on the productivity and population viability of GrSG.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
19.1.1.1	Evaluate the effect of recreational activities on GrSG mating behavior. **[See Research Strategy 21.2.1.5]**	CPW, Other Research Institutions, Universities	Begin by 2020		
19.1.1.2	Evaluate the effect of recreational activities on GrSG nesting and brood-rearing success. **[See Research Strategy 21.2.1.5]**	CPW, Other Research Institutions, Universities	Begin by 2020		
19.1.1.3	Evaluate the effect of recreational activities on GrSG winter flocks. **[See Research Strategy 21.2.1.5]**	CPW, Other Research Institutions, Universities	Begin by 2020		
19.1.1.4	Evaluate the effect of recreational activities on recruitment and long-term population dynamics of GrSG. **[See Research Strategy 21.2.1.5]**	CPW, Other Research Institutions, Universities	Begin by 2020		
ISSUE 19.1	Recreational activities may cause a potential impact to GrSG.				
OBJECTIVE 19.1.2	Minimize the potential adverse impacts of recreational activities on GrSG (see CCP "GrSG Disturbance Guidelines", Appendix B).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
19.1.2.1	Minimize, where possible, the impacts to sage-grouse when designing or modifying recreational roads or trails.	BLM, CPW, County Governments, DPOR, LWGs, Private Landowners, USFS	Ongoing	**CPW: General -** CPW provides comments to land management agencies, recreation groups, and others with sensitive locations and recommendations for minimizing or avoiding impacts to GrSG for use in trail design/modification projects. CPW participates in each of the RMP revisions occurring in GrSG habitat, including travel management planning.	
19.1.2.2	On publicly-owned properties, pets (this excludes working dogs) should be on-leash or restricted from areas within important GrSG breeding habitat (March – July).	BLM, CPW, SLB, USFS, USFWS	2008	**CPW: General -** CPW provides this comment to land management agencies in key GrSG habitats. CPW participates in each of the RMP revisions occurring in GrSG habitat, including travel management planning. For instance, CPW recommends that recreational activities avoid areas within 0.6 miles of leks during the breeding season.	
19.1.2.3	Develop and distribute educational material on (1) general GrSG biology, and (2) the potential harmful effects of recreational activities on GrSG breeding, nesting, and winter areas. Distribute to recreational groups, tourists, pet owners, private landowners, and lek viewers. [See Information, Communication, and Education Strategies 12.2.1.1 and 12.2.1.3]	CPW	2009		
19.1.2.4	Identify and map areas of high recreational use within GrSG habitat for use in guiding management decisions.	LWGs	2008	**BLM: NWCO -** BLM and motorized recreation groups have worked to identify traffic densities in portions of the Little Snake Field Office (particularly the Sand Wash Basin).	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
19.1.2.5	Provide information and signage at areas where management actions relating to GrSG are in effect (e.g., designated trails, seasonal closures). **[See Information, Communication, and Education Strategy 12.2.1.3**	CPW	2009		
19.1.2.6	On land that is important to GrSG, encourage private and public land managers to manage human recreation activities to benefit sage-grouse (e.g., during the breeding season, on winter range). Provide incentives to landowners, if possible. [See also Information, Communication, and Education Strategies 12.2.1.3 and 12.3.1.1]	LWGs	Ongoing	**CPW: General -** CPW provides comments to land management agencies, recreation groups, and others with sensitive locations and recommendations for minimizing or avoiding impacts to GrSG for use in trail design/modification projects. CPW participates in each of the RMP revisions occurring in GrSG habitat, including travel management planning. For instance, CPW recommends that recreational activities avoid areas within 0.6 miles of leks during the breeding season.	
19.1.2.7	Advocate for increased monitoring and enforcement of existing recreational regulations where conflicts with GrSG have been identified	LWGs	Ongoing	**CPW: General -** While areas of specific conflict between recreationists and GrSG have not been widely identified, CPW regularly encourages land management agencies to provide sufficient law enforcement effort to make recreational regulations meaningful.	**CPW: General -** CPW law enforcement officers enforce travel management regulations on State Wildlife Areas.
19.1.2.8	Promote the development of a realistic and enforceable travel management plan on public lands to protect GrSG lek, nesting, brood rearing, and winter habitats.	BLM, CPW, County Governments, LWGs, SLB, USFS	As plans are developed	**CPW: General -** CPW has provided comments on federal land use planning/travel management documents, including necessary protections for GrSG seasonal habitats. Comments have been provided on travel management planning efforts in the Little Snake, Kremmling, and Colorado River Valley draft RMPs and the White River National Forest management plan.	
19.1.2.9	When existing recreational roads and trails conflict with GrSG habitat requirements, consider management options (within authorities) such as seasonal use restrictions, closure, removal, speed limits and realignment (administrative uses may be allowed).	BLM, CPW, County Governments, LWGs, Private Landowners, SLB, USFS	As Needed	**CPW: General -** CPW recommends that land management agencies apply seasonal and/or diurnal closures where recreational trails exist within 0.6 miles of lek sites. PPR - CPW has included speed limits on energy field access roads in some WMPs where conflict with GrSG is likely.	
19.1.2.10	Restrict off-highway vehicles (OHV) to on-trail or on-road use on public lands during the nesting season in occupied GrSG breeding habitat.	BLM, CPW, County Governments, LWGs, SLB, USFS,	As Needed	**BLM: General -** BLM is moving from Open (off-road travel allowed) toward Limited to Existing Routes or Limited to Designated Routes in travel management plans within many important GrSG habitats (examples include the Little Snake and Kremmling field offices).	

20. Roads

ISSUE 20.1	Roads may impact GrSG populations by direct mortality, behavioral changes, spread of exotic plants, fragmentation of habitat, and by providing additional human access to formerly remote areas.				
OBJECTIVE 20.1.1	Minimize the potential for adverse impact of roads on GrSG and their habitat (see CCP "GrSG Disturbance Guidelines", Appendix B).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
20.1.1.1	Identify, categorize (e.g., 2-track, gravel, unpaved, paved), and map roads in GrSG range. Maintain a current GIS roads datalayer.	BLM, County Governments	Ongoing	**Moffat**: all county roads mapped and categorized. Maps updated. Grand: GIS system used to map all county roads. Roads are categorized by ownership, surface type, maintenance schedule, and useage allowances. Public road hearings held annually. January each year, these maps are updated and signed by the BOCC. **Jackson:** All country roads mapped and categorized. Roads GIS data layer updated regularly.	
20.1.1.2	For placement of new roads, GrSG seasonal habitats should be mapped and avoided whenever possible. If seasonal habitats are not yet mapped, construction should be avoided within the buffers described in the CCP "GrSG Disturbance Guidelines" (Appendix B).	BLM, CPW, County Governments, Industry, LWGs, NPS, Private Landowners, SLB, USFS	During road planning phase	**CPW: General -** CPW has regulatory authority over road building, siting and operations only on State Wildlife Areas. CPW routinely provides comments to land management agencies regarding the location of and methods for avoiding key GrSG habitats. **PPR -** CPW incorporates avoidance of GrSG habitat in WMPs with energy companies where possible. **NP -** CPW is in the process of developing seasonal habitat models for NP to assist with conservation planning. **NESR** - CPW makes recommendations to minimize impacts to GrSG habitat.	
20.1.1.3	Timing of road building and road maintenance activities should be modified according to the GrSG seasonal habitat in the area and the timing guidelines provided in Appendix B.	BLM, CPW, County Governments, Industry, LWGs, Private Landowners, SLB, USFS	During road planning phase	**CPW: General -** CPW routinely recommends timing limitations that avoid lekking and nesting periods (March-June) for road construction and maintenance (and other surface disturbing activities). **PPR** - Conduct of work outside key seasonal periods is built into WMPs where possible. **NP** - When provided with the opportunity, CPW will consult and make recommendations on seasonal timing when applicable. **NESR** - CPW makes recommendations to minimize impacts to GrSG habitat.	
20.1.1.4	Where opportunities arise, manage existing roads to minimize disturbance to leks or other seasonal habitats, particularly breeding habitat. Employ seasonal closures, permanent closures, rerouting of existing roads, or other measures, as deemed locally appropriate.	BLM, CPW, County Governments, Industry, LWGs, Private Landowners, SLB, USFS	Annually	**CPW: PPR -** Some WMPs employ this strategy.	
20.1.1.5	If new local or unpaved roads are constructed within GrSG seasonal habitats, encourage appropriate governing authorities to restrict speed limits as specified by the CCP "GrSG Disturbance Guidelines", Appendix B).	BLM, CPW, County Governments, Industry, LWGs, NPS, Private Landowners, SLB, USFS	During road planning phase	**CPW: General -** CPW's BMPs for oil and gas development recommend speed limits on oil and gas roads in GrSG habitat. **PPR -** WMPs generally establish speed limits on service roads in GrSG habitat. **NP -** BLM will restrict speed limits when applicable. **NESR -** CPW makes recommendations to minimize impacts to GrSG habitat.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
20.1.1.6	New roads should not be constructed within 0.6 miles of leks (see CCP "GrSG Disturbance Guidelines", Appendix B). If this is impractical, roads should be placed to avoid line-of-sight between strutting males and road/associated traffic. Lek data are considered sensitive information by CPW. Limit data distribution to the extent necessary for effective management.	BLM, CPW, County	During road planning phase	**CPW: General -** CPW routinely recommends that new roads (and other surface disturbing activities) not be built within 0.6 miles of GrSG leks. CPW BMPs for oil and gas development and the COGCC rules contain this recommendation. BLM RMPs are adding this stipulation during revisions. **PPR** - WMPs utilizes this strategy. **NP** - When provided with the opportunity, CPW will consult and make recommendations on new road placement. CPW is in the process of developing seasonal habitat models for NP to assist with conservation planning. **NESR** - CPW makes recommendations to minimize impacts to GrSG habitat.	
20.1.1.7	On federal land, consider GrSG habitat when determining allocation designations for user-created routes. This should be done when developing activity or LUP level Travel Management Plans.	Governments, NPS, SLB, USFS	During travel mgmt. plan phase	**CPW: General -** CPW staff provides comments to BLM for RMP and other federal EIS development, including travel management planning. All RMPs in CO GrSG habitat are either recently revised or are currently in revision.	
20.1.1.8	If habitat disturbance that will require habitat restoration occurs in conjunction with building, maintaining, or reclaiming roads, the potential vegetation community needs to be identified (Winward 2004) and a diverse seed mixture of native shrubs, grasses, and forbs should be used (see CCP Appendix D, "Recommendations Regarding Plant Species for Use in GrSG Habitat Management and Restoration", Monsen 2005, and "Habitat Enhancement" strategy, pg. 349).	BLM, CDOT, CPW, County Governments, Industry, NPS, Private Landowners, SLB, USFS	Immediately following disturbance	**CPW: General -** CPW routinely makes this recommendation to land management agencies with regulatory authority in this area. CPW BMPs for oil and gas development (including roads) contain similar recommendations for revegetation and reclamation. **PPR -** Reclamation and revegetation of facilities (including roads) is specified in WMPs.	**CPW:** Researcher D. Johnston is studying methods to improve revegetation and reclamation success.
20.1.1.9	Prevent and control the spread of noxious and invasive weeds in disturbed areas associated with roads (see "Weeds" strategy, pg. 425).	BLM, CDOT, CPW, County Governments, SLB, USFS	Ongoing	**CPW: General -** CPW BMPs for oil and gas development (including roads) contain weed management recommendations. **MP -** Support is given for local county to spray road side weeds. **PPR -** WMP's include weed management strategies. CPW Researcher, D. Johnston, is studying ways to limit the establishment of weeds (particularly cheatgrass) in disturbed areas. **NP** - At this point, invasive weeds are not a problem in NP.	
20.1.1.10	Evaluate the effects of road placement and traffic levels on GrSG and GrSG habitat. **[See Research Strategies 21.1.2.3 and 21.2.1.2]**	CPW, Industry, LWGs, Universities	Begin by 2015		

21. Research

ISSUE 21.1	It is not well understood how GrSG population dynamics and sustainability are impacted by (1) the quality and quantity of GrSG habitat; and (2) human-controlled activities in GrSG habitat.				
OBJECTIVE 21.1.1	*Evaluate the effects of habitat quality and quantity* on (1) GrSG behavior; and (2) the dynamics and sustainability of GrSG populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
21.1.1.1	Evaluate how the amount (i.e., "patch size"), configuration, and composition of GrSG habitat affect (1) sage-grouse behavior (e.g., movement and dispersal); (2) species distribution; (3) productivity; (4) population dynamics; and (5) population sustainability. Map and analyze landscape metrics (e.g., edge density, fragmentation, heterogeneity, fractal dimension), using the most reliable and current GIS data and examine the spatial and temporal correlation with sage-grouse population dynamics. Evaluate the potential for dispersal of individuals into currently unoccupied suitable habitat.	BLM, CDA, CPW, Industry, LWGs, NGOs, NRCS, Other Research Institutions, Private Landowners, SLB, Universities, USFS, USFWS, USGS, WAFWA	Begin by 2010	**See Appendix J: Literature Review**	
21.1.1.2	Develop a spatially-explicit population model that incorporates current estimates (with appropriate estimates of temporal and spatial variation) of demography and movement in order to evaluate the relative effects of changing land-uses on GrSG populations.	CCP SC, CPW, NGOs, Other Research Institutions, Universities	Begin by 2009	Thompson, T.R. 2012. Dispersal ecology of greater sage-grouse in northwestern Colorado; evidence from demographic and genetic data. Ph.D. Dissertation, University of Idaho, Moscow, Idaho, USA.	Research conducted in NW CO management zones 1, 3A, and 5.
21.1.1.3	Evaluate the effect(s) of vegetation "quality" (e.g., vegetation structure, sagebrush canopy height and cover, forb and grass height, diversity, and abundance, nutrition available to GrSG) on sage-grouse productivity, adult survival, and population dynamics.	BLM, CDA, CPW, Industry, LWGs, NRCS, Private Landowners, SLB, Universities, USFS, USFWS, USGS	Begin by 2012		
ISSUE 21.1	It is not well understood how GrSG population dynamics and sustainability are impacted by (1) the quality and quantity of GrSG habitat; and (2) human-controlled activities in GrSG habitat.				
OBJECTIVE 21.1.2	*Evaluate human-controlled impacts* on *GrSG habitat,* and the resulting implications for GrSG populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
21.1.2.1	Examine the effects of different habitat treatments on the quality, quantity, and configuration of GrSG habitat, and the responses of GrSG populations.	BLM, CDA, CPW, LWGs, NRCS, Private Landowners, UCEPC, USFS, USFWS, USGS	Begin by 2015		
21.1.2.2	Evaluate the effects of varying grazing management practices (domestic and wild ungulates) on the quality of GrSG habitat (e.g., grass and forb abundance, diversity, and vegetation structure).	BLM, CPW, CSU Extension, LWGs, NAGP, NRCS, Universities, USFS, WAFWA	Begin by 2015		
21.1.2.3	Evaluate the impacts of infrastructure, energy, and mineral development (including reclamation efforts following development), on the quality, quantity, and configuration of GrSG habitat.	CPW, CCP SC, LWGs, Universities	Begin by 2015		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
21.1.2.4	Evaluate the potential impact of (and techniques for) converting CRP to sagebrush habitat on sage-grouse distribution and population viability.	CPW, LWGs, NRCS, Private Landowners, Universities, UCEPC, USFS	Begin by 2010	**UCEPC** has installed one project in 2012 to benefit wildlife in previously cropped land. Another project underway, will be completed summer 2013.	**CPW** proposed research project (2014) that will evaluate the population and demographic response of Columbian sharp-tailed grouse to CRP habitat improvements.
ISSUE 21.2	It is not well-understood how GrSG behavior and demographics are impacted by human-controlled activities.				
OBJECTIVE 21.2.1	Evaluate the *impact of various human-controlled activities on GrSG behavior* , and the resulting implications for GrSG populations.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
21.2.1.1	Evaluate the impact of agricultural and residential development on the behavior, distribution, demography, and population dynamics of sage-grouse.	BLM, CPW, Universities	Begin by 2020		
21.2.1.2	Evaluate the effect of powerlines, fences, roads, and other human infrastructure on the behavior, distribution, demography, and population dynamics of sage-grouse.	CPW, Industry, LWGs, Universities	Begin by 2015		
21.2.1.3	Evaluate the impact of energy development on the behavior, distribution, demography, and population dynamics of sage-grouse. Include: (1) how specific factors affecting population parameters are influenced by energy development; and (2) the relative impact of specific aspects of oil and gas development (e.g., intensity, duration, and timing elements in PVA [see pg. 210]). Recognize the need and timeline necessary to integrate research data and results into energy development planning cycles.	USFWS, Industry, CPW, BLM	Begin by 2020	**CPW Research:** See 3.4.3.3	
21.2.1.4	Evaluate the effect of mining development on the behavior, distribution, demography, and population dynamics of sage-grouse.	CPW, Universities	Begin by Dec. 2008		
21.2.1.5	Evaluate the effect of recreational activities (e.g., lek viewing, hiking, camping, off-road vehicles, etc.) on the behavior, distribution, demography, and population dynamics of sage-grouse.	CPW, Other Research Institutions, Universities	Begin by 2020	This research not conducted, but CPW could use existing data to conduct post-hoc analyses with Colowyo Coal Pit.	
ISSUE 21.3	The effectiveness of current measures designed to protect GrSG from the impacts of energy and mineral development is not well understood.				
OBJECTIVE 21.3.1	Determine the effectiveness of the various programs and approaches designed to protect GrSG from the potential adverse impacts of energy and mineral development, and related infrastructure.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
21.3.1.1	Determine the effectiveness of energy and mining mitigation actions, reclamation, existing stipulations, and BMPs in protecting GrSG habitat and populations.	Universities, CPW	Begin by 2010	**CPW Research:** See 3.3.1.2 and 3.3.4.7	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
21.3.1.2	Determine the effectiveness of stipulations, restrictions, and guidelines designed to protect GrSG populations and habitat from the potential adverse impacts of infrastructure (e.g., powerlines, wind turbines, roads).	USGS, USFWS, USFS, NRCS, LWGs, CPW, CDA, BLM, APHIS	Begin by 2010	**BLM:** Habitat and population monitoring will continue in areas of development. BLM will continue to consider and incorporate new science in recommended restrictions and guidelines for SG in coordination with CPW. CPW has the lead on SG research in CO. **CPW Research:** See 3.3.1.2 above	
ISSUE 21.4	The impacts of predation on GrSG are not well understood.				
OBJECTIVE 21.4.1	Examine the effect(s) of predation on GrSG behavior and population dynamics.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
21.4.1.1	Determine age-specific mortality (especially for chick and adult females, as per the PVA sensitivity analysis [see pg. 217]) and identify the relative risks from avian and mammalian predation within local GrSG populations.	USGS, USFWS, USFS, LWGs, CPW, CDA, BLM, APHIS	Begin by 2010	Thompson, T.R. 2012. Dispersal ecology of greater sage-grouse in northwestern Colorado; evidence from demographic and genetic data. Ph.D. Dissertation, University of Idaho, Moscow, Idaho, USA.	Too early to assess to inform management. This work provided the first estimate of survival (1st yr of life) for GSG. Cause specific mortality was only assessed for broad grouping of avian vs. mammalian.
21.4.1.2	Implement research to better understand the behavioral and spatial interactions of GrSG predators with prey and other predator species.	USGS, USFWS, Universities, CPW, BLM,APHIS	Begin by 2015		
21.4.1.3	Evaluate the large-scale effects of landscape structure (e.g., composition and configuration of landcover types) and small-scale effects (e.g., perch site availability, vegetation structure, and predator exclosures) on GrSG predator-prey interactions.	USGS, USFWS, Universities, CPW, CDA, BLM, APHIS	Begin by 2015	Thompson, T.R. 2012. Dispersal ecology of greater sage-grouse in northwestern Colorado; evidence from demographic and genetic data. Ph.D. Dissertation, University of Idaho, Moscow, Idaho, USA.	Too early to assess.
21.4.1.4	Evaluate whether predator control aimed at specific predator species is an effective management tool that increases production and recruitment of sage-grouse in local populations.	USGS, USFWS, Universities, CPW, CDA, BLM, APHIS	Begin by 2015		
21.4.1.5	Evaluate the spatial and temporal interactions between different trophic levels (e.g., predators and prey) and between similar trophic levels (e.g., examine the impact of grazing by deer and elk on the quality of sagebrush habitats and its effect on sage-grouse behavior and productivity).	USGS, USFWS, USFS, Universities, NRCS, LWGs, CPW, CDA, BLM, APHIS	Begin by 2015		
ISSUE 21.5	WNV is lethal to GrSG and has been detected in Colorado, but few details are known about its potential impact on GrSG.				
OBJECTIVE 21.5.1	Investigate the potential impacts of WNV on GrSG populations in Colorado.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
21.5.1.1	Determine the level of susceptibility to WNV and survival patterns of each GrSG age and sex class. Examine whether sage-grouse can develop immunity to WNV and whether the immune response can be inherited.	CPW, NWRC, Other Research Institutions, Universities	Ongoing	Not conducted and not needed. CPW tested 16 samples in 2007 and only 1 tested positive for WNV. Colorado does not have a problem with WNV.	
21.5.1.2	Examine the spatial interaction of mosquito species that are the main vectors of the virus (e.g., Culex tarsalis and C. pipiens) with seasonal habitat use by GrSG (e.g., evaluate whether sage-grouse are more likely to be exposed to the virus in relatively wetter brood-rearing habitat than in lekking and nesting habitats).	CPW, Other Research Institutions, Universities	Begin by 2010	Not conducted and not needed. CPW tested 16 samples in 2007 and only 1 tested positive for WNV. Colorado does not have a problem with WNV.	
21.5.1.3	Examine the potential impact of WNV on GrSG population dynamics and viability.	CPW, Other Research Institutions, Universities	Ongoing	Not conducted and not needed. CPW tested 16 samples in 2007 and only 1 tested positive for WNV. Colorado does not have a problem with WNV.	
ISSUE 21.6	There is a lack of credible research on the theories of additive and compensatory mortality and sport harvest of GrSG.				
OBJECTIVE 21.6.1	Foster and support the research and the collection of data to gain knowledge about additive and compensatory mortality thresholds and sport harvest in GrSG.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
21.6.1.1	Initiate experimental field research designed to specifically address the issue of compensatory and additive mortality and GrSG. Collaborate with other western states that hunt GrSG.	CPW	Begin 2009, Continue 5 - 10 years		
ISSUE 21.7	Small isolated populations of greater sage-grouse may have low genetic diversity, which may facilitate inbreeding depression.				
OBJECTIVE 21.7.1	Monitor genetic diversity within the smaller isolated populations of greater sage-grouse in Colorado.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
21.7.1.1	Continue to develop and refine, if it proves feasible, techniques to obtain DNA from sage-grouse fecal droppings so that genetic testing can be accomplished without capturing birds.	CPW, Universities	Ongoing		
ISSUE 21.8	Current methods for monitoring trends in GrSG populations and for estimating GrSG population size from lek counts make many unsupported assumptions.				
OBJECTIVE 21.8.1	Conduct research to establish reliable and effective methods for monitoring GrSG population trends and estimating population size.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
21.8.1.1	Develop and evaluate protocols for the inventory and monitoring of GrSG populations and to evaluate factors that influence the population ecology of GrSG.	CPW, Universities	Begin by 2010		
21.8.1.2	Evaluate whether GrSG lek counts can be calibrated and measurements of accuracy and precision can be assessed using mark-resight or sightability models.	CPW, Universities	Begin by 2010		
21.8.1.3	Evaluate alternative methods for estimating GrSG population abundance (e.g., line transects or DNA fingerprinting using fecal samples).	CPW, Universities	Ongoing		

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
21.8.1.4	Determine the causes of mortality in different GrSG age and sex classes and the consequences for population dynamics.	USGS, USFWS, USFS, Universities, NRCS, LWGs, CPW, CDA, BLM, APHIS	Begin by 2015	Thompson, T.R. 2012. Dispersal ecology of greater sage-grouse in northwestern Colorado; evidence from demographic and genetic data. Ph.D. Dissertation, University of Idaho, Moscow, Idaho, USA.	
21.8.1.5	Examine the correlation (and time lag) between the variation in annual GrSG productivity and subsequent lek counts and its impact on the precision of population estimates.	USGS, USFWS, USFS, Universities, NRCS, LWGs, CPW, CDA, BLM	Begin by 2010		
21.8.1.6	Refine the population viability assessment of GrSG based on more accurate and precise estimates of demographic parameters.	USGS, USFWS, USFS, Universities, LWGs, CPW, CDA, BLM	Ongoing	**BLM:** BLM will partner with CPW on any updates to the PVA for GRSG and other research projects as appropriate. This has not been done to date.	

22. Weather

ISSUE 22.1	There is a need to understand weather impacts on GrSG survivability and reproduction.				
OBJECTIVE 22.1.1	Investigate GrSG responses to drought and wet conditions.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
22.1.1.1	Review the literature and existing data regarding whether drought, precipitation, or temperature extremes during specific times of the year have a negative or positive effect on GrSG survivability and reproduction. Also search the literature regarding the effect of climatic conditions on insect and forb availability, as it pertains to the survivability of GrSG broods.	CPW, Other Research Organizations, Universities	2009	**CPW: General -** CPW staff keeps up-to-date on scientific literature. CPW recently contracted Rocky Mountain Wild to conduct climate change risk modeling for a number of wildlife species in Colorado, including GrSG (completed in 2012).	
ISSUE 22.2	There is a need to address drought impacts on GrSG survivability and reproduction.				
OBJECTIVE 22.2.2	Manage GrSG habitats in anticipation of drought conditions.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
22.1.2.1	Develop springs, wells, and other water sources, in appropriate GrSG areas, to provide reliable water and forb/insect production during drought conditions. Consider appropriate water development design to reduce WNV risk to GrSG. Consider appropriate fencing to protect these areas for sage-grouse use.	BLM, CPW, NRCS, Private Landowners, USFWS	2008 and ongoing	**CPW: General** - Wet meadow development is one of the habitat enhancement techniques employed by CPW to improve GrSG habitat. CPW staff supports efforts by local landowners, NRCS and FWS to improve water sources and to provide overflow and create wet seeps for GrSG. **See Appendix A: Habitat Treatments**	**CPW:** Several projects have been completed in GrSG areas. **MP -** On SWA lands, CPW has built water tanks for cattle and piped over flow to an adjacent area of GrSG. In addition CPW has created several shallow water development projects. **NWCO, NP** - CPW, BLM, USFWS, and private landowners have developed wells and seeps to increase forb/insect production for GrSG broods.
22.1.2.2	Manage invasive species in riparian, wet meadow, and uplands in GrSG range to improve the water table (see "Weeds" strategy, pg. 425).	BLM, CPW, County Governments, NRCS, Private Landowners, USFWS	2008 and ongoing	**CPW: General -** CPW has participated in tamarisk removal projects in several areas in NWCO, including portions of the Yampa, White, and Colorado river drainages. Projects have occurred on BLM, USFWS (Browns Park NWR), NPS (Dinosaur National Monument), and private lands. Dinosaur National Monument is leading an effort to eradicate tamarisk from the entire Yampa River drainage basin. CPW has provided significant funding for tamarisk and other riparian weed control efforts through the state's Wetlands Program.	
22.1.2.3	Educate the public and agencies on management that affects riparian and wet meadow areas used by GrSG. **[See Information, Communication, and Education Strategies 12.2.1.3 and 12.3.1.1]**	CPW	2009 / Annually beginning in 2008	**CPW: General -** In working with land management agencies and private landowners, CPW stresses the importance of improving the quality and quantity of riparian and wet meadow habitats. This issue is incorporated into CPW comments on land management plans, grazing permit renewals, habitat management plans, etc.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
22.2.2.4	In areas experiencing sagebrush mortality due to drought, adjust grazing practices, prescriptive fire, and/or vegetation management to minimize additive impacts on GrSG (see "Fire and Fuels Management" [pg. 334], "Grazing" [pg. 342] and "Habitat Enhancement" [pg. 349] strategy sections).	BLM, CPW, Private Landowners, USFWS	As needed.	**CPW: NWCO -** Significant portions of the NWCO population experienced sagebrush defoliation (and mortality in some instances) during the drought of 2001-02. Similar conditions were developing in western portions of the NWCO population in the summer of 2012.	**CPW: NWCO -** CPW has been actively reducing elk populations in the NWCO population to bring numbers down to the long-term population objective. This has been achieved in most herd units in the NWCO GrSG population.
22.2.2.5	Encourage land managers to reduce herbivory, and adjust prescriptive fire and/or vegetation management during times of drought.	BLM, CPW, Private Landowners, USFWS	As needed.	**CPW: General -** CPW regularly encourages grazers to plan for drought by grazing lands sustainably in the good years, so the land retains the capability of producing during drought years. This is a routine part of habitat evaluations conducted on ranches enrolled in CPW's Ranching for Wildlife program. Many of these ranches are concentrated in the **NWCO** population, but also occur in **NP, MWR and NESR**. CPW has also participated in discussion with BLM about appropriate levels of domestic and wild ungulate herbivory, particularly in the NWCO population. This has included participation on BLM Rangeland Health assessments, review and comment on grazing permit renewals, incorporation of BLM comments in big game herd management plans, etc. CPW has sponsored grazing management workshops in several key GrSG areas. **MP** -CPW staff have discussed stocking rates with landowners that have CPW easements.	
22.2.2.6	Develop grass banks for livestock producers to graze during extreme drought conditions (see "Grazing" strategy, pg. 342).	BLM, CPW, LWGs, NRCS, Private Landowners, SLB, USFS, USFWS	2008 and ongoing	**CPW: General (but with emphasis in NWCO) -** CPW has occasionally provided State Wildlife Areas as grass banks to offset grazing on GrSG habitat restoration areas. CPW has encouraged BLM to develop grass banks during RMP revisions, particularly in the NWCO population.	
22.2.2.7	Review agency policies and practices to explore adjusting agency policy (if deemed necessary) for the benefit of selected GrSG habitats during drought conditions.	BLM, CPW, USFWS	2008 and ongoing	**CPW: General (but with emphasis in NWCO) -** CPW has been actively reducing elk populations across GrSG range to bring herds into line with long-term objectives (that are sustainable across a range of environmental conditions). CPW authorizes domestic grazing on State Wildlife Areas to condition vegetation to provide high quality wildlife habitat. Grazing agreements include provisions for modification, or avoidance, of domestic livestock grazing in these areas during drought conditions.	

23. Weeds: Noxious and Invasive Plants

ISSUE 23.1	There is a lack of information on invasive weed distribution in GrSG range in Colorado.				
OBJECTIVE 23.1.1	Gather and share information regarding the distribution of noxious and invasive weeds in GrSG range.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
23.1.1.1	Continue to cooperatively identify, map, and monitor undesirable noxious and invasive weed invasions that occur within GrSG habitat.	BLM, CPW, County Governments, LWGs, NPS, NRCS, SCDs, SLB, USFS	Ongoing	**SLB:** Funds treatment of noxious weeds through the Enhancement Fund (for improvements on trust lands enrolled in CPW's public access program) and the Noxious Weed Fund. Since 2004, SLB has spent over $582K on lands in the NW counties. **CPW: General** - CPW controls weeds on State Wildlife Areas and participates in weed management activities in other areas also. CPW provides significant funding for weed management efforts in several GrSG areas through the Habitat Partnership Program. **MP** - CPW staff monitor weeds on SWA and CPW easement properties and encourage weed control. Ongoing efforts have occurred on the Kemp-Breeze SWA for years and the owner of the Wolf-Taussig easement hired a private weed spray contractor to help with weed control along ditches and roads on the ranch. The local county sprays weeds along the road side. **NP** - At this point, invasive weeds are not a problem in NP. **NESR** - The BLM and USFS manage weeds within GrSG habitat. **PPR** - CPW agreements with energy companies in WMPs contain standards for weed management that are monitored on an annual basis. **Jackson County:** Actively monitors and controls invasive weeds in the NP area.	
23.1.1.2	Inform local work groups of identified invasive weed problems in GrSG range.	BLM, CPW, County Governments, NPS, NRCS, SCDs, SLB, USFS	Ongoing	**MP LWG -** LWG and CPW discuss weed control with landowners. Weeds in MP are limited mostly to ditches and roadsides (houndstongue and thistle), no wide spread problems with cheatgrass in MP.	
ISSUE 23.2	Within GrSG habitat, noxious and invasive weeds may adversely impact GrSG habitat.				
OBJECTIVE 23.2.1	Minimize the impacts of noxious and invasive weeds on GrSG habitat.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
23.2.1.1	Prevent new damaging invasions of noxious and invasive weeds in GrSG habitat. This refers to both new infestations of known weedy species and future infestations of as-yet-unidentified weed species. Coordinate efforts across property boundary lines.	BLM, CPW, County Governments, LWGs, NPS, NRCS, SCDs, SLB, USFS, USFWS	Ongoing	**Grand**: 1) Middle Park Habitat Partnership Program provides landowners in production ag up to $500 year to be used for purchase of herbicides. 2) Includes weed control conditions to Special Use Permits related to gound disturbance in sage grouse habitat. Penalties for non-compliance include a hearing before the BCC, which may result in revocation of permit. **CPW**: General - CPW BMPs for oil and gas development recommend construction equipment be cleaned to remove weed seeds prior to moving to new sites. Similar requirements are included in the COGCC Rules. CPW regularly makes recommendations that weed free mulch be used for reclamation and that weed free hay be required for backcountry stock feeding.	**Grand**: seeing substantial decrease in houndstongue, thistle and black henbane on private lands in GHG habitat.
23.2.1.2	Conduct local workshops emphasizing the prevention of new weed infestations. Include topics on cleaning equipment and vehicles including recreational equipment, minimizing ground disturbance, and spread of seeds.	County Governments	2008	**Moffat**: See 3.2.1.10-3.2.2.7. **Grand**: Works actively with landowners. Policy to fill an approved container each week up to 4 gallons of pre-mixed herbicide free of charge (Free Friday Herbicide Program).	**Grand**: substantial decline in noxious weeds throughout the county.

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
23.2.1.3	Treat all new and existing noxious weed infestations. Treatments may include biological controls, cultural controls such as grazing (see "Grazing" strategy, pg. 342), chemical controls and any other method considered safe and effective. Coordinate efforts across boundary lines. See "Habitat Enhancement" strategy, pg. 349.	BLM, CPW, County Governments, LWGs, NPS, NRCS, SCDs, SLB, USFS, USFWS	Ongoing	**Grand County**: contracts with BLM to treat weed infestation on BLM grazing allotments in GSG habitat. **CPW:** General - CPW actively manages weeds on State Wildlife Areas. CPW provides significant funding for weed control activities on other lands through the Habitat Partnership Program, particularly in the **NWCO and MWR** populations. **MP** - Effort is made to treat known weed infestations on SWA and conservation easements in MP. **PPR** - WMPs include weed management standards that are reviewed annually with energy companies. **NP** - At this point, invasive weeds are not a problem in NP. **NESR** - Cooperative efforts are made to control weed infestations in GrSG habitat.	**Grand:** Noxious weeds in GSG habitat in Grand County treated now since 2001. Obvious substantial reduction in % cover. Native vegetation including sage brush is naturally reestablishing.
23.2.1.4	Monitor the effectiveness of treatments of noxious and invasive weeds in GrSG habitat.	BLM, CPW, County Governments, LWGs, NPS, NRCS, SCDs, SLB, USFS, USFWS	Ongoing	**CPW: General -** CPW monitors weed control efforts on SWA and conservation easements. **PPR -** Weed management requirements are built into WMPs. CPW and WMP energy companies meet annually to review weed management progress.	
23.2.1.5	Keep land managers informed of the latest technology in habitat restoration techniques for weed-infested areas in GrSG habitat by providing periodic technology transfer workshops. [See also Information, Communication, and Education Strategies 12.2.1.3 and 12.3.1.1]	BLM, CPW, County Governments, LWGs, NRCS, USFS	Every 5 years starting in 2008	**CPW: General -** CPW Researcher D. Johnston is conducting research on weed infestations (particularly cheatgrass) on disturbed lands. Research results are disseminated widely, including in semi-annual research up-date conferences for industry and other stakeholders. Research reports are available on CPW's public website.	
ISSUE 23.3	Within GrSG habitat, there is a need for information sharing and coordination among weed managers.				
OBJECTIVE 23.3.1	Improve communication and coordination among those involved with weed and pest management within GrSG range.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
23.3.1.1	The local weed program manager or other entities will keep a database of all lands with developed weed management plans, within occupied GrSG habitat.	BLM, CPW, County Governments, LWGs, NPS, NRCS, SCDs, SLB, USFS	Ongoing	**CPW: General -** CPW maintains records of weed infestations and treatment efforts on State Wildlife Areas.	
23.3.1.2	Inform local weed program managers of all pest management plans developed within GrSG range.	BLM, CPW, County Governments, LWGs, NPS, NRCS, SCDs, SLB, USFS	Ongoing		
23.3.1.3	Organize and participate in annual workshops with all land managers to identify the most threatening weed problems in GrSG habitat, and to prioritize efforts for control. [See also Information, Communication, and Education Strategies 12.2.1.3 and 12.3.1.1]	BLM, CPW, County Governments, Industry, LWGs, NRCS	Ongoing	**Grand County, Summit County**, and "Friends of the Lower Blue" working together to educate landowners on importance of noxious weed control. Kickoff meeting will be spring 2013.	

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
ISSUE 23.4	There is a lack of funding for developing integrated weed management plans, and for application of weed control treatments.				
OBJECTIVE 23.4.1	Identify and provide funding for land managers to scout, map, develop management plans for, and apply treatments to address invasive and noxious weeds.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
23.4.1.1	Encourage land management agencies and industry to fund integrated weed management programs in GrSG range.	BLM, CPW, County Governments, Industry, LWGs, NRCS, SLB, USFS	Ongoing	**CPW: General -** CPW provides significant funding for weed control efforts to improve habitat conditions through the Habitat Partnership Program. **NWCO -** CPW has been an active participant in integrated weed management efforts (generally in partnership with BLM and Moffat County) in several GrSG areas within the NWCO population (e.g., Axial Basin, Hiawatha).	
23.4.1.2	Develop a list of funding opportunities for invasive and noxious weed management.	NRCS	2008		

Appendix A. Vegetation treatments and other projects designed to improve GrSG habitat. First 2 tables summarize acreages of plans and treatments, respectively. The 3rd table provides details of each treatment / plan. All treatments are 2001 ï January 2013. Rows highlighted in yellow indicate projects that were completed or where progress occurred from January 2012 through January 2013.

PLANS - (e.g., Wildlife Mitigation Plans, Grazing Plans, Ranch Management Plans, and Habitat Suitability Plans) Affected Acres

	GrSG Population						
Completion Date	MP	MWR	NESR	NP	NWCO	PPR	Total
2004	4,500						4,500
2005	4,500						4,500
2006	4,500				55,332		59,832
2007	4,500						4,500
2008				123	114,997		115,120
2009					26,802	57,697	84,499
2012					800		800
Total	18,000			123	197,931	57,697	273,751

Treatments (Habitat Manipulation) -Affected Acres

	GrSG Population						
Completion Date	MP	MWR	NESR	NP	NWCO	PPR	Total
2001					550		550
2002					200		200
2003					197		197
2004	1,921				50		1,971
2005	3,020		50	4,123	750		7,943
2006	1,268		280	813	360		2,721
2007	3,891		265	651	5,966		10,773
2008	490		936	13	4,408		5,847
2009	645	227	400	206	7,687		9,165
2010	80	26	167		172	221	666
2011	565		488		5,052	894	6,999
2012	500		958		1,376		2,834
Total	12,380	253	3,544	5,806	26,778	1,115	49,876

Details of vegetation treatments and other projects designed to improve GrSG habitat.

Popula-tion	Date	Project Name	Objectives	# Acres	Partners
MP	2005	Cow Gulch rangeland Aerial Fertilization	Increase herbaceous and grass production and stimulate sagebrush growth, also increase the amount of crude protein in sagebrush	40	BLM, CDOW, Summit County
MP	2005	Pinto Creek mechanical sagebrush treatment and seeding	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	300	Private, CDOW
MP	2006	Woods Sagebrush treatments via Brushbeating and Lawson Aerator	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	36	Private, CDOW
MP	2005	Multiple ranches, clover and ladak alfalfa interseeding around meadow edges	Improve brood rearing forage by planting a beneficial plant throughout Middle Park along irrigation ditches	750	CDOW, NRCS, Private
MP	2006	Multiple ranches, clover and ladak alfalfa interseeding around meadow edges	Improve brood rearing forage by planting a beneficial plant throughout Middle Park along irrigation ditches	120	NRCS, Private
MP	2007	Multiple ranches, clover and ladak alfalfa interseeding around meadow edges	Improve brood rearing forage by aerial application of clover seed along irrigation ditches throughout Middle Park	1,600	CDOW, NRCS, Private
MP	2007	East Fork Troublesome Creek Riparian Fencing	Improve sagebrush and riparian habitat by fencing out livestock	19	CDOW, USFWS Partners
MP	2007	Whitely Peak Sagebrush treatments via mowing	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	5	CDOW, USFWS Partners
MP	2007	Antelope Creek aerial herbicide spraying	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	245	CDOW, NRCS, USFWS Partners
MP	2007	Gunsight Pass Sagebrush treatments via brushbeating	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	5	CDOW, USFWS Partners
MP	2007	Gunsight Pass aerial herbicide spraying & range seeding	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	128	CDOW, NRCS, USFWS Partners
MP	2007	Gunsight pass riparian fencing	Improve sagebrush and riparian habitat by fencing out livestock	3,700 ft.	CDOW, NRCS, USFWS Partners
MP	2004	Red Mountain Rangeland Aerial Fertilization	Increase herbaceous and grass production and stimulate sagebrush growth, also increase the amount of crude protein in sagebrush	100	BLM, CDOW
MP	2005	Sulphur Gulch rangeland Aerial Fertilization	Increase herbaceous and grass production and stimulate sagebrush growth, also increase the amount of crude protein in sagebrush	40	BLM, CDOW
MP	2005	Muddy Creek Kremmling, rangeland Aerial Fertilization	Increase herbaceous and grass production and stimulate sagebrush growth, also increase the amount of crude protein in sagebrush	70	BLM, CDOW
MP	2006	West of Corral Creek, Rangeland Aerial Fertilization	Increase herbaceous and grass production and stimulate sagebrush growth, also increase the amount of crude protein in sagebrush	275	BLM, CDOW
MP	2006	Sulphur Gulch Rangeland Aerial Fertilization	Increase herbaceous and grass production and stimulate sagebrush growth, also increase the amount of crude protein in sagebrush	234	BLM, CDOW
MP	2007	Sulphur Gulch crested wheat removal	Improve rangeland and habitat quality by removing crested wheatgrass and planting native shrubs, forbs and grasses	100	BLM, CDOW
MP	2007	Sulphur Gulch native reseeding	Improve rangeland and habitat quality by removing crested wheatgrass and planting native shrubs, forbs and grasses	100	BLM, CDOW

Popula-tion	Date	Project Name	Objectives	# Acres	Partners
MP	2004	Derringer Dixie Harrow Project	Reduce woody overstory, increase forage production and species diversity, watershed hydrology, seral diversity, wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	374	Private
MP	2004	BVR Brush Beating, 2004	Reduce woody overstory, increase forage production and species diversity, watershed hydrology, seral diversity, wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	40	Private
MP	2004	Camp Creek Prescribed Burn	Reduce woody overstory, increase forage production and species diversity, watershed hydrology, seral diversity, wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	600	Private
MP	2004	BVR Noxious Weeds, 2004	Reduce cover and spread of noxious weed species, propagate native forage production, expand wildlife habitat	30	Private
MP	2004	East Side Watershed Project	Capture and hold water runoff, catch sediment and slow erosion, foster creation of artificial wetlands, provide water sources for livestock and wildlife,	20	Private
MP	2004	East Side Prescribed Grazing, 2004	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	4,500	Private
MP	2005	BVR Brush Beating, 2005	Reduce woody overstory, increase forage production and species diversity, watershed hydrology, seral diversity, wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	35	Private
MP	2005	BVR Noxious Weeds, 2005	Reduce cover and spread of noxious weed species, propagate native forage production, expand wildlife habitat	20	Private
MP	2005	East Side Prescribed Grazing, 2005	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	4,500	Private
MP	2006	BVR Brush Beating, 2006	Reduce woody overstory, increase forage production and species diversity, watershed hydrology, seral diversity, wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	30	Private
MP	2006	BVR Noxious Weeds, 2006	Reduce cover and spread of noxious weed species, propagate native forage production, expand wildlife habitat	103	Private
MP	2006	East Side & State Pasture Prescribed Grazing, 2006	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	4,500	Private
MP	2007	BVR Brush Beating, 2007	Reduce woody overstory, increase forage production and species diversity, watershed hydrology, seral diversity, wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	33	Private
MP	2007	BVR Noxious Weeds, 2007	Reduce cover and spread of noxious weed species, propagate native forage production, expand wildlife habitat	110	Private
MP	2007	East Side & State Pasture Prescribed Grazing, 2007	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	4,500	Private
MP	2008	BVR Noxious Weeds, 2008	Reduce cover and spread of noxious weed species, propagate native forage production, expand wildlife habitat	86	Private

Popula-tion	Date	Project Name	Objectives	# Acres	Partners
MP	2009	BVR Brush Beating, 2008	Reduce woody overstory, increase forage production and species diversity, watershed hydrology, seral diversity, wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	35	Private
MP	2004	Lone Pine Timber Project	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	42	Private
MP	2005	Four-Forty Timber Project	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	101	Private
MP	2006	Welcome Point Timber Project	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	300	Private
MP	2007	State Pasture Timber Project	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	450	Private
MP	2008	Hunter & Sheephorn Timber Projects	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity)	404	Private
MP	2005	Junction Butte sagebrush treatments and Lawson Aerator	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	361	BLM
MP	2005	Mitchell Reservoir sagebrush treatments via and Lawson Aerator	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	90	BLM
MP	2005	McQuery Gulch sagebrush treatments via Lawson Aerator	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	528	BLM
MP	2005	Moore Reservoir sagebrush treatments via Lawson Aerator	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	475	BLM
MP	2005	Barger Gulch sagebrush treatments via Lawson Aerator	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	200	BLM
MP	2005	BLM Wolford Management Area seeded seven miles of closed routes	Reclaim closed vehicle routes with beneficial forbs and grasses.	10	BLM
MP	2006	Antelope Creek Riparian Fencing	Improve sagebrush and riparian habitat by fencing out livestock	40	BLM
MP	2006	South of Pinto Creek sagebrush treatments via Brushbeating	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	100 out of 300	BLM
MP	2007	South of Carter Creek sagebrush treatments via Dixie Harrow	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	160	BLM

Popula-tion	Date	Project Name	Objectives	# Acres	Partners
MP	2007	Gunsight Pass sagebrush treatments via Dixie Harrow	Improve brood rearing and summer habitat by stimulating re-growth of sagebrush, forbs and grasses.	200	BLM
MP	2004	Hartman Divide Piñon Juniper Removal	Remove piñon juniper within historic range to improve habitat conditions	715	BLM
MP	2006	Hartman Divide Piñon Juniper Removal	Remove piñon juniper within historic range to improve habitat conditions	30	BLM
MP	2007	Junction Butte Fertilization	Increase herbaceous and grass production and stimulate sagebrush growth; also increase the amount of crude protein in sagebrush.	400	CDOW
MP	2007	Hunter Springs Weed Spraying	Canada thistle reduction to favor native plant species.	1	USFS
MP	2007	Muddy Allotment Weed Spraying	Yellow toadflax and Canada thistle control for native plant species recovery.	15	USFS
MP	2009	Back Troublesome Grouse Friendly Fencing	NRCS & FWS developed ponds on private property in close proximity to a sage-grouse lek. The DOW paid for fencing material for a temp electric fence so as to negate the need for a permanent fence which can cause grouse collisions and predator perches.	20	CDOW, NRCS, PFW, Private
MP	2009	DOW SWA Kemp Flats Shallow Pond Development	Develop shallow water ponds for wildlife. Will benefit sage-grouse by providing brood and summer foraging habitat. Flooded a weed infested patch of sagebrush habitat.	40	CDOW
MP	2009	BVR, Noxious Weed Control, 2009	Reduce cover and spread of noxious weed species, propagate native forage production, expand wildlife habitat.	100	Private
MP	2009	BVR, 2009 Jones Res/Romaine Timber Harvest	Increase forage production and species diversity, watershed hydrology, forest health and age class diversity, aspen regeneration and wildlife habitat improvement (landscape heterogeneity, edge, species diversity).	450	Private
MP	2010	Brood and Summer Habitat Fencing and Improved Grazing Project	Protection and restoration of brood and summer habitat via fencing and deferred grazing	80	Private, USFWS Partners, CDOW
MP	2011	Fertilized land	BLM Fertilized lands north of Granby landfill	350	BLM
MP	2011	Dixie Harrow	BLM Dixie Harrowed lands near Antelope Pass	200	BLM
MP	2011	Private lands water development project	Rangeland improvements to better water supply for livestock and provide 3 stock tanks and overflow.	2	Private
MP	2011	Alfalfa seeding	Alfalfa seeding on private lands	6	Private
MP	2011	Reclamation of Gravel Pit lek site.	Reseeding and contouring of gravel pit for lek site. Completed with seed from CPW.	5	CPW, Grand County, Private
MP	2011	Legume seeding in agricultural fields	Private lands test plots of legume seeding in agricultural fields. Testing different plant species over a 3 year period.	2	Private
MP	2011	Clover Seed Availability	NRCS clover seed made available to the public to seed along irrigated hay meadows and ditches. They make 2,000 lbs available each year to MP landowners.	NA	CPW, NRCS, Private
MP	2012	Pinyon-Juniper Removal	Pinyon-Juniper removal via hand clearing on 500 acres north of Kremmling.	500	CPW, FWS, NRCS, Private

Popula-tion	Date	Project Name	Objectives	# Acres	Partners
MP	2012	Fence Marking	Fence marking of 500m on private property. Wooded stays were added on long spans (12-16') to increase visibility and reflectors were placed over the draw where stays could not be added. The fence is located adjacent to a lek and winter concentration area. One fence strike was identified prior to the marking project.		CPW, NRCS, Private
MWR	2009	Wenschhof Easement Pasture Fence	Install wildlife-friendly fence on the Wenschhof Easement (held by CDOW) to better manage cattle grazing between irrigated pasture areas and upland sagebrush habitat. The fence will allow for better seasonal use of areas important for sage-grouse nesting.	202	CDOW, Private
MWR	2009	SCTF: Oak Ridge SWA PJ Removal	Remove encroaching PJ to restore GrSG habitat	25	CDOW
MWR	2010	SCTF: Oak Ridge SWA PJ Removal	Remove encroaching PJ to restore GrSG habitat	26	CDOW
NP	2005	Owl Ridge II Brush beat	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat.	310	BLM/ North Park Habitat Partnership Program (NPHPP), Owl Mountain Partnership (OMP)
NP	2005	Owl Ridge II Lawson Aerator	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat.	200	BLM/ NPHPP
NP	2006	Big Horn reseeding	Restore understory in a degraded grazing allotment	300	BLM, OMP, CDOW, Partners for Wildlife (PFW), Private, NPHPP
NP	2005	Refuge Cross Fence	build cross fence to improve grazing management options	1,693	CDOW, USFWS Refuges
NP	2005	Deer Creek WHIP	Install cross fence to improve grazing management; small sagebrush treatment	1,920	NRCS, PFW, OMP
NP	2007	Mexican Creek brushbeat and wet seep development	100 acres of small sagebrush treatments (brushbeating 1-5 acres); install solar pump on well and dribble water across ground to create wet seep for brood habitat	150	CDOW, PFW, OMP, Private
NP	2006	Tointon brushbeat	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat.	200	BLM
NP	2006	Mexican Ridge brushbeat	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat.	200	CDOW, OMP
NP	2006	Snakeweed removal	Herbicide treatment to remove snakeweed in order to improve grass and forb component	100	BLM
NP	2007	Owl Ridge Brush beat	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat.	200	BLM
NP	2006	Government Creek Exclosure Repair	Fencing to protect riparian/wetland habitat	0.6	BLM
NP	2006	Sheep Mtn. Fen	Fencing to protect riparian/wetland habitat	7.2	BLM
NP	2006	Sheep Mtn. Fen - Electric Fence	Fencing to protect riparian/wetland habitat	3.5	BLM
NP	2006	Soap Creek riparian - electric fence 2006	Fencing to protect riparian/wetland habitat	0.6	BLM

Popula-tion	Date	Project Name	Objectives	# Acres	Partners
NP	2007	Soap Creek riparian - electric fence 2007	Fencing to protect riparian/wetland habitat	0.6	BLM
NP	2007	Seymour brushbeat	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat.	100	OMP, Mule Deer Foundation (MDF)
NP	2007	McFarlene brushbeat	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat.	200	OMP
NP	2008	Bush Draw Wet Seep	Dribble water across ground to create a wet seep area to enhance grass and forb growth and improve the insect component in brood habitat	2	CDOW, BLM
NP	2008	Walden Reservoir Wet Seep	Dribble water across ground to create a wet seep area to enhance grass and forb growth and improve the insect component in brood habitat	2	CDOW, BLM
NP	2009	Owl Mountain State Wildlife Area (SWA) Wet Seep	Dribble water across ground to create a wet seep area to enhance grass and forb growth and improve the insect component in brood habitat	2	CDOW, NPHPP, OMP
NP	2009	Refuge Wet Seep	Dribble water across ground to create a wet seep area to enhance grass and forb growth and improve the insect component in brood habitat	2	CDOW, USFWS, OMP
NP	2008	N/S State Lease Wet Seep	Dribble water across ground to create a wet seep area to enhance grass and forb growth and improve the insect component in brood habitat	2	CDOW, SLB, OMP
NP	2008	Cat Canyon Spring Development and Fencing Project	Develop spring and fence out the riparian area to relieve grazing pressure. Improve mesic vegetation condition and improve brood rearing habitat.	5	RMEF, SLB, Private, North Park Habitat Partnership Program (NPHPP), Owl Mountain Partnership (OMP)
NP	2008	Cowdrey Irrigation Improvement/Grazing Plan	Grazing plan and irrigation agreement to improve sage-grouse breeding and brood rearing habitat. Increased overall vegetative cover, residual cover and improved forb condition. Fence removal to improve overall wildlife habitat.	123	CDOW, Private, PFW
NP	2008	Box Spring Exclosure	Fencing to protect riparian/wetland habitat	2	OMP, CDOW
NP	2009	Shawver Wet Seep Development	Create wet seep; improve insect component in brood habitat.	2	CDOW, Private, North Park Habitat Partnership Program (NPHPP), Owl Mountain Partnership (OMP)
NP	2009	MacFarlane State Trust Land Sagebrush Treatment	Improve sagebrush age class diversity and density and improve understory communities. Improve brood-rearing habitat. Dixie Harrow	200	CDOW, Private, North Park Habitat Partnership Program (NPHPP), Owl Mountain Partnership (OMP)
NESR	2005	Redmond WHIP - NRCS	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat. Restore riparian habitat	50	NRCS, PFW
NESR	2008	Devil's Grave WHIP	Improve grazing management through cross-fencing and water development. Create Wet seeps for brood habitat.	936	NRCS, PFW, CDOW
NESR	2007	State Bridge Hand Cutting	Hand cutting PJ in and around GrSG habitat to improve and restore habitat.	220	BLM
NESR	2006	Sunnyside PJ Treatment	Remove encroaching PJ to restore functional habitat	120	BLM, CDOW

Popula-tion	Date	Project Name	Objectives	# Acres	Partners
NESR	2006	Sunnyside PJ Treatment	Remove encroaching PJ to restore functional GrSG habitat	160	CDOW, Private
NESR	2009	Windy Point PJ Treatment	Remove encroaching PJ to restore functional GrSG habitat	400	BLM, CDOW
NESR	2007	Watson Creek treatment	Create small openings in sagebrush stand. Increase grass and forb component and create diversity of sagebrush age classes in brood habitat.	45	BLM, CDOW, Private
NESR	2010	SCTF: PJ Removal	Hydroaxe treatment to remove pinyon juniper in sagebrush community. Sage-grouse fitted with GPS transmitter documented sage-grouse use of similar hydroaxe on adjacent property	167	CDOW, Private
NESR	2011	SCTF: PJ Removal	Remove encroaching PJ to restore functional GRSG habitat.	488	CPW, BLM
NESR	2012	SCTF: PJ Removal	Remove encroaching PJ to restore functional GRSG habitat (Hydroaxe treatment).	410	CPW, BLM
NESR	2012	PJ Removal	Remove encroaching PJ to restore functional GRSG habitat (Handcutting treatment).	263	BLM, CPW
NESR	2012	SCTF: PJ Removal	Remove encroaching PJ to restore functional GRSG habitat (Hydroaxe treatment).	85	CPW, USFS
NESR	2012	PJ Removal	Remove encroaching PJ to restore functional GRSG habitat (Handcutting treatment).	200	USFS
NWCO	2008-2009	Butler WHIP Seeding	Improve grass and forb diversity and improve structure in old ag field that had been planted for upland hay	330	NRCS, CDOW, PFW
NWCO	2003	Mystic WHIP	Improve grass and forb diversity and improve structure in retired CRP	197	CDOW, NRCS
NWCO	2005	Sevenmile Ridge PJ project - Phase 1	Remove PJ to restore areas back to sagebrush to provide GrSG habitat	750	BLM
NWCO	2007	Bighole Gulch Sagebrush Treatment	Enhancement of GrSG brood-rearing habitat through sagebrush management.	875	NRCS, Private
NWCO	2007	Dunkely Flattops Sagebrush Treatment	Enhancement of GrSG brood-rearing habitat through sagebrush management.	108	NRCS, Private
NWCO	2009	Sevenmile Draw Brushbeat	Stand age diversity and improved understory	660	BLM
NWCO	2009	Sevenmile Ridge PJ treatment - Phase 2	Remove young piñon and juniper trees to maintain sagebrush communities. Handcutting.	1,000	BLM
NWCO	2007	Cold Springs Phase 1	Improve brood rearing habitat and create a diversity of sagebrush age classes. Small, randomly located patches aerially sprayed with 2,4-D to treat about 20% 4121 acres of sagebrush. Patches 0.1-0.4 acres each.	4,121	BLM, State, Private
NWCO	2008	Cold Springs Phase 2	Improve brood rearing habitat and create a diversity of sagebrush age classes. Small, randomly located patches aerially sprayed with 2,4-D to treat about 20% of 3248 acres of sagebrush. Patches 0.1-0.4 acres each.	3,248	BLM, State, Private
NWCO	2009	Cold Springs Phase 3	Improve brood rearing habitat and create a diversity of sagebrush age classes. Small, randomly located patches aerially sprayed with 2,4-D to treat about 20% of 4213 acres of sagebrush. Patches 0.1-0.4 acres each.	4,213	BLM, State, Private
NWCO	2008	Diamond Peak Phase 1	Improve brood rearing habitat and create a diversity of sagebrush age classes. Small, randomly located patches aerially sprayed with spike to treat about 20% of 1000 acres of sagebrush. Patches 0.1-0.4 acres each.	1,000	BLM

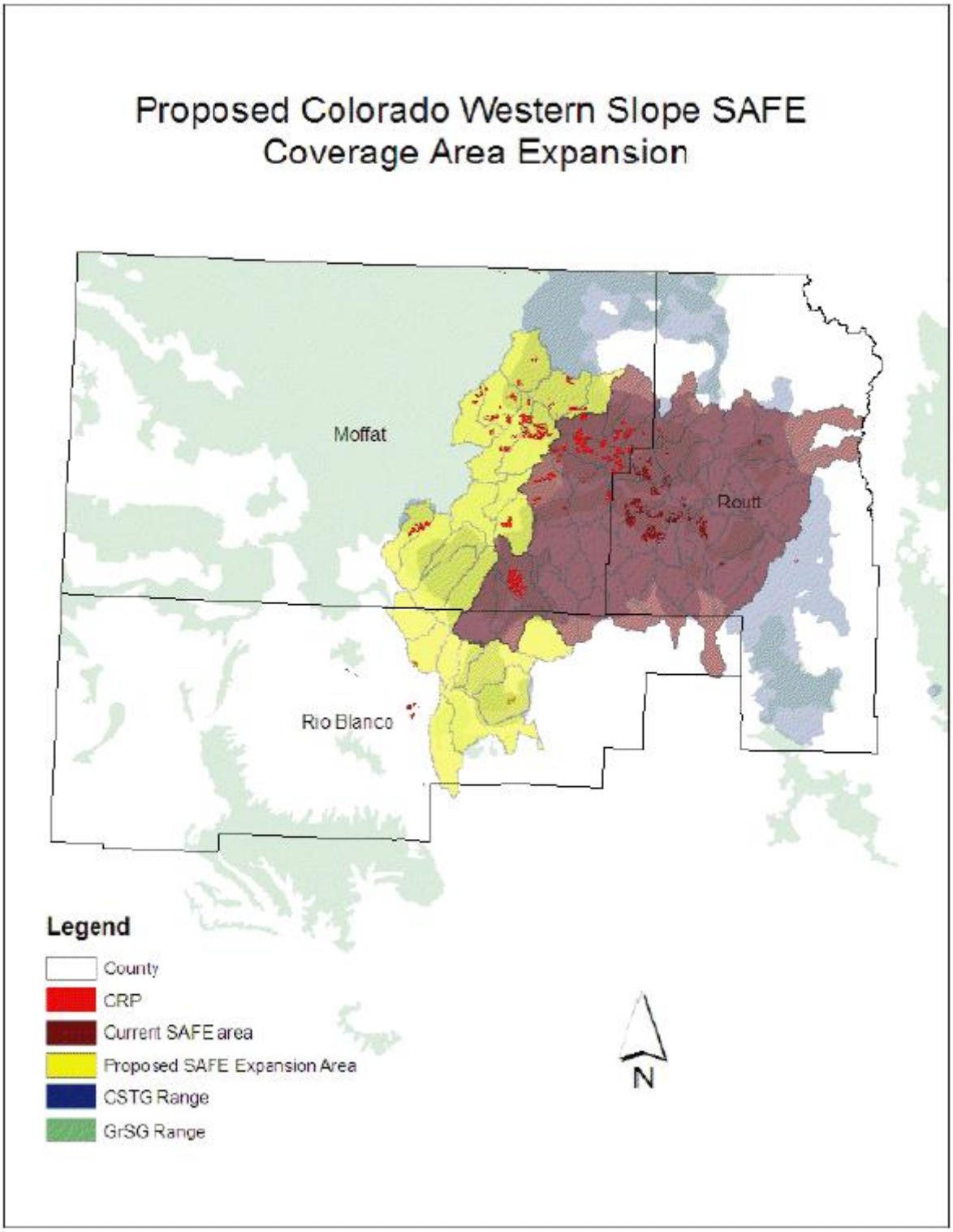
Popula-tion	Date	Project Name	Objectives	# Acres	Partners
NWCO	2009	Diamond Peak Phase 2	Improve brood rearing habitat and create a diversity of sagebrush age classes. Small, randomly located patches aerially sprayed with spike to treat about 20% of 1000 acres of sagebrush. Patches 0.1-0.4 acres each.	500	BLM
NWCO	2008	Blue Mountain Brush Beat	Improve sagebrush age-class diversity and density and improve understory communities. Trying to bring sagebrush vegetative cover closer to ground level for improved nesting habitat. Brush beating	160	BLM
NWCO	2009	Bighole Gulch Grazing Management	Rotational grazing to enhance regionally important brood area	14,000	BLM, Private
NWCO	2009	Axial Basin	Weed management, primarily for whitetop. Is part of the Axial basin CRM	500	BLM
NWCO	2006	Lemon Springs Grazing Mgt.	Grazing Management	20,737	BLM
NWCO	2008	Vermillion Ranch Grazing Management	Grazing Management	58,000	Private, BLM, State
NWCO	2000	CA Park Grouse Habitat Restoration Project 2000	Habitat Restoration - seeding	10	USFS, CDOW
NWCO	2001	CA Park Grouse Habitat Restoration Project 2001	Habitat Restoration - seeding	500	USFS, CDOW
NWCO	2001	CA Park Grouse Habitat Restoration Project - Therber fescue plugs	Habitat Restoration - planting therber fescue plugs	50	USFS, CDOW
NWCO	2002	CA Park Grouse Habitat Restoration Project 2002	Habitat Restoration - fertilization of 2001 seeding	200	USFS, CDOW
NWCO	2004	CA Park Grouse Habitat Restoration Project 2004	Habitat Restoration - seeding	50	USFS, CDOW
NWCO	2006	CA Park Grouse Habitat Restoration Project 2006	Habitat Restoration - seeding	200	USFS, CDOW
NWCO	2006	Rangeland Management Plan	Grazing Management Plan	34,595	USFS
NWCO	2012	CA Park Second Creek Restoration Plan	Overarching Restoration Plan for the Grouse Habitat improvement in CA Park 2nd Creek Pasture	800	USFS, CDOW
NWCO	2009	Stewardship Range Management Plan (Slater Park)	Grazing Management Plan	12,802	USFS
NWCO	2006	Bitterbursh SWA understory enhancement	Enhance/restore degraded meadow understory to improve brood habitat for greater sage-grouse and re-establish nesting cover within closer proximity to meadow. Interseeding bunchgrasses, forbs and big sagebrush.	160	CDOW
NWCO	2007	NPS Slaugh-Wall Sagebrush Treatment	Improve sagebrush structure for more effective nesting habitat.	862	BLM, NPS
NWCO	2008	Cold Springs Vegetative Assessment	Obtain vegetative baseline for future habitat project and grazing management	20,262	SLB, CDOW
NWCO	2008	Baker's Peak Vegetative Assessment	Obtain vegetative baseline for future habitat project and grazing management	12,408	SLB, CDOW
NWCO	2008	Nipple Rim/Sand Wash Vegetative Assessment	Obtain vegetative baseline for future habitat project and grazing management	24,327	SLB, CDOW
NWCO	2009	SCTF: Blue Mountain-Three Springs PJ Removal	Remove encroaching PJ to restore functional GrSG habitat	339	Private, BLM, CDOW

Popula-tion	Date	Project Name	Objectives	# Acres	Partners
NWCO	2009	SCTF: Serviceberry Mountain PJ Removal	Remove encroaching PJ to restore functional GrSG habitat	145	BLM, SLB, CDOW
NWCO	2010	SCTF: Axial Basin Interseed	Increase understory diversity and productivity in pasture grass stand	95	Private, CDOW
NWCO	2010	SCTF: Axial Basin Restoration	Restore agricultural land to native sagebrush community	77	Private, NRCS, CDOW
NWCO	2011	SCTF: Bear Valley PJ Removal	Remove encroaching PJ to restore functional GrSG habitat	1,434	Private, BLM, CDOW
NWCO	2011	SCTF: Peck Mesa PJ Removal	Remove encroaching PJ to restore functional GrSG habitat	167	Private, BLM, CDOW
NWCO	2011	SCTF: Cedar Mountain Restoration	Restore agricultural land to native sagebrush community	192	Private, NRCS, CDOW
NWCO	2011	SCTF: Alkali Fire Restoration	Seed burned area to increase likelihood of desirable species response	1,650	Private, NRCS, FWS Partners, CDOW
NWCO	2011	SCTF: GMU 1 PJ Removal	Remove encroaching PJ to restore functional GRSG habitat	207	CPW, Private
NWCO	2011	SCTF: Ag Restoration in NWCO population.	Began the process of restoring 1290 acres of old CRP (smooth brome and intermediate wheatgrass) with wildlife seed mix that includes sagebrush, native grasses, and forbs. 112 acres cultivated ground seeded with same wildlife mix.	1,402	CPW, Private
NWCO	2012	SCTF: GMU 1 PJ Removal Phase II	Remove encroaching PJ to restore functional GRSG habitat	174	CPW, Private
NWCO	2012	SCTF: Ag Restoration in NWCO population.	Began the process of restoring an additional 571 acres of old CRP (smooth brome and intermediate wheatgrass) to a wildlife seed mix that includes sagebrush, native grasses, and forbs. Practice involves extensive seed-bed prepation prior to seeding.	571	CPW, Private, NRCS, FSA
NWCO	2012	SCTF: Ag Restoration in NWCO population.	Aerial application of locally adapted mountain big sagebrush to CRP restoration areas.	631	CPW
PPR	2009	EnCana Wildlife Mitigation Plan	EnCana wildlife mitigation plan protecting sage-grouse through planning and proper mitigation.	Appro x. 10,000	CDOW, EnCana
PPR	2009	Marathon Comprehensive Development Plan	Marathon comprehensive development plan protecting sage-grouse through planning and proper mitigation.	42,697	CDOW, Marathon
PPR	2009	Williams Comprehensive Development Plan	Williams comprehensive development plan protecting sage-grouse through planning and proper mitigation.	Appro x. 5,000	CDOW, Williams
PPR	2010	SCTF: Ryan & Galloway PJ Removal	Remove encroaching PJ to restore functional GrSG habitat	221	Private, BLM, CDOW
PPR	2011	SCTF:Piceance PJ Removal	Remove encroaching PJ to restore functional GRSG habitat;	294	CPW, Private, BLM
PPR	2011	BLM Burn on Brush Mtn	Burn to thin sagebrush to create patchy mosaic and create multiple age stands.	Not yet avail. (<644?)	BLM

Appendix B. Summary of Colorado Parks and Wildlife expenditures on Greater Sage-Grouse. These expenditures include conservation planning and implementation, land protection (Conservation Easements /Fee Title), population and habitat monitoring, habitat treatments/restoration, research, and communications. These expenditures include funds such as wildlife cash, GOCO, federal funds, and grants (SCTF), etc. (Values as of 5 Oct 2012).

Year	Expenditure
2006	$777,930
2007	$1,374,709
2008	$7,832,494
2009	$2,871,931
2010	$8,718,139
2011	$8,639,896
Partial 2012	$2,801,592
Total	$33,016,691

Appendix C. Agriculture Conversion. New expanded area in State Acres For wildlife Enhancement (SAFE). The proposed area has been approved to be part of the SAFE program (as of Nov 2012). Strategies 1.1.1.5 and 1.2.1.1.



APPENDIX D

PROTECTION OF WILDLIFE RESOURCES

1201. IDENTIFICATION OF WILDLIFE SPECIES AND HABITATS

Prior to the preparation of a Comprehensive Drilling Plan or the submittal of a Form 2A for a proposed new oil and gas location, an operator shall review the Sensitive Wildlife Habitat map and the Restricted Surface Occupancy map maintained by the Commission on its website and attached as Appendices VII and VIII to determine whether the proposed oil and gas location falls within Sensitive Wildlife Habitat or a Restricted Surface Occupancy area. The operator shall include this determination in the Form 2A or Comprehensive Drilling Plan.

1202. CONSULTATION

a. The purpose of consultation under Rule 306.c is to allow the Director to determine whether conditions of approval are necessary to minimize adverse impacts from the proposed oil and gas operations in the identified sensitive wildlife habitat or restricted surface occupancy area, in an order increasing well density, or in a basin-wide order involving wildlife resource issues and to evaluate requests for variances from the provisions of the 1200-Series Rules. For purposes of this rule, minimize adverse impacts shall mean wherever reasonably practicable, to (i) avoid adverse impacts from oil and gas operations on wildlife resources, (ii) minimize the extent and severity of those impacts that cannot be avoided, (iii) mitigate the effects of unavoidable remaining impacts, and (iv) take into consideration cost-effectiveness and technical feasibility with regard to actions taken and decisions made to minimize adverse impacts to wildlife resources, consistent with the other provisions of the Act.

b. Unless excepted as set forth in Rule 1202.d, when a proposed new oil and gas location is located in sensitive wildlife habitat or a restricted surface occupancy area, the Colorado Division of Wildlife shall consult with the operator, the surface owner, and the Director in accordance with Rule 306.c prior to approval of a Form 2A to identify possible conditions of approval.

c. Any conditions of approval resulting from such consultation shall be guided by the list of Best Management Practices for Wildlife Resources maintained on the Commission website. In selecting conditions of approval from such Best Management Practices or other sources, the Director shall consider the following factors, among other considerations:

(1) The Best Management Practices for the producing geologic basin in which the oil and gas location is situated;

(2) Site-specific and species-specific factors of the proposed new oil and gas location;

(3) Anticipated direct and indirect effects of the proposed oil and gas location on wildlife resources;

(4) The extent to which conditions of approval will promote the use of existing facilities and reduction of new surface disturbance;

(5) The extent to which legally accessible, technologically feasible, and economically practicable alternative sites exist for the proposed new oil and gas location;

(6) The extent to which the proposed oil and gas operations will use technology and practices which are protective of the environment and wildlife resources;

(7) The extent to which the proposed oil and gas location minimizes surface disturbance and habitat fragmentation;

(8) The extent to which the proposed oil and gas location is within land used for residential, industrial, commercial, agricultural, or other purposes, and the existing disturbance associated with such use; and

(9) Permit conditions, lease terms, and surface use agreements that predate December 11, 2008.

d. Consultation under Rule 306.c shall not be required if:

(1) The Director or Commission has previously approved a Form 2A or Comprehensive Drilling Plan which includes the proposed new oil and gas location;

(2) The Colorado Division of Wildlife has previously approved, in writing, a wildlife mitigation plan or other wildlife protection or conservation plan that remains in effect for the area that includes the proposed new oil and gas location and the oil and gas location is in compliance with such plan;

(3) The operator demonstrates that the identified habitat and/or species, where applicable, is not in fact present to support the identified species and use, such as where the proposed oil and gas location is located in a high density area, designated pursuant to Rule 603.b, or within an incorporated homeowners association or city or town limits;

(4) The proposed new well would involve a one-time increase in surface disturbance of one (1) acre or less per well site at or immediately adjacent to an existing well site;

(5) The operator applies for and obtains a Commission order pursuant to Rule 503 providing that there will not be more than three (3) well sites per section, with ground disturbing activity during the period from January 1 to March 31 (or other biologically appropriate alternative period up to ninety (90) consecutive days as determined by the Director for bighorn sheep winter range, elk production areas, bald or golden eagle nest or roost sites, columbian or plains sharp-tailed grouse production areas, greater or Gunnison sage grouse production areas, black-footed ferret release areas, or lesser prairie chicken production areas) limited to one (1) such well site, as determined by the Director. This exemption from consultation shall not apply to operations in occupied greater sage grouse sensitive wildlife habitat in Moffat, Routt, or Jackson Counties or in occupied Gunnison sage grouse sensitive wildlife habitat in Delta, Mesa, Gunnison, San Miguel, Dolores, or Montezuma Counties;

(6) The Director grants a variance pursuant to Rule 502.b; or

(7) The Colorado Division of Wildlife waives the consultation requirement.

e. No permit-specific condition of approval for wildlife habitat protection under this rule shall be imposed without surface owner consent, including any permit-specific conditions for wildlife habitat protection that modify, add to, or differ materially from the general operating requirements in Rules 1203 and 1204. If the surface owner fails to consent to any such permit-specific condition of approval, then the parties shall consult with the surface owner regarding alternative conditions of approval acceptable to the surface owner.

1203. GENERAL OPERATING REQUIREMENTS IN SENSITIVE WILDLIFE HABITAT AND RESTRICTED SURFACE OCCUPANCY AREAS

a. **General Operating Requirements.** Within sensitive wildlife habitat and restricted surface occupancy areas, operators shall comply with the operating requirements listed below.

(1) During pipeline construction for trenches that are left open for more than five (5) days and are greater than five (5) feet in width, install wildlife crossovers and escape ramps where the trench crosses well-defined game trails and at a minimum of one quarter (1/4) mile intervals where the trench parallels well-defined game trails.

(2) Inform and educate employees and contractors on wildlife conservation practices, including no harassment or feeding of wildlife.

(3) Consolidate new facilities to minimize impact to wildlife.

(4) Minimize rig mobilization and demobilization where practicable by completing or recompleting all wells from a given well pad before moving rigs to a new location.

(5) To the extent practicable, share and consolidate new corridors for pipeline rights-of-way and roads to minimize surface disturbance.

(6) Engineer new pipelines to reduce field fitting and reduce excessive right-of-way widths and reclamation.

(7) Use boring instead of trenching across perennial streams considered critical fish habitat.

(8) Treat waste water pits and any associated pit containing water that provides a medium for breeding mosquitoes with Bti (*Bacillus thuringiensis v. israelensis*) or take other effective action to control mosquito larvae that may spread West Nile Virus to wildlife, especially grouse.

(9) Use wildlife appropriate seed mixes wherever allowed by surface owners and regulatory agencies.

(10) Mow or brushhog vegetation where appropriate, leaving root structure intact, instead of scraping the surface, where allowed by the surface owner.

(11) Limit access to oil and gas access roads where approved by surface owners, surface managing agencies, or local government, as appropriate.

(12) Post speed limits and caution signs to the extent allowed by surface owners, Federal and state regulations, local government, and land use policies, as appropriate.

(13) Use wildlife-appropriate fencing where acceptable to the surface owner.

(14) Use topographic features and vegetative screening to create seclusion areas, where acceptable to the surface owner.

(15) Use remote monitoring of well production to the extent practicable.

(16) Reduce traffic associated with transporting drilling water and produced liquids through the use of pipelines, large tanks, or other measures where technically feasible and economically practicable.

b. **Exceptions.** If the operator believes that any of the foregoing operating requirements should be waived for any proposed oil and gas location, it shall so specify in a Form 2A for Director consideration.

1204. OTHER GENERAL OPERATING REQUIREMENTS

a. The operating requirements identified below shall apply in all areas.

(1) In black bear habitat west of Interstate 25 and on Raton Mesa east of Interstate 25, operators shall install and utilize bear-proof dumpsters and trash receptacles for food-related trash at all facilities that generate such trash.

(2) In designated Cutthroat Trout habitat, as identified on the Colorado Division of Wildlife Species Activity Mapping (SAM) system, operators shall disinfect water suction hoses and water transportation tanks withdrawing from or discharging into surface waters (other than contained pits) used previously in another river, lake, pond, or wetland and discard rinse water in an approved disposal facility. Disinfection practices shall be repeated after completing work or before moving to the next water body. Disinfection may be performed by removing mud and debris and then implementing one of the following practices:

A. Spray/soak equipment with a disinfectant solution capable of killing whirling disease spores; or

B. Spray/soak equipment with water greater than 140 degrees Fahrenheit for at least 10 minutes.

(3) To minimize adverse impacts to wildlife resources, plan new transportation networks and new oil and gas facilities to minimize surface disturbance and the number and length of oil and gas roads and utilize common roads, rights of way, and access points to the extent practicable, consistent with these rules, an operator's operational requirements, and any requirements imposed by federal and state land management agencies, local government regulations, and surface use agreements and other surface owner requirements, and taking into account cost effectiveness and technical feasibility.

(4) Establish new staging, refueling, and chemical storage areas outside of riparian zones and floodplains.

(5) Use minimum practical construction widths for new rights-of-way where pipelines cross riparian areas, streams, and critical habitats.

b. **Exceptions.** If the operator believes that any of the foregoing operating requirements should be waived for any proposed oil and gas location, it shall so specify in a Form 2A for Director consideration.

1205. REQUIREMENTS IN RESTRICTED SURFACE OCCUPANCY AREAS

a. Operators shall avoid Restricted Surface Occupancy areas to the maximum extent technically and economically feasible when planning and conducting new oil and gas development operations, except:

(1) When authorized following consultation under Rule 306.c.(3);

(2) When authorized by a Comprehensive Drilling Plan;

(3) Upon demonstration that the identified habitat is not in fact present;

(4) When specifically exempted by the Colorado Division of Wildlife; or

(5) In the event of situations posing a risk to public health, safety, welfare, or the environment.

b. As set forth in Rule 1205.a, new ground disturbing activities are to be avoided in Restricted Surface Occupancy areas, including construction, drilling and completion, non-emergency workovers, and pipeline installation activity, to minimize adverse impacts to wildlife resources. Production, routine maintenance, repairs and replacements, emergency operations, reclamation activities, or habitat improvements are not prohibited in Restricted Surface Occupancy areas. Notwithstanding the foregoing, non-emergency workovers, including uphole recompletions, may be performed with prior approval of the Director on a schedule that minimizes adverse impacts to the species for which the restricted surface occupancy area exists.

c. **Applicability.** The requirements of Rule 1205 are not applicable to Applications for Permit-to-Drill, Form 2, or Oil and Gas Location Assessments, Form 2A, which are approved prior to May 1, 2009 on federal land or April 1, 2009 on all other land. The requirements of Rule 1205 are also not applicable until January 1, 2010, for any proposed oil and gas location in a Restricted Surface Occupancy area where the operator has in good faith initiated and is diligently pursuing consultation on the proposed oil and gas location begun prior to May 1, 2009 on federal land or April 1, 2009 on all other land, pursuant to Rule 306.c or Rule 216.

Appendix E. Summary of oil and gas permits within Greater Sage-Grouse habitat as defined in the 100 Series Rule. Production Areas [also as known as Sensitive Wildlife Habitat Areas (SWHA)] are within 4 miles of a lek (using the 2008 lek database) and Restricted Surface Occupancy Areas (RSO) are within 0.6 mi of a lek.

The actual conditions that are included on Form 2A permits are contained in COGCCs data base. CPW assumes that recommendations made and agreed to by the operator will be attached to the permit as a condition of approval. COGCC enforces permit conditions. Neither CPW nor COGCC monitor BMP effectiveness.

Best Management Practices

Summary of the most commonly recommended Best Management Practices (BMPs) for COGCC Form 2A Permits. A total of 97 Form 2A permits occurred in GrSG Production Habitat Areas (SWHA) since 2010.

BMP	# of times BMP requested	Recommended Best Management Practice
Timing - Seasonal	22	Where oil and gas activities must occur within 4 miles of GrSG leks or within other mapped GrSG breeding or summer habitat, conduct these activities outside the period between March 1 and June 30.
Timing - Daily	21	Restrict well site visitations to portions of the day between 9:00 a.m. and 4:00 p.m. during the lekking season (March 1 to May 15).
Sound	14	Muffle or otherwise control exhaust noise from pump jacks and compressors so that operational noise will not exceed 49 dB measured at 30 feet from the source.
Fencing	14	Fence pits to exclude grouse from entry
Netting	10	Net pits to exclude grouse from entry
Native Veg	45	Reclaim/restore GrSG habitats with native grasses, forbs, and shrubs conducive to optimal GrSG habitat and other wildlife appropriate to the ecological site.
Non Native Veg	12	Avoid aggressive non-native grasses in GrSG habitat reclamation. Include integrated vegetation management plan in reclamation plan.
Mosquito	29	Treat waste water pits and any associated pit containing water that provides a medium for breeding mosquitos with Bti (*Bacillus thuringiensis v. israelensis*) or take other effective action to control mosquito larvae that may spread West Nile Virus to wildlife, especially grouse.
Raptor Perch	23	Design tanks and other facilities with structures such that they do not provide perches or nest substrates for raptors, crows and ravens.
SUA	11	Surface Use Agreement describes surface use actions to minimize impacts to wildlife.
BLM COAs for Fed/Fed Permits	6	CPW affirms that the lease stipulations and conditions of approval assigned to this permit by the BLM suffice to address wildlife habitat and mitigation concerns.
WMP Permit Comments	11	Comments convey permit conditions consistent with BMPs in WMP

Wildlife Mitigation Plans

Acres of Greater Sage-Grouse Habitat by Wildlife Mitigation Plan. (Operator names have been generalized). These operators contribute funding to the Parachute/Piceance/Roan Research Project as partial mitigation for wildlife impacts. Research is focused on the GrSG population in the Parachute/Piceance/Roan Plateau area. Operators contributions vary in amount and to the area of research being conducted ï vegetation management, movement and habitat selection and use, habitat treatments.

CDP/WMP Holder	Total Lease Area *(Acres)*	GRSG Production Areas *(Acres)*	GRSG Lek Areas *(Acres)*	Number of Leks (Not all are entirely within WMP boundary)
A	44,687	17,725	1,590	4
B	17,258	9,963	1,182	3
C	149,946	19,325	5,090	15
D	7,724	577	None	0

Specific BMPs related to GrSG contained in the Wildlife Mitigation Plan (WMP) agreements. All COGCC Form 2A permits in SWHA and RSO areas have language that reference BMPs. Out of 97 Form 2A Permits, CPW reviewed 2 RSO permits and 8 SWHA permits in WMPs.

BMPs* **These BMPs are taken directly from the Wildlife Mitigation Plan Agreements. These apply specifically to GrSG and their habitats.**	WMP OPERATOR			
	A	B	C	D
Continue to provide access to CPW research personnel for ongoing sage grouse population research.	X		X	X
Install raptor perch deterrents on cross arms of power poles and other documented raptor perches, such as radio towers where birds are noted perching. Monitor all structures exceeding six feet in height for the presence of perching raptors or ravens. Perch deterrents need not be installed if they pose a safety issue (e.g., on the handrails of a tank battery).	X	X		
New Disturbance will be concentrated within a Development Area, and preferably confined to a ridgeline, to reduce the duration of development activity within such Development Area to the extent practicable. No new disturbance activities will occur within a Development Area during more than three consecutive Critical Habitat Seasons between Vacated Periods.			X	
Limit any new disturbance [in mapped occupied GrSG habitat] in specific areas for 3 [nesting/brood-rearing] seasons.	X			
Drill areas west of specific areas as opposed to mapped occupied GrSG habitat on ridge tops.	X			
Reoccupy existing pads if possible [as opposed to building new pads in mapped occupied GrSG habitat].	X			

Locate new pads outside occupied grouse habitat wherever possible or in habitat that is already disturbed.	X			
Implement three-phase-gathering on existing locations where possible to reduce onsite facilities and increase the acreage put into interim reclamation.	X			
Reduce traffic impacts by carpooling personnel from the Temporary Living Quarters (TLQ) to project locations.	X			
Reduce additional surface disturbance by utilization of the staging/storage yards at the TLQ and XX gravel pit.	X			
Construct cut and fill slopes of the main access road to a length that decreases the extreme slopes typical of cut and fill to facilitate ground movement by sage grouse for the XX Pipeline Project.	X			
Apply a 0.6 mile radius No Disturbance buffer around active leks sites (documented activity in the last five years) from 5:00 AM to 9:00 AM, March 15th through May 15th. Where practicable, traffic and other disturbances will be restricted after sunset when sage grouse are congregating around the lek until 9:00 AM the following morning when birds depart the lek.	X			
Site new disturbance so as to use topographic features to shield leks from new disturbance whenever feasible.	X			X
Restrict well site visitation in occupied habitat to between the hours of 9:00 AM and 4:00 PM during lekking season (March 15th to May 15th).	X			
Schedule cross-country pipeline construction and installation (not including lines along roads) outside of the Critical Habitat Season.	X			
Restrict New Disturbance within nesting and brood-rearing habitat (occupied habitat as mapped until more concise mapping is available) as much as possible from April 15th to July 1st.	X			X
Use interim reclamation to redevelop, as quickly as possible, ground cover that provides for secure ground movements of sage grouse and is an effective precursor to the reestablishment of appropriate sagebrush cover. Detailed guidelines and practices for interim and final reclamation are outlined in the Integrated Vegetation Management Guidance	X	X	X	
Reseed disturbances exceeding 15 feet in width in mapped occupied sage grouse habitat with local sage brush seed, where topography and weather conditions allow safe access to do so.	X			
Utilize the Wildlife Resources Appendices and wildlife resources database and maps to identify and document (where appropriate) potential impacts or concerns during the project planning phase for proposed drilling operations and construction of roads, pads and pipelines. The Wildlife Resources Appendices reflects a prioritization of species habitat sensitivity as agreed upon by CPW.	X			
Voluntary avoidance of GrSG habitats: Lek avoidance March 1 through May 15	X	X		
Voluntary avoidance of GrSG habitats: 4-mile buffer from March 1 to June 30				X
Voluntary avoidance of GrSG habitats: Winter habitat December 1 and March 15				X

*Approximately 30 other field wide BMPs, agreed to in the WMPs, may contribute to minimizing impacts to GrSG. These other BMPs are directed toward big game, raptors, cutthroat trout and may minimize development impacts to greater sage-grouse as well.

Appendix F. Elk Populations in GrSG Habitat. Strategies 6.2.2.1 and 6.2.2.3. The table demonstrates a significant decrease in elk populations to bring them down into Big Game Objectives. These objectives include land health as a component with the assumption that these objectives can be sustainable in the long-range while providing GrSG habitat.

Elk Populations in GrSG Habitat (derived from 2011 post-season population models)						
GrSG Population	**Big Game Herd Unit**	**Big Game Objective/Range**	**2011 Population Estimate**	**2008 Population Estimate**	**2004 Population Estimate**	**2000 Population Estimate**
NWCO	E-1 Cold Springs	950	1,171	2,043	3,494	3,104
NWCO	E-2 Bears Ears	15,000-18,000	15,810	18,271	29,678	38,719
NWCO/MWR/NESR	E-6 White River	32,000-39,000	35,868	43,898	52,897	62,455
NWCO	E-21 Blue Mountain	1,200	4,004	4,036	4,974	4,681
NP	E-3 North Park	4,000-4,500	7,992	8,296	8,469	8,443
MP	E-8 Troublesome	3,600-4,300	4,915	4,640	4,699	4,975
MP	E-13 Williams Fork	4,700-5,500	5,023	5,662	5,959	7,168
NESR	E-7 Gore	3,500-4,500	4,540	4,617	5,167	5,222
NESR	E-12 Piney River	2,950	3,761	4,037	5,683	6,560
PPR	E-10 Yellow Creek	7,000-9,000	11,981	11,196	10,860	10,196

Appendix G. Conservation Easement and Fee Title Summary.

Conservation easements and fee title properties in GrSG habitat in Colorado that are in place or in progress. (Rows highlighted in yellow indicate projects that were completed or are in progress since the last US FWS status review, March, 2012). Habitat acquisition either through easement or fee title has been the primary strategy to protect against habitat loss due to urbanization and housing development. CPW has protected approximately 66,560 acres of greater sage-grouse habitat since 2004 (Note these values do not include non-CPW properties shown below).

GrSG Population	Acres	Approximate Cost	Completion Date
MWR	3,700	Not CPW	2005
	140	Not CPW	2006
	1,123	Not CPW	2006
	2,027	$1,000,000	2007
	1,800	Fee exchange for GrSG habitat	2007
	3,000	$2,500,000	2007
	537	$1,137,500	2008
	725	Not CPW	2008
	1,634	$1,840,000	2009
	5,192	$5,427,000	2010
	3, 210	$2,492,500	2011
MP	3,140	$3,480,000	2007
	1,156	$1,461,250	2008
	2,318	$3,281,250	2008
	950	$2,200,000	2010
	1,120	$1,111,000	2012
NP	1,169	Not CPW	2005
	520	Not CPW	2007
	3,725	Not CPW	2008
	3,470	Not CPW (TNC-held) Tionton	2011
	2,240	1500000 (CCALT-held)	2011
	1,738	$1,000,000 (CPW funds; YVLT held)	Expected 2013
NESR	1,400	Not CPW	2004
	2,050	$2,152,500	2006
NWCO	1,812	$1,500,000	2004
	1,768	Not CPW	2005
	561	$503,147	2007
	2,711	$1,935,500	2007
	3,184	$1,705,000	2007
	630	$472,500	2007
	1,613	$1,210,000	2008
	493	Donation (CPW-held CE)	2010
	500	Donation (CPW-held CE)	2011
	2,447	TNC - no CPW funds	2011
	4,162	$4,920,000	2011

NWCO (continued)	2,535	TNC - no CPW funds	2012
	8,658	$8,722,935	2012
	3,582	$1,800,000	2012
	15,076	$4,243,680	2012

APPENDIX H

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6

MAILING ADDRESS:
P.O. Box 25486, DFC
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

NOV 20 2012

Jeff Ver Steeg
Colorado Parks and Wildlife
1313 Sherman Street, Suite 618
Denver, Colorado 80203

Dear Mr. Ver Steeg:

On March 5, 2010, the U.S. Fish and Wildlife Service (Service) published a status review for the Greater sage-grouse (75 FR 13910), with a determination that listing the species under the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq., Section 4(b)(3)(B)) was warranted but precluded. The Greater sage-grouse (sage-grouse) is now identified as a candidate for listing under the Act. Habitat loss, habitat fragmentation and the lack of regulatory mechanisms conserving habitat were the primary factors contributing to the species candidate status. However, recreational hunting of the sage-grouse continues to be an issue raised by several stakeholders, although it was not identified as a primary concern in the Service's listing determination. Some states have asked for a clarification of the Service's thinking on this issue, so we have prepared the following thoughts for your consideration.

In our status review, the Service examined the impacts of hunting and concluded that there was no evidence suggesting that recreational hunting (including falconry) has been a primary cause of range-wide declines of the Greater sage-grouse. Additionally, the Service did not identify State regulations regarding sage-grouse hunting as inadequate, based on the annual review of the sustainability of hunting sage-grouse and the ability of states to quickly make any appropriate adjustments, as part of their annual hunting season regulatory process conducted by each state.

Although regulated, sport harvest as a singular factor, does not threaten the sage-grouse throughout its range. There is strong data supporting that the sustainability of harvest levels depends, to a large extent, on the quality of sagebrush habitats and the health of the affected population. The Service appreciates the long standing attention of states to closely regulate harvest of sage grouse as part of their efforts to conserve the species.

In light of continuing habitat loss, fragmentation, and other factors with the potential to negatively affect sage-grouse (e.g. West Nile virus), the Service supports the States commitment to continue their longstanding practice of carefully managing hunting mortality, including adjusting seasons, adjusting allowable harvest levels, and imposing emergency closures if needed to protect specific local populations.

We appreciate your efforts to ensure the conservation of the sage-grouse. If you have further questions, regarding this letter, please contact Pat Deibert, Sage-Grouse Recovery Coordinator at Pat_Deibert@fws.gov, or by calling (307) 772-2374, ext. 226.

Sincerely,

Acting Regional Director

Appendix I. Population Status, Trends and Numbers.

The seven populations of Greater Sage-Grouse (GrSG) in Colorado are shown in Figure 1. Most populations in Colorado occur in Management Zone II defined by WAFWA in the GrSG Comprehensive Conservation Strategy (2006). Two populations (Parachute-Piceance-Roan and Meeker-White River) occur in Management Zone VII. Population numbers and trends for six populations are shown here. The seventh population, Laramie River, does not currently have any known active leks and, therefore, lek counts have not been conducted routinely.

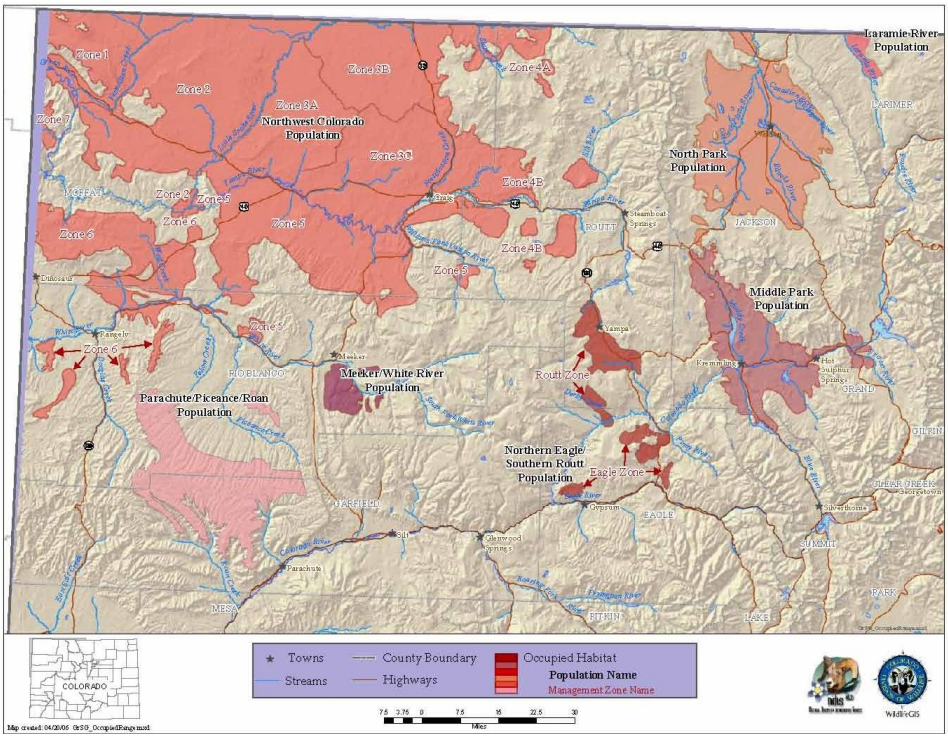


Figure 1. Current distribution of GrSG populations in Colorado.

It is most meaningful to investigate lek counts in terms of 3 -year running averages because CPW does not consider annual fluctuations a good measure when using an index such as lek counts. Lek counts were only designed to be used for long-term trends and not as annual fluctuation indices. Only 10 years of information are included in this dataset because not all populations have data back beyond that. Count methods and overall CPW effort have been consistent during this time period, except for in the PPR population where additional effort is occurring due to various research projects (see PPR specific graph below).

We have detected no significant changes in the status of greater sage-grouse populations within Colorado since 2009 although there has been a very slight increase in most populations in the last few years. Overall, the 2012 counts are slightly higher than 2011 (Figures 2a and 2b). The number of males counted in Colorado is still generally at a 5 - 10 year low, but this is not unexpected given normal periodic fluctuations observed in Colorado lek counts in the past. Based on lek counts in North Park, Colorado, which is arguably the best lek count dataset in North America, numbers are close to a 10 year low although they appear stable with last year.. The level of decline has been observed in the past and we expect the number of males counted in

North Park and throughout Colorado to start increasing in the next few years (3-5 years). There is little concern that the fewer males counted over the last several years represent anything more than normal fluctuations that are expected and somewhat predictable based on weather conditions and population cycling.

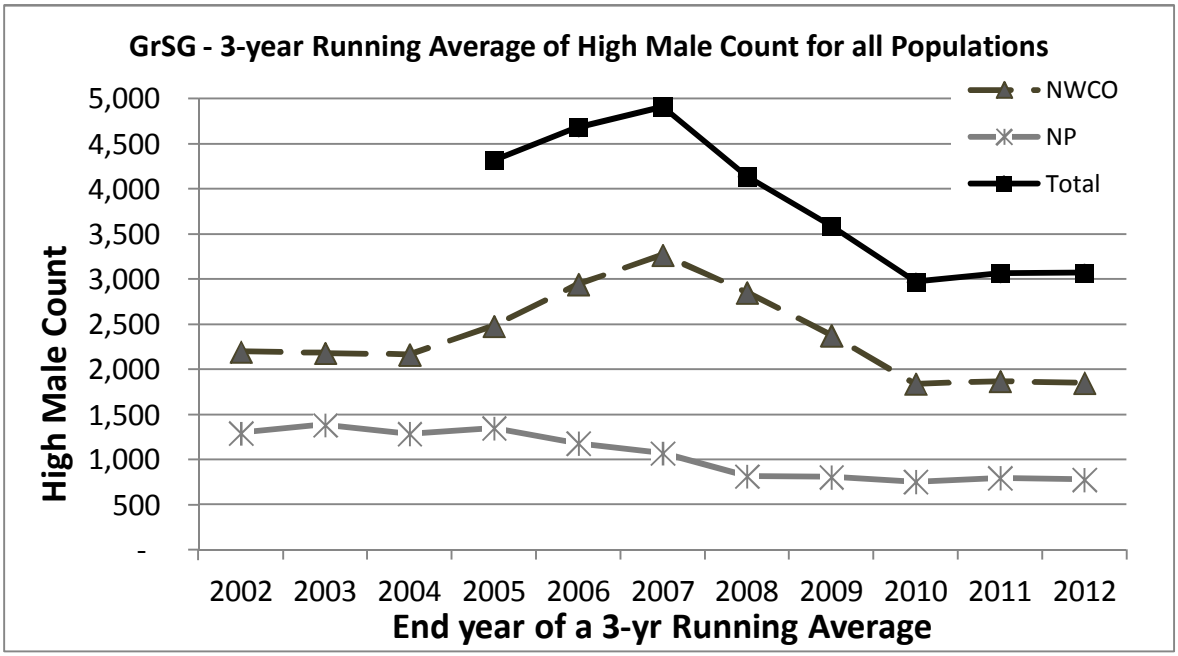


Figure 2a. High male count data for the total of all GrSG Populations and the 2 largest populations (NWCO and NP), 2002-2012. The total data begins in 2005 because PPR and MWR were not counted consistently prior to that.

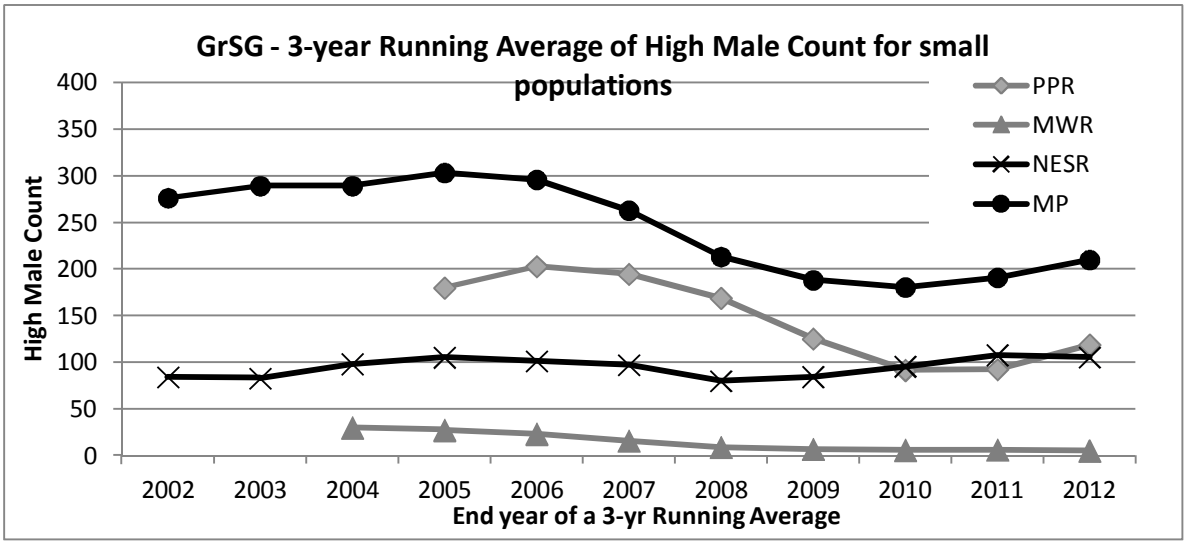
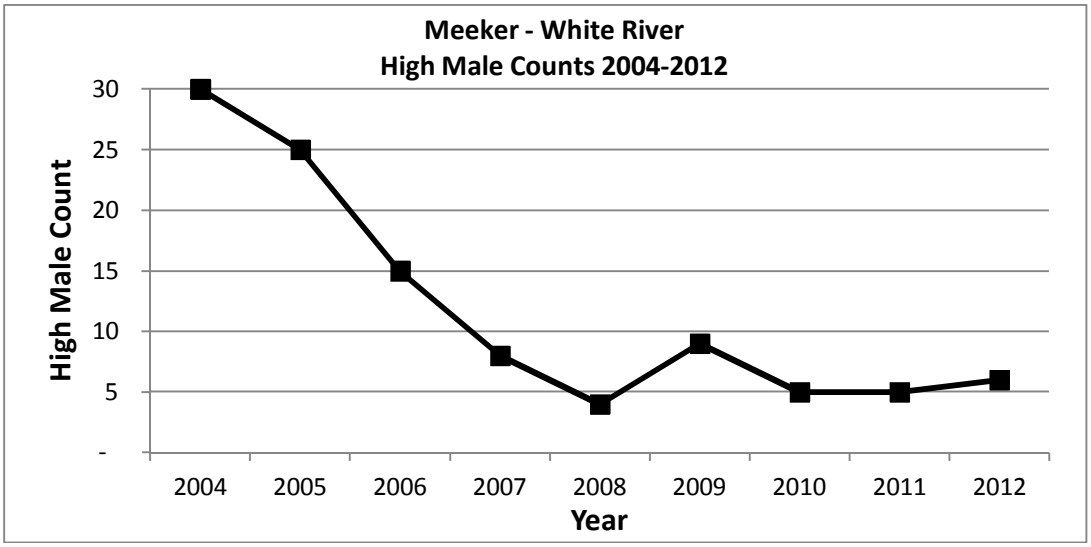


Figure 2b. High male count data for the 4 smallest GrSG Populations (PPR, MWR, NESR, and MP), 2002-2012. Lek counts in the PPR and MWR populations were not consistent prior to the years represented.

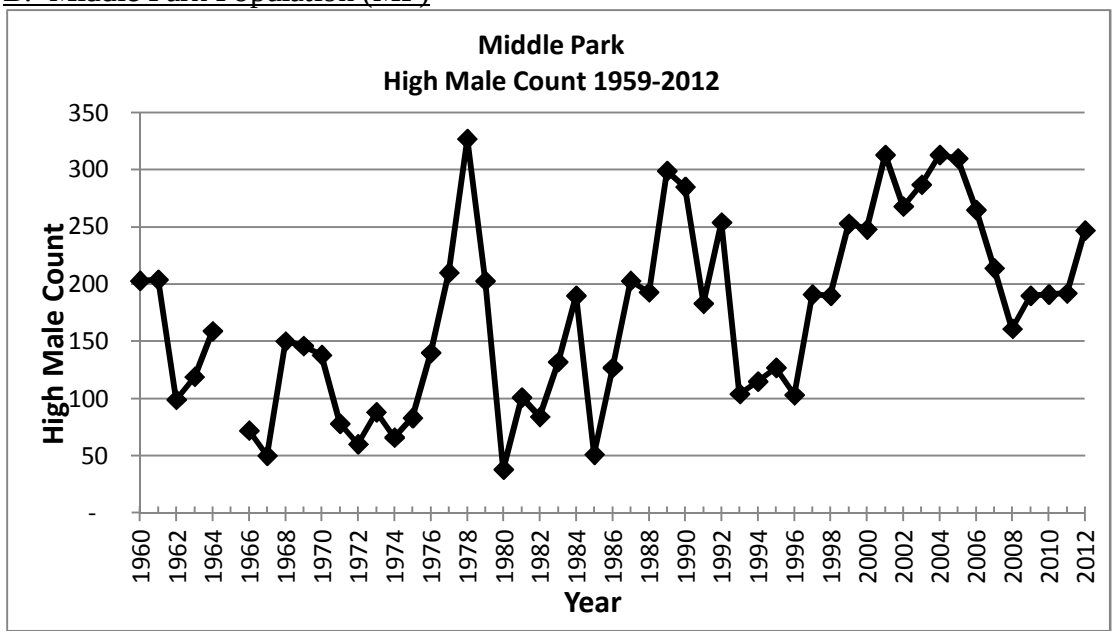
Lek data (high male count) is presented below in more detail for each of the local Colorado GrSG populations. This series of graphs includes all known lek count data for each population through 2012. In general, count methods and effort have been relatively consistent since 1998 although the North Park count effort has been consistent since about 1973 and PPR and MWR only have data for 8 and 9 years, respectively.

A. Meeker ï White River Population (MWR)

The MWR population is the smallest population in Colorado with one active lek. We continue to monitor 6 additional leks that have not shown activity in years (considered ñhistoricò leks). The current lek was discovered in 2004. The population has probably been in decline since the 1950s.

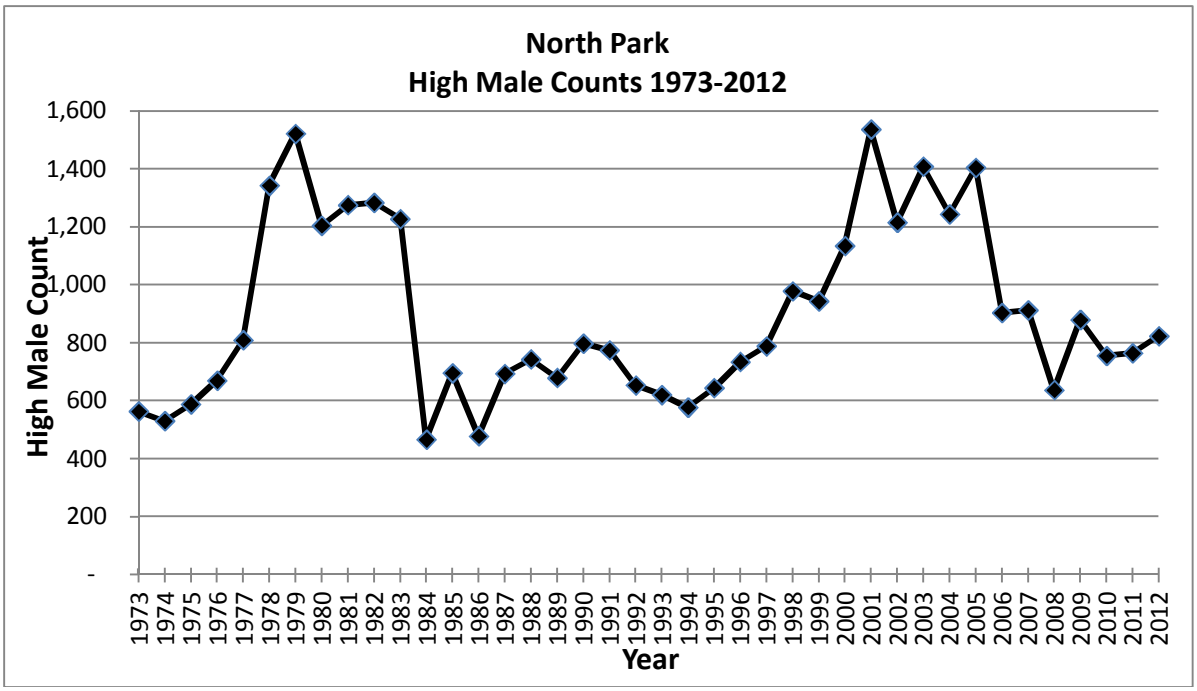


B. Middle Park Population (MP)

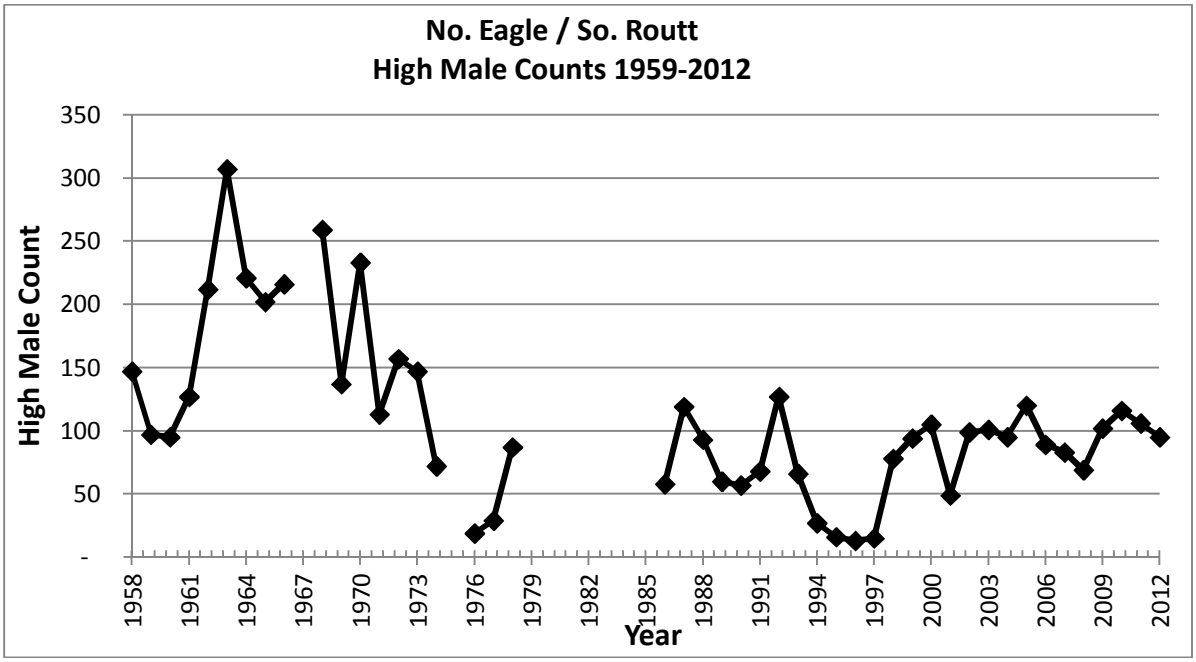


C. North Park Population (NP)

This population, which has arguably the best lek count data set in North America, shows the fluctuating nature of grouse populations. In 2011, some large leks were not counted due to accessibility and the level of late winter/early spring snow.

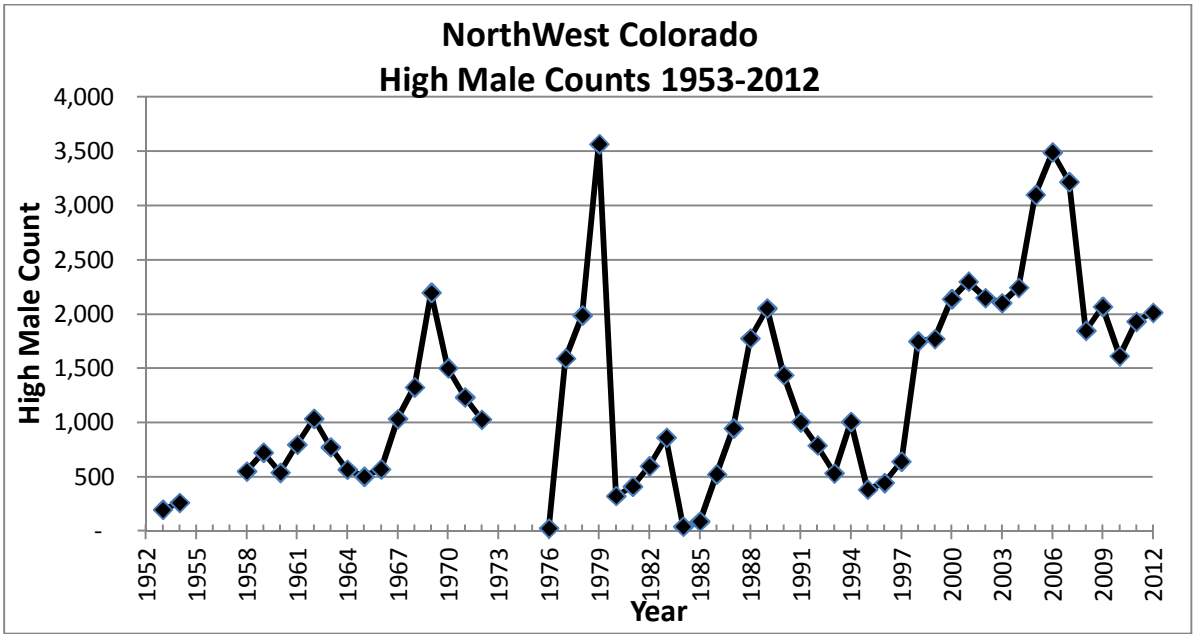


D. Northern Eagle ï Southern Routt Counties Population (NESR)



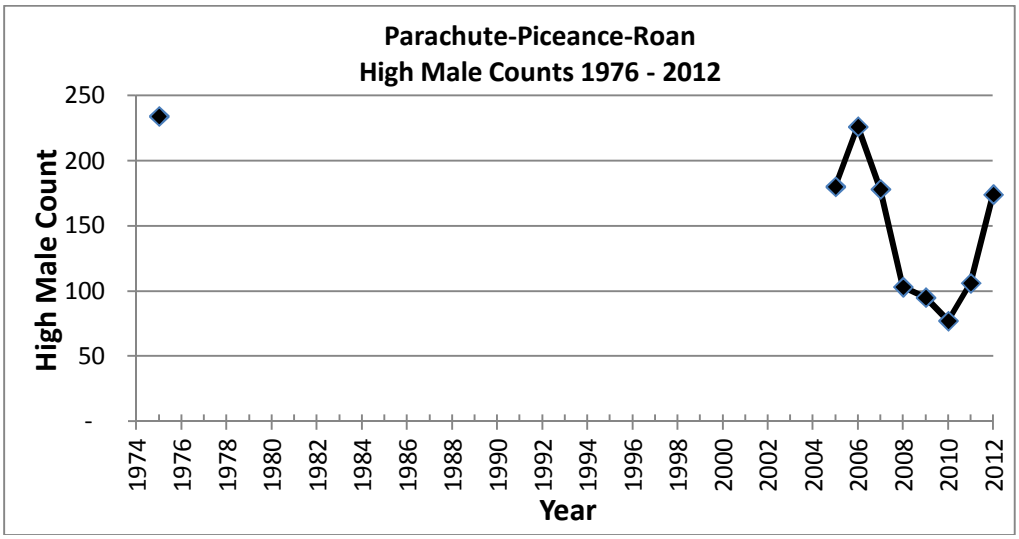
E. Northwest Colorado Population (NWCO)

The NWCO population is the largest GrSG population in Colorado with high male counts more than twice as high as the next largest population (North Park).



F. Parachute ï Piceance – Roan Population (PPR)

Historically, extensive field work in 1976 and 1977 provided the first complete look at sage-grouse distribution and numbers in the PPR (high male count = 234; Kraeger 1977). Recent lek counts have been conducted by helicopter (2005 ï 2012). Data collected in the interim years are not reliable because of the difficulty in obtaining lek count data in the PPR area, and varied effort in conducting lek counts during those years. Lek counts conducted by CPW in the spring of 2006, the most exhaustive count completed since 1976, yielded a high male count of 226 birds. Current, increases in the population may be due to increased efforts due to current research projects by CPW Researcher, B. Walker.



APPENDIX J: Literature Review

21.1.1.1: Evaluate how the amount (i.e., "patch size"), configuration, and composition of GrSG habitat affect (1) sage-grouse behavior (e.g., movement and dispersal); (2) species distribution; (3) productivity; (4) population dynamics; and (5) population sustainability. Map and analyze landscape metrics (e.g., edge density, fragmentation, heterogeneity, fractal dimension), using the most reliable and current GIS data and examine the spatial and temporal correlation with sage-grouse population dynamics. Evaluate the potential for dispersal of individuals into currently unoccupied suitable habitat.

Implementation (Citations)	Effectiveness
a) Thompson, T.R. 2012. Dispersal ecology of greater sage-grouse in northwestern Colorado; evidence from demographic and genetic data. Ph.D. Dissertation, University of Idaho, Moscow, Idaho, USA.	a) It is too early to tell. This research was only recently completed. It will assist in the management of sage-grouse management zones 1, 5, and 3A. This research was central in understanding species dispersal and habitat configuration in management zones.
b) Rice, M.B., A.D. Apa, M.L. Phillips, J.H. Gammonley, B.B. Petch and K. Eichhoff. In Press. Analysis of regional species distribution models based on radio-telemetry datasets from multiple small-scale studies. Journal of Wildlife Management XX:XXX-XXX.	b) Was used in the development of priority habitat map and to refine species distribution in Colorado.
c) Apa, A.D. 2010. Seasonal habitat use, movements, genetics, and vital rates in the Parachute/Piceance/Roan population of greater sage-grouse. Colorado Parks and Wildlife Final Report. Fort Collins, Colorado, USA.	c) Data assisted in the development of the structural and disturbance guidelines in the CCP.
d) Hausleitner, D. 2003. Population dynamics, habitat use and movements of greater sage-grouse in Moffat County, Colorado. M.S. Thesis. University of Idaho, Moscow, Idaho, USA.	d) Assisted in the disturbance buffers, demographic data for the population viability analyses, and structural habitat guidelines in the CCP.
e) Rossi, L., A.D. Apa, and M.B. Rice. 2010. Greater sage-grouse seasonal habitat use and demographics in North Park. Colorado Parks and Wildlife 2010 Progress Report. Fort Collins, Colorado, USA.	e) Too soon to assess.
f) Rossi, L., A.D. Apa, and M.B. Rice. 2011. Greater	

sage-grouse seasonal habitat use and demographics in North Park. Colorado Parks and Wildlife 2011 Progress Report. Fort Collins, Colorado, USA.	f) See "e"
g) Graham, L. and C. McConnell. 2003. Radio-collared greater sage-grouse summary report; southern Routt and northern Eagle Counties, Colorado. Colorado Division of Wildlife, Steamboat Springs, Colorado, USA.	g) Assisted in the development of disturbance buffers and structural habitat guidelines of the CCP.
h) Graham, L. and C. McConnell. 2004. Radio-collared greater sage-grouse summary report; southern Routt and northern Eagle Counties, Colorado. Colorado Division of Wildlife, Steamboat Springs, Colorado, USA.	See "g"

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Appendix J

Areas of Critical Environmental Concern Relevance and Importance Rationale

APPENDIX J
AREAS OF CRITICAL ENVIRONMENTAL CONCERN RELEVANCE AND IMPORTANCE RATIONALE

Northwest Colorado Greater Sage-Grouse EIS
Audubon Areas of Environmental Concern (ACEC) Proposal
Relevance and Importance Rationale
August 10, 2012

Participants:

Delissa Minnick	Erin Jones
Sylvia Ringer	Heidi Plank
Megan McGuire	Desa Ausmus
Lisa Belmonte	

A. Relevance. An area meets the "relevance" criterion if it contains one or more of the following:

1. **A significant historic, cultural, or scenic value (including but not limited to rare or sensitive archeological resources and religious or cultural resources important to Native Americans).**

   No, the proposed ACEC does not meet this criterion.

2. **A fish and wildlife resource (including but not limited to habitat for endangered, sensitive, or threatened species, or habitat essential for maintaining species diversity).**

   Yes, the proposed ACEC meets this criterion. The Greater Sage-Grouse (GRSG) is a candidate species under the Endangered Species Act (ESA) and is a BLM sensitive species, as well as a state species of

special concern in Colorado. The preliminary priority habitat has been delineated by the state wildlife agency, Colorado Parks and Wildlife (CPW).

3. **A natural process or system (including but not limited to endangered, sensitive, or threatened plant species; rare, endemic, or relic plants or plant communities that are terrestrial, aquatic, or riparian; or rare geological features).**

   No, the proposed ACEC does not meet this criterion. The ecosystem encompassed by the PHMA (sagebrush ecosystem) is not unique in Colorado or in the western US.

4. **Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the resource management planning process that it has become part of a natural process.**

   No, the proposed ACEC does not meet this criterion.

B. Importance. The value, resource, system, process, or hazard described above must have substantial significance and values in order to satisfy the "importance" criteria. This generally means that the value, resource, system, process, or hazard is characterized by one or more of the following:

1. **Has more than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.**

   Yes, the proposed ACEC meets this criterion. The PHMA that is found in Colorado is not considered more than locally significant. When the Colorado PHMA is compared to the entire acreage of PHMA as a whole, the Colorado piece is a very small part. However, the PHMA does have special worth and does give the BLM cause for concern. The Colorado portion of PHMA has special worth in that is the southeastern most edge of the range of GRSG. When land uses such as oil and gas development and rights-of-way are factored into the equation, the PHMA becomes even more important for the protection of GRSG.

2. **Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.**

   Yes, the proposed ACEC meets this criterion. The sagebrush ecosystem found in the PHMA is not considered a rare resource in Colorado, or throughout the western United States (US). However, the PHMA in Colorado is considered a fragile ecosystem that has been identified by CPW as very important for GRSG. It contains habitat that is valuable for all life stages, including lekking, brood-rearing, and winter range. GRSG and their habitats are vulnerable to adverse change.

3. **Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA.**

   Yes, the lands in the proposed ACEC meet this criterion. The GRSG land use planning process has been identified as a national priority concern. The BLM Washington Office issued two instructional memorandums, Instruction Memorandum 2012-043 and Instruction Memorandum 2012-044, to help guide the BLM through its land use planning processes across each state, and to identify these processes as a national priority.

4. **Has qualities which warrant highlighting in order to satisfy public or management concerns about safety and public welfare.**

   No, the proposed ACEC does not meet this criterion.

5. **Poses a significant threat to human life and safety or to property.**

   No, the proposed ACEC does not meet this criterion.

Northwest Colorado Greater Sage-Grouse EIS
Priority Habitat Management Areas and Linkage/Connectivity Habitat Management Areas
Relevance and Importance Rationale
March 20, 2013

Participants:

Bridget Clayton	Erin Jones
Sylvia Ringer	Heidi Plank
Megan McGuire	Desa Ausmus
Lisa Belmonte	Robert Skorkowsky

A. Relevance. An area meets the "relevance" criterion if it contains one or more of the following:

1. **A significant historic, cultural, or scenic value (including but not limited to rare or sensitive archeological resources and religious or cultural resources important to Native Americans).**

   This criterion is not applicable to this proposal.

2. **A fish and wildlife resource (including but not limited to habitat for endangered, sensitive, or threatened species, or habitat essential for maintaining species diversity).**

   Yes, GHMA and linkage areas do contain habitat for GRSG, which is a candidate species for listing under the ESA.

3. **A natural process or system (including but not limited to endangered, sensitive, or threatened plant species; rare, endemic, or relic plants or plant communities that are terrestrial, aquatic, or riparian; or rare geological features).**

   No, the GHMA and linkage areas do not meet this criterion. The ecosystem encompassed by the GHMA and linkage areas (sagebrush ecosystem) is not unique in Colorado or in the western US.

4. **Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the resource management planning process that it has become part of a natural process.**

   This criterion is not applicable to this proposal.

B. Importance. The value, resource, system, process, or hazard described above must have substantial significance and values in order to satisfy the "importance" criteria. This generally means that the value, resource, system, process, or hazard is characterized by one or more of the following:

1. **Has more than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.**

   The GHMA and linkage areas do not have special worth, consequence, meaning, distinctiveness, or cause for concern, compared to any similar resource. They do not contain essential habitat, and according to the CPW website[1] description of the linkage habitat, "These linkages should be considered only as **potential areas** for movements between populations." Overall, the GHMA and linkage areas that are found in Colorado are not considered more than locally significant. When the Colorado GHMA and linkage areas are compared to GRSG habitat as a whole, the Colorado piece is a very small part and does not have more than locally significant qualities.

2. **Has a quality or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.**

   The linkage areas and GHMA are not unique, fragile, sensitive, rare, irreplaceable, exemplary, endangered, threatened, or vulnerable to adverse change. The linkage areas would provide habitat that would facilitate genetic flow between populations, but there is no data to suggest that these are the only areas that would facilitate genetic flow between populations in Northwest Colorado. According to the CPW website[1] description of the linkage habitat, "These linkages should be considered only as **potential areas** for movements between populations." Other areas that are not designated as linkage areas could also facilitate genetic flow between populations. Habitat qualities in the linkage areas and GHMA have not been found support persistent use or sustain life functions of GRSG to the degree that PHMA has been.

3. **Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA.**

   The GRSG land use planning process has been identified as a national priority concern. The BLM Washington Office issued two instructional memorandums, Instruction Memorandum 2012-043 and Instruction

[1] http://wildlife.state.co.us/SiteCollectionDocuments/DOW/Maps/WildlifeSpecies/Birds/GrSG_PPH_PGH_20120309_Final.pdf

Memorandum 2012-044, to help guide the BLM through its land use planning processes across each state, and to identify these processes as a national priority. However, the lands in GHMA and linkage areas contain habitats that have not been identified in the Sage-Grouse National Technical Team (NTT) report (NTT 2011) as essential for breeding and should be considered as areas with generally lower activity as well as potential areas for movement between populations. Therefore, the GHMA and linkage areas do not meet this criterion.

4. **Has qualities which warrant highlighting in order to satisfy public or management concerns about safety and public welfare.**

   This criterion is not applicable to this proposal.

5. **Poses a significant threat to human life and safety or to property.**

   This criterion is not applicable to this proposal.

Appendix K

BLM Standards for Public Land Health and Guidelines for Livestock Grazing Management in Colorado

APPENDIX K
BLM STANDARDS FOR PUBLIC LAND HEALTH AND GUIDELINES FOR LIVESTOCK GRAZING MANAGEMENT IN COLORADO

STANDARDS FOR PUBLIC LAND HEALTH

Standards describe conditions needed to sustain public land health, and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape.

Standard 1

Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.

Indicators

- Expression of rills, soil pedestals is minimal.
- Evidence of actively-eroding gullies (incised channels) is minimal.
- Canopy and ground cover are appropriate.
- There is litter accumulating in place and is not sorted by normal overland water flow.
- There is appropriate organic matter in soil.
- There is diversity of plant species with a variety of root depths.
- Upland swales have vegetation cover or density greater than that of adjacent uplands.
- There are vigorous, desirable plants.

GRSG Habitat Implications

Soils are the foundation supporting the plant communities that GRSG depend upon. Generally, healthy plant communities maintain healthy soil conditions. In a codependent cycle, productive plant communities are dependent on healthy soils. Whereas some habitat components such as hiding cover can change as a product of annual precipitation, soil standard indicators relate to long-term ecosystem health.

Unhealthy plant communities result in depleted soils in two fundamental ways. First, unhealthy plants do not generate the robust root systems that decay into soil organic material. Second, above-ground plant material (alive or as litter) is not available to protect the soil surface.

Soil degradation is a long-term process. A reduction in soil organic material reduces the soil's ability to hold water for plant production. A lack of vegetation cover leads to bare ground, and eventually soil loss from erosion in the most important top soil surface. The rills and gullies created by a lack of vegetation cover are a form of desertification wherein alternating drought and floods replace effective use of the precipitation through soil infiltration.

By the time vegetation mismanagement manifests itself in soil depletion, GRSG habitat—notably hiding cover—has most likely been marginalized for years. Following soil depletion, a site loses the ability to produce a vigorous herbaceous understory. There is no scenario where management that leads to depleted soils simultaneously supports a healthy GRSG population.

Whereas vegetation habitat issues caused by periodic drought or infrequent heavy grazing can be remedied by better years or improved grazing management, problems created by soil depletion are not readily reversible. Once soil is degraded, opportunities to support GRSG populations are deferred indefinitely. Conversely, adherence to this standard is a meaningful safeguard for GRSG populations, and the standard stands alone as a critical "required conservation measure."

Standard 2

Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbance such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment, and provides forage, habitat and bio-diversity. Water quality is improved or maintained. Stable soils store and release water slowly.

Indicators

- Vegetation is dominated by an appropriate mix of native or desirable introduced species.
- Vigorous, desirable plants are present.

- There is vegetation with diverse age class structure, appropriate vertical structure, and adequate composition, cover, and density.
- Streambank vegetation is present and is comprised of species and communities that have root systems capable of withstanding high streamflow events.
- Plant species present indicate maintenance of riparian moisture characteristics.
- Stream is in balance with the water and sediment being supplied by the watershed (e.g., no headcutting, no excessive erosion or deposition).
- Vegetation and free water indicate high water tables.
- Vegetation colonizes point bars with a range of age classes and successional stages.
- An active floodplain is present.
- Residual floodplain vegetation is available to capture and retain sediment and dissipate flood energies.
- Stream channels with size and meander pattern appropriate for the stream's position in the landscape, and parent materials.
- Woody debris contributes to the character of the stream channel morphology.

GRSG Habitat Implications

GRSG make important use of wet meadow riparian habitats particularly for late brood-rearing during the summer. Some populations migrate long distances from nesting habitat at lower elevations to foothills habitat that features these meadows. Consequently, the health of riparian areas and adherence to standard 2 is important to some populations and crucial to others. Standard 2 is an important stand- alone "required conservation measure."

Healthy riparian meadow systems generally feature sedges and rushes with root masses capable of sustaining stream banks during peak flows. With unmanaged grazing, these plant communities shift to a more grazing-resistant plant community of Kentucky bluegrass, clover, and dandelions. Some of these grazing-resistant forbs do provide a food source for GRSG. However, this initial benefit is often short term because systems in this condition tend to break down as a product of hydrologic dysfunction. This grazing-resistant plant community generally fails to maintain the stream banks, resulting in downgrading or widening of the channel depending on the substrate of the riparian system. Either way, the result is a lowering of the water table and a general diminishment of both quality and volume of GRSG habitat.

Some of the riparian indicators make reference to systems (other than wet meadows) that support large shrubs and trees. Generally, references to point bars, woody debris, and vegetation age class/vertical structure refer to riparian systems that do not provide important habitat for GRSG.

Standard 3

Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species' and habitat's potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes.

Indicators

- Noxious weeds and undesirable species are minimal in the overall plant community.
- Native plant and animal communities are spatially distributed across the landscape with a density, composition, and frequency of species suitable to ensure reproductive capability and sustainability.
- Plants and animals are present in mixed age classes sufficient to sustain recruitment and mortality fluctuations.
- Landscapes exhibit connectivity of habitat or presence of corridors to prevent habitat fragmentation.
- Photosynthetic activity is evident throughout the growing season.
- Diversity and density of plant and animal species are in balance with habitat/landscape potential and exhibit resilience to human activities.
- Appropriate plant litter accumulates and is evenly distributed across the landscape.
- Landscapes composed of several plant communities that may be in a variety of successional stages and patterns.

GRSG Habitat Implications

GRSG are sagebrush obligates, particularly in the winter when sagebrush is their exclusive food source. Large expanses of sagebrush are a core habitat requirement. However, the understory herbaceous component is also important. Diversity of forb species substantially enhances GRSG habitat in the spring early brood-rearing season. The composition and vigor of the grass understory will, in most situations, dictate the quality of hiding cover and nesting success.

In most of the GRSG range in Colorado, large cool-season bunchgrasses such as needle and thread and bluebunch wheatgrass provide the most opportunity for hiding cover. Conversion of these species to smaller more grazing-resistant grasses like Sandberg bluegrass will reduce the hiding cover available. This

important consideration is addressed as it relates to plant composition in the indicators. The reference to "vigorous" plant community is directly linked to the standard because vigorous plants grow larger and produce the most hiding cover. Mismanagement of vegetation to the extent that 1) soil is adversely affected, or 2) invasive species like cheatgrass are able to exploit vacant niches, is the worst case scenario for GRSG.

The indicator referring to mixed age classes may or may not be beneficial to GRSG. Historically, fire was a benefit because of the way it rejuvenated individual stands. However, in the modern era, that benefit may not warrant the loss of existing sagebrush stands.

The statement "plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes" and the indicator referring to habitat connectivity and fragmentation relate directly to GRSG. However, these references in the standards require interpretation to stand alone as a "required conservation measure." For example, the herbaceous standing crop from previous year is a critical factor for nesting cover, because nesting generally occurs prior to major plant growth each spring. Standard 3 does not address this situation. Adherence to standard 3 is important for GRSG populations, but the standard covers so many ecological processes that proper interpretation is required.

Standard 4

Special status, threatened and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.

Indicators

- All the indicators associated with the plant and animal communities standard apply.
- There are stable and increasing populations of endemic and protected species in suitable habitat.
- Suitable habitat is available for recovery of endemic and protected species.

GRSG Habitat Implications

While not "a required conservation measure" in itself, Colorado BLM standard operating procedure implementing standard 4 is a critical function protecting GRSG habitat and population. Field biologists evaluate proposals such as grazing permit renewals via the Colorado Greater Sage-grouse Conservation Plan (2008). Structural habitat guidelines in Appendix A of that plan are key criteria relating to BLM wildlife specialists' recommendations. Standard 4 requires that these recommendations are either adopted or that substitute measures are

implemented. The process is effective in assuring that "suitable habitat is available for recovery of endemic and protected species." In most circumstances, "required conservation measures" are stipulated as COAs.

Standard 5

The water quality of all water bodies, including ground water where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado. Water Quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under State law as found in (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act.

Indicators

- Appropriate populations of macroinvertabrates, vertebrates, and algae are present.
- Surface and ground waters only contain substances (e.g. sediment, scum, floating debris, odor, heavy metal precipitates on channel substrate) attributable to humans within the amounts, concentrations, or combinations as directed by the Water Quality Standards established by the State of Colorado (5 CCR 1002-8).

GRSG Habitat Implications

Standard 5 relates to GRSG because all life is linked to clean water. However, clean water is not considered a major threat to GRSG populations in Colorado, and the standard is to general to serve as a "required conservation measure."

Guidelines

Guidelines are the management tools, methods, strategies, and techniques (e.g., best management practices) designed to maintain or achieve healthy public lands as defined by the standards. Currently, the only guidelines for BLM Colorado that have been developed in concert with the Resource Advisory Councils are livestock grazing management guidelines.

1. Grazing management practices promote plant health by providing for one or more of the following:
    - periodic rest or deferment from grazing during critical growth periods;
    - adequate recovery and regrowth periods;
    - opportunity for seed dissemination and seedling establishment.
2. Grazing management practices address the kind, numbers, and class of livestock, season, duration, distribution, frequency and intensity of grazing use and livestock health.

3. Grazing management practices maintain sufficient residual vegetation on both upland and riparian sites to protect the soil from wind and water erosion, to assist in maintaining appropriate soil infiltration and permeability, and to buffer temperature extremes. In riparian areas, vegetation dissipates energy, captures sediment, recharges ground water, and contributes to stream stability.

4. Native plant species and natural revegetation are emphasized in the support of sustaining ecological functions and site integrity. Where reseeding is required, on land treatment efforts, emphasis will be placed on using native plant species. Seeding of non-native plant species will be considered based on local goals, native seed availability and cost, persistence of non-native plants and annuals and noxious weeds on the site, and composition of non-natives in the seed mix.

5. Range improvement projects are designed consistent with overall ecological functions and processes with minimum adverse impacts to other resources or uses of riparian/wetland and upland sites.

6. Grazing management will occur in a manner that does not encourage the establishment or spread of noxious weeds. In addition to mechanical, chemical, and biological methods of weed control, livestock may be used where feasible as a tool to inhibit or stop the spread of noxious weeds.

7. Natural occurrences such as fire, drought, flooding, and prescribed land treatments should be combined with livestock management practices to move toward the sustainability of biological diversity across the landscape, including the maintenance, restoration, or enhancement of habitat to promote and assist the recovery and conservation of threatened, endangered, or other special status species, by helping to provide natural vegetation patterns, a mosaic of successional stages, and vegetation corridors, and thus minimizing habitat fragmentation.

8. Colorado Best Management Practices and other scientifically developed practices that enhance land and water quality should be used in the development of activity plans prepared for land use.

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Appendix L

Biological Assessment Summary

APPENDIX L
BIOLOGICAL ASSESSMENT SUMMARY

The purpose of the biological assessment is to review the Northwest Colorado Greater Sage-Grouse (GRSG) Proposed Land Use Plan Amendment (LUPA) to determine the extent that its implementation may affect proposed, threatened, and endangered species and proposed or designated critical habitat under the Endangered Species Act in the planning area. Because the LUPA is a planning document, the biological assessment focuses on the effects of management actions that will be implemented as a part of this planning.

Section 7(c) of the Endangered Species Act requires federal agencies to complete a biological assessment to determine the effects of implementing the LUPA on listed species, based on compliance with NEPA Section 102. Federal agencies are required to consider, avoid, or prevent adverse impacts on fish and wildlife species. Federal agencies are also required to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or their critical habitat. The Endangered Species Act requires action agencies, such as the US Department of the Interior, Bureau of Land Management (BLM) and US Department of Agriculture, Forest Service (Forest Service), to not only consult or confer with the US Department of the Interior, Fish and Wildlife Service (USFWS) when there is discretionary federal involvement or control over the action, but also to ensure that resources are afforded adequate consideration and protection. Formal consultation becomes necessary when the action agency requests consultation after determining that the proposed action is likely to adversely affect listed species or critical habitat, or when the aforementioned federal agencies do not concur with the action agency's finding (USFWS 1998).

The programmatic biological assessment developed for the Northwest Colorado Greater Sage-Grouse LUPA provides documentation and analysis of the proposed action to meet the federal requirements and agreements set forth among the federal agencies. It addresses proposed and federally listed species

and proposed or designated critical habitat. It was prepared under Endangered Species Act Section 7 regulations, in accordance with the 1998 procedures set forth by USFWS and the National Marine Fisheries Service. The BLM and Forest Service, in coordination with USFWS, analyzed the effects of the proposed LUPA on listed species.

In general, the conservation measures applied on behalf of GRSG will also provide conservation value to other species including federally listed plants and animals. In instances where there may be some possible conflicts with federally protected species, conservation measures specific to individual species are incorporated into the LUPA and/or biological assessment as part of the federal action to avoid or greatly reduce any discernable effects. Within this context of conservation benefits, avoidance measures and effect-reduction efforts, the BLM and Forest Service have made the following effects determinations for the federally listed and proposed species and critical habitat analyzed in the biological assessment:

Table L.1
Effects Determinations for Federally Listed and Proposed Species and Critical Habitat in the Northwest Colorado LUPA Planning Area

Species Name	Federal Status	Effects Determination
Black-footed ferret *Mustela nigripes*	Endangered Experimental Population	Not likely to jeopardize the continued existence of the species
Canada lynx *Lynx canadensis*	Threatened	May affect, but is not likely to adversely affect
Canada lynx critical habitat	Proposed	No Effect
North American wolverine *Gulo gulo luscus*	Proposed Threatened	No Effect
Least tern *Sterna antillarum*	Endangered	No Effect
Mexican spotted owl *Strix occidentalis lucida*	Threatened	No Effect
Mexican spotted owl critical habitat	Designated	No Effect
Piping plover *Charadrius melodus*	Threatened	No Effect
Piping plover critical habitat	Designated	No Effect
Whooping crane *Grus Americana*	Endangered Experimental Population	No Effect
Whooping crane critical habitat	Designated	No Effect
Western yellow-billed cuckoo *Coccyzus americanus*	Proposed Threatened	Not likely to jeopardize the continued existence of the species
Western yellow-billed cuckoo critical habitat	Proposed	Not likely to result in the destruction or adverse modification of
Bonytail chub *Gila elegans*	Endangered	No Effect

Table L.1
Effects Determinations for Federally Listed and Proposed Species and Critical Habitat in the Northwest Colorado LUPA Planning Area

Species Name	Federal Status	Effects Determination
Bonytail chub critical habitat	Designated	No Effect
Humpback chub *Gila cypha*	Endangered	No Effect
Humpback chub critical habitat	Designated	No Effect
Colorado pikeminnow *Ptychocheilus lucius*	Endangered	No Effect
Colorado pikeminnow critical habitat	Designated	No Effect
Greenback cutthroat trout *Onchorhynchus clarki* ssp. *Stomias*	Threatened	No Effect
Pallid sturgeon *Scaphirynchus albus*	Threatened	No Effect
Razorback sucker *Xyrauchen texanus*	Endangered	No Effect
Razorback sucker critical habitat	Designated	No Effect
Colorado hookless cactus *Sclerocactus glaucus*	Threatened	May affect, but is not likely to adversely affect
DeBeque phacelia *Phacelia submutica*	Threatened	May affect, but is not likely to adversely affect
DeBeque phacelia critical habitat	Designated	May affect, but is not likely to adversely affect
Dudley Bluffs bladderpod *Lesquerella congesta*	Threatened	May affect, but is not likely to adversely affect
Dudley Bluffs twinpod *Physaria obcordata*	Threatened	May affect, but is not likely to adversely affect
North Park phacelia *Phacelia formosula*	Endangered	May affect, but is not likely to adversely affect
Osterhout milkvetch *Astragalus osterhoutii*	Endangered	May affect, but is not likely to adversely affect
Parachute beardtongue *Penstemon debilis*	Threatened	May affect, but is not likely to adversely affect
Parachute beardtongue critical habitat	Designated	May affect, but is not likely to adversely affect
Penland beardtongue *Penstemon penlandii*	Endangered	May affect, but is not likely to adversely affect
Ute ladies'-tresses *Spiranthes diluvialis*	Threatened	May affect, but is not likely to adversely affect
Western prairie fringed orchid *Platanthera praeclara*	Threatened	No Effect

To access the complete biological assessment, see the project website: https://www.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=48134.

REFERENCES

USFWS (US Department of the Interior, Fish and Wildlife Service) 1998. Endangered Species Act Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act. March 1998.

Appendix M

US Forest Service Biological Evaluation and Management Indicator Species Report

US Forest Service
Biological Evaluation and
Management Indicator Species Report

for the

Greater Sage-Grouse Conservation Effort to Amend the Routt National Forest Plan

May 15, 2015

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ACRONYMS

ADH all designated habitat

BBS Breeding Bird Survey

BE biological evaluation

BLM Bureau of Land Management

CFR Code of Federal Regulations

CMZ Colorado Management Zone

COT Conservation Objectives Team

CRCT Colorado River cutthroat trout

CSTG Columbian sharp-tailed grouse

EIS environmental impact statement

FEIS final environmental impact statement

FSM Forest Service Manual

GHMA general habitat management area

GRSG greater sage-grouse

LCHMA linkage/connectivity habitat management area

LMP land management plan

LRMP land and resource management plan

MIS management indicator species

NSO no surface occupancy

NTT National Technical Team

PHMA priority habitat management area

RNF United States Forest Service, Routt National Forest

ROW right-of-way

SUA special use authorization

SRP special recreation permit

USFWS United States Fish and Wildlife Service

BIOLOGICAL EVALUATION

I. INTRODUCTION

This biological evaluation (BE), including management indicator species (MIS), was developed as the basis of the effects analysis for sensitive species and MIS identified by the US Forest Service, Routt National Forest (RNF). It provides a preliminary look at the effects of adding conservation direction to conserve greater sage-grouse (GRSG) and their habitats on the RNF.

This BE has been prepared following the standards set forth in Forest Service Manual (FSM) 2672.4. It is in compliance with 36 Code of Federal Regulations (CFR), Part 219.19 and 36 CFR, Part 241.1.

This analysis is framed around two primary sections:

1. Region 2 species designated by the Regional Forester as sensitive species, including GRSG
2. Management indicator species

This report provides a framework and preliminary analysis of the anticipated effects on these conservation priority species occurring in the RNF.

The MIS section of this report describes the anticipated effects of the action alternatives on species identified as MIS. The FSM defines MIS as "…plant and animal species, communities, or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (Forest Service 1991).

II. PROJECT HISTORY

GRSG have emerged as a significant conservation concern over the last 10 years. The species is currently a candidate species for listing under the Endangered Species Act, implying that listing is "warranted, but precluded due to higher priorities" because of two primary factors: the large-scale loss and fragmentation of habitats across the species range, and a lack of regulatory mechanisms in place to ensure the conservation of the species. The primary threats to GRSG habitat are summarized in the listing decision. The two dominant threats are related to infrastructure associated with energy development in the eastern portion of the species' range, and the conversion of sagebrush communities to annual grasslands, resulting in large uncharacteristic wildfires in the western portion of the species' range.

The Bureau of Land Management (BLM) manages approximately half of the remaining occupied GRSG habitats, whereas the Forest Service manages approximately 8 percent of the species' habitat, with most of that occurring on national forests in the Intermountain Region. The Forest Service manages approximately 9 million acres of sagebrush habitats, about 7.5 million acres of which is in the Intermountain Region. Most habitats on Forest Service-administered lands contribute to summer brood-rearing, although some forests and grasslands do contribute important breeding, nesting, and winter habitat.

In 2011 and 2012, the United States Fish and Wildlife Service (USFWS) submitted letters to the BLM and Forest Service recommending that the agencies amend land management plans (LMPs) to provide adequate regulatory mechanisms in the form of management direction specific to conserve the species. Originally, this recommendation identified 10 National Forests viewed as high priority to ensure appropriate regulatory mechanisms. Following scoping and discussion, the Forest Service added an additional 10 forest plans that would be considered for amendment.

The Forest Service is participating in several joint environmental impact statements (EISs) with the BLM to develop records of decision that will be used as a basis for amending LMPs, including Forest Plans (http://fsweb.r4.fs.fed.us/unit/nr/sagegrouse/index.shtml).

Because the BLM administers most occupied GRSG habitat remaining on federal lands, that agency is leading the effort to amend or revise LMPs, with the Forest Service as a cooperating agency. The purpose is to provide direction in LMPs that conserve and protect GRSG habitat and to assure the USFWS that adequate regulatory mechanisms are in place to ensure the conservation of the species. EISs will be completed for the following GRSG planning subregions:

- Eastern Montana and portions of North and South Dakota
- Idaho and southwest Montana
- Oregon
- Wyoming
- Northwest Colorado
- Utah
- Nevada and northern California

The Forest Service is participating in six of these EISs (excluding Eastern Montana/Dakotas and some of the areas in Wyoming). The EISs will include joint agency signatures but separate records of decision.

III. PURPOSE AND NEED

The purpose of the RNF Land and Resource Management Plan (LRMP) Amendment for the GRSG is to identify and incorporate appropriate measures to conserve, enhance, or restore GRSG habitat by reducing, eliminating, or minimizing threats. The need to create this amendment arose when the inadequacy of regulatory mechanisms was identified as a significant threat in the USFWS finding on the petition to list the GRSG. The USFWS identified conservation measures in Forest Service LRMPs (as well as BLM LMPs) as the principal regulatory mechanisms for habitat conservation. Therefore the RNF LRMP Amendment will focus on areas affected by threats to GRSG habitat identified by the USFWS in the March 2010 listing decision (USFWS 2010).

IV. DESCRIPTION OF THE ALTERNATIVES

A range of alternatives were developed that are specifically structured to identify and incorporate appropriate conservation measures in the LMP to conserve, enhance, or restore GRSG habitat by reducing, eliminating, or minimizing threats to that habitat. There are five alternatives to consider under this analysis. A brief description of each of the alternatives is provided below. For a full description of the alternatives, please refer to Chapter 2 of the final EIS (FEIS).

The planning area includes priority habitat management areas (PHMA[1]), general habitat management areas (GHMA[2]), linkage/connectivity habitat management areas (LCHMA[3]), and additional lands not designated as PHMA, GHMA, or LCHMA. Collectively, PHMA, GHMA, and LCHMA are referred to as All Designated Habitat (ADH).

The Draft EIS evaluates restricting disturbance based on maximums called caps in three of the alternatives. Additional actions or projects would generally not be approved if a disturbance cap for a particular management zone had been reached; this includes the Colorado Management Zone (CMZ). GRSG populations would be monitored and evaluated by management zone.

Table 1. Disturbance Type Caps Under Each Alternative

Disturbance Type	Alternative A	Alternative B	Alternative C	Alternative D	Proposed Plan Amendment
Anthropogenic	None	3% cap on PHMA habitat	3% cap on ADH	5% cap on ecological sites that support sagebrush	3% cap in PHMA
Total disturbance	None	Manage or restore priority areas so that at least 70% of the land cover provides adequate sagebrush habitat to meet GRSG	None	Less than 30%, to include all loss of sagebrush from all causes, including anthropogenic, disturbance, wildfire, plowed field	In PHMA, the desired condition is to maintain a minimum of 70% of lands capable of producing sagebrush with 10-30% sagebrush canopy cover

[1]Areas identified by the Forest Service, in coordination with respective state wildlife agencies, as having the highest conservation value to maintaining sustainable GRSG populations. These areas include breeding, late brood-rearing, and winter concentration areas.

[2]Areas identified by the Forest Service, in coordination with respective state wildlife agencies, as those outside of priority and sagebrush focal management areas and occupied by GRSG seasonally or year-round.

[3]Areas that have been identified as broader regions of connectivity important to facilitate the movement of GRSG and to maintain ecological processes.

Disturbance Type	Alternative A	Alternative B	Alternative C	Alternative D	Proposed Plan Amendment
		needs		agriculture, and vegetation treatments	

Alternative A: No Action

Under the No Action Alternative the RNF LRMP would not be amended. The existing management direction for species conservation would continue to guide Forest Plan implementation.

Alternative B

Conservation measures developed by the National Technical Team (NTT) and summarized in the 2011 Sage-Grouse NTT Report are the foundation for Alternative B (Sage-Grouse National Technical Team 2011). These conservation measures would apply only to GRSG PHMA. There would be a 3 percent cap on disturbance in these areas. Additional details about this alternative are as follows:

- Travel construction would be limited in PHMA, minimum standards would be applied, and there would be no road upgrades
- Recreation special use permits in PHMA would be allowed only if they were deemed to have no effect on GRSG
- Rights-of-way (ROWs) would be excluded in PHMA; the RNF would aim to keep and acquire PHMA.
- Grazing direction would be adjusted to improve management for GRSG
- PHMA would be closed to new fluid minerals leases; existing leases would have a 4-mile no surface occupancy (NSO) buffer around leks
- Wildfire/fuels would aim to protect sagebrush habitats in PHMA
- Habitat restoration would be a priority, with a focus on native species

Alternative C

This alternative would expand many of the conservation measures under Alternative B to all designated GRSG habitat, including PHMA, GHMA and linkage areas. There would be a 3 percent cap on disturbance in these areas, and PHMA would be closed to livestock grazing. Additional details about this alternative are as follows

- Travel construction would be limited in ADH, and no new roads would be constructed within 4 miles of a lek or occupied habitat
- Recreation would seasonally prohibit camping and nonmotorized recreation within 4 miles of a lek
- ADH would be exclusion areas for ROWs and special use permits

- The RNF would aim to keep and acquire ADH
- Wind and solar installations would not be allowed in designated habitat
- ADH would be closed to new fluid minerals leases; existing leases would have a 4-mile NSO buffer around leks
- Wildfire/fuels would aim to protect and restore sagebrush habitats; areas would be closed to grazing after wildfire
- All PHMA would be designated as Zoological Areas in the RNF, a status similar to areas of critical environmental concern on BLM-administered lands

Alternative D

This alternative is very similar to Alternative B, the NTT alternative. It would be applied to sagebrush ecological sites in PHMA. Fluid mineral surface occupancy would be prohibited in ADH within a minimum of 4 miles from active leks and there would be a 5 percent cap on disturbance in these areas. Additional details about this alternative are as follows:

- Travel construction would be limited in PHMA, with a disturbance exception allowing the RNF to exceed the 5 percent cap if GRSG populations were doing well
- Recreation special use permits that do not adversely affect GRSG would be allowed
- ROWs would be excluded in PHMA, with the exception of transmission lines
- Grazing direction would be adjusted to improvement management for GRSG in ADH
- PHMA would be designated as a NSO for new fluid minerals leases; existing leases would have seasonal conditional surface use
- Wildfire/fuels would aim to protect sagebrush habitats in ADH
- Habitat restoration would be a priority, with a focus on native species

Proposed Plan Amendment

The proposed plan incorporates the following GRSG goals: Conserve, enhance, and restore the sagebrush ecosystem on which GRSG populations depend in an effort to maintain or increase their abundance and distribution, in cooperation with other conservation partners. For the full details of each agency's proposed plan, please refer to Chapter 2 of the FEIS.

The Proposed RNF LRMP Amendment seeks to allocate resources between competing human interests and land uses and the conservation of natural resource values, including GRSG habitat. At the same time, it would sustain and enhance ecological integrity across the landscape, including plant, wildlife, and fish habitat.

The proposed plan amendment incorporates adjustments made in response to public comments on the Draft LRMP Amendment, as well as cooperating agency input. Conservation measures under the proposed plan amendment are focused on PHMAs and GHMAs, as well as active leks (regardless of which type of habitat the active lek is in).

The Proposed RNF LRMP Amendment would manage discrete anthropogenic disturbances so they would be limited to less than 3 percent of PHMA in a biologically significant unit (CMZ). See Chapter 2 of FEIS for full details on disturbance caps.

The proposed plan incorporates the following GRSG goals: Conserve, enhance, and restore the sagebrush ecosystem on which GRSG populations depend in an effort to maintain or increase their abundance and distribution, in cooperation with other conservation partners. For the full details of the proposed plan, please refer to Chapter 2 of the FEIS.

This alternative would expand many of the conservation measures in Alternative B to ADH. There would be a 3 percent cap on disturbance in PHMA. Other details about this alternative are as follows:

- No new leasing of unleased fluid minerals within 1 mile from active leks in ADH
- NSO in PHMA and within 2miles of active leks in GHMA
- For leased fluid minerals, within 1 mile of active leks, disturbance, disruptive activities, and occupancy are precluded
- All PHMA and GHMA would be avoidance areas for Forest Service special use authorization (SUA) permits
- No new roads or aboveground structures would be authorized within 1 mile of an active lek
- Wind energy and industrial solar development would be excluded in PHMA and avoided in GHMA
- PHMAs would be closed to new mineral sales and new nonenergy mineral leases

For a detailed description of each program area under this alternative see Chapter 2 of the FEIS.

Comparison of Alternatives

Table 2. Comparative Summary of Alternatives

Resource or Resource Use	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Proposed Plan
GRSG Habitat Areas (BLM/Forest Service surface and federal mineral estate, including coal)					
PHMA	0	1,576,900	1,576,900	1,576,900	5,000
GHMA	0	1,134,800	1,134,800	1,134,800	15,000
Linkage/connectivity	0	181,900	181,900	181,900	0
Resource Uses					
Livestock Grazing					
Acres closed to all classes of livestock grazing, including outlying areas	0	0	1,751,600	0	0
Comprehensive Travel and Transportation Management					
Open to cross-country motorized travel	202,600	202,600	202,600	202,600	0
Closed to motorized travel	52,600	52,600	52,600	52,600	0
Lands and Realty					
ROW exclusion areas	25,600	926,800	1,751,600	0	0

Resource or Resource Use	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Proposed Plan
ROW avoidance areas	127,600	0	0	930,500	20,000
ROW avoidance areas for large transmission lines (greater than 230 kilovolts)	0	0	0	68,000	0
ROW exclusion areas for large transmission lines (greater than 230 kilovolts)	0	0	0	881,000	0
ROW avoidance areas for large transmission lines (greater than 100 kilovolts)					All PHMA and GHMA are avoidance areas
Recommend for withdrawal (federal minerals in PHMA)	0	1,576,900	1,576,900	0	0
Coal					
Unsuitable for surface mining and operations	1,670,800	1,576,900	1,576,900	Criteria applied to 1,576,900 acres	Criteria applied to 5,000 acres
Fluid Mineral Leasing (including oil shale and uranium)					
Closed to fluid mineral leasing	100,200	1,347,400	2,473,000	100,200	0
Open to leasing, subject to NSO-BLM surface/federal minerals	350,300	350,300	350,300	1,347,400	5,000
Locatable Minerals, Mineral Materials, and Nonenergy Solid Leasable Minerals					
Closed to mineral materials sales	104,200	926,800	926,800	200	5,000
Closed to nonenergy mineral leasing	11,200	926,800	926,800	11,200	5,000

V. ANALYSIS AREA

In the analysis area, the management direction proposed in the action alternatives would apply to designated GRSG habitats (PHMA, GHMA, and linkage areas) in northwestern Colorado that have been identified (Figure 1); however, there are no areas designated as linkage areas in the RNF. There are a total of 12,501 acres of identified GRSG habitat on the RNF, approximately 1 percent of the whole RNF. Of the 12,501 acres of identified habitat in the RNF, 1,571 acres are PHMA (13 percent) and 10,930 acres are GHMA (87 percent). Each of the three Ranger Districts in the RNF contain GRSG habitat. The Hahns Peak/Bears Ears District contains 9,982 acres, the Yampa District contains 1,262 acres, and the Parks District contains1, 257 acres (Table 3). The Yampa and Parks Districts are the only Ranger Districts with identified PHMA, whereas the Hahns Peak/Bears Ears District contains most of the habitat, but it is all classified as GHMA (Table 3). State and private land inholdings also occur in the RNF boundary and include GRSG habitat, as described in Table 3. The breakdown of vegetation cover types in the RNF by GRSG CMZ are described in Table 4.

Table 3. GRSG Habitat by Ranger District and Habitat Type in the RNF

Ranger District	Surface Landownership	GRSG Habitat Type	Acres
Hahns Peak-Bears Ears	National Forest System	GHMA	9,982
Hahns Peak-Bears Ears	Private inholding	GHMA	1,150
Hahns Peak-Bears Ears	State inholding	GHMA	649
		Hahns Peak-Bears Ears Total	**11,781**
Parks	National Forest System	GHMA	285
Parks	National Forest System	PHMA	972
		Parks Total	**1,257**
Yampa	National Forest System	GHMA	663
Yampa	National Forest System	PHMA	599
Yampa	Private inholding	GHMA	1,179
Yampa	Private inholding	PHMA	1,363
Yampa	State inholding	GHMA	507
Yampa	State inholding	PHMA	6
		Yampa Total	**4,316**
		Grand Total	**17,354**

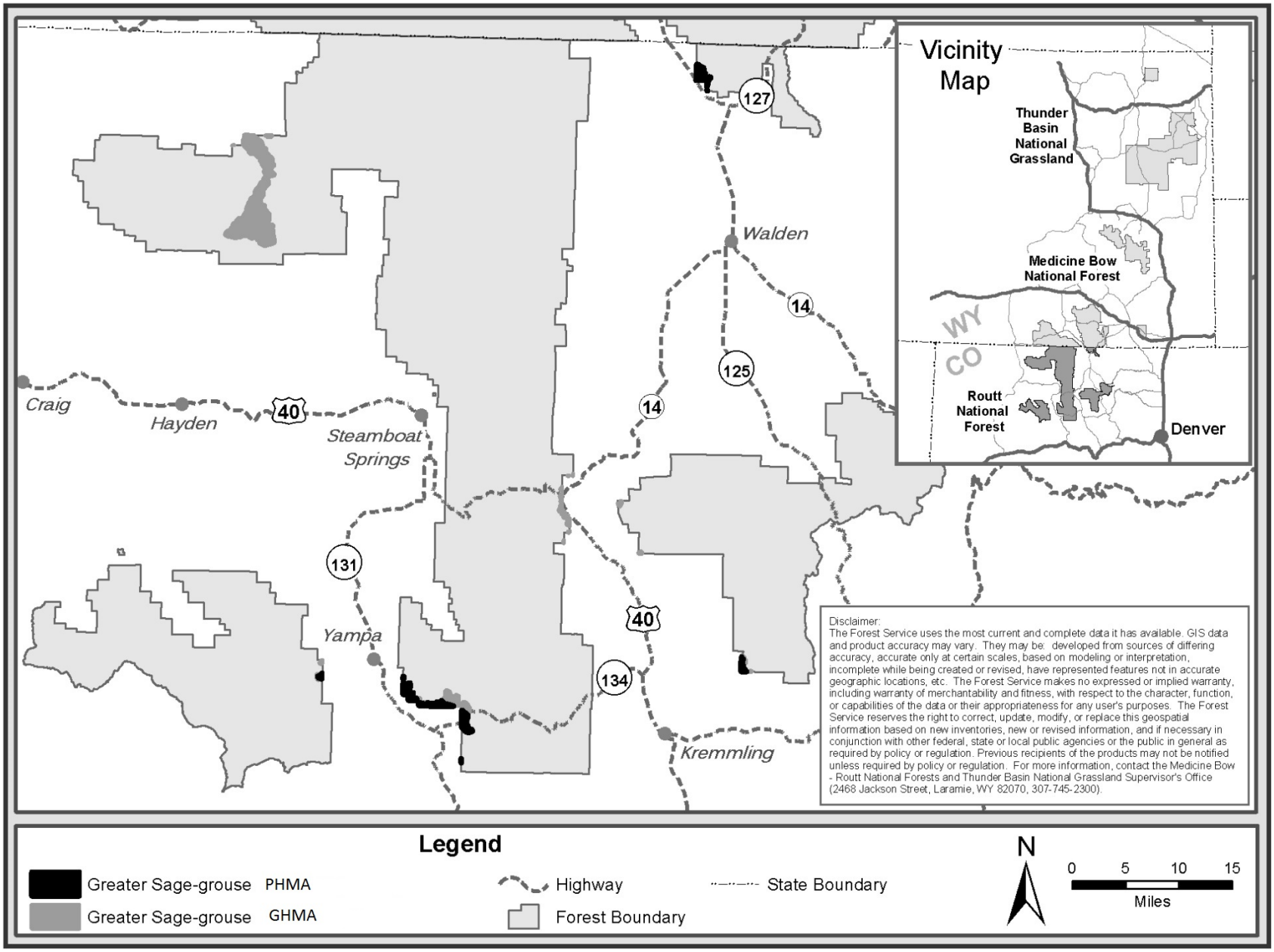

Figure 1. Locations of Greater Sage-Grouse habitat management areas in the RNF.

Table 4. GRSG Designated habitat by Cover Type for Each Management Zone

GRSG CMZ	GRSG Habitat type	Vegetation Cover type Source: FSveg database	Acres
Zone 07	GHMA	Forb, grass, sagebrush	7,969
Zone 07	GHMA	Grass—riparian	190
Zone 07	GHMA	Shrub	56
Zone 07	GHMA	Shrub—willow	625
Zone 07	GHMA	Tree—aspen	1,011
Zone 07	GHMA	Tree—lodgepole pine	21
Zone 07	GHMA	Tree—spruce-fir	58
		Zone 07 Total	**9,930**
Zone 11	PHMA	Forb, grass, sagebrush	681
Zone 11	PHMA	Grass—riparian	41
Zone 11	PHMA	Shrub	22
Zone 11	PHMA	Shrub—willow	2
Zone 11	PHMA	Tree—aspen	6
Zone 11	PHMA	Tree—Douglas-fir	14
		Zone 11 Total	**766**
Zone 13	GHMA	Forb, grass, sagebrush	533
Zone 13	GHMA	Shrub	58
Zone 13	GHMA	Shrub—willow	7
Zone 13	GHMA	Tree—aspen	158
Zone 13	GHMA	Tree—lodgepole pine	13
Zone 13	GHMA	Tree—spruce-fir	4
Zone 13	PHMA	Forb, shrub	161
Zone 13	PHMA	Tree—aspen	43

GRSG CMZ	GRSG Habitat type	Vegetation Cover type Source: FSveg database	Acres
Zone 13	PHMA	Tree—spruce-fir	2
		Zone 13 Total	**980**
Zone 14	GHMA	Forb, grass, sagebrush	139
Zone 14	GHMA	Shrub	42
Zone 14	GHMA	Shrub—willow	24
Zone 14	GHMA	Tree—aspen	20
Zone 14	PHMA	Forb, grass, sagebrush	529
Zone 14	PHMA	Shrub—willow	20
Zone 14	PHMA	Tree—aspen	21
Zone 14	PHMA	Tree—lodgepole pine	3
		Zone 14 Total	**825**

VI. FOREST SERVICE SENSITIVE SPECIES ON THE ROUTT NATIONAL FOREST

Forest Service policy requires that a review of programs and activities, through a BE, be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and sensitive species (FSM 2670.3). This section provides a preliminary analysis that will be used to develop the BE specific to sensitive species that will be prepared for this project, which will be included with the FEIS.

The purpose of a BE for this planning project is to analyze and determine the likely effects of the alternatives associated with the GRSG planning on Forest Service sensitive species (FSM 2670.31-2670.32), including the GRSG, for the RNF.

Sensitive species in Region 2 are listed on the Regional Forester's sensitive species list and are composed of plants, birds, mammals, amphibians, reptiles, fish, and invertebrates. The Forest Service conducted a review for Region 2 sensitive species that may occur or be affected by the plan amendment FEIS and the subsequent RNF plan amendment for the GRSG. Existing occurrence information, as well as known or potential habitat, was reviewed by searching the Natural Resource Management database. Sources of information contained in this database include Forest Service records and files, the Colorado Natural Heritage Program, Colorado Parks and Wildlife information, and published research.

Table 5 is a list of species designated by the Regional Forester as sensitive and identified for consideration in the RNF. All of the species in Table 5 were considered in this analysis and were compared to the five criteria listed below. Criteria 1-4 are used to identify species that would likely experience no impact from an action alternative and could therefore be eliminated from more detailed analysis. Criterion 5 indicates that the species should be carried forward for more analysis to clarify the potential effects. The criteria are as follows:

1. Suitable habitat or elevation range does not exist for these species in the GRSG ADH in the RNF.
2. The type or intensity of the activity in the proposed action is expected to have no impact on these species or their habitat.
3. Individual animals may be accidental, dispersing, migrating, happenstance, vagrant, nomadic, or opportunistic visitors to the ADH, but no affiliation or dependence on these habitats has been shown.
4. The associated conservation design or mitigations eliminate any potential for impact on the species.
5. The coarse filter evaluation has not resulted in a preliminary indication that the alternatives are clearly likely to result in no impact; therefore the species will be carried forward for a more detailed analysis.

Species in Table 6 are likely to occur in or near the analysis area, or with potential habitat in or near the analysis area that may be affected (negatively or positively, directly, indirectly, or cumulatively) by an action alternative were it carried forward and a more detailed analysis of the project effects were subsequently conducted.

Table 5. Forest Service Region 2 Sensitive Species Occurring or Potentially Occurring in the RNF That May be Influenced by an Action Alternative[4]

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
AMPHIBIANS						
Boreal toad	*Anaxyrus boreas boreas*	Wetlands at elevations from 7,400 to 11,800 feet	Y	Y	5	Detailed analysis below.
Northern leopard frog	*Lithobates pipiens*	Cooler climates, broad use of uplands and wetlands	Y	Y	5	Detailed analysis below.
Wood frog	*L. sylvatica*	Wide range of aquatic and moist habitats	Y	Y	5	Detailed analysis below.
BIRDS						
American peregrine falcon	*Falco peregrinus anatum*	Nests on cliffs with a wide view, low disturbance, and abundance of prey	N	N	1, 2	No impact
Bald eagle	*Haliaeetus leucocephalus*	Generally aquatic habitats and prefers fish for prey	N	N	1, 2, 3	No impact
Black swift	*Cypseloides niger*	Nests on cliffs near waterfalls	N	N	1, 2	No impact
Boreal owl	*Aegolius funereus*	Mature to late-successional	N	N	1, 2	No impact

[4]While candidate species have no formal status and protections under the Endangered Species Act, in the Rocky Mountain Region they are provided sensitive species status, and effects on candidate species are evaluated through the BE process.

[5]**Bold text** indicates the species is discussed in detail below.

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
		Engelmann spruce and subalpine fir above 9,000 feet				
Brewer's sparrow	*Spizella breweri*	Sagebrush-obligate that gleans insects and eats seeds	Y	Y	5	Detailed analysis below.
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	Sagebrush grasslands with forbs and insects for broods	Y	Y	5	Detailed analysis below.
Flammulated owl	*Otus flammeolus*	Forest owl that nests in cavities and caves from 6,000 to 10,000 feet	N	N	1, 2	No impact
Greater sage-grouse	*Centrocercus urophasianus*	Sagebrush hills, with forbs and insects for broods below 8,400 feet	Y	Y	5	Detailed analysis below.
Lewis's woodpecker	*Melanerpes lewis*	Open ponderosa pine forest, open riparian woodlands dominated by cottonwood, and burned pine forests	N	N	1, 3	No impact
Loggerhead shrike	*Lanius ludovicianus*	Grasslands, shrublands, and agricultural lands	Y	Y	5	Detailed analysis below.
Northern goshawk	*Accipiter gentilis*	Mature forests, large trees on moderate slopes with open understories for breeding	N	N	1, 2	No impact
Northern harrier	*Circus cyaneus*	Wetlands or grasslands with tall dense vegetation and high residual cover	Y	Y	5	Detailed analysis below.

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
Olive-sided flycatcher	*Contopus cooperi*	Forest openings and edges	N	N	1, 2	No impact
Purple martin	*Progne subis*	Relatively large old growth aspen near standing or free-flowing water	Y	Y	1, 2	No impact
Sage sparrow	*Amphispiza bellii*	Shrublands dominated by big sagebrush with a perennial bunchgrass understory	Y	Y	5	Detailed analysis below.
White-tailed ptarmigan	*Lagopus leucurus*	Alpine ecosystems at or above treeline.	N	N	1, 2	No impact
Yellow-billed cuckoo	*Coccyzus americanus*	Open woodlands with an understory of dense vegetation, near water	N	N	1	No impact
FISH						
Mountain sucker	*Catostomus platyrhynchus*	Lotic waters, from small montane streams to large rivers	Y	Y	5	Detailed analysis below.
Roundtail chub	*Gila robusta*	Colorado River drainage	N	N	1, 2	No impact
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouveri*	Found in diverse habitats from beaver ponds to high gradient cold water streams	N	N	1, 2	No impact
Colorado River cutthroat	*O. c. pleuriticus*	Cold, clean water environments in high elevation streams and lakes	Y	Y	5	Detailed analysis below.
INSECTS						
Hudsonian emerald	*Somatochlora hudsonica*	Deep sedge-bordered lakes and ponds	N	N	1, 3	No impact

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
MAMMALS						
North American wolverine	*Gulo gulo luscus*	Remote habitats in the conifer, subalpine, and tundra zones	N	N	2, 3	No impact
Townsend's big-eared bat	*Corynorhinus townsendii*	Mature forest canopies and edges	N	N	1, 3	No impact
Spotted bat	*Euderma maculatum*	Cliffs and open and dense deciduous and coniferous forests, hay fields, deserts, marshes, riparian areas	N	N	1, 2	No impact
Hoary bat	*Lasiurus cinereus*	Woodland, mainly coniferous forests	N	N	1, 2	No impact
River otter	*Lontra canadensis*	Permanent water, of relatively high quality, and with an abundant food base of fish and crustaceans	N	N	1, 3	No impact
American marten	*Martes americana*	Mature and old-growth spruce-fir and lodgepole forests	N	N	1, 2, 3	No impact
Fringed myotis	*Myotis thysanodes*	Caves, mines, cliffs, abandoned buildings, and snags	N	N	1, 2	No impact
Rocky Mountain bighorn sheep	*Ovis canadensis canadensis*	Open or semi-open terrain with a mix of steep and gentle slopes, broken cliffs, rock outcrops, and canyons	N	N	1, 2	No impact
Pygmy shrew	*Sorex hoyi*	Forest conditions, from	N	N	1, 2, 3	No impact

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
		subalpine to boggy meadows, to willow thickets				
MOLLUSCS						
Rocky Mountain capshell	*Acroloxus coloradensis*	Cold mountain lakes and in very slow moving rivers	N	N	1, 2	No impact
PLANTS						
Sea pink	*Armeria maritima* spp. *sibirica*	Grassy tundra slopes, on wet, sandy, or spongy organic soils; 11,900 to 13,000 feet	N	N	1	No impact
Park Milkvetch	*Astragalus leptaleus*	Moist swales and meadows; 6,500 to 9,500 feet	Y	Y	5	Detailed analysis below.
Narrowleaf moonwort	*Botrychium lineare*	Disturbed sites, grassy slopes among medium height grasses, along edges of streamside forests, alpine areas and aspen forests; 7,900 to 11,000 feet	Y	Y	5	Detailed analysis below.
Paradox moonwort	*Botrychium paradoxum*	Grassy meadows, gravelly road sides, low herbaceous cover under small conifer saplings; probably at 5,000 to 9,000 feet	Y	Y	5	Detailed analysis below.
Lesser panicled sedge	*Carex diandra*	Wet meadows and subalpine willow carrs; 7,000 to 9,000 feet	Y	Y	5	Detailed analysis below.

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
Livid sedge	*C. livida*	Fens and wetlands; 9,000-10,000 ft.	N	N	1	No impact
Lesser yellow lady's slipper	*Cypripedium parviflorum*	Moist forests and aspen groves; 7,400 to 8,500 feet	Y	Y	5	Detailed analysis below.
Clawless draba	*Draba exunguiculata*	Alpine and subalpine on tundra, gravelly slopes or fell fields; 11,500 to 14,000 feet; central Colorado, including Chaffee, Clear Creek, Huerfano, and Park Counties	N	N	1	No impact
Gray's peak whitlowgrass	*D. grayana*	Alpine on rocky and gravelly slopes or fell fields, usually on granitic substrates; 12,000 to 14,000 feet	N	N	1	No impact
Roundleaf sundew	*Drosera rotundifolia*	Among sphagnum on the margins of ponds, fens, and floating peat mats; 9,100 to 9,800 feet	N	N	1	No impact
Elliptic spikerush	*Eleocharis elliptica*	Wetlands; widely distributed in North America but with few confirmed Colorado records	Y	Y	5	Detailed analysis below.
Dropleaf Buckwheat (slender leaved buckwheat)	*Eriogonum exilifolium*	Sagebrush flats; North and Middle Parks; 7,500 to 9,000 feet	Y	Y	5	Detailed analysis below.
Whitebristle cottongrass (altai	*Eriophorum altaicum* var.	Alpine wetlands; 9500 to 14,000 feet	N	N	1	No impact

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
cottongrass)	*neogaeum*					
Slender cottongrass	*E. gracile*	Montane and subalpine wetlands, wet meadows and pond edges; 8,100 to 12,000 feet	Y	Y	5	Detailed analysis below.
Plains rough fescue (Hall's fescue)	*Festuca hallii*	Alpine and subalpine grasslands and meadows; 11,000 to 12,000 feet	N	N	1	No impact
Weber's scarlet gilia (rabbit ears gilia)	*Ipomopsis aggregata* ssp. *weberi*	Forb or shrub dominated montane meadows; 6,560 to 10,500 feet; a narrow endemic known from the Park Range	Y	Y	5	Detailed analysis below.
Simple bog sedge (Kobresia)	*Kobresia simpliciuscula*	Alpine areas, including tundra, fens, moist gravel, and glacial outwash	N	N	1	No impact
Colorado tansyaster	*Machaeranthera coloradoensis* var. *coloradensis*	Mountain parks, slopes, and rock outcrops and dry tundra; 8,500 to 12,500 feet	Y	Y	5	Detailed analysis below.
White adder's-mouth orchid	*Malaxis brachypoda*	Riparian areas, 7,200 to 8,000 feet	Y	Y	5	Detailed analysis below.
Weber's (Rocky Mountain) monkeyflower	*Mimulus gemmiparus*	Granitic seeps, slopes, and alluvium in open sites in spruce-fir and aspen forests; 8,500 to 10,500 feet	Y	Y	5	Detailed analysis below.
Kotzebue's grass of Parnassus	*Parnassia kotzebuei*	Alpine and subalpine, in wet rocky areas, among moss mats and	N	N	1	No impact

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
		along streamlets; 10,000 to 12,000 feet				
Harrington's beardtongue	*Penstemon harringtonii*	Known primarily from sagebrush communities, often on calcareous substrates; 6,400 to 9,400 feet	Y	Y	5	Detailed analysis below.
Rock cinquefoil (front range cinquefoil)	*Potentilla rupincola*	Cracks in granite rock outcrops: 6,500 to 10,900 feet	Y	Y	5	Detailed analysis below.
Ice cold buttercup	*Ranunculus karelinii* (= *R. gelidus* ssp. *grayi*)	Alpine slopes and summits among rocks and scree; 10,000 to 14,100 feet	N	N	1	No impact
Dwarf raspberry (nagoon berry)	*Rubus arcticus* var. *acaulis* (= *Cylactis arctica* ssp. *acaulis*)	Understory of spruce- and willow-dominated communities, boggy woods, and mountain meadows at 7,000 to 9,000 feet	Y	Y	5	Detailed analysis below.
Sageleaf willow (hoary willow)	*Salix candida*	Wetlands in willow carrs and mossy stream sides; 8,600 to 9,700 feet	Y	Y	5	Detailed analysis below.
Autumn willow	*Salix serissima*	Wetland areas including marshes, fens, and bogs; 7,800-10,200 ft.	Y	Y	5	Detailed analysis below.
Club spikemoss (northern spikemoss)	*Selaginella selaginoides*	Marshy areas and wet spruce forests; east side of the Park Range	Y	Y	5	Detailed analysis below.
Sphagnum	*Sphagnum angustifolium*	Peat bogs, conifer forests, and moist tundra areas	N	N	1	No impact

COMMON NAME[5]	SCIENTIFIC NAME	HABITAT DESCRIPTION AND RANGE	KNOWN OR SUSPECTED TO OCCURR IN ADH?	SUITABLE HABITAT IN ADH?	EVALUATION CRITERIA	PRELIMINARY BIOLOGICAL DETERMINATION FOR THE FEIS
Baltic sphagnum	*S. balticum*	Fens among other moss, sedges, and willows; 9,000 to 10,000 feet	N	N	1	No impact
Largeflower triteleia	*Triteleia grandiflora*	Full sunlight to partial shade in meadows, grasslands, sagebrush, pinyon-juniper woodlands, aspen woodlands, pine forests, and scattered woodlands; 7,760 feet	Y	Y	5	Detailed analysis below.
Lesser bladderpod	*Utricularia minor*	Shallow water of subalpine ponds; 5,500\ to 9,000 feet	Y	Y	5	Detailed analysis below.
Selkirk's violet	*Viola selkirkii*	Forests from montane to subalpine; 6,000 to 9,100 feet	Y	Y	5	Detailed analysis below.

Table 6. Summary List of Regional Foresters Designated Sensitive Species

Common Name	Scientific Name	Habitat Affinity
AMPHIBIANS		
Boreal toad	*Anaxyrus boreas boreas*	WET, WST
Northern leopard frog	*Lithobates pipiens*	WET, WST
Wood frog	*L. sylvatica*	WET, WST
BIRDS		
Brewer's sparrow	*Spizella breweri*	MS, S
Columbian sharp-tailed grouse	*Tympanuchus phasianellus*	MS, S
Greater sage-grouse	*Centrocercus urophasianus*	MS, S
Sage sparrow	*Amphispiza bellii*	MS, S
Loggerhead shrike	*Lanius ludovicianus*	MS, FM, RIP
Northern harrier	*Circus cyaneus*	MS, RIP, WET, GRA
FISH		
Mountain sucker	*Catostomus platyrhynchus*	WST
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	WST
PLANTS		
Park milkvetch	*Astragalus leptaleus*	Meadow
Narrow-leaved moonwort	*Botrychium lineare*	Meadow
Paradox moonwort	*B. paradoxum*	Meadow
Lesser panicled sedge	*Carex diandra*	Wetland
Lesser yellow lady's slipper	*Cypripedium parviflorum*	Forest (wet)
Elliptic spikerush	*Eleocharis elliptica*	Wetland
Dropleaf buckwheat	*Eriogonum exilifolium*	Shrubland (dry)
Slender cotton-grass	*Eriophorum gracile*	Wetland
Weber's scarlet-gilia	*Ipomopsis aggregata* ssp. *weberi*	Meadow
Colorado tansy aster	*Machaeranthera coloradoensis*	Dry Shrub
White adder's-mouth orchid	*Malaxis brachypoda*	Forest (wet)
Weber's monkey flower	*Mimulus gemmiparus*	Wetland
Harrington beardtongue	*Penstemon harringtonii*	Shrubland (dry)

Common Name	Scientific Name	Habitat Affinity
Rock cinquefoil	*Potentilla rupincola*	Rock outcrops
Dwarf raspberry	*Rubus arcticus* var. *acaulis*	Wetland Forest (wet)
Sageleaf willow	*Salix candida*	Wetland
Autumn willow	*S. serissima*	Wetland
Club spikemoss	*Selaginella selaginoides*	Wetland
Largeflower triteleia	*Triteleia grandiflora*	Meadow, Shrubland (dry)
Lesser bladderpod	*Utricularia minor*	Wetland (aquatic)
Selkirk violet	*Viola selkirkii*	Forest
Key: AQ = Aquatic; SF = Spruce-fir; LPP = Lodgepole pine; FM = Forest meadows; GRA = Grassland; MS = Mountain shrub; RIP = Riparian; S = Sagebrush; WAT = Water; WET = Marshes, shallow ponds; WST = Streams		

A. Greater sage-grouse (*Centrocercus urophasianus*)

The Routt National Forest includes high elevation mountain sagebrush (*A. t. pauciflora var. vaseyana*) communities that primarily function as late summer brood-rearing habitat for sage-grouse. These habitats are peripheral to the lower elevation sagebrush stands that provide winter, nesting and brood-rearing habitats on private and BLM lands. Sage-grouse habitats on the Forest consist of 12,501 acres of identified GRSG habitat on the RNF, approximately 1 percent of the RNF, comprised of 1,571 acres of PHMA (13 percent) and 10,930 acres are GHMA (87 percent) distributed within three areas on the RNF (Hahns Peak-Bears Ears, Parks and Yampa)(Table 3). State and private land inholdings also occur within the RNF boundary and include GRSG habitat. Vegetation cover types and their associated acres on the RNF are described in Table 4. General biological information on the status, distribution, threats, and trends for GRSG in the analysis area are described in the FEIS. This information is not repeated in this section except when specific elements are addressed to understand the status of GRSG under particular alternatives on the RNF.

In the analysis area, the management direction proposed in the action alternatives would apply to designated GRSG habitats (PHMA, GHMA, and linkage areas) in the RNF (Figure 1). There are no designated linkage areas in the RNF; however, there are approximately 12,501 acres of ADH, or approximately 1 percent of the RNF land area. Of the ADH in the RNF, 1,571 acres are PHMA (13 percent) and 10,930 acres are GHMA (87 percent).

Each of the three Ranger Districts in the RNF contain some GRSG habitat. The Hahns Peak/Bears Ears District contains the most, with 9,982 acres of GHMA; the Yampa District contains 1,262 acres, including both GHMA and PHMA; and the Parks District contains 1,257 acres of both GHMA and PHMA (Table 3).

State and private land inholdings also occur in the National Forest boundary and include GRSG habitat, as described in Table 2. The breakdown of vegetation cover types in the RNF by GRSG CMZ are described in Table 4.

There are no active GRSG leks in the RNF, but there is one historic lek in the Slater Park area of the Hahns Peak Bears Ears Ranger District. Sporadic observations of individual birds during the summer have been documented in the following arears of the RNF, as follows:

Near Forest Road 8 and Spronks Creek

- Near the Flat Tops Wilderness Area (CMZ 14)
- In Slater Park near a Columbian sharp-tailed grouse (CSTG) lek (CMZ 7)
- North of Toponas, near Forest Road 285 (CMZ 14) (December 2012 NRM Database)

The primary GRSG use of the RNF is in CMZs 11, 13, and 14 and is apparently used as summer brood-rearing habitat, whereas the RNF lands in CMZ 7 are only occasionally used and have not been recently documented to be used as breeding, brood-rearing, or wintering habitats. It is unlikely that GRSG habitats in the RNF provide winter habitats due to their higher elevation and the deeper winter snows.

The combined GRSG habitat (PHMA and GHMA) identified on the RNF is 0.4 percent of the FEIS area. GRSG habitat on the RNF is primarily composed of small areas that are peripheral to more extensive habitats in lower elevation areas not managed by the Forest Service. As a result of the peripheral nature of the habitat in the RNF, GRSG use is most likely limited to summer brood rearing. Due to the absence of active leks in the RNF, the absence of suitable wintering habitat, and the limited summer habitats available, the populations of GRSG that use the RNF (Populations in CMZs 7, 11, 13, and 14) are highly dependent on habitats managed under other landownerships for their continued survival. Although the contribution of NFS to GRSG habitats is minor when compared to the larger population area, they may be locally important during the late-summer brood rearing period.

The GRSG populations identified in this FEIS are analogous to subpopulations, defined as Priority Areas for Conservation (PACs), described in the Conservation Objectives Team (COT) report (USFWS 2013). These are slightly different, as the CMZs are limited to Colorado and some of the COT populations cross state lines. The four populations associated with the RNF are:

- CMZ 7 = COT Report NW Colorado population (PAC 9e)[6]
- CMZ 11 = COT Report North Park population (PAC 9d)
- CMZ 13 = COT Report Middle Park population (PAC 6)
- CMZ 14 = COT Report Eagle South Routt population (PAC 5)

Most habitat in the RNF is in close proximity to populations 9d and 9e. These populations are southern extensions of the much larger Wyoming Basin (PAC 9a) population and are well connected to that population, which has a high likelihood of persistence. Both 9d and 9e populations show a high likelihood of short- and long-term persistence as modeled by Garton et al. 2011 (cited in USFWS 2013) (Table 7).. The Eagle South Routt population (CMZ 14/PAC 5) is small and isolated. The RNF contributes limited suitable sagebrush vegetation and therefore only a small amount of habitat to this population (1,262 acres of habitat [663 acres of GHMA and 599 acres of PHMA]). The small size and isolation of this population are factors that increase the challenge of long-term persistence, particularly if larger adjacent populations undergo contractions and become farther separated from this population. Similarly, the Middle Park population (CMZ 13/PAC 6) is also isolated and vulnerable to similar risks as the Eagle South Routt population. The RNF represents a small fraction of the suitable habitat for

[6]COT unit 9e includes CMZ 7 population, as well as several other CMZ populations.

these populations. Hence, the connectivity of these small isolated populations to larger adjacent populations is important to their persistence.

Table 7. GRSG populations in proximity of the RNF and modeled persistence estimates based on the COT Report (USFWS 2013, cf. Garton et al. 2011).

Population Area	<200 Males/500 Birds	Percent Chance of <50 birds/20 males in 2037	Percent Chance of <500 birds/200 males in 2037	Percent Chance of <50 birds/20 males in 2107	Percent Chance of <500 birds/200 males in 2107
Management Zone II—Wyoming Basin	Not Applicable	0.1	0.2	16.1	16.2
9d—North Park	No	0	0	9.9	10.7
9e—NWCO	No	0	0	9.9	10.7
5—Eagle South Routt	Yes	No Data	No Data	No Data	No Data
6—Middle Park	No	2.5	100	7.1	100

B. Amphibians

Amphibian species are associated with wetland areas that occur in the matrix of GRSG habitats (ADH) and thus could be influenced by management actions in these areas that change Forest Plan direction. There are three sensitive amphibian species that occur in these areas in the RNF: the boreal toad, northern leopard frog, and wood frog.

Boreal toad (*Anaxyrus boreas boreas*)

According to Keinath and McGee (2005), boreal toads were once widely distributed in Region 2 but have declined dramatically during the last 25 years. The overall range of the toad has contracted slightly, but its distribution in that range has been greatly reduced in the Rocky Mountain Region, geographically isolating some populations, thereby causing them to be more susceptible to local extirpation. Several boreal toad breeding sites have been documented in the RNF (Forest Service 2012). In GRSG habitat areas they are known to occur in the California Park and by Muddy Pass areas of the RNF.

Boreal toads are associated with a variety of habitats, including wetlands, forests, woodlands, sagebrush, meadows, and floodplains in the mountains and valleys. Usually they inhabit wetlands near ponds, lakes, reservoirs, rivers, and streams. They require three main habitat components: shallow wetlands for breeding, terrestrial habitats with vegetative cover for foraging, and burrows for hibernation (Loeffler 2001).

Threats to boreal toads are chytrid fungus (*Batrachochytrium dendrobatidis*), acidification of wetlands, sedimentation due to timber harvesting, livestock grazing/trampling in and around riparian areas, pesticides and herbicides, and introduced species that prey on toads, create competition for resources, or are vectors for pathogens (Keinath and McGee 2005). Any activity that affects suitable wetland habitats could affect boreal toad populations.

Northern leopard frog (*Lithobates pipiens*)

The northern leopard frog is a medium sized frog (2 to 3.5 inches snout-vent length), with brown or green background color, and two or three irregular rows of dark spots on the back (Conant and Collins 1991).

Northern leopard frogs have been found throughout much of Forest Service Region 2, including Colorado and the RNF. Despite this distribution there have been significant declines and localized extirpations. There have been numerous detections of northern leopard frogs in the RNF (Forest Service 2012); currently, the only part of the RNF where they have been documented in conjunction with designated GRSG habitat is in GHMA in the California Park area. Historically, they were likely found across the entire RNF, and additional surveys would probably lead to more detections of this species. They are also known to be present on private land next to the RNF, in small reservoirs and along the Yampa River.

Northern leopard frogs need a wide range of habitats close to each other, for example, wetland habitats with shallow quiet waters, upland areas in grassy meadows to feed, and the bottoms of flowing streams and ponds that are large enough to freeze so that they can overwinter (Smith and Keinath 2007).

Threats to the Northern leopard frog are habitat loss and fragmentation, fish stocking in fishless ponds that are critical to frog reproduction, disease introduction, livestock and wild ungulates, and water quality degradation from pesticides, acid rain, fertilizers, and other chemicals (Smith and Keinath 2007).

Wood frog (*Lithobates sylvaticus*)

The wood frog is a moderate sized frog (1.25 to 3.22 inches snout-vent length), with many color variations, including light tan to dark brown, olive, green, gray, and pink (Muths et al. 2005). Wood frogs use a wide range of aquatic and moist habitats, during both aquatic and terrestrial stages.

According to Muths et al. (2005), in Region 2 there are isolated relict populations of wood frogs. Numerous wood frogs have been documented in the RNF, but none in designated GRSG habitat (Forest Service 2012). The only sites with suitable habitat and potential for occurrence are in PHMA and GHMA on the Parks Ranger District north of Walden, near Muddy Pass and North Ryder Peak (CMZ zone 13).

Threats to wood frogs are habitat fragmentation and loss, wetlands and moist meadows degradation, drought, roads and human activity, and poor water quality from pollutants, such as herbicides, fire retardants and chemical road de-icers (Muths et al. 2005).

C. Birds

Brewer's sparrow (*Spizella breweri*)

The Brewer's sparrow is a small passerine that inhabits arid sagebrush communities. It is a shrub-nesting species that generally produces three to four eggs per nest and is capable of producing more than one brood in a nesting year. Brewer's sparrows primarily forage in shrubs, gleaning insects (Holmes and Johnson 2005a), and secondarily consume seeds from the ground. Brewer's sparrows are a common occurrence throughout Colorado and Wyoming; based on habitat, perhaps 50 percent of the population may occur on National Forest System lands in this area (Holmes and Johnson 2005). Breeding Bird Survey (BBS) data suggest that there has been a 2 percent decline in numbers since around 1970. Numerous Brewer's sparrows have been documented in the RNF, including in the analysis area in both GHMA and PHMA (Forest Service 2012).

Throughout their range, Brewer's sparrows are associated with landscapes dominated by big sagebrush (*Artemisia tridentata* spp.) and are considered to be a sagebrush-obligate species (Paige and Ritter 1999). They prefer sagebrush cover averaging 13 percent and not exceeding 50 percent and seem to be strongly influenced by landscape-level habitat changes; however, more research is needed in this area (Bock and Bock 1987; Braun et al. 1976; Rotenberry et al. 1999; Wiens and Rotenberry 1981). Minimum patch size and degree of isolation have not been determined, but some researchers have suggested that Brewer's sparrows are less likely to nest in isolated sagebrush stands smaller than 5 acres (Knick and Rotenberry 1995).

Habitat on National Forest System lands has remained relatively stable while habitat on private land has declined due to fragmentation from conversion to agriculture and housing development (Holmes and Johnson 2005). Threats to the Brewer's sparrow are wildland fire, nonnative plant invasion, livestock and wild ungulate grazing, and habitat manipulations.

Effects on GRSG as a result of management actions and direction are anticipated to be similar for Brewer's sparrow.

Columbian sharp-tailed grouse (*Tympanuchus phasianellus*)

In Region 2, CSTG are found only in Colorado and Wyoming (Hoffman and Thomas 2007). Sixty-eight percent of the occupied habitat in the region is on private lands, with four percent on lands administered by the Forest Service on the Routt, Medicine Bow, and White River National Forests. The birds inhabit the transition zone between the arid sagebrush rangelands and the start of the aspen-conifer forests at elevations of 6,200 to 8,500 feet. There are two CSTG leks and four lek complexes in

the RNF (Forest Service 2012); all are in GHMA in the analysis area in the California Park and the Slater Park areas of the RNF. (A lek complex is a group of several small proximal leks that birds appear to move between.)

CSTG are associated with sagebrush habitat and can even be found in sagebrush that has been sprayed or burned and reseeded with nonnative grasses, as long as adequate cover is present. CSTG select habitats mostly based on structural characteristics of the vegetation, but species composition is also important. Lek location depends primarily on the proximity to suitable nesting and brood-rearing cover. Typically, leks are on elevated sites in open areas where the vegetation is short and sparse. Nests with more cover show greater success than nests with less cover (Schroeder and Baydack 2001). Brood habitats provide enough cover from predators and weather, while supplying the plant species that chicks and hens need to meet nutritional requirements. Flocks begin forming in the fall, and by winter CTSG move to riparian zones and patches of mountain shrubs. In the RNF, the primary winter cover is mountain shrub and aspen.

CTSG are sympatric with GRSG in ADH in the RNF and share similar threats. CTSG is anticipated to respond similarly to the GRSG as a result of the management guidance proposed across the alternatives.

Sage sparrow (*Amphispiza bellii*)

The sage sparrow is a medium-sized passerine that breeds in sagebrush-steppe of the Intermountain West. According to Holmes and Johnson (2005b), in Region 2, the sage sparrow breeds in portions of western, central, and northwestern Wyoming and in western and south-central Colorado. They have been documented within 6.2 miles of the RNF but no actually in it (Forest Service 2012). Additionally, the Colorado Breeding Bird Atlas reports possible sage sparrow breeding in several survey blocks that overlap the RNF (Lambeth 1998).

The sage sparrow is a sagebrush obligate that prefers shrublands dominated by big sagebrush (*Artemisia tridentata* spp.) with a perennial bunchgrass understory (Holmes and Johnson 2005b). Landscape level attributes that are positively associated with sage sparrow density are high sagebrush cover, large patch size, spatially similar patches, low disturbance, and little fragmentation (Knick and Rotenberry 1995). Sage sparrows are ground-foraging omnivores, preying primarily on insects, spiders, seeds, small fruits, and succulent vegetation (Holmes and Johnson 2005b).

The effects on GRSG from management actions and direction are anticipated to be similar for sage sparrow.

Loggerhead shrike (*Lanius ludovicianus*)

The loggerhead shrike is a species that frequents open habitats, such as grasslands, shrublands, and agricultural lands. Important habitat requirements are scattered trees, shrubs, or low bushes for nesting substrate; elevated perches for hunting and courtship; foraging areas of open, short vegetation with some relatively bare areas; and thorny trees or barbed wire fences for impaling prey (Pruitt 2000).

The species appears to have suffered substantial population declines from historical levels across its range (Forest Service 2003). Wiggins (2005) suggests that loggerhead shrikes were historically common breeding birds in Region 2, although recent BBS data suggests long-term negative trends in breeding season abundance. In Colorado, loggerhead shrikes have historically been noted as common breeders statewide at lower elevations, but recent information suggests that they have patchy, uncommon distributions in western Colorado and are mostly associated with river valleys (Wiggins 2005). Several loggerhead shrikes have been documented in the RNF; however, none have been observed in areas with designated GRSG habitat (Forest Service 2012).

Northern harrier (*Circus cyaneus*)

Most northern harrier nests are found in undisturbed wetlands or grasslands dominated by thick vegetation. They prefer open habitats characterized by tall, dense vegetation. They nest in dry or wet grasslands, wetlands, croplands, fallow fields, lightly grazed management units, and brushy areas. Northern harriers forage over open habitats of moderate to heavy cover and hunt by flying close to the ground and taking small animals by surprise. The diet consists mainly of small mammals, including mice and voles, but they are also known to consume birds and occasionally reptiles and frogs. Northern harriers are a wide ranging species, with very large distributions. Some have long-ranging seasonal migrations, sometimes from North to South America. They are found in Colorado and have been documented in the analysis area (Forest Service 2012).

D. Fish

Mountain sucker (*Catostomus platyrhynchus*)

In Region 2, the mountain sucker occurs throughout Wyoming and in northwestern Colorado and western South Dakota. Mountain suckers have been documented in the RNF, including along multiple streams in GHMA in the California Park area of the Hahns Peak/Bears Ears Ranger District (Forest Service 2012).

Little information and data exist for the mountain sucker, especially Region 2 populations. They primarily occur in lotic waters, from small montane streams to large rivers (Simpson and Wallace 1982; Page and Burr 1991; Baxter and Stone 1995). Most commonly they are found in smaller headwater streams. They prefer clear, cold creeks and small to medium rivers.

Threats to mountain suckers are habitat loss due to stream impoundment, habitat degradation due to sedimentation, passage barrier construction, such as dams and culverts, and nonnative species introduction causing increased predation and competition (Belica and Nibbelink 2006).

Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*)

The Colorado River cutthroat trout (CRCT) range is colder headwaters of the Green and Colorado rivers, which include the Yampa River drainage in Colorado, Utah, and Wyoming (Young 1995). Recent work by Hirsch et al. (2006) estimates that CRCT occupy 13 percent and potentially up to 14 percent of their historical range in the mountainous regions of the Colorado River Basin identified by Benhke (1992).

CRCT have been documented in the RNF (Forest Service 2012). This includes two sites in the analysis area: along multiple streams in GHMA in the California Park area of the Hahns Peak/Bears Ears Ranger District and along one stream north of Toponas on the Yampa Ranger District. The Yampa River Basin has 53 conservation populations identified in 79 streams or 339 miles of stream and has the third highest number of conservation populations (Upper Green River Basin has 76 populations, ranked first, and Upper Colorado has 75 populations, ranked second).

CRCT thrive in cold, clean water environments in high elevation streams and lakes that have well-vegetated stream banks for cover and bank stability. The decline of CRCT is attributed to replacement by brown, rainbow, and brook trout, hybridization with rainbow trout, over-harvest, and habitat fragmentation or alteration from livestock overgrazing, logging, mining, and water diversions (Behnke 1992; Young 1995).

E. Plants

The following 21 Region 2 sensitive plant species are analyzed in greater detail for this Biological Evaluation: park milkvetch (*Astragalus leptaleus*), narrow-leaved and paradox moonworts (*Botrychium lineare*, *B. paradoxum*), lesser-panicled sedge (*Carex diandra*), lesser yellow lady's-slipper (*Cypripedium parviflorum*), elliptic sedge (*Carex elliptica*), dropleaf (slender leaved) buckwheat (*Eriogonum exifolium*), slender cottongrass (*Eriophorum gracile*), Weber's scarlet gilia (*Ipomopsis aggregata* ssp. w*eberi*), Colorado tansyaster (*Machaeranthera coloradensis* var. *coloradensis*), white adder's-mouth orchid (*Malaxis brachypoda*), Weber's (Rocky Mountain) monkeyflower (*Mimulus gemmiparus*), Harrington beardtongue (*Penstemon harringtonii*), rock cinquefoil (*Potentilla rupincola*), dwarf raspberry (*Rubus arcticus* var. *acaulis*), sageleaf willow (hoary willow; *Salix candida*), autumn willow (*S. serissima*), club spikemoss (northern spikemoss; *Selaginella selaginoides*), largeflower triteleia (*Triteleia grandiflora*), lesser bladderwort (*Utricularia minor*), and Selkirk's violet (*Viola selkirkii*).

The programmatic nature and landscape-scale effects will be analyzed generally and collectively for this group of species. Although species-specific effects may differ slightly, potential impacts would be similar. In addition, the adverse impacts on these plant species are expected to be minor to negligible. This is because the purpose of this project is to amend the Forest and Grassland Plans to include regulatory mechanisms and conservation measures for sagebrush habitats and GRSG by minimizing anthropogenic disturbances on the landscape and because none of these species are known to occur in PHMA or GHMA. While none of the plant species analyzed are known to occur in the action area, potentially suitable habitat is suspected to occur.

Park milkvetch (*Astragalus leptaleus*)

Park milkvetch is a perennial herb that occurs in sedge-grass meadows, swales and hummocks, wetlands, aspen glades, and streamside willow communities between 6,500 and 9,500 feet. It is known from Idaho, Montana, Wyoming, and Colorado, from all the districts on the RNF. The species is more common in Colorado than in the other states. Threats to Park milkvetch are habitat loss and degradation from grazing, trampling, and nonnative species invasion (Ladyman 2006a; Spackman et al. 1997). The species is ranked as secure globally but imperiled in Colorado (G4S2). Potentially suitable habitat in the analysis area occurs in the riparian zones and small moist swales. This habitat is limited in the analysis area.

Narrow-leaved moonwort (*Botrychium lineare*)

Narrow-leaved moonwort is an inconspicuous perennial herb that occurs in a wide range of habitats, including grass and forb meadows, under trees in woods, on shelves of limestone cliffs, and among riparian transition vegetation associated with aspen. It is sometimes associated with previously disturbed ground. In Colorado it is found at elevations ranging from roughly 7,900 to 11,000 feet. Its distribution extends from Washington and Montana south to California and Colorado. Historic records include Quebec and Nebraska. The species is thought to be globally imperiled and critically imperiled in Colorado (G2/S1). It was previously a candidate for federal listing as an endangered or threatened species (66 Federal Register 30368). Threats are road maintenance and construction, mining, mine reclamation, trampling by hikers or all-terrain vehicles, over-collection, and alteration of soil and hydrological regimes (Beatty et al. 2003a).

Paradox moonwort (*B. paradoxum*)

Paradox moonwort is a perennial herb that inhabits mesic to wet subalpine meadows. Its distribution extends from southwestern Canada to Montana, Idaho, and Utah. Populations are small and widely scattered. Paradox moonwort is ranked G2 and S1 in Idaho and Utah; Montana ranks the species S2. This rank indicates that the species is considered imperiled globally and in Montana and is critically imperiled in Idaho and Utah; it is not currently ranked in Colorado. This plant is small, is easily overlooked, and may not produce aboveground structures every year. Threats to the species are similar to those faced by *B. lineare*: road maintenance and construction, mining, mine reclamation, trampling by hikers or all-terrain vehicles, over-collection, and alteration of soil and hydrological regimes.

Lesser panicled sedge (*Carex diandra*)

In Colorado, the most common habitats for lesser panicled sedge are montane and subalpine fens, particularly those formed in depressions, such as small kettles or other basins. The species may also be found in other cool, moist settings, such as wet meadows. Its distribution spans the northern half of the United States; it reaches its southernmost Rocky Mountain distribution in Colorado. It is known from Boulder, Grand, Jackson, and Larimer Counties at elevations ranging from 7,000 to 9,000 feet. The species is globally secure (ranked G5) but is considered critically imperiled in Colorado (ranked S1). Threats to the species and its habitat are hydrological alteration, timber harvesting, fire, roads and trails, off-road vehicles, peat extraction, livestock, recreation, exotic species, atmospheric deposition of pollution, and climate change (Gage and Cooper 2006).

Lesser yellow lady's-slipper (*Cypripedium parviflorum*)

A perennial orchid, it occurs in a variety of shaded, moist habitats, including aspen forests, white spruce/paper birch, paper birch/hazelnut, and ponderosa pine/Douglas-fir forests. It is found in rich humus and decaying leaf litter in wooded areas, rocky wooded hillsides on north- or east-facing slopes, on wooded loess river bluffs, and moist creek sides (Mergen 2006; Spackman et al. 1997). Although widespread, it is uncommon in most of its range. Populations are widely scattered in Colorado, where the species is known from ten counties (including Garfield, a small part of which is in the analysis area) at a narrow elevation range of 7,400 to 8,500 feet. Although the species is considered secure globally, it is considered imperiled in Colorado (G5/S2). Threats are habitat alteration (including conifer encroachment), overstory modification, soil and hydrological regime changes, land management activities, unauthorized recreation, and over-collection (Mergen 2006). The species is believed to be in decline due to habitat loss associated with residential development on private lands, over-collection, grazing, and logging (Mergen 2006). Potentially suitable habitat in the analysis area occurs in the riparian zones and small moist swales.

Elliptic spikerush (*Eleocharis elliptica*)

Elliptic spikerush is a perennial, mat-forming wetland species. In Colorado, it occurs in piedmont valleys, outwash mesas, and wet places in pine forests (Nellessen 2006). Primary threats are hydrologic changes (including water chemistry), grazing, nonnative species, and climate change. It is ranked as globally secure but critically imperiled in Wyoming (S1). It is not ranked in Colorado. Potentially suitable habitat in the project area is in the riparian zones and small moist swales. No population trend data are available (Nellessen 2006).

Dropleaf buckwheat (*Eriogonum exilifolium*)

Dropleaf buckwheat is a perennial herb that grows in sparsely vegetated habitats, such as barren hills or sagebrush flats of the mountain parks. It is a regional endemic known only from 26 occurrences in Wyoming and Colorado, although it may be locally abundant. In Colorado the plant has been found in North Park and Middle Park of Jackson and Grand Counties, at elevations ranging from 7,500 to 9,000 feet in scattered small areas of specific habitats. Individual occurrences range from groups of 30 plants to more than one million (Anderson 2006a). Global ranking for the species is G3 (vulnerable to extinction) and state ranking is S2 (imperiled). In the RNF, habitat for this species occurs at lower elevations near the boundaries with sagebrush.

According to Anderson (2006), there is evidence to suggest that *Eriogonum exilifolium* numbers are trending downward as the result of human activities and habitat loss; however, the plant may be abundant where areas of suitable habitat are extensive since it is under-inventoried, and it is possible that occurrences remain to be discovered.

Threats include "residential and commercial development, range improvements, off-road vehicle use, other recreational uses, grazing, energy development, reservoir creation, ROW management, coal mining, exotic species invasion, effects of small population size, disease, declining pollinators, fire, global climate change, and pollution" (Anderson 2006a).

Slender cottongrass (*Eriophorum gracile*)

Slender cottongrass is a perennial sedge that grows in montane and subalpine wetlands, as well as wet meadows and pond edges. Distribution extends from Alaska, Canada, and the northern states south to California and Colorado. It reaches its southernmost Rocky Mountain distribution in Colorado where it is known from elevations of 8,100 to 12,000 feet. The known sites are widely scattered in Jackson, Las Animas, and Park Counties. The species is ranked secure globally (G5) but imperiled in Colorado (S2). In Region 2, slender cottongrass appears to be on a downward trend, as eight of the region's 36 known sites have apparently been extirpated (Decker, Culver, and Anderson 2006). Potentially suitable habitat in the analysis area occurs but is extremely limited.

Weber's scarlet gilia (*Ipomopsis aggregata* ssp. w*eberi*)

Weber's scarlet gilia is a perennial forb that grows in coarse-textured rocky or gravelly soils of open sites in montane shrub communities or coniferous forest. The subspecies is endemic to northern Colorado and southern Wyoming, Most populations occur around Rabbit Ears Pass near Steamboat Springs, in Routt County. Although the species is secure globally (G5, *Ipomopsis aggregata* is a common species), the subspecies *weberi* is imperiled globally and at the state level (Ladyman 2004). Threats are recreation, residential development, road construction, grazing (by both livestock and native ungulates), and invasive species. Stochastic events may also be a threat due to small population size. Most populations have not been monitored since their discovery, so trend data are unavailable.

Colorado tansy-aster (*Machaeranthera coloradoensis*)

Colorado tansy-aster is a perennial herb that inhabits mountain parks, slopes, rock outcrops, and dry tundra, at elevations ranging from 8,500 to 12,500 feet. The species is found only in Wyoming and Colorado. It is considered imperiled both globally (G2) and in Colorado (S2). No population trend is apparent, but several forest botanists believe that extensive surveys would discover more populations, and 15 new locations have been discovered since 1997 (Beatty et al. 2004).

Machaeranthera coloradoensis is vulnerable because of its restricted geographic range and small number of documented occurrences. Direct or indirect negative impacts on populations or habitats by human-related activities could occur from motorized and nonmotorized recreation, trail or road construction and maintenance, reservoir expansion, housing development, natural disturbance regime changes, domestic livestock, invasive species introduction, or small-scale mining. Lower elevation populations and those closest to roads and trails are likely at the most risk.

White adder's-mouth orchid (*Malaxis brachypoda*)

White adder's-mouth orchid occurs in mossy wet areas, shaded riparian areas, and riparian transition zones. It is disjunct and extremely rare in Region 2; the nearest occurrences to those in Colorado are in southern California and northern Minnesota (Anderson 2006b). In Colorado it is found at elevations between 7,000 and 9,080 feet. Globally, there is concern for its long-term viability (ranked G4Q), and it is considered critically imperiled (S1) in Colorado. *Malaxis brachypoda* has endangered, threatened, or other status in ten US states and one Canadian province. Population trend data are unknown, but extirpation of many of the historic populations suggests the species is declining (Anderson 2006b). In Colorado, the species is known mainly from the eastern part of the state.

Weber's (Rocky Mountain) monkeyflower (*Mimulus gemmiparus*)

Weber's monkeyflower is an annual herb found in granitic seeps, slopes, and alluvium in open sites in spruce-fir and aspen forests at 8,500 to 10,500 feet. The species is endemic to the mountains of central and northern Colorado, including Grand County. It is considered critically imperiled, both globally and in Colorado (ranked G1/S1). The primary threat to *Mimulus gemmiparus* is the small size of populations; a single disturbance could feasibly extirpate an occurrence. Activities that could impact an occurrence are recreation, nonnative plant species, trail and road construction and maintenance, wildfires, and forest management activities, such as logging, thinning, or prescribed fires (Beatty et al. 2003b). Population trend for this species is unknown.

Harrington beardtongue (*Penstemon harringtonii*)

Harrington beardtongue is a perennial herb endemic to Colorado. It is known primarily from sagebrush slopes at elevations from 6,400 to over 9,400 feet in Eagle, Garfield, Grand, Pitkin, Routt, and Summit Counties. The species is ranked G3/S3, indicating vulnerability throughout its range. Threats are habitat loss due to agricultural conversion or residential development, motorized recreation, nonnative plant species, domestic livestock and native ungulate grazing, oil and gas development, and climate change (Spackman-Panjabi and Anderson 2006). Cumulative impacts of these threats may be causing the populations to decline (Spackman-Panjabi and Anderson 2006) but the magnitude of the decline is unknown. Small stands of sagebrush at the lower elevation RNF boundaries are the primary potential habitat.

Rock cinquefoil (*Potentilla rupincola*)

Rock cinquefoil is an herbaceous species that occurs in granite outcrops at elevations between 6,500 feet and 10,900 feet in central and northern Colorado, including in Grand County. It is considered imperiled at both global (G2) and state (S2) levels. Threats are exotic species invasion, residential and commercial development, indirect effects of grazing, off-road and recreational vehicles, small population size, climate change, and pollution (Anderson 2004).

Dwarf raspberry (*Rubus arcticus* var. *acaulis*)

Dwarf raspberry is an herbaceous wetland species found in willow carrs and on mossy streamsides at elevations ranging from 8,600 to 9,700 feet. Associated species include shrubby cinquefoil, dwarf birch, diamondleaf willow, water sedge, and alpine meadow-rue. Distribution is circumboreal, ranging south in North America to Oregon, Colorado, Michigan, and Maine. In Colorado, the species is known from Grand, Jackson, and Park Counties. Dwarf raspberry is ranked G5/T5 indicating that the species and subspecies are secure globally, but the species is ranked S1 (critically imperiled) in both Colorado and Wyoming. Threats are habitat loss from recreational activities, livestock grazing, and natural resource extraction, such as for timber and peat. Activities such as water diversions or impoundment that reduce water availability and change habitat quality are also a threat. Other threats are recreation, forest management activities, nonnative plant invasion, and climate change. Finally, in Region 2 dwarf raspberry occurs in small and disjunct populations, leaving them vulnerable to stochastic events. The current population trend is unknown, but Ladyman (2006b) notes that several extirpations appear to have taken place; the species is now absent from the British Isles and Latvia, and it is now endangered in Estonia. Clearly, the species is vulnerable to extirpation, particularly in areas such as Region 2, where it is on the edge of its range and less common.

Sageleaf willow (hoary willow; *Salix candida)*

Sageleaf willow is found in pond and stream edges as well as in fens of the foothill and montane wetlands. Distribution spans the northern third of the western hemisphere. Its southernmost extent is Colorado, where it is found from 8,800 to 10,600 feet in Jackson, La Plata, Lake, Larimer, and Park Counties. Although sageleaf willow is considered secure globally (ranked G5), it is ranked critically imperiled (S1) in Colorado. Population trends are unknown (Decker 2006a). Seven populations (one historic) are known from the Medicine Bow National Forest, but none are known from the RNF (Decker 2006a).

Autumn willow (*Salix serissima)*

Autumn willow is a woody shrub of the willow family (Salicaceae) that grows in wetland areas including marshes, fens, and bogs. The species ranges from Canada to the northern United States. In the Rocky Mountains it is found in Montana, Wyoming, and Colorado, where it reaches its southernmost distribution. Here, autumn willow is known from Custer, Park, Larimer, and Routt Counties at elevations ranging from 7,800 to 10,200 feet. It is apparently secure globally (G4), but it is critically imperiled in Colorado (S1). Population trend data for this species are lacking (Decker 2006b).

Club spikemoss (northern spikemoss; *Selaginella selaginoides*)

Club spikemoss is an herbaceous, mat-forming perennial that grows in marshy areas and wet spruce forests and produces spores during July and August. Distribution is circumboreal, with the southern extent in the United States. It is known to occur in Wyoming, but reports of occurrences in Colorado could not be substantiated (Heidel and Handley 2006). The species is difficult to identify in the field, which may contribute to the lack of information on the species' distribution. Club spikemoss is ranked G5; in Wyoming it is considered critically imperiled (S1). In Colorado it is ranked as SRF (indicating a false report). Threats are hydrologic changes, grazing, timber harvest, invasive species, and climate warming. Although population trend data are lacking, some populations have been extirpated, and the species is vulnerable to decline (Heidel and Handley 2006).

Largeflower triteleia (*Triteleia grandiflora*)

Largeflower triteleia is a perennial forb of the lily family (Liliaceae). Distribution of this species centers around the Pacific Northwest, with populations in Colorado (San Juan National Forest, Montezuma County) and Wyoming (Medicine Bow National Forest) representing the southern- and eastern-most extents. In Colorado, the species is found in openings among *Pinus ponderosa* (ponderosa pine) and *Quercus gambelii* (Gambel oak) at approximately 7,800 feet. *Triteleia grandiflora* is considered globally secure (ranked G4) but critically imperiled (S1) in Colorado. Threats are habitat loss, fragmentation, and degradation caused by human recreation, livestock grazing, resource development (timber and mineral), and invasive nonnative plant species are potential threats to the long-term persistence of *Triteleia grandiflora* throughout its range, including Region 2. Long-term monitoring data are needed to determine population trends, but Ladyman (2007) notes that several populations have been extirpated and extant populations appear to be declining.

Lesser bladderwort (*Utricularia minor*)

Lesser bladderwort is an aquatic perennial herb that can occasionally become beached when water levels drop. The plants are insectivorous, with bladders acting as tiny insect traps. Although distribution is circumboreal, populations are very infrequent. In Colorado, the species is known from shallow water in subalpine ponds at 5,500 to 9,000 feet. There are two known populations on the RNF; neither occurs in the analysis area (Neid 2006). Although the species is considered globally secure (G5), it is considered imperiled to critically imperiled (S2) in Colorado. Threats are hydrologic impacts (water quality degradation and alteration of hydrologic regime), habitat loss, and invasive species (Neid 2006). Population trend data are lacking.

Selkirk's violet (*Viola selkirkii*)

Selkirk's violet is a perennial herb that inhabits cold mountain aspen forests, moist woods, and thickets. Although the species distribution is circumboreal, it occurs only in small disjunct populations (Hornbeck et al. 2003). In Colorado it is known from 8,500 to 9,100 feet elevation in Custer, Douglas, Fremont, and Larimer Counties. The species is considered secure globally, although there is some uncertainty about the ranking (G5). In Colorado it is critically imperiled (ranked S1). Threats to the species are recreation, nonnative plant species invasion, wildlife and livestock grazing and trampling, road and trail construction and maintenance, forest management activities, climate change, and stochastic events. Population trend data are lacking.

VII. EFFECTS ANALYSIS FOR SENSITIVE SPECIES

Greater Sage-Grouse as an Umbrella Species

GRSG populations require large landscapes and specific habitat conditions at broad scales to meet their seasonal life requisite requirements. Rowland et al. (2010) and Hanser and Knick (2006) provide evidence that GRSG habitats at broad scales have substantial overlap with habitats of other species similarly associated with sagebrush and sagebrush-steppe communities.

The plan amendment is specially designed to provide protections for GRSG and their habitats. Although individual species have specific habitat requirements at finer scales that differentiate their use of habitats, habitat protections for GRSG will benefit other species similarly dependent on these habitats. The structure of this biological evaluation reviews the efficacy of conservation and

management actions for GRSG, and then evaluates the adequacy of these protections for other sensitive species, including those associated with sagebrush habitats.

Viability Evaluation for Greater Sage-Grouse

Forest Service policy based on the National Forest Management Act (NFMA) and associated regulations motivates careful consideration of the conservation status of sensitive species. In this section we briefly outline the legal foundation and the policy which establishes our approach to evaluating the contribution of habitat on NFS land to the overall viability of the GRSG, and how that evaluation is used to determine the inherent capability and suitability of the environment.

The statutory underpinning for evaluating viability of species expressed in 16 U.S.C. §1604(g)(3)(B) requires the Secretary to promulgate regulations that shall include, but not be limited to:

> (3) specifying guidelines for land management plans developed to achieve the goals of the Program which –
>
> (B) provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, …

The Department published planning regulations in 1982, under which the land management plans associated with the current amendment for GRSG were written. The 1982 regulations included the viability provision at 36 CFR 219.19:

> Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area.

All Forest Plans being considered for amendment to address GRSG conservation and recovery were developed under the 1982 planning regulations. This Biological Evaluation considers management guidance for GRSG on NFS lands in Colorado, and assesses the outcomes of five alternatives for amendment of plans for the Routt National Forest. As stated previously, NFS land managed on the Routt National Forest occur at an elevation and in ecological settings such that they support certain life history needs, but not others. As a result, GRSG use National Forest System lands for only a portion of the year (i.e. primarily for late summer brood-rearing habitat).

As outlined in the *FEIS and referenced in this Biological Evaluation*, the capability of NFS lands to support self-sustaining populations of GRSG is limited. The national forest contain relatively small areas of GRSG habitat, and habitat on NFS land only contributes to particular life cycle requisites.

Consequently, the assessment of whether habitat on NFS land is sufficient to maintain viable populations of GRSG must consider the contribution of habitat on NFS land to GRSG persistence

recognizing the inherent limitations on the ability to meet needs for all GRSG life stages from habitat located exclusively on NFS land. As recognized in the NFMA, the ability of the Forest Service to provide for diversity of animal communities is limited by "the suitability and capability of the specific land area. . . " 16 U.S.C. & 1604(g)(3)(B). Accordingly, this BE considers the contribution of these three NFS units to GRSG viability as follows:

- Forest plans provide for management of the environment to provide habitat to meet species' requirements associated with the particular seasons and life history stages supported on National Forest System (NFS) lands;
- Because GRSG spend only a portion of the year on NFS lands in response to the inherent capability and suitability of the lands (e.g. breeding habitat occurs off NFS), there are threats and stressors to species' which occur off of NFS land, and therefore over which the Forest Service has no jurisdiction or control;
- Managing habitats on NFS land to contribute to the support of persistent populations on NFS land is not the same as ensuring species viability over its entire range;
- The scale of analysis to assess the contribution of habitat on NFS land to GRSG viability is the planning unit, which is generally considered a national forest.

The five alternatives represent various scenarios for multiple resource management on NFS land with differing outcomes for GRSG. For each alternative, we end our discussion in this Biological Evaluation with a determination regarding the likelihood that the scenario provides conditions to support the ***persistence*** of GRSG on the NFS units ***to meet the associated life cycle requisites*** that land is suitable for and capable of providing, based on the combined outcomes of regulatory restrictions and restoration of habitat.

Threats by Population

The COT report (USFWS 2013) identifies potential threats for PACs in proximity to the RNF. The potential for these threats were further refined for GRSG habitats (PHMA and GHMA) occurring on the RNF. The alternatives in the FEIS are evaluated in light of these threats and their associated management actions. These are the basis for identifying and reviewing the effects of alternatives.

Table 8. Threats identified in the COT report for individual PACs potentially associated with management activities on the RNF (USFWS 2013)[7].

COT Report Population Area	Isolated/Small Size	Sagebrush Elimination	Agriculture Conversion	Fire	Conifer Encroachment	Weeds/Invasive Species	Energy	Mining	Infrastructure	Grazing	Equids	Recreation	Urbanization
North Park—9d	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y
NWCO—9e	N	L	Y	Y	L	Y	Y	Y	Y	Y	L	Y	Y
Eagle South Routt—5	Y	L	Y	L	L	Y	Y	N	Y	Y	N	L	Y
Middle Park—6	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y
Threats to GRSG on the RNF	Y	L	N	L	L	L	N	N	N	Y	N	L	N

Key: Y =Yes; N = No; L = Likely; NWCO = Northwest Colorado

A. Effects of Alternative A on GRSG

Recreation and Travel

Under this alternative there would be no changes to the current National Forest System roads, transportation plan, or recreation management on the RNF. The management direction, and the associated outcomes would remain the same. Levels of recreation use and travel may increase with increasing human populations in the area, but the infrastructure associated with these activities would not change. Human uses associated with recreation and travel corridors may create the potential for increased negative effects. For GRSG, this could disrupt some stages of their life cycle, including nesting and brood rearing stages. It is difficult to speculate the extent of disturbance that may occur in the future under the current management.

Any direct negative effects currently experienced by GRSG under current recreation and travel management, from general disturbance to GRSG by humans from recreation would continue. Conversely, existing efforts and opportunities through travel management and recreation planning to reduce impacts to GRSG and their habitats would continue.

GRSG species may see the potential for greater negative impacts from Alternative A, compared to other alternatives, due to the reduced level of management direction for the protection of GRSG and their habitat. Garton et al. (2015) showed a significant decline in population under the current management strategy across the range of GRSG from 2007 to 2013. This was an expansion of their previous analysis (Garton et al. 2011).

Lands and Realty

Forest Service lands in the RNF would continue to be managed according to existing policy, regulation, and plan direction. Permitted ROWs would continue to produce construction, maintenance, and operation activities, based on the existing guidance in the Forest Plan. This may result in greater sagebrush habitat loss, fragmentation, temporary increases in road use, potential sedimentation or degradation of habitats for sensitive animal species, compared to an action alternative that has added direction in GRSG habitat areas for lands and realty management.

Under this alternative, there would be no changes to the current approach from exchange, acquisition, or disposal of lands or with permitting ROWs on Forest Service lands. Though most proposed project proponents would strive to mitigate or minimize impacts to GRSG, this alternative would likely have the greatest potential for impact on GRSG. Alternative A has a greater potential for negative effects than an alternative with additional management direction, although this would likely be negligible to sensitive animal species that use a broader range of habitats on the RNF.

Range

Under this alternative, there would be no change in the numbers, timing, or method of livestock grazing on the RNF from the existing Forest Plan. Under current management, GRSG, would be managed based on existing plan direction. Implementation of range decisions with existing plan direction has been determined to result in impacts on sensitive animal species. Alternative A has a greater potential for negative effects to GRSG, than an action alternative with additional management direction for the species.

Energy and Minerals

Energy and mineral development is not a major use in the RNF and is not a current threat in GRSG habitat for areas affected by the FEIS. Currently none of the PHMA in the RNF is leased. There has been a dramatic increase in energy development on adjacent private and BLM-administered lands and, although it is not a current issue in the RNF, this could change in the future. Under this alternative, the existing direction for energy and mineral development would remain the same. The existing plan with respect to energy development is somewhat dated and does not reflect the current approaches to energy development that are being used. Existing stipulations are limited to timing in most GRSG habitat areas. A small percentage of PHMA would remain closed to non-energy leasable mineral leasing, with the majority or remainder of ADH open to leasing (including expansion of new leases), with no cap on surface-disturbing activities. As such, this alternative would be expected to have the potential for the greatest amount of direct and indirect habitat loss, degradation, and habitat fragmentation for GRSG.

Fire and Fuels Management

Alternative A would have the fewest restrictions on impacts to GRSG for fuels management activities, which could result in a higher potential for impacts in sagebrush habitats. This alternative does not prioritize fire operations beyond what has already been determined in the fire management plans for the area. Potential impacts to GRSG may include increased loss of sagebrush habitat due to current

direction fire management. A lack of additional management direction for fuels management in sagebrush, is likely to result in a greater potential for impacts to GRSG.

Cumulative Effects—Alternative A

The cumulative effects from existing activities would generally maintain the current conditions on GRSG habitats and populations. GRSG would still occur on private, state, and BLM-administered land next to the RNF. Potential effects described above may also occur on adjacent lands with other ownership. There are some existing conservation measures on these other lands, especially those administered by the BLM. There could be additional population loss, habitat loss, or habitat degradation from recreation and travel, ROWs, energy and mineral development, fire and fuels treatments, range management, or other activities in sagebrush habitat off the RNF. In the RNF, the limitation or prohibition of the use of prescribed fire in sagebrush habitats and the sagebrush protection emphasis during wildland fire operations would not be instituted as they would be in the action alternatives. Under Alternative A, the direct and indirect effects in conjunction with the past, present, and reasonably foreseeable future actions and the likelihood of increasing future fires and predicted climate change may increase loss and fragmentation of the existing sagebrush habitat from wildfire, which could contribute to negative cumulative impacts on GRSG.

Summary of Alternative A

Under the No Action Alternative, current management actions would continue unchanged. The condition of GRSG populations would continue to reflect the effects of all past and current management activities, which based on Garton et al. (2011) and Garton et al. (2015) for the entire range of GRSG has been a significant downward trend. Direct effects on habitat under the current management regime would occur from wildland fire operations and fuels management, and livestock grazing. Potential indirect effects would occur from competition from invasive species and habitat fragmentation. These impacts could adversely impact individuals or populations or cause habitat fragmentation or loss.

Further, alternative A provides the least protection for GRSG habitats on the RNF. Existing conservation measures limit some but not all impacts to GRSG. Impacts on potentially suitable habitat would be possible. While some impact to GRSG is possible under alternative A, the amount would be limited based on the amount of habitat relative to the total amount of habitat used by GRSG in the area. Therefore, this alternative "**may adversely impact individuals, but not likely to result in a loss of viability in the analysis area, nor cause a trend toward federal listing"** for all terrestrial and aquatic species analyzed.

B. Effects of Alternative B on GRSG

Alternative B would place a 3 percent cap on disturbance in the PHMA, which accounts for approximately 13 percent of the analysis area. Outside the PHMA, activities would continue under current management.

Recreation and Travel

Under this alternative there would be limited opportunities for road construction in PHMA, with minimum standards applied and no upgrading of roads. In addition, recreation use permits would be given in PHMA only if there were a neutral or beneficial impact on GRSG. Therefore, additional impacts from new roads and their use would be limited. These standards and guidelines would limited road construction, resulting in less use, road density, recreational disturbance, and reduced likelihood

for vehicle-GRSG collisions. Therefore, GRSG on the RNF are likely to benefit from added the management under Alternative B, compared to Alternative A.

Since only a very small portion of the RNF is considered PHMA, the effects would likely be negligible to minor, but any management direction leading to conservation would have a positive effect.

The 3 percent cap on disturbance would reduce but not eliminate the potential direct and indirect effects described under Alternative A. Reductions in the level of disturbance could benefit individuals and populations of GRSG that occur in meadow or shrublands habitats, but it would not likely affect any species as a whole. Of course, benefits would occur only on PHMA, not across all habitats.

Lands and Realty

Under Alternative B, PHMA would be managed as an exclusion area and general habitat would be managed as an avoidance area for new ROW projects. In addition, Alternative B would encourage the retention, acquisition, and consolidation of GRSG habitat areas, facilitating protection for GRSG. The RNF would keep lands within PHMA. This would result in little to no degradation, fragmentation, and habitat loss for GRSG PHMA. These standards and guidelines would be more protective for GRSG than measures under Alternatives A and D, but less protective than under Alternative C. This represents a concerted effort to maximize connectivity and minimize sagebrush habitat fragmentation, thus indirectly benefiting GRSG and their habitats.

Range

Alternative B would adjust grazing direction in GRSG PHMA, which is less than 1 percent of the land cover of the RNF. The potential effects to GRSG from livestock grazing, vegetation disturbance, and range improvement projects is expected to be very similar under this alternative (Alternative B), as it would be under Alternative A, except there would be a few more restrictions to grazing in PHMA, thus benefiting GRSG. These objectives, particularly with respect to the habitat objectives, stocking adjustments, timing, and residual cover—would likely provide a minor but positive effect on habitat effectiveness and decrease disturbance for GRSG in PHMA.

The indirect effects from decreasing grazing pressure on such a small part of the RNF could lead to localized habitat improvements for GRSG, but are small with respect to the overall GRSG population.

Energy and Minerals

Under Alternative B, PHMA would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks. Direct impacts on wildlife habitats from construction and operation of energy or mineral facilities would be a similar impact for ROWs and could include direct habitat loss, fragmentation, and degradation.

Currently there are no known active GRSG leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for the most important GRSG habitats, thereby improving conditions and limiting adverse impacts to GRSG. This alternative would minimize or eliminate the likelihood for adverse impacts to GRSG on PHMA on 1,968 acres.

Fire and Fuels Management

GRSG habitat, specifically PHMA, would have additional management direction designed to promote the protection of PHMA from wildfire and ensure that effects from fuels management are

accomplished in a manner that benefits or does not impact GRSG. This alternative would help reduce the localized threats to PHMA from fire, compared to Alternative A. This would be a benefit to GRSG.

Cumulative Effects—Alternative B

Cumulative effects for Alternative B would be similar to those described for Alternative A. However, because this alternative places a 3 percent cap on new disturbance in the PHMA, the magnitude of impacts in addition to impacts from the past, present and reasonably foreseeably future actions could be less than that described for Alternative A. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analyzing site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push GRSG over a threshold toward a federal listing; nor would they cause concerns for population loss or species viability for the RNF.

Summary of Alternative B

This alternative limits loss, fragmentation, and disturbance in PHMA to 3 percent of the area in PHMA areas and thus provides protections for GRSG habitats in these areas. Implementing the criteria would likely reduce, but not eliminate, direct and indirect effects on GRSG and their habitat. Generally, activities in GHMA and the remaining sagebrush habitat would occur as they do under existing management direction or could increase as existing direction allows. Overall, impacts would be less than those projected under Alternative A.

Existing conservation measures limit some, but not all impacts on GRSG. Therefore, it is determined that this alternative "**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"** for GRSG on the RNF.

C. Effects of Alternative C to Sensitive Animal Species including the GRSG

This alternative would place a 3 percent disturbance cap in PHMA and GHMA (the entire 12,500-acre analysis area). Closure to grazing would further reduce disturbance in ADH (Refer to Chapter 2 in this document, and Tables 1 and 2)

Recreation and Travel

Under Alternative C, road and trail construction would be limited in ADH, and no new roads would be constructed within 4 miles of a lek or occupied habitat. Under this alternative, effects would be similar to those mentioned in Alternative B, except that they would apply to ADH and not just PHMA. This is the most restrictive alternative for recreation and travel.

There would be very few, if any negative effects from this alternative on GRSG on the RNF as a result of recreation- or travel-related projects. Therefore, current population trends are expected to stabilize or slightly improve over time.

Lands and Realty

Under this alternative, ADH would be exclusion areas for ROWs and special use permits. The RNF would keep and seek to acquire GRSG ADH where interest and opportunities exist. This would result in little to no degradation, fragmentation, or loss of GRSG habitat in all areas of ADH. Therefore this would have the most protective measures, thus benefiting GRSG in these areas.

Alternative C would have the most protective measures for all GRSG habitat. Under this alternative, ADH would be managed as an exclusion area for new ROW projects. In addition, Alternative C would

encourage consolidation of GRSG habitats, facilitating habitat conservation and management. This alternative would be expected to have the least negative impacts and most positive impacts for GRSG.

Range

This alternative would eliminate grazing in ADH. This accounts for approximately 1 percent of the land cover of the RNF. If grazing were removed in these areas, there would be reductions of impacts that result from livestock grazing. The direct effects of changes to vegetation condition due to grazing and the potential for trampling of individuals, nests, or chicks would be removed.

This management action would result in greater vegetation cover improving hiding cover and habitat quality for GRSG. Palatable forbs may increase, allowing insects to increase, which is an important protein source for GRSG chicks during brood rearing.

Energy and Minerals

Under this alternative, ADH would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks. These protective measures would benefit GRSG within all designated habitats. Under this alternative, effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH.

Fire and Fuels Management

Alternative C would aim to protect and restore sagebrush habitats in all designated GRSG habitat using native seed post fire, with all burned areas closed to grazing post wildfire. Any reduction in wildfire near and around sagebrush habitats would likely benefit GRSG in the short term. Alternative C extends management direction throughout ADH, as opposed to just priority habitat in Alternative B, thus increasing the potential for retaining larger areas of sagebrush ecosystem in a condition more suitable for GRSG. This may improve opportunities for population expansion in the future. Under this alternative, effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH.

Cumulative Effects—Alternative C

Cumulative effects for Alternative C would be similar to those described for Alternatives A and B. Because this alternative limits the level of disturbance, the magnitude of cumulative impacts could be less than those for either Alternative A or B. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analysis of site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push GRSG populations over a threshold toward a federal listing; nor would it cause concerns for population loss or species viability issues from the Forest Service units under review.

Summary of Alternative C

This alternative limits habitat loss, fragmentation, and degradation in ADH across the analysis area, providing conservation for sensitive terrestrial and aquatic species and their habitats. The implementation of the criteria would reduce but not eliminate adverse direct and indirect effects to GRSG and their sagebrush habitat. Generally, activities in the sagebrush habitat outside. Overall, impacts would be less than those expected for all other alternatives.

Existing conservation measures limit some but not all impacts on terrestrial and aquatic sensitive species. Therefore the determination for this alternative "**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" for GRSG.

D. Effects of Alternative D to Sensitive Animal Species including the GRSG

Alternative D would apply a 5 percent disturbance cap in ecological sites that support sagebrush in PHMA, calculated in CMZs. Range management would aim to meet GRSG habitat objectives in ADH. Most protections from fire and fuels management activities would apply to ADH (

Refer to Chapter 2 in this document, and Tables 1 and 2)

Recreation and Travel

Under this alternative, the effects of most suggested management actions would be similar to Alternative B. The exception is that more flexibility or discretion would be given to the land management agency to allow route construction in PHMA, road improvements, and Special Recreation Permits (SRP) issuance if it were determined that these actions would not adversely affect GRSG or their habitat. Any new roads could be constructed to the highest standard and it would allow roads to be upgraded based on no adverse effect on GRSG. Seasonal closure areas in ADH would also be identified for GRSG.

Under this alternative, if populations and habitats are healthy or improving, it could permit disturbance above the 5 percent cap for the CMZ. Effects of this alternative allow for greater disturbance to sensitive species habitat, compared to Alternatives B or C, although distinctions and overall effects on recreation and travel are minor among the action alternatives and likely insignificant in the RNF due to the limited designated GRSG habitat.

Lands and Realty

Alternative D is very similar to Alternative B, with the major differences being no ROWs would be permitted in PHMA and the RNF would keep and seek to acquire lands in PHMA where interest and opportunity may enable acquisition. This would result in the potential for minimal impacts from lands and realty management in PHMA, but it could shift impacts to GHMA or other habitat types. In non-PHMA, permitted ROWs would likely have effects similar to those addressed in Alternative A.

Under Alternative D, PHMA would be managed as an avoidance area, but new ROW projects would be allowed in designated corridors. ROWs would also be allowed in PHMA if the project would not adversely affect GRSG populations. PHMAs would be exclusion areas for large transmission lines (greater than 230 kilovolts), and 68,000 acres would be managed as avoidance areas for large transmission lines. This alternative would be more protective than Alternative A but less protective than Alternatives B and C for sensitive animal species using GRSG habitats. However, due to the extent of habitat on RNF, the effects would be similar to Alternatives B and C.

Range

The effects from Alternative D would be similar to Alternative B, but would be slightly more restrictive as GRSG habitat objectives in grazing allotments would be applied to ADH and not just PHMA. This alternative would have more management direction than Alternative A and B, resulting in a benefit to GRSG. However, this benefit would be less that that realized with Alternative C. Generally speaking, if GRSG habitat were taken into consideration before applying the management action, then GRSG would likely benefit from that protection or management action.

Under this alternative, vegetative composition and structure would be managed to be consistent with ecological site potential. Riparian areas and wet meadows would be managed for proper functioning condition and to maintain diverse species richness. New water developments would be authorized only after determining that GRSG would not be adversely impacted from habitat loss. In PHMAs sagebrush ecosites retain a minimum of 70 percent of the ecological sites capable of supporting 12 percent canopy cover of Wyoming sagebrush or 15 percent canopy cover of mountain sagebrush. Alternative D management would allow a total disturbance cap of less than 30 percent. New range improvement projects would be designed to enhance livestock distribution, timing, and use.

Energy and Minerals

Under this alternative, PHMA would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks, similar to Alternative B. However, with some mineral development, this alternative would allow up to 5 percent disturbance in any CMZ. Direct effects would be similar to those under Alternative B. There could be a few more impacts if the disturbance allowance were increased from 3 percent to 5 percent. Therefore effects would be similar to those described under Alternative B and would be mostly positive.

Fire and Fuels Management

Alternative D is generally the same as Alternative B and much of Alternative C, except that it extends almost all the same protections across all ADH, not just PHMA. Alternative D would be the most restrictive of all the alternatives for fire and fuels management and therefore the most protective for GRSG. Alternative D would help reduce the local threats to ADH from fire, compared to Alternative A.

Under Alternative D, in PHMA, sagebrush would not be reduced to less than 15 percent unless a vegetation management objective required additional reduction. Seasonal restrictions would be applied for implementing treatments. Fire would not be used to treat sagebrush in areas of less than 12 inches of precipitation. Treated areas would be rested from livestock grazing for two full growing seasons unless vegetation recovery were to dictate otherwise. These standard and guidelines would protect and enhance GRSG habitat and benefit the species.

Cumulative Effects—Alternative D

Cumulative effects for Alternative D would be similar to those for Alternatives A and B. However, because Alternative D places a 5 percent cap on new disturbance in the PHMA, the magnitude of disturbance could be more than that described for Alternative B or the proposed plan amendment. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analyzing site-specific projects when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push GRSG over a threshold toward a federal listing; nor would they cause concerns for population loss or species viability concern on the RNF

Summary of Alternative D

Alternative D has provisions that fall that provide protections that fall between those of Alternatives A and B. It includes a cap on disturbance in PHMA, while there is no similar limit under Alternative A. The allowance of 5 percent disturbance in PHMA would allow some additional habitat loss and degradation. Limited conservation in the remaining sagebrush habitat could allow changes in habitat quantity, quality, and ownership in sagebrush habitat on the units. None of the proposed conservation

measures is specific to sensitive plant species. Implementing the measures would likely reduce but not eliminate all direct and indirect effects on GRSG. Therefore the determination for this alternative "**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"** for GRSG.

E. Effects of The proposed plan on GRSG

The proposed plan would apply a 3 percent disturbance cap to PHMA, calculated in a Biologically Significant Unit (the CMZ). The proposed plan expands many of the conservation measures in Alternative B to all designated GRSG habitat. Grazing use guidelines would be applied in each of the seasonal GRSG habitats, and other grazing guidelines would focus on protecting areas within 1.2 miles of active leks (regardless of which type of habitat the lek is in). Most protections from fire and fuels management activities would apply to ADH. (Refer to Chapter 2 in this document, and Tables 1 and 2).

Recreation and Travel

Under The proposed plan, there would be no new road or trail construction in PHMA or GHMA. No road or trail maintenance would be allowed within 2 miles of an active lek during lekking (March 1 to April 30). In addition, recreational use permits would be given in PHMA or GHMA only if there were a neutral or beneficial impact on GRSG.

There would be fewer impacts from this alternative relative to the effects of Alternative A. These positive impacts would be no new road or trail construction, road density, recreational disturbance, and opportunities for collisions and reduced indirect impacts on adjacent areas habitat disturbances. Therefore, GRSG are likely to benefit from added management direction under the proposed plan, compared to Alternative A. Further, these management directions are expected to provide benefits to GRSG from fewer disturbances and adverse impacts to their habitat.

Lands and Realty

Under the proposed plan, PHMA and GHMA would be managed as avoidance areas for new SUA projects. No new roads or aboveground structures would be authorized within 1 mile of an active lek. PHMAs and GHMAs would be managed as avoidance areas for high voltage transmission lines (greater than 100 kilovolts). In addition, The proposed plan would encourage the retention, acquisition, and consolidation of GRSG habitat areas, facilitating conservation of GRSG and other species that depend on sagebrush ecosystem. The RNF would keep its PHMA and would work to acquire more. This would result in little to no degradation, fragmentation, and loss of GRSG habitat. In non-PHMA, permitted ROWs would likely have effects similar to those under Alternative A. These conservation measures would be more protective than those under Alternatives A and D but less protective than Alternative C. This represents a concerted effort to maximize connectivity and minimize fragmentation of sagebrush habitats, thus indirectly benefiting other sensitive species that use these habitats.

Range

The proposed plan would adjust grazing direction in GRSG PHMA, which is less than 1 percent of the land cover of the RNF. The potential effects of livestock grazing, vegetation disturbance, and range improvements are expected to be similar under the proposed plan as under Alternative A. The exception is that there would be a few more restrictions to grazing in PHMA, thus benefiting GRSG. These adjustments—timing, stocking rates, and residual cover—would likely provide a minor but positive effect on habitat effectiveness and would decrease the likelihood for trampling and disturbance for GRSG using areas in PHMA.

Energy and Minerals

Under the proposed plan amendment, no new leasing in ADH would be allowed within 1 mile of an active lek. There would be NSO in PHMA and within 2 miles of active leks in GHMA. A no activity buffer of 4 miles in active leks from March 1 to July 15 would be enforced. For wind and solar projects PHMA would be excluded and GHMA would be avoidance areas. PHMAs would be closed to new mineral materials sales and new nonenergy mineral leasing. NSO would be precluded on existing nonenergy leasable mineral leases within 2 miles of active leks in PHMAs. Presumably, the above protective measures would benefit GRSG. Direct impacts on GRSG habitat from constructing and operating energy or mineral facilities would be similar to the impact for SUAs and could include direct habitat loss, fragmentation, and degradation.

Though currently there are no known active GRSG leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for the most important GRSG habitats, thereby improving conditions for GRSG. This alternative would minimize or eliminate the likelihood for impacts to GRSG 1,968 acres within the PHMA.

Fire and Fuels Management

Sage-grouse habitat, specifically PHMA, would have additional management direction designed to protect PHMA from wildfire and ensure that effects from fuels management benefit or do not impact GRSG. This alternative would help reduce the localized threats to PHMA from fire, compared to Alternative A. This would be a benefit to GRSG.

Cumulative Effects—The proposed plan

Cumulative effects for the proposed plan would be similar to those described for Alternatives A and B. However, because the proposed plan places a 3 percent cap on new disturbance in the PHMA, the magnitude of cumulative impacts could be less than those described for Alternative A and the same for Alternative B. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analysis of site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push GRSG over a threshold toward a federal listing; nor would they cause concerns for population loss or concern over species viability on the RNF.

Summary of the proposed plan

This alternative has provisions that are more protective than those in Alternatives A and D, but less protective than alternatives B and C. The proposed plan does include a cap on disturbance in PHMA, while there is no similar limit under Alternative A. The allowance of 3 percent disturbance in PHMA will allow some additional habitat loss and degradation but not as much as Alternative D, which includes a 5 percent disturbance cap. Limited conservation in the remaining sagebrush habitat could allow changes in habitat quantity, quality, and ownership in sagebrush habitat on the units. Implementation of the measures would likely reduce but not eliminate direct and indirect effects on GRSG or their habitats. Existing conservation measures limit many, but not all impacts on GRSG. Therefore the determination for this alternative "**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"** for GRSG.

F. Effects of Alternative A on Sensitive Animal Species

Recreation and Travel

Under this alternative there would be no changes to the current National Forest System roads, transportation plan, or recreation management on the RNF. The management direction, and the associated outcomes would remain the same. Levels of recreation use and travel may increase, but the infrastructure associated with these activities would not change. Human uses associated with recreation and travel corridors may create the potential for increased negative effects. For sagebrush-obligate birds, this could disrupt nesting and cause young abandonment or temporary displacement.

Any direct negative effects currently experienced by sensitive animal species under current recreation and travel management, such as siltation/sedimentation of ponds, wetlands, or streams, due to motor vehicle use, and general disturbance to sensitive species by humans from recreation would continue. Conversely, existing efforts and opportunities through travel management and recreation planning to reduce impacts to protect sensitive animal species and their habitats would continue.

Motorized travel would continue to degrade aquatic habitat in a small way. The condition of fish and amphibian populations and aquatic habitats across designated habitat would remain stable, reflecting the effects of all past and current management activities.

Sensitive animal species may see the potential for greater negative impacts from Alternative A, compared to other alternatives, due to the reduced level of management direction restrictions on activities that cause these effects. For sensitive species using a broader range of habitats in the RNF, changes in management direction are likely to be insignificant.

Lands and Realty

Forest Service lands in the RNF would continue to be managed according to existing policy, regulation, and plan direction. Permitted ROWs would continue to produce construction, maintenance, and operation activities, based on the existing guidance in the Forest Plan. This may result in greater habitat loss, fragmentation, temporary increases in road use, potential sedimentation or degradation of habitats for sensitive animal species, compared to an action alternative that has added direction in GRSG habitat areas for lands and realty management.

Under this alternative, there would be no changes to the current approach from exchange, acquisition, or disposal of lands or with permitting ROWs on Forest Service lands. Though most proposed project proponents would strive to mitigate or minimize impacts, this alternative would likely have the greatest potential for impact on sensitive animal species. Alternative A has a greater potential for negative effects than an alternative with additional management direction, although this would likely be negligible to sensitive animal species that use a broader range of habitats on the RNF.

Please refer to the lands and realty section of the FEIS for additional information.

Range

Under this alternative, there would be no change in the numbers, timing, or method of livestock grazing on the RNF from the existing Forest Plan. In addition, there would be no change to wild horse and burro management, which is not a current issue in the RNF.

Under current management, sensitive animal species, including amphibians, fish, and sensitive birds, would be managed based on existing plan direction. Implementation of range decisions with existing plan direction has been determined to result in impacts on sensitive animal species. It is likely that

these impacts may be reduced with an action alternative in GRSG habitats with the addition of additional management direction. Alternative A has a greater potential for negative effects, than an alternative with additional management direction, although this would likely be negligible to sensitive animal species that use a broader range of habitats on the RNF.

Please refer to the range section of the FEIS for additional information.

Energy and Minerals

Energy and mineral development is not a major use in the RNF and is not a current threat in GRSG habitat for areas affected by the FEIS. Currently none of the PHMA in the RNF is leased. There has been a dramatic increase in energy development on adjacent private and BLM-administered lands and, although it is not a current issue in the RNF, this could change in the next several years.

Under this alternative, the existing energy and mineral development direction would remain the same. This direction is somewhat dated and does not reflect the more current approaches to energy development that are being used. Existing stipulations are limited to timing in most grouse habitat areas. A small percentage of PHMA would remain closed to nonenergy leasable mineral leasing, with the majority or remainder of ADH open to leasing (including expansion of new leases), with no cap on surface-disturbing activities. As such, this alternative would be expected to have the potential for the greatest amount of direct and indirect habitat loss, degradation, and fragmentation for sensitive animal species and their habitats.

Though there are conservation measures and best management practices in place to minimize effects, the potential effects from development would be greater under Alternative A, since more areas would be available and there would be fewer restrictions.

Please refer to the energy and mineral section of the FEIS for additional and more detailed information on the effects of Alternative A.

Fire and Fuels Management

Alternative A would have the fewest restrictions for fuels management actions in areas with GRSG habitat, which could result in a higher potential for vegetation impacts in the sagebrush type. As this alternative does not prioritize fire operations beyond what has already been determined in the fire management plans for the area, potential impacts may include the potential for increased loss of sagebrush habitat due to current direction for fuels management. A lack of additional management direction for fuels management in sagebrush, is likely to result in a greater potential for impacts on animal species that use sagebrush habitats.

Please refer to the fire and fuels management section of the FEIS for additional information and more detailed information on the effects of Alternative A.

Cumulative Effects—Alternative A

The cumulative effects from existing activities would generally maintain the current conditions on sensitive animal habitats and populations. Sensitive terrestrial and aquatic species would still occur on private, state, and BLM-administered land next to the RNF. Potential effects described above may also occur on other ownerships. There are some existing conservation measures on these other lands, especially those administered by the BLM. There could be additional species loss, habitat loss, or degradation from recreation and travel, ROWs, energy and mineral development, fire and fuels treatments, range management, or other activities in sagebrush habitat off the RNF. In the RNF, the

limitation or prohibition of the use of prescribed fire in sagebrush habitats and the sagebrush protection emphasis during wildland fire operations would not be instituted as they would be in Alternatives B, C, D, and E. Under Alternative A, the direct and indirect effects in conjunction with the past, present, and reasonably foreseeable future actions and the likelihood of increasing future fires and predicted climate change may increase loss and fragmentation of the existing sagebrush habitat from wildfire, which could contribute to negative cumulative impacts on sensitive species.

Summary of Alternative A

Under the No Action Alternative, current management actions would continue unchanged. The condition of sensitive species populations in GRSG designated habitat would continue to reflect the effects of all past and current management activities. Direct effects on habitat under the current management regime are wildland fire and livestock grazing and trampling. Potential indirect effects are competition from invasive species, habitat fragmentation, and hydrological conditions alteration. These impacts can kill individuals or populations or cause habitat fragmentation or loss.

Alternative A provides the least protection for GRSG habitats on the RNF. Existing conservation measures limit some but not all impacts on species. Impacts on potentially suitable habitat would be possible. Therefore the determination for this alternative "**may adversely impact individuals, but not likely to result in a loss of viability in the analysis area, nor cause a trend toward federal listing"** for all terrestrial and aquatic species analyzed.

G. Effects of Alternative B on Sensitive Animal Species

Alternative B would place a 3 percent cap on disturbance in the PHMA, which accounts for approximately 13 percent of the analysis area. Outside the PHMA, activities would continue under current management.

Recreation and Travel

Under this alternative there would be limited opportunities for road construction in PHMA, with minimum standards applied and no upgrading of roads. In addition, recreation use permits would be given in PHMA only if there were a neutral or beneficial impact on GRSG.

Conditions for sensitive animal species that use PHMA would improve, relative to effects of Alternative A. These positive impacts would be limited road construction, resulting in less use, road density, recreational disturbance, and opportunities for collisions and reduced indirect impacts on adjacent areas from sedimentation to wetland systems. Therefore sensitive animal species using these areas are likely to benefit from added the management under Alternative B, compared to Alternative A. Since only a very small portion of the RNF is considered PHMA, the effects would likely be minor to negligible, but any management direction leading to conservation would be a positive effect.

The 3 percent cap on disturbance would reduce but not eliminate the potential direct and indirect effects described under Alternative A. Reductions in the level of disturbance could benefit individuals and populations of species that occur in meadow or shrublands habitats, but it would not likely affect any species as a whole. Of course, benefits would occur only on PHMA, not across all habitats. Species using areas outside PHMA would still be subject to direct effects, as described for Alternative A.

Please refer to the recreation and travel section of the FEIS for additional information and more detailed information on the effects of Alternative B.

Lands and Realty

Under Alternative B, PHMA would be managed as an exclusion area and general habitat would be managed as an avoidance area for new ROW projects. In addition, Alternative B would encourage the retention, acquisition, and consolidation of GRSG habitat areas, facilitating conservation for GRSG and other species that depend on sagebrush ecosystem. The RNF would keep PHMA and would work to acquire more. This would result in little to no degradation, fragmentation, and loss of sensitive species habitat in GRSG PHMA, but this restriction may shift land and realty project focus to GRSG designated GHMA or other non-grouse habitat types. In areas other than PHMA, permitted ROWs would likely have effects similar to those addressed under Alternative A. These conservation measures would be more protective than conservation measures under Alternatives A and D, but less protective than under Alternative C. This represents a concerted effort to maximize connectivity and minimize sagebrush habitat fragmentation, thus indirectly benefiting other sensitive species that use these habitats.

Please refer to the lands and realty section of the FEIS for additional information and more detailed information on the effects of Alternative B.

Range

Alternative B would adjust grazing direction in GRSG PHMA, which is less than 1 percent of the land cover of the RNF. The potential effects due to livestock grazing, vegetation disturbance, and range improvements is expected to be very similar under Alternative B, as it would be under Alternative A, except there would be a few more restrictions to grazing in PHMA, thus benefiting sensitive animal species that use these habitat types. These adjustments—timing, stocking rates, and residual cover—would likely provide a minor but positive effect on habitat effectiveness and would decrease the likelihood for trampling and disturbance for sensitive animal species using areas in PHMA.

None of the sensitive amphibian species are known to occur in these areas, so there would likely be no change to sensitive amphibian species under Alternative B. This includes a very small proportion of the southern site in the analysis area where CRCT are known to occur. Mountain sucker are not found in the PHMA in the RNF. Even in the area where CRCT do occur, there would be no direct negative effects on the species from Alternative B. The indirect effects from decreasing grazing pressure on such a small part of the RNF could lead to small habitat improvements for populations of CRCT farther downstream by decreasing the amount of sediment deposited in waterways; however, these improvements would likely be so small as to not be measurable.

The indirect effects from decreasing grazing pressure on such a small part of the RNF could lead to localized habitat improvements; however, these improvements would likely be considered insignificant to sensitive species at the forest scale, particularly for those species that use a broader range of habitat types. Cumulative effects are anticipated to be similar to those of Alternative A.

Please refer to the rangeland management section of the FEIS for additional information and more detailed information on the effects of Alternative B.

Energy and Minerals

Under Alternative B, PHMA would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks. Presumably, the above protective measures would benefit those other sensitive animal species whose ranges or habitat are coincident with GRSG PHMA. This restriction could create impacts in other adjacent habitat types if there were interest in energy or

mineral development under the NSO. Direct impacts on wildlife habitats from construction and operation of energy or mineral facilities would be a similar impact for ROWs and could include direct habitat loss, fragmentation, and degradation.

Though currently there are no known active GRSG leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for the most important GRSG habitats, thereby improving conditions for sensitive species that use areas mapped as PHMA (Brewer's sparrow, CSTG, and sage sparrow). There would likely be very minor indirect benefits to fish from protecting PHMA. This alternative may shift energy and mineral development to less desirable sagebrush or non-sagebrush habitat, there may be lingering effects of not protecting all sagebrush or ADH. This alternative would minimize or eliminate the likelihood for impacts on sensitive animal species using PHMA on 1,968 acres (delineated PHMA).

Please refer to the energy and minerals related section of the FEIS for additional information and more detailed information on the effects of Alternative B.

Fire and Fuels Management

GRSG habitat, specifically PHMA, would have additional management direction designed to promote the protection of PHMA from wildfire and ensure that effects from fuels management are accomplished in a manner that benefits or does not impact GRSG. This alternative would help reduce the localized threats to PHMA from fire, compared to Alternative A. This would be a benefit to sensitive animal species that use PHMA habitats.

Please refer to the fire and fuels management related sections of the FEIS for additional information and more detailed information on the effects of Alternative B.

Cumulative Effects—Alternative B

Cumulative effects for Alternative B would be similar to those described for Alternative A. However, because this alternative places a 3 percent cap on new disturbance in the PHMA, the magnitude of cumulative impacts could be less than that described for Alternative A. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analyzing site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push any of the sensitive plant species over a threshold to a federal listing; nor would they cause concerns for population loss or species viability issues for the Forest Service units under review.

Summary of Alternative B

This alternative limits loss, fragmentation, and disturbance in PHMA to 3 percent of the area in PHMA areas and thus provides protections for GRSG habitats in these areas. Implementing the criteria would likely reduce, but not eliminate, direct and indirect effects on sensitive terrestrial or aquatic species or their habitats in sagebrush communities. Generally, activities in GHMA and the remaining sagebrush habitat would occur as they do under existing management direction or could increase as existing direction allows. Overall, impacts would be less than those projected under Alternative A.

Existing conservation measures limit some, but not all impacts on terrestrial and aquatic sensitive species. Therefore the determination for this alternative "**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"** for all terrestrial and aquatic species analyzed.

H. Effects of Alternative C to Sensitive Animal Species

This alternative would place a 3 percent disturbance cap in PHMA and GHMA (the entire 12,500-acre analysis area). Closure to grazing would further reduce disturbance in ADH (Refer to Chapter 2 in this document, and Tables 1 and 2)

Recreation and Travel

Under Alternative C, road and trail construction would be limited in ADH, and no new roads would be constructed within 4 miles of a lek or occupied habitat. Under this alternative, effects would be similar to those mentioned in Alternative B, except that they would apply to ADH and not just PHMA. This is the most restrictive alternative for recreation and travel.

There would be very few if any negative effects from this alternative on sensitive species occurring in ADH as a result of recreation- or travel-related projects. Amphibians in any of the delineated area mentioned above would largely be protected, and the impacts would likely be positive, such as reduced siltation/sedimentation of ponds, wetlands, or streams; slightly improved and likely largely undisturbed breeding and foraging habitat; and less disruption of normal life history activities by humans. Therefore current population trends would stabilize or slightly improve over time.

Please refer to the recreation and travel management sections of the FEIS for additional information and more detailed information on the effects of Alternative C.

Lands and Realty

Under this alternative, ADH would be exclusion areas for ROWs and special use permits. The RNF would keep and seek to acquire GRSG ADH where interest and opportunities exist. This would result in little to no degradation, fragmentation, or loss of sensitive wildlife habitat in all areas of ADH. Therefore this would have the most protective measures, thus benefiting sensitive animal species in these areas.

Alternative C would have the most protective measures for all GRSG habitat. Under this alternative, ADH would be managed as an exclusion area for new ROW projects. In addition, Alternative C would encourage consolidation of GRSG habitats, facilitating habitat conservation and management. This alternative would be expected to have the least negative impacts and most positive impacts on wildlife species whose ranges overlap with GHMA and PHMA.

Maintaining continuous diverse sagebrush habitats would likely maintain good watershed and runoff patterns that sustain health of the land and the streams that bear fish.

Please refer to the lands and realty management sections of the FEIS for additional information and more detailed information on the effects of Alternative C.

Range

This alternative would eliminate grazing in ADH. This accounts for approximately 1 percent of the land cover of the RNF. If grazing were removed in these areas, there would be reductions of impacts that result from livestock grazing. The direct effects of changes to vegetation condition due to grazing and the potential for trampling of individuals, nests, or chicks, as well as the indirect effects of erosion and sedimentation from domestic livestock would be removed. Wild ungulates would still create some of these types of impacts, though to a lesser degree due to lower concentrations. This management action would result in greater vegetation cover improving hiding cover and habitat quality for sagebrush-associated species.

The positive effects of Alternative C on fish and amphibians would be even more pronounced than those described in Alternative B because all grazing would be terminated in ADH. Though this accounts for only 1 percent of the land cover of the RNF, the effects on fish downstream of these areas could be ameliorated by no cattle grazing in, near, and around riparian areas and streams in ADH. There would likely be no negative effects on fish by removing cattle from the system, but there would be substantial positive impacts of reduced sedimentation and turbidity, as well as overall riparian vegetative health and water quality. Under this alternative and based on potential positive impacts of removing grazing, CRCT may increase in population trends because of this species' limited distribution in the RNF.

There would be few if any negative effects on sensitive animal species under Alternative C with respect to range resources, but the potential for fire may increase due to increases in fine fuels.

Please refer to the rangeland management related sections of the FEIS for additional information and more detailed information on the effects of Alternative C.

Energy and Minerals

Under this alternative, ADH would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks. Presumably, the protective measures would benefit those sensitive species whose ranges or habitat are coincident with all designated GRSG habitat or the buffer. Under this alternative, effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH.

Please refer to the energy and mineral management related sections of the FEIS for additional information and more detailed information on the effects of Alternative C.

Fire and Fuels Management

Alternative C would aim to protect and restore sagebrush habitats in all designated GRSG habitat using native seed post fire, with all burned areas closed to grazing post wildfire. Any reduction in wildfire near and around sagebrush habitats would likely benefit GRSG and other sensitive species in the short term. Alternative C extends management direction throughout ADH, as opposed to just priority habitat in Alternative B, thus increasing the potential for retaining larger areas of sagebrush ecosystem in a condition more suitable for GRSG, This may improve opportunities for population expansion in the future. Under this alternative, effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH.

Please refer to the fire and fuels management related sections of the FEIS for additional information and more detailed information on the effects of Alternative C.

Cumulative Effects—Alternative C

Cumulative effects for Alternative C would be similar to those described for Alternatives A and B. Because this alternative limits the level of disturbance, the magnitude of cumulative impacts could be less than those for either Alternative A or B. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analysis of site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push any of the sensitive plant species over a threshold toward a federal listing; nor would it cause concerns for population loss or species viability issues from the Forest Service units under review.

Summary of Alternative C

This alternative limits habitat loss, fragmentation, and degradation in ADH across the analysis area, providing conservation for sensitive terrestrial and aquatic species and their habitats. The implementation of the criteria would reduce but not eliminate adverse direct and indirect effects on sensitive terrestrial or aquatic species or their habitats in sagebrush. Generally, activities in the sagebrush habitat outside ADH would occur as they do currently or could expand as existing direction allows. Overall, impacts would be less than those expected for all other alternatives.

Existing conservation measures limit some but not all impacts on terrestrial and aquatic sensitive species. Therefore the determination for this alternative "**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"** for all terrestrial and aquatic species analyzed.

I. Effects of Alternative D to Sensitive Animal Species

Alternative D would apply a 5 percent disturbance cap in ecological sites that support sagebrush in PHMA, calculated in CMZs. Range management would aim to meet GRSG habitat objectives in ADH. Most protections from fire and fuels management activities would apply to ADH (

Refer to Chapter 2 in this document, and Tables 1 and 2)

Recreation and Travel

Under this alternative, the effects of most suggested management actions would be similar to Alternative B. The exception is that more flexibility or discretion would be given to the land management agency to allow route construction in PHMA, road improvements, and Special Recreation Permits (SRP) issuance if it were determined that these actions would not adversely affect GRSG or their habitat. Any new roads could be constructed to the highest standard and it would allow roads to be upgraded based on no adverse effect on GRSG. Seasonal closure areas in ADH would also be identified for GRSG.

Under this alternative, if populations and habitats are healthy or improving, it could permit disturbance above the 5 percent cap for the CMZ. Effects of this alternative allow for greater disturbance to sensitive species habitat, compared to Alternatives B or C, although distinctions and overall effects on recreation and travel are minor among the action alternatives and likely insignificant in the RNF due to the limited designated GRSG habitat.

Please refer to the recreation and travel management sections of the FEIS for additional and more detailed information on the effects of Alternative D.

Lands and Realty

Alternative D is very similar to Alternative B, with the major differences being no ROWs would be permitted in PHMA and the RNF would keep and seek to acquire lands in PHMA where interest and opportunity may enable acquisition. This would result in the potential for minimal impacts from lands and realty management in PHMA, but it could shift impacts to GHMA or other habitat types. In non-PHMA, permitted ROWs would likely have effects similar to those addressed in Alternative A.

Under Alternative D, PHMA would be managed as an avoidance area, but new ROW projects would be allowed in designated corridors. ROWs would also be allowed in PHMA if the project would not adversely affect GRSG populations. PHMAs would be exclusion areas for large transmission lines (greater than 230 kilovolts), and 68,000 acres would be managed as avoidance areas for large

transmission lines. This alternative would be more protective than Alternative A but less protective than Alternatives B and C for sensitive animal species using GRSG habitats. However, due to the extent of habitat on RNF, the effects would be similar to Alternatives B and C.

Please refer to the lands and realty management related sections of the FEIS for additional and more detailed information on the effects of Alternative D.

Range

Alternative D would be similar to Alternative B but would be slightly more restrictive as GRSG habitat objectives in grazing allotments would be applied to ADH and not just PHMA. This alternative would have more management direction than Alternative A and B, resulting in a benefit to sensitive animal species, but this benefit would be less that that realized with Alternative C. Generally speaking, if GRSG habitat were taken into consideration before applying the management action, then GRSG and other sensitive animal species would likely benefit from that protection or management action.

Under this alternative, vegetative composition and structure would be managed to be consistent with ecological site potential. Riparian areas and wet meadows would be managed for proper functioning condition and to maintain diverse species richness. New water developments would be authorized only after determining that GRSG would not be adversely impacted from habitat loss. In PHMAs sagebrush ecosites retain a minimum of 70 percent of the ecological sites capable of supporting 12 percent canopy cover of Wyoming sagebrush or 15 percent canopy cover of mountain sagebrush. Alternative D management would allow a total disturbance cap of less than 30 percent. New range improvement projects would be designed to enhance livestock distribution, timing, and use.

Please refer to the rangeland management related sections of the FEIS for additional and more detailed information on the effects of Alternative D.

Energy and Minerals

Under this alternative, PHMA would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks, similar to Alternative B. However, with some mineral development, this alternative would allow up to 5 percent disturbance in any CMZ. Direct effects would be similar to those under Alternative B. There could be a few more impacts if the disturbance allowance were increased from 3 percent to 5 percent. Therefore effects would be similar to those described under Alternative B and would be mostly positive.

Please refer to the energy and mineral management related sections of the FEIS for additional and more detailed information on the effects of Alternative D.

Fire and Fuels Management

Alternative D is generally the same as Alternative B and much of Alternative C, except that it extends almost all the same protections across all ADH, not just PHMA. Alternative D would be the most restrictive of all the alternatives for fire and fuels management and therefore the most protective for sensitive animal species. Alternative D would help reduce the local threats to ADH from fire, compared to Alternative A. This would be a benefit to sensitive animal species that use ADH habitats.

Under Alternative D, in PHMA, sagebrush would not be reduced to less than 15 percent unless a vegetation management objective required additional reduction. Seasonal restrictions would be applied for implementing treatments. Fire would not be used to treat sagebrush in areas of less than 12 inches

of precipitation. Treated areas would be rested from livestock grazing for two full growing seasons unless vegetation recovery were to dictate otherwise.

Please refer to the fire and fuels management related sections of the FEIS for additional and more detailed information on the effects of Alternative D.

Cumulative Effects—Alternative D

Cumulative effects for Alternative D would be similar to those for Alternatives A and B. However, because Alternative D places a 5 percent cap on new disturbance in the PHMA, the magnitude of disturbance could be more than that described for Alternative B or the proposed plan amendment. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analyzing site-specific projects when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push any of the sensitive terrestrial or aquatic species over a threshold toward a federal listing; nor would they cause concerns for population loss or species viability.

Summary of Alternative D

Alternative D has provisions that fall that provide protections that fall between those of Alternatives A and B. It includes a cap on disturbance in PHMA, while there is no similar limit under Alternative A. The allowance of 5 percent disturbance in PHMA would allow some additional habitat loss and degradation. Limited conservation in the remaining sagebrush habitat could allow changes in habitat quantity, quality, and ownership in sagebrush habitat on the units. None of the proposed conservation measures is specific to sensitive plant species.

Existing conservation measures limit some, but not all impacts on terrestrial and aquatic sensitive species. Therefore the determination for this alternative "**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"** for all terrestrial and aquatic species analyzed.

J. Effects of The proposed plan on Sensitive Animal Species

The proposed plan would apply a 3 percent disturbance cap to PHMA, calculated in a Biologically Significant Unit (the CMZ). The proposed plan expands many of the conservation measures in Alternative B to all designated GRSG habitat. Grazing use guidelines would be applied in each of the seasonal GRSG habitats, and other grazing guidelines would focus on protecting areas within 1.2 miles of active leks (regardless of which type of habitat the lek is in). Most protections from fire and fuels management activities would apply to ADH. (Refer to Chapter 2 in this document, and Tables 1 and 2).

Recreation and Travel

Under The proposed plan, there would be no new road or trail construction in PHMA or GHMA. No road or trail maintenance would be allowed within 2 miles of an active lek during lekking (March 1 to April 30). In addition, recreational use permits would be given in PHMA or GHMA only if there were a neutral or beneficial impact on GRSG.

Sensitive animal species that use PHMA and GHMA, would improve relative to the effects of Alternative A. These positive impacts would be no new road or trail construction, road density, recreational disturbance, and opportunities for collisions and reduced indirect impacts on adjacent areas from sedimentation to wetland systems. Therefore sensitive animal species using these areas are likely to benefit from added management direction under The proposed plan, compared to Alternative

A. Since only a small portion of the RNF is considered PHMA, the effects would likely be minor to negligible, but any management direction leading to conservation would be a positive effect.

Please refer to the Recreation and Travel section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Lands and Realty

Under the proposed plan, PHMA and GHMA would be managed as avoidance areas for new SUA projects. No new roads or aboveground structures would be authorized within 1 mile of an active lek. PHMAs and GHMAs would be managed as avoidance areas for high voltage transmission lines (greater than 100 kilovolts). In addition, The proposed plan would encourage the retention, acquisition, and consolidation of GRSG habitat areas, facilitating conservation of GRSG and other species that depend on sagebrush ecosystem. The RNF would keep its PHMA and would work to acquire more. This would result in little to no degradation, fragmentation, and loss of sensitive species habitat in GRSG PHMA; however, this restriction may shift land and realty project focus to GRSG-designated GHMA or other non-grouse habitat types. In non-PHMA, permitted ROWs would likely have effects similar to those under Alternative A. These conservation measures would be more protective than those under Alternatives A and D but less protective than Alternative C. This represents a concerted effort to maximize connectivity and minimize fragmentation of sagebrush habitats, thus indirectly benefiting other sensitive species that use these habitats.

Please refer to the lands and realty section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Range

The proposed plan would adjust grazing direction in GRSG PHMA, which is less than 1 percent of the land cover of the RNF. The potential effects of livestock grazing, vegetation disturbance, and range improvements are expected to be similar under The proposed plan as under Alternative A. The exception is that there would be a few more restrictions to grazing in PHMA, thus benefiting sensitive animal species that use these habitat types. These adjustments—timing, stocking rates, and residual cover—would likely provide a minor but positive effect on habitat effectiveness and would decrease the likelihood for trampling and disturbance for sensitive animal species using areas in PHMA.

Because none of the sensitive amphibian species are known to occur in these areas, there would likely be no change to sensitive amphibian species under The proposed plan. The indirect effects from decreasing grazing pressure on such a small part of the RNF could lead to small habitat improvements for populations of CRCT farther downstream by decreasing the amount of sediment deposited in waterways; however, these improvements would likely be so small as to not be measurable.

The indirect effects from decreasing grazing pressure on such a small part of the RNF could lead to localized habitat improvements; however, these improvements would likely be considered insignificant to sensitive species at the forest scale, particularly for those that use a broader range of habitat types. Cumulative effects are anticipated to be similar to Alternative A.

Please refer to the rangeland management related section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Energy and Minerals

Under the proposed plan amendment, no new leasing in ADH would be allowed within 1 mile of an active lek. There would be NSO in PHMA and within 2 miles of active leks in GHMA. A no activity buffer of 4 miles in active leks from March 1 to July 15 would be enforced. For wind and solar projects PHMA would be excluded and GHMA would be avoidance areas. PHMAs would be closed to new mineral materials sales and new nonenergy mineral leasing. NSO would be precluded on existing nonenergy leasable mineral leases within 2 miles of active leks in PHMAs. Presumably, the above protective measures would benefit those other sensitive animal species whose ranges or habitat are coincident with GRSG PHMA. This restriction could create impacts in adjacent habitat types if there were interest in energy or mineral development under the NSO. Direct impacts on wildlife habitats from constructing and operating energy or mineral facilities would be similar to the impact for SUAs and could include direct habitat loss, fragmentation, and degradation.

Though currently there are no known active GRSG leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for the most important GRSG habitats, thereby improving conditions for sensitive species that use areas mapped as PHMA (Brewer's sparrow, CSTG, and sage sparrow). There would likely be very minor indirect benefits for fish by protecting PHMA. This alternative may shift energy and mineral development to less desirable sagebrush or non-sagebrush habitat, thus there may be lingering effects of not protecting all sagebrush or ADH. This alternative would minimize or eliminate the likelihood for impacts on sensitive animal species using PHMA on 1,968 acres (delineated PHMA).

Please refer to the energy and minerals related section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Fire and Fuels Management

Sage-grouse habitat, specifically PHMA, would have additional management direction designed to protect PHMA from wildfire and ensure that effects from fuels management benefit or do not impact GRSG. This alternative would help reduce the localized threats to PHMA from fire, compared to Alternative A. This would be a benefit to sensitive animal species that use PHMA habitats.

Please refer to the fire and fuels management related sections of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Cumulative Effects—The proposed plan

Cumulative effects for the proposed plan would be similar to those described for Alternatives A and B. However, because the proposed plan places a 3 percent cap on new disturbance in the PHMA, the magnitude of cumulative impacts could be less than those described for Alternative A and the same for Alternative B. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analysis of site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push any of the sensitive terrestrial or aquatic species over a threshold toward a federal listing; nor would they cause concerns for population loss or species viability.

Summary of the proposed plan

This alternative has provisions that are more protective than those in Alternatives A and D, but less protective than alternatives B and C. The proposed plan does include a cap on disturbance in PHMA, while there is no similar limit under Alternative A. The allowance of 3 percent disturbance in PHMA

will allow some additional habitat loss and degradation but not as much as Alternative D, which includes a 5 percent disturbance cap. Limited conservation in the remaining sagebrush habitat could allow changes in habitat quantity, quality, and ownership in sagebrush habitat on the units. Implementation of the measures would likely reduce but not eliminate direct and indirect effects on sensitive terrestrial or aquatic species or their habitats in PHMA and some areas of ADH.

Existing conservation measures limit some but not all impacts on terrestrial and aquatic sensitive species. Therefore the determination for this alternative "**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"** for all terrestrial and aquatic species analyzed.

K. General Effects of All Alternatives on Sensitive Plant Species

No Region 2 sensitive plants are known to occur in the action area; however, no plant surveys have been conducted specifically for this analysis. Where suitable habitat is available and surveys have not been conducted, species are assumed to be present, unless they are known to occur only in areas distant from the analysis area. Since the specific characteristics of suitable habitat for most rare species are not known, habitat is assumed to be suitable if it is of the same general type as known habitat. If, for example, the species occurs in fens, then all fen habitat is assumed to be suitable, unless it is obviously of the wrong type or at the wrong elevation for the species. This assumption likely overestimates the amount of suitable habitat. In many instances, a species may not occur in habitat that appears to be very similar to areas where it does occur. In those cases, there may be subtle differences that are not discernable without in-depth studies. In many cases it is likely that the available habitat in the analysis area is not suitable due to subtle differences from known habitat. Since that cannot be known for certain, the habitat is assumed to be suitable and the species are assumed to be present if surveys have not been conducted, unless otherwise noted.

Programmatic plans, such as the proposed RNF LRMP Amendment, allow but do not authorize or approve any site-specific projects or actions. They are much like zoning ordinances under which future decisions are made. Decisions at the LRMP level establish goals and objectives, identify the types of activities that are allowed or prohibited in specific areas, may specify management standards and minimum habitat condition goals either unit wide or for specific areas, and may establish a monitoring and evaluation program.

This BE does not analyze site-specific actions (e.g., ongoing and new roads or other disturbances or ongoing, new, or renewed permits). Effects determinations made in this document should not be assumed to relate to site-specific projects. In the future, during project-level environmental planning and analysis, site-specific actions will continue to be analyzed to identify possible effects on listed and R2 sensitive species. Site-specific analysis of such actions may identify potential effects on species even when this programmatic evaluation determines no effect. As part of any future project-level environmental analysis, specific conservation measures and strategies to alleviate any potential adverse effects may be developed as the details of the future proposed actions become available.

The analysis area occurs in parts of six counties in northwestern Colorado: Garfield, Grand, Jackson, Moffat, Rio Blanco, and Routt. Seven of the plant species analyzed in detail have not been found in those counties, in the RNF, or near the analysis area; they are as follows: elliptic spikerush, Colorado tansyaster, white adder's-mouth orchid, salix candida, club spikemoss, largeflower triteleia, and Selkirk violet. Species that are not known in the counties in the analysis area or in the RNF are less likely to occur or have suitable habitat in PHMA or GHMA in the analysis area. Since known occurrences of these species are distant from the analysis area, it is likely that either habitat

requirements are not met in the analysis area or that the species have not been able to become established in the analysis area from the distant sites.

Direct Effects on Plant Species Evaluated

A reduction in potential direct effects on sensitive plants is the most likely result from the proposed amendment to the RNF LRMP, due to the restrictive nature of the conservation measures. No ground-disturbing actions are proposed that are not already authorized. Many potential disturbances in PHMA and GHMA may be prevented or reduced. Ongoing authorized uses would generally continue, with some changes intended to improve the ecological condition of sagebrush habitats.

Several of the sensitive plants need bare ground or open spaces to thrive, so they may benefit from some disturbance. Moonworts can grow in sparsely vegetated areas, typically in areas that have been disturbed up to 50 years in the past (Beatty et al. 2003). Other plants that often grow in sparse vegetation are dropleaf buckwheat, Weber's scarlet gilia, Harrington beardtongue, and rock cinquefoil. Some disturbance in the vicinity of these plants may have beneficial effects by opening the ground surface to colonization by those plants, but only if the adverse effects of disturbance, such as trampling, compaction, and invasive plant establishment or spread, are not greater than the beneficial effects.

The effects of grazing and trampling impacts on individuals, populations, and habitat quality depend on plant species biology (e.g., response to herbivory and tolerance of trampling), type of grazer (e.g., cattle, deer, elk, or sheep), timing of grazing (e.g., season), grazing intensity (e.g., stocking density), habitat type (e.g., meadow or forest), and site conditions (e.g., topography, moisture, or invasive plants; Beatty et al. 2003a).

Several studies on *Botrychium* species (moonworts), for instance, have found that the loss of aboveground biomass either through herbivory, fire, or plant collection seems to have no effect on the subsequent return of the plant the following year (Beatty et al. 2003a). Because nutrition may be supplied through interactions with mycorrhizal fungi, moonwort individuals may be more tolerant of removal of leaf tissue by herbivores or other disturbances. Removing the current year's growth may not affect future years' growth, unless the underground structures are damaged or the plant cannot reclaim significant energy. For this reason *Botrychium* species may be more likely to be damaged by trampling than by herbivory.

Timing of disturbance may result in direct effects on individuals and populations, but the nature of these effects varies. Some species are thought to overcompensate for lost biomass by producing additional seed-bearing stems, but effects on any given species may be variable. For example, early season grazing of *Ipomopsis aggregata* may (Paige 1992; Paige and Whitham 1987) or may not (Ladyman 2004; Bergelson and Crawley 1992) lead to overcompensation. Grazing can also delay plant phenology (Bergelson and Crawley 1992), and late season grazing of *Ipomopsis aggregata* consistently reduces performance of affected plants (Bergelson and Crawley 1992).

Dropleaf buckwheat, lesser panicled sedge, and Rocky Mountain monkeyflower are noted as being susceptible to fire. If undiscovered individuals of these species are present in the analysis area, they could be affected by wildland or prescribed fire under any of the alternatives. Although fire is not listed as a threat for other species, they could also be affected under any alternative. Intense fires that burn deeply into the ground could damage *mychorrhizae* associated with plants or the underground structures of moonworts.

Indirect Effects on Plant Species Evaluated

Indirect effects of management activities include increased soil compaction, erosion, and sedimentation (resulting from hoof action and motor vehicles), and introduction or spread of invasive species. These indirect effects can degrade habitat, which ultimately displaces individuals or populations of plant species. As authorized activities (such as grazing, mining, and recreation) continue, indirect effects may also continue to impact sensitive plants and their habitats.

Despite designs to avoid livestock concentration, livestock grazing can result in moderate to intense local ground disturbance. While detrimental to most species, this may be beneficial to others, at least when the disturbance is minimal, limited in space, or temporary. For example, *Botrychium* species are mostly found in areas that have been disturbed in the past and have begun to recover.

Invasive species often occur where habitats are disturbed. Some invasive species can be introduced and spread by forest management that disturb the ground surface. Invasive species can also alter composition of native plant communities, often displacing native plant species (Olson 1999).

Changes in plant community composition can alter animal use patterns (Olson 1999). If the community composition shifts to undesirable, unpalatable, or toxic species, animals are likely to avoid or abandon the area (Olson 1999; Zouhar 2003), which may increase grazing pressure on other plant communities. Invasive species presence can add to other disturbances and can change the mycorrhizal communities that are critical to some plant species (With 2002).

Ungulate grazing and browsing pressure may have substantial effects on vegetation dynamics (Randall and Walters 2011). By altering vegetation composition, the proposed activities may modify forage condition and quality, thus leading wild and domestic ungulates to change their foraging patterns.

Soil compaction could occur where any activities are concentrated (for example, mining activities, recreation activities, and livestock grazing). The negative effects of soil compaction have been documented by numerous authors and studies (Cochran and Brock 1985; Daddow and Warrington 1983). Effects occur when forces exerted on the soil (such as from the weight of machinery or large animals) reduce pore space, particularly macro pores that provide for air and water movement through soils (Adams and Froehlich 1981). Activities that compact soils and reduce pore space can affect both soil microorganisms and plants themselves.

The following are the existing conservation measures in the RNF LRMP which will benefit plants:

Existing Conservation Measures from the Routt National Forest Land and Resource Management Plan (Forest Service 1998)

Forest Goals and Objectives

Goal 1—Ecosystem management on the Routt National Forest shall provide for multiple-use outputs and the habitats and processes necessary to maintain the biological diversity found on the Forest.

Objectives

Maintain or create habitats suitable for a stable or increasing population of federally listed threatened and endangered species and Forest Service, Region 2 sensitive species for the Routt National Forest, including the Colorado River cutthroat trout.

Threatened, Endangered, Sensitive Species, and Wildlife Standards

Where newly discovered threatened, endangered, proposed, or sensitive species habitat is identified, conduct an analysis to determine if any adjustments in the forest plan are needed. Manage activities to avoid disturbance to sensitive species which would result in a trend toward Federal listing or loss of

population viability. The protection will vary depending on the species, potential for disturbance, topography, location of important habitat components, and other pertinent factors. Give special attention during breeding, young rearing, and other times which are critical to survival of both flora and fauna. Avoid disturbing threatened, endangered, and proposed species (both flora and fauna) during breeding, young rearing, or at other times critical to survival by closing areas to activities. Exceptions may occur when individuals are adapted to human activity, or the activities are not considered. In land adjustment activities, give priority to acquiring lands that contain habitat identified by Fish and Wildlife Service as necessary for recovery of federally listed threatened and endangered species.

Real Estate—Land Adjustments Standards

In land adjustment activities including land exchange, purchase, disposal, and donation, consider the following: b) Consider the effect of land adjustments on sensitive species habitat. Avoid land adjustments which could result in a trend toward federal listing or loss of population viability for any sensitive species. Ownership of sensitive species habitat can be conveyed if conveyance would not result in a trend toward federal listing or adversely impact the population viability of the species or if effects could be mitigated. c) Acquire lands that contain resource values identified during scoping as important in contributing toward national forest system resource management goals and objectives as stated in the forest plan. Examples include: wetlands, riparian areas, essential wildlife habitat, threatened or endangered species habitat, sensitive species habitat, significant cultural resources, timber lands, rangelands, or other areas.

Range Standards

1. Provide mitigation measures to protect national forest resources from animal damage control activities conducted by other governmental entities. Mitigation measures emphasize protection of public safety; threatened, endangered, or sensitive species; water quality; and other resource values.

G. Effects of Alternative A on Sensitive Plant Species

Recreation and Travel

There would be no changes to the current system of roads, transportation, or recreation management. There would be few seasonal restrictions on casual use, and some new roads would be permitted and existing roads would be upgraded. There are few restrictions on recreation special uses. In general, more acres and linear miles of travel routes and recreational use equate to a greater likelihood of loss or disturbance of habitat. Impacts are physical damage to individuals or habitat. Habitat fragmentation may disrupt plant-pollinator relationships. Growth, development, root storage, or seed set may be reduced or individual mortality might occur. There could be increased erosion, sedimentation, soil compaction, or invasive weed spread.

Lands and Realty

There would be no changes to the current approach associated with exchange, acquisition, or disposal of lands or with permitting ROWs on Forest Service-administered lands. Impacts on sensitive plants from such exchanges would be considered and mitigated in accordance with Forest Service policy (see Existing Conservation Measures section above). All National Forest System-administered lands would continue to be managed according to Forest Service policy and regulation. Permitted ROWs would continue to allow construction, maintenance, and operations that may result in habitat loss or disturbance. Other impacts may include new infestations of noxious or invasive weeds, physical damage or death to individuals, erosion, sedimentation, and soil compaction. Plant species that require

open areas or bare soils may benefit in some situations. Though most projects would attempt to mitigate or minimize impacts on R2 sensitive species, there could be loss of habitat.

Range

There would be no change in the numbers, timing, or method of livestock grazing. Potential effects on plant habitat could include site-specific overgrazing, structure and diversity of residual vegetation reduction from consumption, and rangeland habitat degradation due to trampling. Growth, development, root storage, and seed set may be reduced or individual plant mortality might occur. Other impacts are new infestations of noxious or invasive weeds, physical damage or erosion, sedimentation, and soil compaction. Species requiring disturbance could benefit from the disturbance but not the other impacts, such as plant loss, habitat loss, spread of invasive weeds, or soil compaction. The RNF LRMP and other range direction usually provide for sufficient cover and diversity for healthy plant habitat across the forest.

Energy and Minerals

Only a small percentage of PHMA would be closed to nonenergy leasable minerals. Although R2 sensitive species occurrences are generally protected from disturbance, some sensitive species habitat may be open to leasing, including new lease expansion. This alternative could allow habitat loss and degradation of sagebrush habitat. There could be physical damage or death to individual plants if undiscovered individuals occur in the energy and minerals activity areas. Other impacts may include new infestations of noxious or invasive weeds, physical damage, or erosion, sedimentation, and soil compaction. Species that depend on sparse vegetation conditions could benefit from the disturbance but not the other impacts, such as plant loss, habitat loss, spread of invasive weeds, or soil compaction.

Fire and Fuels Management

There would be few restrictions for fuels management in sagebrush. Therefore Alternative A could allow a large amount of habitat loss and sagebrush habitat degradation. There could be physical damage or death to any undiscovered individual plants. Other impacts may include new infestations of noxious or invasive weeds, physical damage, erosion, or sedimentation. Fire-adapted plant species and plant species that favor early successional habitats could benefit. However, species dependent on mature plant communities could be negatively affected by fire and associated changes in vegetation.

Additional impacts on sensitive plant species could result from the direct and indirect effects of fire suppression. The creation of fire lines could result in direct mortality to individual plants or negative impacts associated with alteration of their habitat through soil disturbance, alteration of hydrology, and promotion of the establishment or spread of invasive nonnative species.

Applying fire retardant can negatively impact some plant species by killing entire plants, burning shoots and leaves, and reducing germination rates (Bell et al. 2005). Fire retardant also can have fertilizing effects and promote the spread of invasive nonnative species (Bell et al. 2005). Longer term impacts on plant species could occur from fire suppression. Fire suppression may initially result in higher rates of pinyon-juniper encroachment in some areas. In the initial stages of encroachment (phase I), fuel loadings remain consistent with the sagebrush understory. As pinyon-juniper encroachment advances (Phases II and III) and the understory begins to thin, the depleted understory causes the stands to become resistant to wildfire and further alters fire return intervals. During years of high fire danger, the resulting heavy fuel loadings in these stands can contribute to larger-scale wildfire events and confound control efforts due to extreme fire behavior. Such high-severity fires can negatively impact native plant species by promoting the establishment of exotics (Hunter et al. 2006).

Although impacts from fire and fuels management could occur on any of the sensitive plants in Table 3, those for which fire has been identified as a major potential threat are dropleaf buckwheat, lesser panicled sedge, and Rocky Mountain monkeyflower.

Cumulative Effects on All Plant Species Evaluated

There could be cumulative effects in addition to the impacts described above. These plants occur on private, state, and BLM-administered land next to the RNF. Potential effects described above may also occur on other ownerships. There are some existing conservation measures on these other lands, especially those administered by the BLM. There could be additional plant and habitat loss, degradation, soil compaction, or invasive weed spread from recreation and travel, ROWs, energy and mineral development, fire and fuels treatments, range management, or other activities in sagebrush habitat outside the RNF.

On the RNF, the limitation or prohibition of the use of prescribed fire in sagebrush habitats and the sagebrush protection emphasis during wildland fire operations would not be instituted as they would be in Alternatives B, C, and D. Under Alternative A, the direct and indirect effects in conjunction with the past, present, and reasonably foreseeable future actions and the likelihood of increasing future fires from annual weed invasions and predicted climate change may increase loss and fragmentation of the existing sagebrush habitat from wildfire, which could contribute to negative cumulative impacts on sensitive plants.

Summary of Alternative A

Under Alternative A, the No Action Alternative, current management actions would continue unchanged. The condition of terrestrial and aquatic plant populations in GRSG-designated habitat would continue to reflect the effects of all past and current management activities. Direct effects on all plant species habitat under current management are trampling by livestock, wildlife, motor vehicles, and foot traffic), damage from fire, and grazing. Potential indirect effects are soil compaction, erosion, sedimentation, competition from invasive species, habitat fragmentation, and hydrological condition alteration. These impacts can physically damage individuals, populations, and the habitat where they grow. This may reduce growth, development, and seed set. Such impacts may also cause mortality of individuals. These impacts on individual plants can reduce population size, change meta-population structure, and potentially affect the viability of the species on the planning unit or across the species' range.

Seven Region 2 sensitive plant species— *Eleocharis elliptica*, *Machaeranthera coloradoensis*, *Malaxis brachypoda*, *Salix candida*, *Selaginella selaginoides*, *Triteleia grandiflora*, and *Viola selkirkii*—have not been found in the project area or in the counties where the project is located, and their habitats are much less likely to occur there. For those species, Alternative A would have **no impact**.

Existing conservation measures limit some but not all impacts on plant species. Although no Region 2 sensitive plants have been found in the analysis area, for species with a greater likelihood of habitat in the analysis area, impacts on potentially suitable habitat would be possible. Therefore the determination for this alternative "**may adversely impact individuals, but not likely to result in a loss of viability in the analysis area, nor cause a trend toward federal listing"** for *Astragalus leptaleus*, *Botrychium lineare*, *B. paradoxum*, *Carex diandra*, *Eriogonum exifolium*, *Eriophorum gracile*, *Ipomopsis aggregate* ssp. *weberi*, *Mimulus gemmiparus*, *Penstemon harringtonii*, *Potentilla rupincola*, *Rubus arcticus* var. *acaulis*, *Salix serissima*, and *Utricularia minor*.

L. Effects of Alternative B on Sensitive Plant Species

Alternative B would place a 3 percent cap on disturbance in the PHMA, which accounts for approximately 13 percent of the analysis area. Outside the PHMA, activities would continue under current management.

Recreation and Travel

Under Alternative B there would be limited opportunities for road construction in PHMA, with minimum standards applied and no upgrading of current roads. In addition, recreational use permits would be given in PHMA only if there were a neutral or beneficial impact on GRSG.

Alternative B measures allow less habitat degradation or loss than Alternative A and would retain more sagebrush habitat and more undisturbed sagebrush habitat. If they were to occur in PHMA, sensitive plants and habitat would improve relative to the effects of Alternative A. Impacts, largely positive, are limited road construction resulting in less use, road density, recreational disturbance, opportunities for collisions, and reduced indirect impacts on adjacent areas from sedimentation to wetland systems. Therefore sensitive plant species with suitable habitat in these areas are likely to benefit from added management direction under Alternative B compared to Alternative A. Since only a very small portion of the RNF is considered PHMA, the effects would likely be minor to negligible, but any management direction leading to conservation would be a positive effect.

The 3 percent cap on disturbance would reduce but not eliminate the potential direct and indirect effects described in Alternative A. Reductions in the amount of disturbance could benefit individuals and populations of species that occur in meadow or shrublands habitats but would not likely affect any species as a whole. Of course, benefits would occur only on PHMA, not all habitat for these plants. Species outside PHMA would still be subject to direct effects, as described for Alternative A.

Lands and Realty

Under Alternative B, PHMA would be managed as an exclusion area and GHMA would be managed as an avoidance area for new ROW projects. In addition, Alternative B would encourage the retention, acquisition, and consolidation of GRSG habitat areas, facilitating conservation for GRSG and other species that depend on sagebrush ecosystems. The RNF would keep and work to acquire PHMA. This would result in little to no degradation, fragmentation, and loss of sensitive species habitat in GRSG PHMA; however, this restriction may shift land and realty project focus to GRSG designated GHMA or other non-grouse habitat types. In non-PHMA, permitted ROWs would likely have effects similar to those addressed in Alternative A. Alternative B conservation measures for GRSG would be more protective than conservation measures in Alternatives A and D but would be less protective than Alternative C. Alternative B represents a concerted effort to maximize connectivity and minimize fragmentation of sagebrush habitats, thus indirectly benefiting other sensitive species that use these habitats.

Range

Alternative B proposed conservation measures would benefit sensitive plant species. The potential effects due to livestock grazing and range improvements would be similar to Alternative A, except that Alternative B provides a few more restrictions to protect habitat. GRSG PHMA accounts for 13 percent of all GRSG habitat in the RNF, so changes would be variable and localized. There could be areas of improved habitat for plant health, growth, development, root storage, or seed set. Species requiring open ground and sparse vegetation cover could benefit from ground disturbance but not the

associated impacts, such as plant loss, habitat loss, compaction, or weed increases. Proposed adjustments, timing, stocking rates, and residual cover, would likely provide a minor but positive effect on habitat and decrease the likelihood for trampling and disturbance for sensitive plant species using areas in PHMA.

The indirect effects from decreasing grazing pressure on such a small part of the RNF could lead to localized habitat improvements; however, these improvements would likely be considered insignificant to sensitive species at the forest scale, particularly for those species that use a broader range of habitat types.

Energy and Minerals

Under this alternative, PHMA would be closed to new fluid mineral leases and existing leases would have a 4-mile NSO buffer around leks. Presumably, the above protective measures would be expected to benefit those sensitive plant species whose ranges or habitat are coincident with GRSG PHMA. This restriction could create impacts on other adjacent habitat types if there were interest in energy or mineral development under the NSO. Direct impacts on plant habitats from construction and operation of energy or mineral facilities would be similar to impacts for ROWs and could include direct plant loss, habitat loss, fragmentation and degradation.

Though currently there are no known active GRSG leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for the most important GRSG habitats, thereby improving conditions for sensitive species that may use areas mapped as PHMA. This alternative may shift energy and mineral development to less desirable sagebrush or non-sagebrush habitat; there may be lingering effects of not protecting all sagebrush or ADH. This alternative would minimize or eliminate the likelihood for impacts on sensitive plant species using PHMA

Fire and Fuels Management

GRSG habitat, specifically PHMA, would have additional management direction designed to protect PHMA from wildfire and ensure that effects from fuels management are accomplished in a manner that benefits or does not impact GRSG. This alternative would help reduce the localized threats to PHMA from fire, compared to Alternative A. This would be a benefit to sensitive plant species that use PHMA habitats.

Cumulative Effects on All Plant Species Evaluated

Cumulative effects for Alternative B would be similar to those described for Alternative A. However, because this alternative places a 3 percent cap on new disturbance in the PHMA the magnitude of cumulative impacts could be less than that described for Alternative A. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analysis of site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push any of the sensitive plant species over a threshold toward a federal listing; nor would they cause concerns for population loss or species viability issues in the RNF.

Summary of Alternative B

Alternative B limits loss, fragmentation, and disturbance in PHMA to 3 percent of the area. So, there would be benefits to individual plants and habitat in PHMA. None of the proposed GRSG design criteria is specific to sensitive plant species. Implementing the criteria would likely reduce but not

eliminate direct and indirect effects on sensitive plants and habitat in sagebrush. Generally, activities in GHMA and the remaining sagebrush habitat would occur as they do currently or could expand as existing direction allows. Overall impacts would be reduced slightly, compared to Alternative A.

Seven Region 2 sensitive plant species have not been found in the project area or in the counties where the project is located, and their habitats are much less likely to occur there. For those species—*Eleocharis elliptica*, *Machaeranthera coloradoensis*, *Malaxis brachypoda*, *Salix candida*, *Selaginella selaginoides*, *Triteleia grandiflora*, and *Viola Selkirkii*—Alternative B would have **no impact**.

Existing conservation measures limit some but not all impacts on plant species. Although no Region 2 sensitive plants have been found in the project area, for species with a greater likelihood of habitat in the project area, impacts on potentially suitable habitat would be possible. Therefore the determination for this alternative "**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"** for *Astragalus leptaleus*, *Botrychium lineare*, *Botrychium paradoxum*, *Carex diandra*, *Cypripedium parviflorum*, *Eriogonum exifolium*, *Eriophorum gracile*, *Ipomopsis aggregata* ssp. *weberi*, *Mimulus gemmiparus*, *Penstemon harringtonii*, *Potentilla rupincola*, *Rubus arcticus* var. *acaulis*, *Salix serissima*, and *Utricularia minor*.

M. Effects of Alternative C on Sensitive Plant Species

This alternative would place a 3 percent cap on disturbance in PHMA and GHMA (the entire 12,500-acre analysis area). Closure to grazing would further reduce disturbance in ADH.

Recreation and Travel

Under this alternative, road and trail construction would be limited in ADH, and no new roads would be constructed within 4 miles of a lek or occupied habitat. Under this alternative, effects would be similar to those under Alternative B, except that it would apply to ADH and not just PHMA. This is the most restrictive alternative for recreation and travel.

There would be very few if any negative effects from this alternative on sensitive plant species occurring in ADH as a result of recreation or travel related projects. Any sensitive plants or habitat in any of the ADH would largely be protected, and the impacts would likely be positive, such as reduced siltation/sedimentation of ponds, wetlands, or streams, slightly improved and likely largely undisturbed habitat, and less human disruption.

Lands and Realty

Under this alternative, ADH would be exclusion areas for ROWs and special use permits. The RNF would keep and seek to acquire GRSG ADH where interest and opportunities exist. This would result in little to no degradation, fragmentation, and loss of sensitive plant habitat in all areas of ADH. In addition, Alternative C would encourage consolidation of GRSG habitats, facilitating habitat conservation and management. This alternative would be expected to have the least potential for negative impacts and the greatest potential for positive impacts on sensitive plant species whose ranges overlap with PHMA and GHMA.

Range

Alternative C would eliminate grazing in ADH. If this happened, impacts from livestock grazing would be reduced. The direct effects of changes to vegetation condition due to grazing and the potential for trampling of individuals, as well as the indirect effects of erosion and sedimentation

caused by domestic livestock, would be removed. Wild ungulates would still create some of these types of impacts, though to a lesser degree due to lower concentrations. This management action would result in greater vegetation cover and habitat quality for GRSG and sagebrush associated species. Palatable forbs may increase, allowing improved conditions for pollinators.

With the removal of grazing and potential increases in the amount of fine fuels, the potential for fire may increase. Removing domestic livestock may increase forage available to wildlife. This may increase wildlife numbers and, if wildlife populations were to increase, the negative effects of herbivory and trampling may return to levels previously experienced under domestic grazing. These indirect effects could cancel the beneficial direct effects previously described.

Energy and Minerals

Under this alternative, ADH would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks. Presumably, the protective measures would benefit those sensitive plant species whose ranges or habitat are coincident with all designated GRSG habitat or the buffer. Under Alternative C, effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH. There would be reduced physical damage or death to individual plants, reduced infestations of noxious or invasive weeds, and reduced erosion, sedimentation, and soil compaction.

Fire and Fuels Management

Alternative C would aim to protect and restore sagebrush habitats in all designated GRSG habitat using native seed post fire, with all burned areas closed to grazing post wildfire. Any reduction in wildfire near and around sagebrush habitats would likely benefit GRSG and other sensitive species in the short term. Alternative C extends management direction throughout ADH, as opposed to just priority habitat as under Alternative B, thus increasing the potential for retaining larger areas of sagebrush ecosystem in a condition more suitable for GRSG, This may improve opportunities for population expansion in the future. Under this alternative, the effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH. This alternative would not increase the open habitat that some plants need for establishment and spread.

Cumulative Effects on All Plant Species Evaluated

The cumulative effects for Alternative C would be similar to those described for Alternatives A and B. Because this alternative limits the level of disturbance in both PHMA and GHMA, the magnitude of cumulative impacts could be less than those for either Alternative A or Alternative B. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analysis of site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push any of the sensitive plant species over a threshold toward a federal listing; nor would they cause concerns for population loss or species viability issues in the RNF.

Summary of Alternative C

This alternative limits habitat loss, fragmentation, and degradation in ADH across the analysis area, providing conservation for sensitive plant habitat. However, none of the proposed GRSG conservation measures are specific to sensitive plant species. Implementing the conservation measures would likely reduce, but not eliminate, direct and indirect effects on sensitive plant habitat or any undiscovered sensitive plants growing in GRSG habitat. Generally, activities in the sagebrush habitat outside ADH

would occur as they do currently or could expand as existing direction allows. Overall, impacts on sensitive plants would be reduced, compared to all other alternatives.

Seven Region 2 sensitive plant species have not been found in the project area or in the counties where the project is located, and their habitats are much less likely to occur there. For those species—*Eleocharis elliptica*, *Machaeranthera coloradoensis*, *Malaxis brachypoda*, *Salix candida*, *Selaginella selaginoides*, *Triteleia grandiflora*, and *Viola selkirkii*)—Alternative C would have **no impact**.

Existing conservation measures limit some but not all impacts on plant species. Although no Region 2 sensitive plants have been found in the project area, for species with a greater likelihood of habitat in the project area, impacts on potentially suitable habitat would be possible. Therefore the determination for this alternative "**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"** for *Astragalus leptaleus*, *Botrychium lineare*, *B. paradoxum*, *Carex diandra*, *Cypripedium parviflorum*, *Eriogonum exifolium*, *Eriophorum gracile*, *Ipomopsis aggregata* ssp. *weberi*, *Mimulus gemmiparus*, *Penstemon harringtonii*, *Potentilla rupincola*, *Rubus arcticus* var. *acaulis*, *Salix serissima*, and *Utricularia minor*.

N. Effects of Alternative D on Sensitive Plant Species

Alternative D would apply a 5 percent disturbance cap in ecological sites that support sagebrush in PHMA, calculated in CMZs. Range management would aim to meet GRSG habitat objectives in ADH. Most protections from fire and fuels management activities would apply to ADH.

Recreation and Travel

Under this alternative, the effects of most proposed management actions would be similar to Alternative B, with the exception that more flexibility or discretion would be given to the land management agency to allow route construction in PHMA, road improvements, and issuance of special use permits if it is determined that these actions would not adversely affect GRSG. The exceptions to this would be that any new roads could be constructed to the highest standard, and the amendment would allow upgrading roads based on no adverse effect on GRSG. Under Alternative B, if GRSG populations and habitats were healthy or improving, disturbance above the 5 percent cap could be permitted for the CMZs (See the Greater GRSG section above). The effects of this alternative could include greater disturbance to sensitive plant habitat compared to Alternatives B or C, although differences are minor, and overall effects from recreation and travel are likely insignificant in the RNF due to the limited extent of designated GRSG habitat.

Lands and Realty

This alternative is similar to Alternative B, with the major differences being no ROW would be permitted in PHMA, with the exception of transmission lines for Alternative D. This would result in the potential for minimal impacts from lands and realty management in PHMA, but could shift impacts to GHMA or other habitat types. In non-PHMA, permitted ROW would likely have effects similar to those addressed in Alternative A.

Under Alternative D, PHMA would be managed as an avoidance area, but new ROW projects would be allowed in designated corridors. ROW would also be allowed in PHMA if the project would not adversely affect GRSG populations. This alternative would be more protective than Alternative A, but less protective than Alternatives B and C for sensitive plant species and potential habitat. However, due to the limited amount of GRSG habitat on RNF the effects would be similar to Alternatives B and C.

Range

Alternative D would be similar to Alternative B but would be slightly more restrictive because GRSG habitat objectives in grazing allotments would be applied to ADH and not just PHMA. This alternative would have more management direction than Alternatives A and B, resulting in benefits to sensitive plant species, but benefits would be less than under Alternative C. Generally speaking, if GRSG habitat were taken into consideration before applying the management action, then GRSG and sensitive plant species would likely benefit from that protection or management action.

Energy and Minerals

Under Alternative D, ADH would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks. However, with some mineral development, this alternative would allow up to 5 percent disturbance in any CMZ (see the GRSG section above). Direct effects would be similar to those associated with Alternative B. There could be a few more impacts if the disturbance allowance were increased from 3 percent under Alternative B to 5 percent.

Fire and Fuels Management

Alternative D is generally the same as Alternative B, except that it extends most protections across ADH not just PHMA. It would be the most restrictive for fire and fuels management and thus the most protective for sensitive plant species for fire and fuels management. This alternative would help reduce the localized threats to ADH from fire, compared to Alternative A. This would benefit most sensitive plant habitat in ADH.

Cumulative Effects of Alternative D

Cumulative effects for Alternative D would be similar to those for Alternatives A and B. However, because this alternative places a 5 percent cap on new disturbance in the PHMA, the magnitude of disturbance could be more than described for Alternative B. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analysis of site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push any of the sensitive plant species over a threshold toward a federal listing; nor would they cause concerns for population loss or species viability issues in the RNF.

Summary of Alternative D

Alternative D has provisions that fall between those of Alternatives A and B. It does include a cap on disturbance in PHMA, while there is no similar limit under Alternative A. The allowance of 5 percent disturbance in PHMA would allow some additional habitat loss and degradation. Limited conservation in the remaining sagebrush habitat could allow changes in habitat quantity, quality, and ownership in sagebrush habitat in the RNF. None of the proposed conservation measures is specific to sensitive plant species. Implementing the measures would likely reduce but not eliminate direct and indirect effects on sensitive plants growing in PHMA and some areas of ADH.

Seven Region 2 sensitive plant species—*Eleocharis elliptica*, *Machaeranthera coloradoensis*, *Malaxis brachypoda*, *Salix candida*, *Selaginella selaginoides*, *Triteleia grandiflora*, and *Viola selkirkii*—have not been found in the project area or in the counties where the project is located, and their habitats are much less likely to occur there. For those species, Alternative D would have **no impact**.

Existing conservation measures limit some but not all impacts on plant species. Although no Region 2 sensitive plants have been found in the project area, for species with a greater likelihood of habitat in the project area, impacts on potentially suitable habitat would be possible. Therefore the determination for this alternative "**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"** for *Astragalus leptaleus*, *Botrychium lineare*, *B. paradoxum*, *Carex diandra*, *Cypripedium parviflorum*, *Eriogonum exifolium*, *Eriophorum gracile*, *Ipomopsis aggregata* ssp. *weberi*, *Mimulus gemmiparus*, *Penstemon harringtonii*, *Potentilla rupincola*, *Rubus arcticus* var. *acaulis*, *Salix serissima*, and *Utricularia minor*.

O. Effects of the proposed plan on Sensitive Plant Species

The proposed plan would apply a 3 percent disturbance cap to PHMA, calculated in a Biologically Significant Unit (CMZ). The proposed plan expands many of the conservation measures in Alternative B to all designated GRSG habitat. Grazing use guidelines would be applied in each of the seasonal GRSG habitats, and other grazing guidelines would focus on protecting areas within 1.2 miles of active leks (regardless of which type of habitat the lek is in). Most protections from fire and fuels management activities would apply to ADH.

Recreation and Travel

Similar to Alternative C, the proposed plan would prohibit new road or trail construction in PHMA and GHMA, except when necessary for administrative access, public safety, or access to valid existing rights. This is more restrictive than Alternatives B and D, where a similar restriction applies only to PHMA. For travel management activities, the effects of the proposed plan could result in less disturbance to sensitive plant habitats, compared to Alternatives B or D, and would be similar to Alternative C.

Under Alternatives B, C, and D, recreation SUAs would be allowed in PHMA only for activities without the potential to adversely affect GRSG or its habitat. Under the proposed plan, this same guideline exists for SUAs in PHMA, but it should not be approved unless the development results in a net conservation gain to GRSG or their habitats or the development is required for visitor safety. In addition, the proposed plan would not allow temporary recreation facilities or activities in either PHMA and GHMA that would result in loss of habitat or would have long-term (greater than 5 years) negative impacts on GRSG or their habitats. Terms and conditions that protect or restore GRSG habitat should be included in recreation SUAs in both PHMA and GHMA. For authorizations of recreation facilities or activities, fewer disturbances to sensitive plant habitats would be expected because of the additional restrictions in GHMA, compared to Alternatives B, C, and D. For sensitive plants, the differences are minor, and overall effects from recreation and travel are likely insignificant in the RNF due to the limited extent of designated GRSG habitat.

Lands and Realty

Whereas Alternatives B and C would make PHMA exclusion areas for new SUAs, Alternatives D and the proposed plan make PHMA avoidance areas for new SUAs. In addition, the proposed plan makes GHMA avoidance areas for new SUAs, and no new roads or aboveground structures would be authorized within 1 mile of an active lek (regardless of the type of GRSG habitat). This alternative would be more protective than Alternative A but slightly less protective than Alternatives B and C for sensitive plant habitats in PHMA. However, the proposed plan is the most restrictive in GHMA because it also makes GHMA avoidance areas for new SUAs. Therefore in PHMA the effects of this alternative on sensitive plant habitats would be similar to Alternative D (less restrictive than

Alternatives B or C), but more restrictions would apply in GHMA compared to all of the other alternatives.

Range

The proposed plan would be similar to Alternative D, but it would be slightly less restrictive because GRSG habitat objectives in grazing allotments would be applied to GRSG seasonal habitats (wherever they occur) instead of throughout all designated GRSG habitat. This may result in grazing restrictions being implemented on fewer acres, and thus benefits to GRSG and sensitive plant habitats could be slightly less than Alternative D. Because Alternative C proposes to remove livestock grazing entirely in all designated GRSG habitats, that alternative would still benefit sensitive plant habitats the most. Sensitive plant habitats would benefit more from the proposed plan because it includes more restrictive management direction than Alternatives A and B.

Energy and Minerals

Under the proposed plan, in PHMA, any new oil and gas leases must include a NSO stipulation. In terms of overall disturbance allowed, this alternative is similar to Alternative B due to a 3 percent cap being applied to PHMA. However, the proposed plan uses CMZs as the basis for calculating the total disturbance. The proposed plan would be less restrictive than Alternative C, which applies a 3 percent disturbance cap to PHMA and GHMA, and would be more restrictive than Alternative D, which applies a 5 percent disturbance cap to PHMA. Sensitive plant habitats would benefit from disturbance restrictions at a level commensurate with the extent and level of the restrictions applied.

Fire and Fuels Management

The proposed plan is similar to Alternatives C and D because it extends most protections across ADH, not just PHMA. Alternatives C, D, and the proposed plan are the most restrictive for fire and fuels management, therefore it is the most protective for sensitive plant habitats for fire and fuels management activities. This alternative would help reduce the localized threats to sensitive plant habitats in ADH from fire, compared to Alternatives A and B.

Cumulative Effects of The proposed plan

Cumulative effects for the proposed plan would be similar to those described for Alternatives A and B. Overall, impacts on sensitive plant habitats would be more than under Alternative C and less than under Alternative D. Given the small area of the RNF affected by this proposed LRMP amendment, its programmatic scale, and the requirements for analysis of site-specific projects, when combined with the potential impacts of this action, the impacts of other projects are not expected to cumulatively push any of the sensitive plant species over a threshold toward a federal listing; nor would the impacts cause concerns for population loss or species viability issues in the RNF.

Summary of The proposed plan

Generally, this alternative has provisions that fall between those of Alternatives C and D. This alternative includes a cap on disturbance in PHMA, while there is no similar limit under Alternative A. The allowance of 3 percent disturbance in PHMA could allow some additional habitat loss and degradation. Limited conservation in the remaining sagebrush habitat could allow changes in habitat quantity, quality, and ownership in sagebrush habitat in the RNF. Although none of the proposed conservation measures is specific to sensitive plant species, implementing the measures would likely

reduce but not eliminate direct and indirect effects on sensitive plants growing in PHMA and some areas of ADH.

Seven Region 2 sensitive plant species—*Eleocharis elliptica*, *Machaeranthera coloradoensis*, *Malaxis brachypoda*, *Salix candida*, *Selaginella selaginoides*, *Triteleia grandiflora*, and *Viola selkirkii*—have not been found in the project area or in the counties where the project is located, and their habitats are much less likely to occur there. For those species, the proposed plan would have **no impact**.

Existing conservation measures limit some but not all impacts on plant species. Although no Region 2 sensitive plants have been found in the project area, for species with a greater likelihood of habitat in the project area, impacts on potentially suitable habitat would be possible. Therefore the determination for this alternative "**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"** for *Astragalus leptaleus*, *Botrychium lineare*, *B. paradoxum*, *Carex diandra*, *Cypripedium parviflorum*, *Eriogonum exifolium*, *Eriophorum gracile*, *Ipomopsis aggregata* ssp. *weberi*, *Mimulus gemmiparus*, *Penstemon harringtonii*, *Potentilla rupincola*, *Rubus arcticus* var. *acaulis*, *Salix serissima*, and *Utricularia minor*.

MANAGEMENT INDICATOR SPECIES REPORT

I. INTRODUCTION

The National Forest Management Act directs National Forests to identify MIS. MIS are chosen as a representative of certain habitat conditions important to a variety of other species. [The previous sentence is not complete – MIS are chosen to meet one of 5 different criteria] MIS are generally presumed to be sensitive to habitat changes.. According to the Routt National Forest LRMP Amendment 4 (Forest Service 2007a, 2007b), MIS for the RNF include the six terrestrial and aquatic wildlife species listed in Table 9. There are no plant MIS in the RNF.

Table 9. RNF Revised MIS list

Common Name	Scientific name
Golden-crowned kinglet	*Regulus satrapa*
Northern goshawk	*Accipiter gentilis*
Vesper sparrow	*Pooecetes gramineus*
Wilson's warbler	*Wilsonia pusilla*
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*
Brook trout	*Salvelinus fontinalis*

MIS were reviewed to determine which are present or have habitat in the analysis area and to identify those likely to be affected by the implementation of a management decision. Table 10 outlines RNF MIS, their presence in the analysis area, and anticipated effects due to implementation of an action alternative.

Table 10. RNF MIS

Common Name	Management Issue	Species Present in ADH in the RNF?	Habitat Present in ADH in the RNF?	Summary of Anticipated Effects on MIS from Implementingan Action Alternative
Golden-crowned kinglet	Spruce-fir timber management	No	No	There are no records of the species or habitat in mapped PHMA or GHMA habitat. Implementing the alternatives would not change populations of golden-crowned kinglets or its habitat. Therefore this species is not evaluated in more detail.
Northern goshawk	Lodgepole pine timber management	No	No	There are no records of the species or habitat in mapped PHMA or GHMA habitat. Implementing the alternatives would not change populations of northern goshawk or its habitat. Therefore this species is not evaluated in more detail.
Vesper sparrow	Rangeland residual forage	Yes	Yes	There are records of the species in PHMA and GHMA habitat. The alternatives propose some changes to grazing management in PHMA and GHMA, so populations of vesper sparrow could respond to changes in grazing management under each of the alternatives. Therefore this species is evaluated in more detail in this analysis under each of the alternatives.
Wilson's warbler	Herbivory in riparian areas	No	No	There are no records of the species in the analysis area. It generally breeds in willow thickets of lakeshores, streambanks, and wet meadows, at or just above the timberline at higher elevation subalpine meadows. The alternatives propose some changes to grazing management, but it is not anticipated that these actions will affect in more than a negligible way the Wilson's warbler or its habitat. This species is not evaluated in more detail.
Colorado River cutthroat trout/brook trout	Aquatic habitat fragmentation and sedimentation of riparian areas and aquatic habitats	Yes /Yes	Yes/Yes	There are records of these species in streams in the analysis area and next to PHMA and GHMA habitat. In addition, all fish-bearing streams in the analysis area likely contain brook trout. The alternatives propose some changes to grazing management in PHMA and GHMA, so populations of CRCT and brook trout could respond to changes in grazing management under each of the alternatives. Therefore these species are evaluated in more detail in this analysis under each of the alternatives.

II. MIS EVALUATIONS

A. Vesper sparrow (*Poocetes gramineus*)

The vesper sparrow was selected as an MIS to represent issues associated with rangeland residual forage. Vesper sparrows are primarily summer residents in the RNF and use grass/forb habitats in or near the forest for breeding. Refer to the Environmental Assessment for Management Indicator Species Forest Plan Amendment 4 and the associated decision notice for more information regarding this species' selection as an MIS (Forest Service 2007b).

***Natural History*—**Vesper sparrows breed in grasslands, open shrublands mixed with grasslands, and open pinyon-juniper woodlands. Vesper sparrows have two broods per nesting season with 3 to 6 eggs per clutch (Kingery 1998). This species seeks a narrow set of habitat conditions in its nesting range (middle to high elevation sagebrush and grassland habitats), and subtle changes in these conditions, such as reductions in residual grass and forbs, can impact essential nesting habitat components (Kingery 1998). The vesper sparrow is a common summer resident in foothills (and adjacent lowlands) and mountain parks, a fairly common spring and fall migrant in western valleys, foothills, mountain parks, and on eastern plains.

In migration this sparrow occurs in open riparian and agricultural areas (NDIS 2005). *Breeding Bird Atlas* (Kingery 1998) data show that, in Colorado, the densest populations occur in middle to high elevation sagebrush. The *Breeding Bird Atlas* also shows that montane grasslands support high population densities, as do lower elevation sagebrush grasslands in northwestern Colorado. Sparsely or patchily distributed shrubs with a good grass cover make the best habitat (Kingery 1998). It is rare in late summer and fall above the timberline. There are about 20 winter records in the western valleys of Colorado, mostly in Mesa County, and on the eastern plains near foothills from Larimer County southward. It appears that this species is occasionally present in these areas during the winter (NDIS 2005).

***Population Status, Abundance, and Trend*—**Vesper sparrows are primarily summer residents in the RNF and use grass/forb habitats in or near it for breeding. The 2008 report (Blakesley 2008) concluded that density estimates of Vesper sparrows in sage/mountain meadow habitat were slightly lower in the RNF than statewide for 2005 to 2007, although 90 percent confidence intervals of the two samples overlapped in two of the three years (Table 11, Figure 2). Results from 2009 further support this trend. In 2010, the sample sites were changed. This change places more of an emphasis on sensitive species and was not specifically stratified with the detection of MIS in mind. With limited samples since that time, there have been no adequate detections to estimate densities of vesper sparrow in the RNF (Tables 10-11). The change in density and data availability are an artifact of the change in sampling technique and are not likely representative of a change in vesper sparrow population status or trends.

***Routt National Forest MIS Monitoring*—**The RNF has an established protocol for monitoring the vesper sparrow as an MIS. This protocol is based on point transect sampling and distance analysis. The protocol identifies an approach to compare the RNF trend-to-trend at the scale of the Colorado and evaluate if the rate of change between the two trends is significantly different (Skorkowsky and Dolan 2005).

A preliminary analysis was conducted in 2005 (Lukacs 2005). An additional analysis was completed in 2008 (Blakesley 2008).

Table 11. Estimated Densities of Vesper Sparrow in Sage/Mountain Meadow Habitat Throughout Colorado, 1999-2007, and in the RNF, 2005-2007 (Blakesley 2008)

	Colorado					RNF Planning Area				
Year	D	LCL	UCL	% CV	n	D	LCL	UCL	% CV	n
1999	16	10	26	30	145					
2000	37	21	64	34	210					
2001	19	13	30	26	172					
2002	21	14	33	26	175					
2003	29	20	43	24	153					
2004	22	16	31	20	179					
2005	40	28	57	21	231	12	4	32	59	26
2006						13	6	29	46	40
2007	47	30	74	28	346	24	12	46	39	59

D = estimated density (birds/km^2); *LCL* and *UCL* = lower and upper 90 percent confidence limits on *D*; *Percent CV* = percent coefficient of variation of *D*; *n* = number of observations used to estimate *D*

Table 12. Vesper Sparrow Density for Colorado and the RNF from 2008-2011 (Blakesley and Hanni 2009; Blakesley et al. 2010; White et al. 2011; White et al. 2012)

	State of Colorado						RNF		
Year	D	N	SE	%CV	90 % CI (lower)	90 % CI (High)	n	D	% CV
2008	0.46	120,906	50,346	42	55,216	264,746	7	0.59	48
2009	-	-	-	-	-	-	7	0.5	49
2010	6.18	1,667,129	-	17	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-

D = estimated density (birds/km^2); *N* = XXX; *SE* = XXX; *Percent CV* = percent coefficient of variation of *D*; *Percent CI* = XXX; *n* = number of observations used to estimate D.

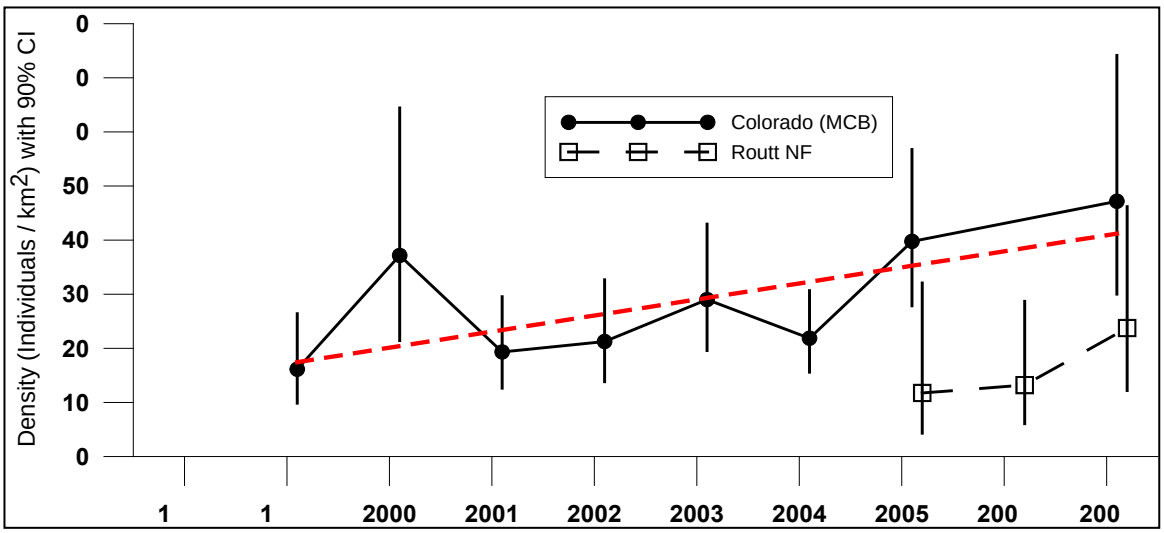

Figure 2. Estimated densities of vesper sparrow in sage/mountain meadow habitat throughout Colorado, 1999-2007, and in the RNF, 2005-2007. Error bars represent 90 percent confidence intervals. The red dashed line represents the best estimate of observed population trend.

Table 13. Vesper Sparrow Unadjusted Counts for the RNF (All Cover Types) 1998-2011

Year	Effort (Number of Points Sampled)	Number of Vesper Sparrows Observed)	Vesper Sparrow Relative Abundance
1998	75	0	0
1999	195	10	0.051
2000	213	13	0.061
2001	180	7	0.039
2002	210	20	0.095
2003	135	10	0.074
2004	197	22	0.112
2005	560	33	0.059
2006	621	57	0.092
2007	579	84	0.145
2008	239	9	0.038
2009	106	0	0
2010	228	0	0
2011	337	0	0

On the RNF, the vesper sparrow was identified as the MIS species best suited to assist in evaluating this management issue related to rangeland residual forage and the specific question: Is adequate residual forage being retained for native species?

Livestock and wild ungulate grazing affects several habitat types, particularly mountain parks and aspen forests. Residual grass and forbs are important as food and cover for many species using rangeland habitats. Species affected are invertebrates, birds, small mammals, and several native predators that feed on the birds and small mammals that are associated with these communities. Retaining insufficient residual forage could affect several rangeland-associated species. Monitoring residual forage is an ongoing activity in managing rangelands and using the vesper sparrow as an MIS complements the evaluation of whether residual forage direction in the forest plan is adequate.

Population trends of this species have historically been relatively stable to slightly increasing, indicating that management approaches implemented in the RNF have been adequate to maintain vesper sparrow populations.

Within the analysis area, the RNF NRIS wildlife database contains 42 observation records for this species, indicating that suitable habitat exists in the analysis area. All but one of these observations was in the California Park and Slater Park portion of GHMA on the Hahns Peak/Bears Ears Ranger District. The other observation was on the edge of the RNF boundary in PHMA on the Parks District north of Walden.

Existing habitat conditions for vesper sparrows across the RNF are well-suited to sustain current populations of these birds. During the last 50 years, rangeland management practices have improved grassland conditions in the RNF, and vesper sparrow populations have undoubtedly stabilized as nesting and brood-rearing habitat responded positively to lower livestock numbers. Though numbers may be variable on private lands, where human encroachment and habitat alteration/conversion continues, vesper sparrow habitat appears to be improving on National Forest System lands.

***Conclusions*—**Available population and habitat information suggests vesper sparrows in the RNF have a population trend that is currently stable. In addition, the vesper sparrow is widely distributed in the RNF and is well distributed throughout all grassland areas in Colorado. Evidence from the *Colorado Breeding Bird Atlas* (Kingery 1998) surveys across the state suggests vesper sparrow breeding pairs are present in relatively high densities across the landscape, ranking it as the 21st out of 264 most abundant breeding birds in Colorado (Kingery 1998).

Alternative A—No Action

Recreation and Travel

Under Alternative A there would be no changes to the current National Forest System roads, transportation plan, or recreation management in the RNF. That means there would be minimal seasonal restrictions on casual use, and some of the areas in GRSG habitat would remain open to cross country travel. In general, the more acres and miles of routes that are designated in an area, the greater the likelihood of habitat fragmentation and disturbance to vesper sparrows. In addition, less restrictive travel conditions usually mean higher concentrations of human use next to motorized routes. This can disrupt nesting activities, causing abandonment of young and temporary displacement. However, since populations have been either stable or increasing in the

last few years in the RNF and throughout Colorado, indications are that the current recreation and travel conditions are not adversely affecting vesper sparrows.

Lands and Realty

Under this alternative, there would be no changes to the current approach associated with exchange, acquisition, or disposal of lands or with permitting ROWs on Forest Service lands. All Forest Service lands would continue to be managed according to Forest Service policy and regulation. Permitted ROWs would continue to allow construction, maintenance, and operation activities that may result in habitat loss, fragmentation, or degradation for vesper sparrows. Indirect effects may include new infestations of noxious or invasive weeds and an increase in edge habitat. Though most projects would be forced to mitigate or minimize impacts, this alternative would likely have the greatest negative impact on vesper sparrows.

Range

Under this alternative, there would be no change in the numbers, timing, or method of livestock grazing in the RNF. In addition, there would be no change to wild horse or burro management. Potential direct effects on vesper sparrow habitat could include site-specific overgrazing, cover, structure, and diversity of residual vegetation reduction due to consumption, and rangeland habitat degradation due to trampling of riparian vegetation. As current livestock grazing management has not caused a decline in vesper sparrow numbers, it is unlikely that Alternative A would have any adverse effects.

Energy and Minerals

Under this alternative, a small percentage of PHMA would be closed to nonenergy leasable mineral leasing, with most or the remainder of ADH open to leasing (including expansion of new leases), with no cap on surface-disturbing activities. As such, this alternative would cause the greatest extent of direct and indirect habitat loss, degradation, and fragmentation for vesper sparrows. There would likely also be greater negative effects from noise, increased presence of roads and humans, and anthropogenic structures in an otherwise open landscape. Recent work from developed natural gas in Wyoming gas fields (Gilbert and Chalfoun 2011) documents 10 to 20 percent declines in the abundance of the sagebrush obligates, sage sparrow and Brewer's sparrow.

Fire and Fuels Management

Alternative A would have the fewest restrictions for fuels management actions and has a high potential for vegetation disturbance. As this alternative does not prioritize fire operations beyond what has already been determined in the fire management plans for the area, potential impacts may include removing or losing large tracts of habitat due to wildfire, injuring or killing eggs or chicks, changing species movement patterns due to areas being devoid of vegetation, and the increase of nonnative or exotic grasses or weeds.

Alternative B

Recreation and Travel

Under this alternative there would be limited opportunities for road construction in PHMA, with minimum standards applied and no upgrading of current roads. In addition, recreational use

permits would be given in PHMA only if there were a neutral or beneficial impact on GRSG and no cross country driving were permitted in PHMA. This is more restrictive than Alternative A, reducing direct and indirect impacts on vesper sparrows by minimizing human use and disturbance and construction or upgrading of roads. This would also likely keep some areas, such as leks and GRSG nesting habitat, less disturbed and fragmented, indirectly benefiting the vesper sparrow.

Lands and Realty

Under this alternative, PHMA would be managed as an exclusion area and GHMA would be managed as an avoidance area for new ROW projects. In addition, Alternative B would encourage consolidation of GRSG habitat and therefore most of the known habitat for vesper sparrows in the RNF. These conservation measures would be more protective than conservation measures under Alternatives A and D but less protective than Alternative C. This represents a concerted effort to maximize connectivity and minimize fragmentation of sagebrush habitats indirectly benefiting the vesper sparrow.

Range

Alternative B would adjust grazing direction in GRSG PHMA. This accounts for less than 1 percent of the land cover of the RNF. The potential effects due to livestock grazing, vegetation disturbance, and range improvements are expected to be the same under Alternative B as they would be under Alternative A, except that Alternative B would provide a few more restrictions to protect vesper sparrow habitat. Not only would that minimize disturbance, but it would provide a very minor positive effect on the PHMA habitat, likely creating small pockets of improved areas for productive breeding, nesting, and brood rearing for vesper sparrow. Though this would occur at a very small scale, the effects on local populations would likely be beneficial.

Energy and Minerals

Under Alternative B, PHMA would be closed to new fluid mineral leases and existing leases would have a 4-mile NSO buffer around leks. Though currently there are no known active leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for the most important GRSG habitats, which would encompass the habitats used by vesper sparrows. This alternative may shift energy and mineral development to less desirable sagebrush or non-sagebrush habitats. As the vesper sparrow also prefers grassland areas, by minimizing the effects in sagebrush habitats, other minor negative effects may be observed if development occurs in grassland habitats.

Fire and Fuels Management

Alternative B would be the most restrictive for fire and fuels management actions, but only in PHMA. As vesper sparrows are currently found in GHMA, effects from this alternative would not largely benefit the species. Effects would be very similar to those described under Alternative A.

Alternative C

Recreation and Travel

Under this alternative, effects would be similar to those for Alternative B, except that Alternative C would apply to ADH and not just PHMA.

Lands and Realty

Alternative C would have the most protective measures for vesper sparrows. Under this alternative, ADH would be managed as an exclusion area for new ROW projects. In addition, Alternative C would encourage consolidation of GRSG habitats, facilitating habitat conservation and habitat contiguity. This alternative would have the greatest positive impacts on vesper sparrows because, of the observations recorded, all but one occurred in GHMA. This alternative would restrict all ROWs in ADH, thereby protecting every known observation of the species in the RNF.

Range

Under this alternative, all grazing in ADH would be discontinued. As overgrazing of livestock is the single largest threat to this species, removing domestic livestock grazing would lessen the impacts on vegetation this species uses for nesting and foraging, and it would eliminate the possibility of nest trampling. There would be no known negative effects on vesper sparrows under Alternative C, with respect to range resources. Conversely, this alternative would likely provide the most positive impacts on vesper sparrows.

Energy and Minerals

Under this alternative, the effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH.

Fire and Fuels Management

Under this alternative, the effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH.

Alternative D

Recreation and Travel

Under Alternative D, the effects of most suggested management actions would be similar to Alternative B, except that more flexibility or discretion would be given to the land management agency to allow route construction, road improvements, and SRP issuance in PHMA if it were determined that these actions would not adversely affect GRSG. If populations and habitats were healthy or improving, Alternative D could permit disturbance above the 5 percent cap of disturbance for the CMZ. The effects of this alternative could include small continued additive disturbances of vesper sparrow habitat and disruption of normal life history behaviors. As conditions would be monitored for GRSG, the vesper sparrow would likely benefit from the association of sagebrush habitats in the RNF.

Lands and Realty

Under Alternative D, PHMA would be managed as an avoidance area; however, new ROW projects would be allowed in designated corridors. ROWs would also be allowed in PHMA if the

project would not adversely affect GRSG populations. This alternative would be more protective than Alternative A, but less protective than Alternatives B and C.

Range

Alternative D would be similar to Alternative B but would be slightly more restrictive because GRSG habitat objectives in grazing allotments would be applied to ADH and not just PHMA. This alternative would have much fewer negative impacts than Alternative A but slightly more than Alternative C. With regard to wild horses and burros, Alternative D would be similar to Alternatives B and C, but would consider all resource values in conjunction with GRSG when managing wild horses and burros. Generally speaking, if GRSG habitat were taken into consideration before the management action were applied, then vesper sparrows would likely benefit from that protection or management action.

Energy and Minerals

Under this alternative, PHMA would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks, similar to Alternative B. However, with some mineral development, this alternative would allow up to 5 percent disturbance in any CMZ. Direct effects would be similar to those associated with Alternative B. There may be a few more impacts if the disturbance allowance were increased from 3 percent to 5 percent. However the potential for this difference to have negative impacts on vesper sparrows is minor. Therefore the effects would be similar to those described under Alternative B.

Fire and Fuels Management

Alternative D is generally the same as Alternative B except that the potential for direct habitat loss and indirect impacts would be greater under than under Alternatives B and C, due largely to the five percent disturbance cap and allowance for development to occur in PHMA (open for development). As such, this alternative would provide fewer protective measures to vesper sparrows than Alternatives B and C but more than Alternative A.

The proposed plan

Recreation and Travel

Under this alternative there would be no new road or trail construction in PHMA or GHMA. No road or trail maintenance activities would be allowed within 2 miles of an active lek during lekking (March 1 to April 30). In addition, recreation use permits would be given in PHMA or GHMA only if there were a neutral or beneficial impact on GRSG. This alternative is more restrictive than Alternative A, reducing direct and indirect impacts on vesper sparrows by minimizing human use and disturbance and constructing or upgrading roads. This would also likely keep some areas, such as leks and GRSG nesting habitat, less disturbed and fragmented, thereby indirectly benefiting the vesper sparrow. Since only a very small portion of the RNF is considered PHMA, the effects would likely be minor to negligible, but any management direction leading to conservation would be a positive effect.

Please refer to the recreation and travel section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Lands and Realty

Under this alternative, PHMA and GHMA would be managed as avoidance areas for new SUA projects. No new roads or aboveground structures would be authorized within 1 mile of an active lek. PHMAs and GHMAs would be managed as avoidance areas for high voltage transmission lines (greater than 100 kilovolts). In addition, the proposed plan would encourage the retention, acquisition, and consolidation of GRSG habitat areas, facilitating conservation for GRSG and other species that depend on sagebrush ecosystem, and therefore most of the known habitat for vesper sparrows in the RNF. These conservation measures would be more protective than the conservation measures in Alternatives A and D but less protective than Alternative C. This represents a concerted effort to maximize connectivity and minimize fragmentation of sagebrush habitats, indirectly benefiting the vesper sparrow.

Please refer to the lands and realty section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Range

The proposed plan would adjust grazing direction in PHMA. This is less than 1 percent of the land cover of the RNF. The potential effects under the proposed plan of livestock grazing, vegetation disturbance, and range improvements are expected to be very similar under Alternative A, except that there would be a few more restrictions to protect vesper sparrow habitat. Not only would that minimize disturbance, but it would provide a very minor positive effect on the PHMA habitat, likely creating small pockets of improved areas for productive breeding, nesting, and brood rearing for vesper sparrows. Though this would occur at a very small scale, the effects on local populations would likely be beneficial.

Please refer to the rangeland management related section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Energy and Minerals

Under this alternative, no new leasing in ADH would be allowed within 1 mile of an active lek. There would be NSO in PHMA and within 2 miles of active leks in GHMA. A no activity buffer within 4 miles of active leks from March 1 to July 15 would be enforced. For wind and solar projects, PHMA would be excluded and GHMA would be avoidance areas. PHMAs would be closed to new mineral material sales and new nonenergy mineral leasing. NSO would be precluded on existing nonenergy leasable mineral leases within 2 miles of active leks in PHMAs. Though currently there are no known active leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for the most important GRSG habitats, which would encompass the habitats used by vesper sparrow. This alternative may shift energy and mineral development to less desirable sagebrush or non-sagebrush habitats. As the vesper sparrow also prefers grassland areas, by minimizing the effects in sagebrush habitats, other minor negative effects may be observed if development occurs in grassland habitats.

Please refer to the energy and minerals related section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Fire and Fuels Management

GRSG habitat, specifically PHMA, would have additional management direction designed to promote the protection of PHMA from wildfire and to ensure that effects from fuels management are accomplished in a manner that benefits or does not impact GRSG. This alternative would help reduce the localized threats to PHMA from fire, compared to Alternative A. Because vesper sparrows are currently found in GHMA, effects from this alternative would not largely benefit the species. The effects would be very similar to those described for Alternative A.

Please refer to the fire and fuels management related sections of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Summary

The effects on the vesper sparrow and its habitat are similar to those described for the sagebrush-associated birds in this BE. Overall, the highest potential for negative effects would be under Alternative A. Though populations of this species appear to be stable or slightly increasing, additional effects from management actions that might change the structural makeup of the vegetation could have minor detrimental effects. However, the species appears to be doing well under the current management regime. Alternative C restricts direct and indirect human disturbances on the largest number of acres (17,354 acres, or 1.5 percent of the RNF). Under this alternative, grazing would be removed from ADH. Alternatives B, D, and the proposed plan would also provide greater protections to the habitats used by vesper sparrow but would allow grazing to occur at lower intensities than currently allowed.

The vesper sparrow was identified as an MIS to assess the adequacy of residual vegetation for other native species. Under all action alternatives adequate residual forage would also be retained for these species.

B. Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*)

The CRCT was selected as an MIS to represent issues associated with aquatic habitat fragmentation and sedimentation of riparian areas and aquatic habitats. Refer to the Environmental Assessment for Management Indicator Species Forest Plan Amendment 4 and the associated decision notice for more information regarding this species selection as an MIS (Forest Service 2007).

CRCT has already been analyzed in the project BE fish section. A summary at the end of this section includes CRCT, describing the overall effects and placing in context the alternatives with respect to aquatic habitat fragmentation and sedimentation of riparian areas and aquatic habitats.

C. Brook trout (*Salvelinus fontinalis*)

The brook trout was selected as an MIS to represent issues associated with aquatic habitat fragmentation and sedimentation of riparian areas and aquatic habitats. Refer to the Environmental Assessment for Management Indicator Species Forest Plan Amendment 4 and the associated decision notice for more information regarding this species selection as an MIS (Forest Service 2007).

***Natural History*—**Brook trout is now the most widely introduced nonnative trout species in the west. Preferred habitat is clear, cool, well-oxygenated creeks, small to medium rivers, and lakes.

The brook trout is highly adaptable to disturbance and can tolerate temperatures ranging from 0 °C to 20 °C, but it prefers temperatures of 14 to 16 °C (NatureServe 2014). It spawns from September into October. Its usual life span is approximately four years, however in higher elevation colder climates, it often does not reach reproductive maturity until four years unless it migrates to larger bodies of water (Page and Burr 1991).

Brook trout are nearly ubiquitous in most RNF watersheds. At the broadest scale, none of the common trout species (brook, brown, or rainbow) are native to Region 2. However, these desired nonnative game fish have been stocked repeatedly for more than 100 years throughout most of the Rocky Mountain Region. They are now widely distributed, commonly captured, and generally abundant in the Rocky Mountain Region as a whole. These fish occur in both stocked and wild (naturally reproducing) populations, although the distribution varies locally by habitat type and elevation as a result of minor ecological differences. Brook trout are capable of living under a wide variety of conditions, from high to low elevation, often at very high densities.

The primary threats to brook trout populations are negative factors that lower survival of large juveniles and small adults (NatureServe 2014). Introduced brook trout have contributed to the decline of native fishes, amphibians, and invertebrates. In areas identified for CRCT restoration, brook trout are targeted for eradication. Methods such as depletion-removal electrofishing have significantly reduced populations and recruitment but have not totally eradicated brook trout (NatureServe 2014).

Population Status, Abundance and Trend—Several sources of information are available and are useful for estimating current population trend and abundance for brook trout. The data used is from various sources, which include Division of Wildlife stocking reports and survey data from the analysis area. While none of these data are independently adequate to estimate brook trout population trend and abundance, and some information may even be contradictory, collectively the information affords a basis for making credible inferences about population trend and abundance.

Globally the conservation status is G5 ~ Secure and nationally is N5 ~ Secure (NatureServe 2014). NatureServe (2014) does not have a conservation status rank for Colorado because it is not a suitable target for conservation activities. In Colorado, the brook trout is a game species and can be harvested (CDOW 2007). The daily bag limit is 4 and possession limit is up to 8. In addition to this limit, the daily bag and possession limit for brook trout that are 8 inches or less is 10.

The brook trout was first introduced into Colorado in the late 1800s (CDOW 2006). In the early 1900s, state and federal hatcheries began stocking brook trout in great numbers. The numbers peaked in 1930, when 15.4 million brook trout were stocked into Colorado streams and lakes. Most streams in Colorado have a self-sustaining population of wild brook trout that likely are descendants of the nineteenth century pioneers.

At a broad scale, brook trout are found to be abundant across the streams of the RNF. For the preparation of the Forest Plan Revision (Forest Service 1998), a geographic information systems analysis was completed for presence of trout species. Approximately 606 miles of stream were analyzed for the presence of brook, brown, cutthroat, or rainbow trout species. Approximately 439 miles of stream contained brook trout (Forest Service 1996). Through this analysis it was estimated that 72 percent of the streams in the RNF have brook trout, but this percentage is likely

higher with so few streams having only Colorado River cutthroat, brown, or rainbow trout present.

Collectively, the available population and habitat information suggests brook trout in the RNF have a population trend that is stable or likely increasing. Except for streams that are designated as CRCT conservation populations, the brook trout is widely distributed across the RNF and is well distributed in mountain streams, ponds, and lakes. The Natural Diversity Information Source (NDIS 2007) categorizes this cold-water game fish in Colorado streams as extremely prolific, with up to 3,500 brook trout per acre, which also suggests stability and likely increasing populations.

RNF MIS Monitoring—Two rotations of monitoring for this species have been conducted in recent years; those data have not been analyzed. Brook trout would be expected to occur in streams in all of the designated habitat in the analysis area except for the small sections of GHMA near Carter Mountain and North Ryder Peak. These two areas are too dry to hold suitable streams.

Alternative A—No Action

Recreation and Travel

Under this alternative there would be no changes to the current National Forest System roads, transportation plan, or recreation management in the RNF. That means that the fewest acres would have seasonal restrictions on casual use, and some of the areas in GRSG habitat would remain open to cross country travel. Motorized travel would continue to contribute to minor degradation of aquatic habitat. The condition of fish populations and aquatic habitats across designated habitat would remain stable, reflecting the effects of all past and current management activities. The cumulative effects from existing activities would generally result in maintaining the current conditions of aquatic habitats.

Lands and Realty

Under this alternative, there would be no changes to the current approach associated with exchange, acquisition, or disposal of lands or with permitting ROWs on Forest Service lands. All Forest Service lands would continue to be managed according to its policy and regulation. Permitted ROWs would continue to allow construction, maintenance, and operation, which may result in temporary increases in road use and potential sedimentation. Indirect effects may include new infestations of noxious or invasive weeds, which could change the soil stability of the site, making it more likely to erode over time and end up in streams and waterways. These effects would be negligible, especially in light of other conservation measures in the LRMP that would be employed to protect aquatic species.

Range

Under this alternative, there would be no change in the numbers, timing, or method of livestock grazing in the RNF. In addition, there would be no change to wild horse or burro management. The negative effects of livestock grazing could include trampling and consumption of riparian plants that shade streams, increased sediment loads from overgrazed eroding hill slopes, unstable stream banks due to hoof action, and decreases in water quality and increases in turbidity. This may degrade the conditions for fish, making them less suitable. Under this alternative, there

would be no change in management action and currently the populations of fish are stable, so they would likely remain the same.

Energy and Minerals

Under this alternative, a small percentage of PHMA would be closed to nonenergy leasable mineral leasing, with the majority or remainder of ADH open to leasing (including expansion of new leases) with no cap on surface-disturbing activities. As such, this alternative would have the greatest potential for damage to riparian and fish habitat. Though there are conservation measures and best management practices in place to minimize effects, continued development would not likely improve conditions for fish species.

Fire and Fuels Management

Alternative A would have the fewest restrictions for fuels management actions and has a high potential for vegetation disturbance. As this alternative does not prioritize fire operations beyond what has already been determined in the fire management plans for the area, potential impacts may include large burns devoid of vegetation, invasion of exotic grasses or other weeds, and potential decrease in soil stability, leading to sedimentation in streams.

Alternative B

Recreation and Travel

Under this alternative there would be limited opportunities for road construction in PHMA, with minimum standards applied and no upgrading of current roads. In addition, recreation use permits would be given in PHMA only if there were a neutral or beneficial impact on GRSG and if driving cross country would not be permitted in PHMA. This is more restrictive than Alternative A, providing small beneficial impacts on fish by minimizing human use and maintaining the footprint of existing roads. As only 1 percent of the RNF is considered PHMA, the effects would likely be minor to negligible, but any management direction leading to conservation would be a positive effect.

Lands and Realty

Under this alternative, PHMA would be managed as an exclusion area, and general habitat would be managed as an avoidance area for new ROW projects. In addition, Alternative B would encourage consolidation of GRSG habitat, facilitating habitat conservation and continuity. These conservation measures would be more protective than conservation measures under Alternatives A and D but less protective than under Alternative C.

Range

Alternative B would adjust grazing direction in GRSG PHMA. This accounts for less than 1 percent of the land cover of the RNF and includes only a very small proportion of the southern site in the analysis area where CRCT are known to occur. Mountain sucker are not found in the PHMA in the RNF. Even in the area where CRCT do occur, there would be no direct effects on the species from Alternative B. The indirect effects from decreasing grazing pressure on such a small part of the RNF could lead to habitat improvements for populations of CRCT farther

downstream by decreasing the amount of sediment deposited in waterways; however, these improvements would likely be so small as to not be measurable.

Energy and Minerals

Under Alternative B, PHMA would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks. Although currently there are no known active leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for GRSG habitats. There would likely be very minor indirect benefits to fish from protecting PHMA.

Fire and Fuels Management

Alternative B would be the most restrictive for fire and fuels management actions, but only in PHMA. Again, as there is very little PHMA, effects would be similar to those described under Alternative A.

Alternative C

Recreation and Travel

Under this alternative, effects would be similar to those under Alternative B, except that it would apply to ADH and not just PHMA.

Lands and Realty

Alternative C would have the most protective measures for all GRSG habitat. Under this alternative, ADH would be managed as an exclusion area for new ROW projects. In addition, Alternative C would encourage consolidation of GRSG habitats, facilitating habitat contiguity. Maintaining continuous diverse sagebrush habitats would likely maintain good watershed and runoff patterns that sustain health of the land and the streams that bear fish.

Range

The positive effects of Alternative C on fish would be even more pronounced than those described for Alternative B, because all grazing would be terminated on ADH. Though this accounts for only 1.5 percent of the land cover of the RNF, effects on fish downstream of these areas could be ameliorated by prohibiting cattle grazing in, near, and around riparian areas and streams. There would likely be no negative effects on fish by removing cattle from the system, but there would be substantial positive benefits of reduced sedimentation and turbidity, as well as overall riparian vegetative health and water quality.

Energy and Minerals

Under this alternative, the effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH.

Fire and Fuels Management

Under this alternative, the effects would be similar to those described under Alternative B, except that the same protections would be expanded to include ADH.

Alternative D

Recreation and Travel

Under this alternative, the effects of most suggested management actions would be similar to Alternative B, with the exception that more flexibility or discretion would be given to the land management agency to allow route construction in PHMA, road improvements, and SRP issuance if it were determined that these actions would not adversely affect GRSG. This alternative is still more restrictive than Alternative A, and it would likely provide some minor beneficial effects over time.

Lands and Realty

Under Alternative D, PHMA would be managed as an avoidance area; however, new ROW projects would be allowed in designated corridors. ROWs would also be allowed in PHMA if the project were not to adversely affect GRSG populations. This alternative would be more protective than Alternative A but less protective than Alternatives B and C for fish. Due to the extent of habitat on RNF, the effects would be similar to Alternatives B and C.

Range

Alternative D would be similar to Alternative B but would be slightly more restrictive because GRSG habitat objectives in grazing allotments would be applied to ADH and not just PHMA. This alternative would have fewer impacts than Alternative A but greater impacts than Alternative C. With regard to wild horses and burros, Alternative D would be similar to Alternatives B and C, but would consider all resource values in conjunction with GRSG when managing wild horses and burros. Generally, if conservation efforts are made to maintain or improve GRSG habitat before applying the management action, then fish would likely benefit, even in small measure, from that protection or management action.

Energy and Minerals

Under this alternative, PHMA would be closed to new fluid mineral leases, and existing leases would have a 4-mile NSO buffer around leks, similar to Alternative B. However with some mineral development, this alternative would allow up to 5 percent disturbance in any CMZ. Direct effects would be similar to those associated with Alternative B. There may be a few more impacts if the disturbance allowance were increased from 3 percent to 5 percent, but the potential for this difference to have negative impacts on fish is negligible. Therefore the effects would be similar to those described under Alternative B, mostly positive.

Fire and Fuels Management

Effects due to Alternative D are generally the same as Alternatives B and E, except that the potential for direct habitat loss and indirect impacts would be slightly greater under this alternative, compared with Alternatives B, C, and E. This is due largely to the five percent

disturbance cap and allowance for development to occur in PHMA. As such, this alternative would be expected to provide fewer protective measures for fish than Alternatives B, C, and the proposed plan but more than Alternative A.

The Proposed Plan

Recreation and Travel

Under this alternative there would be no new road or trail construction in PHMA or GHMA. No road or trail maintenance would be allowed within 2 miles of an active lek during lekking (March 1 to April 30). In addition, recreation use permits would be given only in PHMA or GHMA if there were a neutral or beneficial impact on GRSG. This is more restrictive than Alternative A, providing small beneficial impacts on fish by minimizing human use and maintaining the footprint of existing roads. As only 1 percent of the RNF is considered PHMA, the effects would likely be minor to negligible, but any management direction leading to conservation would be a positive effect.

Please refer to the recreation and travel section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Lands and Realty

Under this alternative, PHMA and GHMA would be managed as avoidance areas for new SUA projects. No new roads or aboveground structures would be authorized within 1 mile of an active lek. PHMAs and GHMAs would be managed as avoidance areas for high voltage transmission lines (greater than 100 kilovolts). In addition, the proposed plan would encourage the retention, acquisition, and consolidation of GRSG habitat areas, facilitating conservation for GRSG and other species that depend on sagebrush ecosystem. The RNF would keep its PHMA and would work to acquire more. This would result in little to no degradation, fragmentation, and loss of sensitive species habitat in GRSG PHMA, but this restriction may shift land and realty project focus to GRSG-designated GHMA or other non-grouse habitat types. In non-PHMA, permitted ROWs would likely have effects similar to those addressed in Alternative A. These conservation measures would be more protective than the conservation measures in Alternatives A, B, and D but less protective than Alternative C. This represents a concerted effort to maximize connectivity and minimize fragmentation of sagebrush habitats, thus indirectly benefiting aquatic sensitive species that use these habitats.

Please refer to the lands and realty section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Range

The proposed plan would adjust grazing direction in GRSG PHMA; this is less than 1 percent of the land cover of the RNF and includes only a very small proportion of the southern site in the analysis area where CRCT are known to occur. Even in the area where CRCT occur, there would be no direct effects on the species from the proposed plan. The indirect effects from decreasing grazing pressure on such a small part of the RNF could lead to habitat improvements for populations of CRCT farther downstream by decreasing the amount of sediment deposited in waterways; however, these improvements would likely be so small as to not be measurable. Mountain sucker are not found in the PHMA in the RNF.

Please refer to the rangeland management related section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Energy and Minerals

Under this alternative, no new leasing in ADH would be allowed within 1 mile of an active lek. There would be NSO in PHMA and within 2 miles of active leks in GHMA. A no activity buffer of 4 miles within active leks from March 1 to July 15 would be enforced. PHMA would be excluded for wind and solar projects, and GHMA would be avoidance areas. PHMAs would be closed to new mineral materials sales and new nonenergy mineral leasing. NSO would be precluded on nonenergy leasable mineral leases within 2 miles of active leks in PHMAs. Though currently there are no known active leks and very little PHMA in the RNF, this alternative would provide protection now and into the future for GRSG habitats. There would likely be very minor indirect benefits to fish from protecting PHMA. This alternative may shift energy and mineral development to less desirable sagebrush or non-sagebrush habitat, and there may be lingering effects of not protecting all sagebrush or ADH.

Please refer to the energy and minerals related section of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Fire and Fuels Management

GRSG habitat, specifically PHMA, would have additional management direction designed to protect PHMA from wildfire and ensure that effects from fuels management were accomplished in a manner that benefits or does not impact GRSG. This alternative would help reduce the localized threats to PHMA from fire, compared to Alternative A. This would be a benefit to aquatic species that use PHMA.

Please refer to the fire and fuels management related sections of the FEIS for additional information and more detailed information on the effects of the proposed plan.

Summary

Currently, under the No Action Alternative, population levels and habitat conditions for brook trout and CRCT appear to be stable, even with the current grazing practices. However, under the action alternatives, the suggested management actions to be taken would further minimize negative impacts and promote more intact and higher quality sagebrush ecosystems in the RNF.

Alternative C, is the most conservative and restricts direct and indirect anthropogenic impacts on brook trout and CRCT on the largest number of acres. Under Alternative C, grazing would be terminated in ADH (17,354 acres or 1.5 percent of the RNF). The removal of domestic livestock grazing would lessen the impacts on streams and riparian areas, eliminate the possibility of domestic livestock trampling fish eggs, and would improve overall fish habitat and water quality. Despite the fact that under the current grazing conditions populations appear to be stable, all of the action alternatives would reduce current impacts on brook trout and CRCT beyond management under current management.

It is apparent that the action alternatives would likely improve or stabilize the aforementioned conditions on a localized site-specific scale, commensurate with the 1.5 percent of designated GRSG habitat in the RNF and better than the No Action Alternative alone. This is because the

CRCT and brook trout were selected as an MIS to represent issues associated with aquatic habitat fragmentation and sedimentation of riparian areas and aquatic habitats.

Alternative C would likely have the longest term overall beneficial effects due to the removal of livestock, but each of the action alternatives would likely improve aquatic and riparian habitats by minimizing ROWs, energy development, and road upgrading or construction.

III. CONCLUSION

Golden-crowned kinglet, northern goshawk, and Wilson's warbler, three species of MIS in the RNF were reviewed but not considered in a detailed analysis. This is because there would be no impact on these species from any of the proposed actions due to the different habitat type and areas these species use. The remaining three MIS—vesper sparrow and both of the aquatic MIS (CRCT and brook trout)—have been documented in the analysis area and could be affected by an action alternative.

When considering the potential for population-level impacts on these species across the planning area of the entire RNF, it is important to consider that the analysis area makes up less than 1 percent (12,501 acres) of the entire acreage of the RNF. Therefore it is unlikely that any population-level trends at the forest scale would be significantly altered by any of the action alternatives. A more likely scenario under the action alternatives is that there could be slight increases in the numbers of individuals and quality of habitat in areas of designated habitat. This analysis indicates that implementing any of the action alternatives would maintain at least stable populations and habitat of all species of MIS or would not add to the potential for negative impacts.

IV. CONTACTS

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Appendix N

Socioeconomics Data and Methodology

APPENDIX N
SOCIOECONOMICS DATA AND METHODOLOGY

DETAILED EMPLOYMENT AND EARNINGS DATA BY COUNTY

Table N.1 through **Table N.7** provide detailed employment and earnings data by county.

Table N.1
Employment Levels by Industry Sector and County in 2010[1,2]

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[3]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Farm	184	738	248	142	2,076	524	339	654	2,113	54	975	370	267
Forestry, fishing, & related activities[4]	(D)	189	138	75	359	148	(D)	218	595	(D)	105	(D)	(D)
Mining (including oil and gas)	(D)	2,286	94	69	3,621	664	921	678	1,084	(D)	2,915	462	5,823
Utilities	71	220	(D)	(L)	232	(D)	(D)	(D)	255	(D)	146	75	(D)
Construction	4,092	4,509	1,117	(D)	6,019	418	352	2,053	12,018	1,895	1,283	781	2,241
Manufacturing	389	323	166	(D)	3,028	106	83	213	11,933	164	258	(D)	1,384

[1] (D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.
[2] (L) Fewer than 10 jobs, but the estimates for this item are included in the totals.
[3] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.
[4] "Related activities" includes hunting and trapping, as well as agricultural services such as custom tillage.

Table N.1
Employment Levels by Industry Sector and County in 2010[1,2]

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[3]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Wholesale trade	543	866	(D)	(D)	2,622	283	(D)	(D)	3,725	(D)	667	76	(D)
Retail trade	3,590	3,662	897	99	9,938	961	298	1,775	21,174	2,975	1,869	958	2,935
Transportation and warehousing	664	905	193	(D)	3,141	(D)	140	451	2,938	351	964	539	1,656
Information	471	260	56	(D)	1,101	90	28	218	3,287	(D)	169	98	245
Finance and insurance	1,789	1,309	334	(D)	4,135	224	120	901	9,683	908	792	280	702
Real estate and rental and leasing	5,124	2,481	1,141	40	4,380	288	124	2,257	10,517	3,015	827	406	1,248
Professional and technical services	2,375	2,168	500	(D)	4,286	(D)	(D)	1,318	16,663	1,380	554	287	881
Management of companies and enterprises	240	260	47	0	384	(D)	(D)	103	610	130	(D)	20	93
Administrative and waste services	2,277	1,755	416	(D)	4,454	222	193	835	11,750	1,201	(D)	267	752
Educational services	373	511	71	12	666	(D)	17	326	2,775	255	121	(D)	125
Health care and social assistance	2,297	2,618	302	60	9,978	(D)	94	1,454	19,552	1,141	1,075	(D)	1,299
Arts, entertainment, and recreation	3,962	891	1,139	28	1,780	139	63	1,502	5,078	1,551	122	202	262
Accommodation and food services	7,048	2,742	1,680	84	6,289	525	314	2,113	15,194	5,909	998	964	2,293
Other services, except public administration	2,300	1,720	434	(D)	4,416	455	159	1,119	9,464	1,032	1,065	444	1,213
Federal government	312	488	206	46	2,004	219	109	214	3,383	157	570	338	513
State government	107	498	68	25	2,134	231	203	146	11,756	155	145	549	273
Local government	2,904	4,326	1,095	119	5,975	867	859	1,589	13,576	2,168	2,252	1,319	4,031
Categories for which data were not disclosed	438	0	149	404	0	1,417	284	508	0	791	652	1,281	1,389
Total Employment	**41,550**	**35,725**	**10,491**	**1,203**	**83,018**	**7,781**	**4,700**	**20,645**	**189,123**	**25,232**	**18,524**	**9,716**	**29,625**

Source: US Department of Commerce 2012

Table N.2
Employment Percentages by Industry Sector and County in 2010[1,2]

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[3]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Farm	0.4%	2.1%	2.4%	11.8%	2.5%	6.7%	7.2%	3.2%	1.1%	0.2%	5.3%	3.8%	0.9%
Forestry, fishing, & related activities[4]	(D)	0.5%	1.3%	6.2%	0.4%	1.9%	(D)	1.1%	0.3%	(D)	0.6%	(D)	(D)
Mining (including oil and gas)	(D)	6.4%	0.9%	5.7%	4.4%	8.5%	19.6%	3.3%	0.6%	(D)	15.7%	4.8%	19.7%
Utilities	0.2%	0.6%	(D)	(L)	0.3%	(D)	(D)	(D)	0.1%	(D)	0.8%	0.8%	(D)
Construction	9.8%	12.6%	10.6%	(D)	7.3%	5.4%	7.5%	9.9%	6.4%	7.5%	6.9%	8.0%	7.6%
Manufacturing	0.9%	0.9%	1.6%	(D)	3.6%	1.4%	1.8%	1.0%	6.3%	0.6%	1.4%	(D)	4.7%
Wholesale trade	1.3%	2.4%	(D)	(D)	3.2%	3.6%	(D)	(D)	2.0%	(D)	3.6%	0.8%	(D)
Retail trade	8.6%	10.3%	8.6%	8.2%	12.0%	12.4%	6.3%	8.6%	11.2%	11.8%	10.1%	9.9%	9.9%
Transportation and warehousing	1.6%	2.5%	1.8%	(D)	3.8%	(D)	3.0%	2.2%	1.6%	1.4%	5.2%	5.5%	5.6%
Information	1.1%	0.7%	0.5%	(D)	1.3%	1.2%	0.6%	1.1%	1.7%	(D)	0.9%	1.0%	0.8%
Finance and insurance	4.3%	3.7%	3.2%	(D)	5.0%	2.9%	2.6%	4.4%	5.1%	3.6%	4.3%	2.9%	2.4%
Real estate and rental and leasing	12.3%	6.9%	10.9%	3.3%	5.3%	3.7%	2.6%	10.9%	5.6%	11.9%	4.5%	4.2%	4.2%
Professional and technical services	5.7%	6.1%	4.8%	(D)	5.2%	(D)	(D)	6.4%	8.8%	5.5%	3.0%	3.0%	3.0%
Management of companies and enterprises	0.6%	0.7%	0.4%	0.0%	0.5%	(D)	(D)	0.5%	0.3%	0.5%	(D)	0.2%	0.3%
Administrative and waste services	5.5%	4.9%	4.0%	(D)	5.4%	2.9%	4.1%	4.0%	6.2%	4.8%	(D)	2.7%	2.5%
Educational services	0.9%	1.4%	0.7%	1.0%	0.8%	(D)	0.4%	1.6%	1.5%	1.0%	0.7%	(D)	0.4%
Health care and social assistance	5.5%	7.3%	2.9%	5.0%	12.0%	(D)	2.0%	7.0%	10.3%	4.5%	5.8%	(D)	4.4%
Arts, entertainment, and recreation	9.5%	2.5%	10.9%	2.3%	2.1%	1.8%	1.3%	7.3%	2.7%	6.1%	0.7%	2.1%	0.9%
Accommodation and food services	17.0%	7.7%	16.0%	7.0%	7.6%	6.7%	6.7%	10.2%	8.0%	23.4%	5.4%	9.9%	7.7%
Other services, except public administration	5.5%	4.8%	4.1%	(D)	5.3%	5.8%	3.4%	5.4%	5.0%	4.1%	5.7%	4.6%	4.1%
Federal government	0.8%	1.4%	2.0%	3.8%	2.4%	2.8%	2.3%	1.0%	1.8%	0.6%	3.1%	3.5%	1.7%
State government	0.3%	1.4%	0.6%	2.1%	2.6%	3.0%	4.3%	0.7%	6.2%	0.6%	0.8%	5.7%	0.9%
Local government	7.0%	12.1%	10.4%	9.9%	7.2%	11.1%	18.3%	7.7%	7.2%	8.6%	12.2%	13.6%	13.6%
Categories for which data were not disclosed	1.1%	0.0%	1.4%	33.6%	0.0%	18.2%	6.0%	2.5%	0.0%	3.1%	3.5%	13.2%	4.7%

Source: US Department of Commerce 2012

[1] (D) Not shown to avoid disclosure of confidential information (US Bureau of Economic Analysis does not report data when there are three or fewer employers in a sector), but the estimates for this item are included in the totals.
[2] (L) Fewer than 10 jobs (US Bureau of Economic Analysis does not report specific data when there are fewer than 10 jobs in a sector), but the estimates for this item are included in the totals.
[3] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.
[4] "Related activities" includes hunting and trapping, as well as agricultural services such as custom tillage.

Table N.3
Labor Income Levels by Industry Sector and County and Non-Labor Income Levels by County in 2010, presented in 2010 dollars (millions)

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[1]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Population	52,064	56,139	14,791	1,390	146,307	13,819	6,625	23,451	300,552	28,082	32,435	15,834	43,623
Non-labor income[2]	$773.7	$672.7	$200.6	$24.7	$2,052.1	$144.8	$73.6	$458.4	$3,975.0	$473.1	$269.7	$231.5	$542.2
Dividends, interest, and rent	$631.4	$423.7	$136.9	$15.6	$1,042.5	$66.2	$36.8	$366.5	$2,360.9	$389.9	$124.7	$132.1	$320.2
Personal current transfer receipts[3]	$142.3	$249.1	$63.7	$9.1	$1,009.6	$78.6	$36.8	$91.9	$1,614.1	$83.2	$145.0	$99.4	$222.0
Adjustment for residence[4]	$34.3	$40.4	$43.2	$1.2	$86.1	$57.4	-$24.4	-$42.6	$649.1	-$58.6	-$23.6	-$6.9	-$135.9
Contributions for government social insurance[5]	$182.5	$155.1	$32.1	$2.8	$363.3	$32.5	$22.5	$82.3	$803.0	$91.2	$93.0	$53.3	$218.9
Total personal income by place of residence	$2,506.8	$2,092.7	$551.5	$57.7	$5,029.9	$505.5	$268.2	$1,142.5	$11,585.1	$1,210.0	$935.9	$615.4	$2,092.9
Earnings by place of work[6]	$1,881.3	$1,534.7	$339.8	$34.6	$3,255.0	$335.8	$241.6	$809.0	$7,764.0	$886.9	$782.9	$444.0	$1,905.5
Total earnings by place of work by sector[7,8]													
Farm	$2.1	-$1.0	$4.2	$8.7	$4.1	$9.6	$1.9	$3.9	$20.9	-$0.2	-$0.9	$6.1	$1.9
Forestry, fishing, & related activities[9]	(D)	$1.7	$1.3	$1.5	$7.3	$2.0	(D)	$3.5	$7.9	(D)	$1.2	(D)	(D)
Mining (including oil and gas)	(D)	$183.1	$2.0	(L)	$235.7	$65.9	$76.8	$56.3	$23.1	(D)	$202.7	$35.7	$740.7
Utilities	$6.4	$24.4	(D)	(L)	$22.4	(D)	(D)	(D)	$22.8	(D)	$19.8	$6.3	(D)
Construction	$242.0	$241.7	$44.2	(D)	$269.5	$15.4	$24.0	$114.1	$609.7	$81.1	$69.4	$48.8	$153.1
Manufacturing	$12.6	$16.2	$5.9	(D)	$134.1	$2.9	$3.0	$3.6	$1,019.1	$2.8	$7.3	(D)	$134.9
Wholesale trade	$33.0	$55.2	(D)	(D)	$137.0	$14.6	(D)	(D)	$216.7	(D)	$42.1	$2.8	(D)
Retail trade	$144.3	$121.3	$24.7	$2.8	$269.0	$29.4	$16.9	$76.1	$541.2	$88.2	$49.5	$27.3	$84.7

[1] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.
[2] Non-labor income includes dividends, interest, and rent and personal current transfer receipts.
[3] Personal current transfer receipts are benefits received by persons for which no current services are performed. They are payments by government and business to individuals and institutions, such as retirement and disability insurance benefits.
[4] Residence adjustment represents the net inflow of the earnings of inter-area commuters. A positive number indicates that, on balance, area residents commute outside to find jobs; a negative number indicates that, on balance, people from outside the area commute in to find jobs.
[5] Contributions for government social insurance consist of payments by employers, employees, the self-employed, and other individuals who participate in the following government programs: Old-age, Survivors, and Disability Insurance; Medicare; unemployment insurance; railroad retirement; pension benefit guarantee; veterans' life insurance; publicly-administered workers' compensation; military medical insurance; and temporary disability insurance.
[6] Earnings by place of work differs from total personal income by the exclusion of dividends, interest, and rent, as well as adjustments to account for net transfer payments (e.g., unemployment benefits and Social Security taxes and payments) and the residential adjustment.
[7] (D) Not shown to avoid disclosure of confidential information (US Bureau of Economic Analysis does not report data when there are three or fewer employers in a sector), but the estimates for this item are included in the totals.
[8] (L) Less than $50,000 (therefore US Bureau of Economic Analysis does not disclose specific figures), but the estimates for this item are included in the totals.
[9] "Related activities" includes hunting and trapping, as well as agricultural services such as custom tillage.

Table N.3
Labor Income Levels by Industry Sector and County and Non-Labor Income Levels by County in 2010, presented in 2010 dollars (millions)

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[1]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Transportation and warehousing	$32.9	$51.8	$5.3	(D)	$191.4	(D)	$8.9	$16.3	$121.3	$14.6	$57.6	$37.5	$119.7
Information	$22.9	$10.4	$2.5	(D)	$52.4	$3.2	$0.7	$8.9	$174.3	(D)	$6.2	$3.2	$7.5
Finance and insurance	$54.3	$42.3	$6.6	(D)	$132.6	$7.6	$2.8	$33.7	$253.3	$22.2	$10.3	$8.6	$29.6
Real estate and rental and leasing	$258.8	$66.3	$23.7	(L)	$57.1	$3.4	$1.7	$35.1	$118.1	$69.2	$26.0	$3.8	$34.8
Professional and technical services	$111.3	$85.8	$20.5	(D)	$170.1	(D)	(D)	$56.8	$885.3	$73.6	$28.5	$9.9	$48.5
Management of companies and enterprises	$13.1	$10.1	$0.7	$0.0	$15.7	(D)	(D)	$5.9	$55.2	$6.1	(D)	$1.5	$6.1
Administrative and waste services	$71.5	$56.3	$8.5	(D)	$138.9	$5.1	$6.3	$24.4	$342.9	$34.8	(D)	$4.5	$20.5
Educational services	$13.8	$11.5	$0.6	$0.0	$10.2	(D)	(L)	$6.4	$50.1	$5.7	$0.9	(D)	$2.0
Health care and social assistance	$172.9	$137.5	$11.4	$0.6	$496.2	(D)	$2.1	$77.0	$992.4	$63.1	$39.0	(D)	$50.5
Arts, entertainment, and recreation	$160.9	$12.2	$35.8	$0.2	$19.8	$1.5	$0.7	$52.6	$57.2	$39.5	$0.5	$7.4	$3.1
Accommodation and food services	$246.5	$65.7	$40.0	$1.2	$130.5	$9.8	$10.6	$56.6	$298.0	$182.2	$16.9	$18.8	$45.3
Other services, except public administration	$78.7	$63.9	$20.5	(D)	$156.6	$13.6	$17.0	$41.2	$328.1	$35.3	$42.1	$13.5	$48.0
Federal government	$18.9	$37.8	$13.8	$3.4	$173.1	$17.3	$8.0	$13.8	$328.8	$9.2	$44.8	$23.2	$34.3
State government	$7.5	$31.2	$4.1	$1.2	$114.0	$10.1	$9.8	$7.8	$574.3	$7.3	$9.7	$34.1	$17.5
Local government	$165.3	$209.4	$53.6	$3.9	$317.2	$40.5	$39.7	$76.1	$723.4	$113.0	$94.4	$67.0	$218.3
Categories for which data were not disclosed	$11.9	$0.0	$10.2	$11.1	$0.0	$84.0	$10.9	$38.6	$0.0	$39.2	$14.8	$84.3	$104.6

Source: US Department of Commerce 2012

Table N.4
Labor Income Percentages by Industry Sector and County and Non-Labor Income Percentages by County in 2010

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[1]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Population	52,064	56,139	14,791	1,390	146,307	13,819	6,625	23,451	300,552	28,082	32,435	15,834	43,623
Non-labor income as a proportion of total personal income[2]	30.9%	32.1%	36.4%	42.8%	40.8%	28.6%	27.4%	40.1%	34.3%	39.1%	28.8%	37.6%	25.9%
Dividends, interest, and rent as a proportion of total personal income	25.2%	20.2%	24.8%	27.1%	20.7%	13.1%	13.7%	32.1%	20.4%	32.2%	13.3%	21.5%	15.3%
Personal current transfer receipts as a proportion of total personal income[3]	5.7%	11.9%	11.5%	15.7%	20.1%	15.5%	13.7%	8.0%	13.9%	6.9%	15.5%	16.1%	10.6%
Adjustment for residence as a proportion of total personal income[4]	1.4%	1.9%	7.8%	2.0%	1.7%	11.4%	-9.1%	-3.7%	5.6%	-4.8%	-2.5%	-1.1%	-6.5%
Contributions for government social insurance as a proportion of total personal income[5]	7.3%	7.4%	5.8%	4.9%	7.2%	6.4%	8.4%	7.2%	6.9%	7.5%	9.9%	8.7%	10.5%
Total personal income by place of residence ($ millions)	$2,506.8	$2,092.7	$551.5	$57.7	$5,029.9	$505.5	$268.2	$1,142.5	$11,585.1	$1,210.0	$935.9	$615.4	$2,092.9
Earnings by place of work ($ millions)[6]	$1,881.3	$1,534.7	$339.8	$34.6	$3,255.0	$335.8	$241.6	$809.0	$7,764.0	$886.9	$782.9	$444.0	$1,905.5
Total earnings by place of work by sector [7,8]													
Farm	0.1%	-0.1%	1.2%	25.1%	0.1%	2.8%	0.8%	0.5%	0.3%	0.0%	-0.1%	1.4%	0.1%
Forestry, fishing, & related activities[9]	(D)	0.1%	0.4%	4.3%	0.2%	0.6%	(D)	0.4%	0.1%	(D)	0.2%	(D)	(D)
Mining (including oil and gas)	(D)	11.9%	0.6%	(L)	7.2%	19.6%	31.8%	7.0%	0.3%	(D)	25.9%	8.0%	38.9%
Utilities	0.3%	1.6%	(D)	(L)	0.7%	(D)	(D)	(D)	0.3%	(D)	2.5%	1.4%	(D)
Construction	12.9%	15.8%	13.0%	(D)	8.3%	4.6%	9.9%	14.1%	7.9%	9.1%	8.9%	11.0%	8.0%
Manufacturing	0.7%	1.1%	1.7%	(D)	4.1%	0.8%	1.2%	0.4%	13.1%	0.3%	0.9%	(D)	7.1%

[1] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.
[2] Non-labor income includes dividends, interest, and rent and personal current transfer receipts.
[3] Personal current transfer receipts are benefits received by persons for which no current services are performed. They are payments by government and business to individuals and institutions, such as retirement and disability insurance benefits.
[4] Residence adjustment represents the net inflow of the earnings of inter-area commuters. A positive number indicates that, on balance, area residents commute outside to find jobs; a negative number indicates that, on balance, people from outside the area commute in to find jobs.
[5] Contributions for government social insurance consist of payments by employers, employees, the self-employed, and other individuals who participate in the following government programs: Old-age, Survivors, and Disability Insurance; Medicare; unemployment insurance; railroad retirement; pension benefit guarantee; veterans' life insurance; publicly-administered workers' compensation; military medical insurance; and temporary disability insurance.
[6] Earnings by place of work differs from total personal income by the exclusion of dividends, interest, and rent, as well as adjustments to account for net transfer payments (e.g., unemployment benefits and Social Security taxes and payments) and the residential adjustment.
[7] (D) Not shown to avoid disclosure of confidential information (US Bureau of Economic Analysis does not report data when there are three or fewer employers in a sector), but the estimates for this item are included in the totals.
[8] (L) Less than $50,000 (therefore US Bureau of Economic Analysis does not disclose specific figures), but the estimates for this item are included in the totals.
[9] "Related activities" includes hunting and trapping, as well as agricultural services such as custom tillage.

Table N.4
Labor Income Percentages by Industry Sector and County and Non-Labor Income Percentages by County in 2010

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[1]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Wholesale trade	1.8%	3.6%	(D)	(D)	4.2%	4.4%	(D)	(D)	2.8%	(D)	5.4%	0.6%	(D)
Retail trade	7.7%	7.9%	7.3%	8.1%	8.3%	8.8%	7.0%	9.4%	7.0%	9.9%	6.3%	6.1%	4.4%
Transportation and warehousing	1.8%	3.4%	1.6%	(D)	5.9%	(D)	3.7%	2.0%	1.6%	1.6%	7.4%	8.4%	6.3%
Information	1.2%	0.7%	0.7%	(D)	1.6%	1.0%	0.3%	1.1%	2.2%	(D)	0.8%	0.7%	0.4%
Finance and insurance	2.9%	2.8%	1.9%	(D)	4.1%	2.3%	1.1%	4.2%	3.3%	2.5%	1.3%	1.9%	1.6%
Real estate and rental and leasing	13.8%	4.3%	7.0%	(L)	1.8%	1.0%	0.7%	4.3%	1.5%	7.8%	3.3%	0.8%	1.8%
Professional and technical services	5.9%	5.6%	6.0%	(D)	5.2%	(D)	(D)	7.0%	11.4%	8.3%	3.6%	2.2%	2.5%
Management of companies and enterprises	0.7%	0.7%	0.2%	0.0%	0.5%	(D)	(D)	0.7%	0.7%	0.7%	(D)	0.3%	0.3%
Administrative and waste services	3.8%	3.7%	2.5%	(D)	4.3%	1.5%	2.6%	3.0%	4.4%	3.9%	(D)	1.0%	1.1%
Educational services	0.7%	0.7%	0.2%	0.0%	0.3%	(D)	(L)	0.8%	0.6%	0.6%	0.1%	(D)	0.1%
Health care and social assistance	9.2%	9.0%	3.3%	1.8%	15.2%	(D)	0.9%	9.5%	12.8%	7.1%	5.0%	(D)	2.7%
Arts, entertainment, and recreation	8.6%	0.8%	10.5%	0.6%	0.6%	0.5%	0.3%	6.5%	0.7%	4.4%	0.1%	1.7%	0.2%
Accommodation and food services	13.1%	4.3%	11.8%	3.4%	4.0%	2.9%	4.4%	7.0%	3.8%	20.5%	2.2%	4.2%	2.4%
Other services, except public administration	4.2%	4.2%	6.0%	(D)	4.8%	4.1%	7.0%	5.1%	4.2%	4.0%	5.4%	3.0%	2.5%
Federal government	1.0%	2.5%	4.1%	9.9%	5.3%	5.2%	3.3%	1.7%	4.2%	1.0%	5.7%	5.2%	1.8%
State government	0.4%	2.0%	1.2%	3.5%	3.5%	3.0%	4.0%	1.0%	7.4%	0.8%	1.2%	7.7%	0.9%
Local government	8.8%	13.6%	15.8%	11.2%	9.7%	12.1%	16.4%	9.4%	9.3%	12.7%	12.1%	15.1%	11.5%
Categories for which data were not disclosed	0.6%	0.0%	3.0%	32.2%	0.0%	25.0%	4.5%	4.8%	0.0%	4.4%	1.9%	19.0%	5.5%

Source: US Department of Commerce 2012

Table N.5
Employment Trends by Select Industry Sector and County, 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mining										
Eagle, CO	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Garfield, CO	382	478	753	1,011	1,657	2,314	2,514	3,240	2,395	2,717
Grand, CO	(D)	22	27	(D)	(D)	(D)	(D)	83	88	125
Jackson, CO	(D)	(D)	(D)	(D)	(L)	10	11	44	63	95
Mesa, CO	652	665	799	1,125	1,519	2,363	3,462	4,884	3,874	3,752
Moffat, CO	533	578	553	552	608	672	688	755	684	671
Rio Blanco, CO	553	571	563	666	796	907	945	1,089	917	939
Routt, CO	572	586	619	652	670	(D)	(D)	(D)	732	674
Socioeconomic Study Area	**2,692**	**2,900**	**3,314**	**4,006**	**5,250**	**6,266**	**7,620**	**10,095**	**8,753**	**8,973**
Farming[1]										
Eagle, CO	166	152	162	160	163	165	181	185	181	183
Garfield, CO	701	677	699	672	672	670	737	741	726	739
Grand, CO	246	241	248	237	232	230	246	250	245	248
Jackson, CO	181	163	167	153	146	140	139	144	140	143
Mesa, CO	2,016	1,962	1,993	1,907	1,898	1,886	2,092	2,083	2,045	2,082
Moffat, CO	543	528	525	496	486	476	529	529	519	527
Rio Blanco, CO	345	333	334	318	314	311	340	341	333	339
Routt, CO	743	757	732	673	642	612	657	659	647	657
Socioeconomic Study Area	**4,941**	**4,813**	**4,860**	**4,616**	**4,553**	**4,490**	**4,921**	**4,932**	**4,836**	**4,918**
Retail trade										
Eagle, CO	3,537	3,392	3,582	3,730	3,718	3,870	4,118	4,079	3,713	3,590
Garfield, CO	3,714	3,667	3,724	3,969	4,042	4,379	4,584	4,384	3,990	3,682
Grand, CO	1,001	955	999	1,041	1,148	1,174	1,218	1,091	987	894
Jackson, CO	110	109	109	115	113	117	120	111	100	102
Mesa, CO	9,499	9,618	9,848	10,070	10,263	10,467	10,873	10,694	10,213	9,836
Moffat, CO	931	905	901	873	863	881	945	1,060	1,024	926
Rio Blanco, CO	353	334	372	324	321	334	341	326	342	304
Routt, CO	1,929	1,945	1,939	1,934	2,003	2,021	2,059	2,052	1,855	1,804

[1] Farming values sum data for "Farm" and "Agriculture and forestry support activities."

Table N.5
Employment Trends by Select Industry Sector and County, 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Socioeconomic Study Area	**21,074**	**20,925**	**21,474**	**22,056**	**22,471**	**23,243**	**24,258**	**23,797**	**22,224**	**21,138**
Accommodation and food services										
Eagle, CO	6,396	6,339	6,610	6,722	7,122	7,199	7,315	7,809	7,165	7,028
Garfield, CO	2,567	2,533	2,601	2,719	2,812	2,966	3,178	3,235	2,959	2,740
Grand, CO	1,728	1,771	1,790	1,808	1,734	1,768	1,869	1,882	1,697	1,668
Jackson, CO	67	66	73	95	101	96	87	90	87	84
Mesa, CO	5,297	5,841	5,850	6,070	6,081	6,245	6,570	6,902	6,571	6,267
Moffat, CO	571	574	566	572	566	579	545	573	575	523
Rio Blanco, CO	293	0	295	320	343	367	399	403	364	312
Routt, CO	2,305	2,316	2,306	2,337	2,336	2,380	2,394	2,317	2,162	2,111
Socioeconomic Study Area	**19,224**	**19,440**	**20,091**	**20,643**	**21,095**	**21,600**	**22,357**	**23,211**	**21,580**	**20,733**
Arts, entertainment, and recreation										
Eagle, CO	3,649	3,747	3,468	3,630	3,801	3,899	3,904	3,961	3,976	3,996
Garfield, CO	808	829	808	843	854	869	890	887	889	905
Grand, CO	1,241	1,139	1,243	1,065	1,039	1,052	1,110	1,151	1,136	1,135
Jackson, CO	24	27	28	24	26	30	28	30	26	29
Mesa, CO	1,261	1,316	1,328	1,567	1,742	1,800	1,865	1,873	1,815	1,842
Moffat, CO	76	(D)	83	98	117	130	147	175	143	132
Rio Blanco, CO	78	(D)	66	69	68	64	70	65	63	65
Routt, CO	1,430	1,428	1,418	1,395	1,483	1,423	1,494	1,489	1,404	1,493
Socioeconomic Study Area	**8,567**	**8,486**	**8,442**	**8,691**	**9,130**	**9,267**	**9,508**	**9,631**	**9,452**	**9,597**

Source: US Department of Commerce 2012

Table N.6
Labor Earnings Trends by Select Industry Sector and County, 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mining										
Eagle, CO	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Garfield, CO	$29.4	$34.0	$52.4	$70.4	$123.8	$198.5	$216.1	$290.5	$196.6	$209.0
Grand, CO	$0.0	$0.7	$0.7	$0.0	$0.0	$0.0	$0.0	$4.0	$1.9	$2.0
Jackson, CO	$0.0	$0.0	$0.0	$0.0	$0.2	$0.3	$0.3	$0.0	$0.0	$0.0
Mesa, CO	$29.9	$29.8	$36.0	$71.9	$97.5	$178.4	$272.4	$384.9	$264.2	$254.1
Moffat, CO	$47.0	$50.0	$52.7	$59.6	$60.7	$72.5	$75.0	$100.8	$71.4	$88.4
Rio Blanco, CO	$40.0	$46.0	$48.1	$59.1	$69.2	$83.6	$79.9	$95.1	$78.4	$77.2
Routt, CO	$50.3	$51.1	$51.3	$59.3	$60.7	$0.0	$0.0	$0.0	$63.2	$53.9
Socioeconomic Study Area	**$196.6**	**$211.5**	**$241.2**	**$320.2**	**$412.1**	**$533.2**	**$643.7**	**$875.3**	**$675.8**	**$684.6**
Farming[1]										
Eagle, CO	$6.2	$10.2	$6.2	$6.3	$7.0	$5.0	$4.5	$4.4	$5.4	$3.1
Garfield, CO	$5.1	$8.2	$6.6	$11.1	$10.0	$6.1	$4.2	$2.8	$3.6	-$1.2
Grand, CO	$0.0	$1.3	$2.1	$7.9	$9.0	$11.7	$8.0	$7.5	$9.0	$5.3
Jackson, CO	-$1.7	$2.0	$2.9	$5.1	$9.8	$11.5	$12.3	$9.2	$10.2	$7.5
Mesa, CO	$17.3	$18.0	$11.4	$17.6	$22.4	$14.9	$18.9	$15.9	$14.7	$3.6
Moffat, CO	$5.1	$7.5	$11.8	$16.3	$19.5	$17.5	$22.4	$17.4	$20.8	$12.4
Rio Blanco, CO	$3.1	$4.0	$4.4	$7.0	$10.1	$7.3	$6.9	$3.1	$4.7	$2.7
Routt, CO	$1.0	$4.9	$6.9	$12.4	$13.1	$9.8	$10.3	$10.6	$10.0	$4.4
Socioeconomic Study Area	**$36.2**	**$56.1**	**$52.3**	**$83.6**	**$100.8**	**$83.8**	**$87.6**	**$70.8**	**$78.4**	**$37.8**
Retail trade										
Eagle, CO	$138.3	$137.5	$146.9	$150.8	$150.6	$161.2	$171.9	$165.3	$148.2	$138.5
Garfield, CO	$118.2	$118.1	$119.6	$129.5	$133.6	$148.8	$158.5	$154.3	$136.5	$118.1
Grand, CO	$26.2	$25.2	$25.5	$26.9	$30.3	$31.8	$33.3	$29.6	$26.9	$24.5
Jackson, CO	$2.3	$2.6	$2.5	$2.5	$2.5	$2.8	$2.5	$2.4	$2.7	$2.9
Mesa, CO	$267.4	$275.4	$281.8	$285.6	$290.0	$300.8	$310.6	$307.5	$281.1	$266.2
Moffat, CO	$26.8	$25.8	$28.3	$27.8	$28.1	$29.4	$31.3	$33.5	$30.8	$28.2
Rio Blanco, CO	$12.3	$15.0	$17.7	$18.7	$18.0	$18.1	$16.9	$16.4	$16.9	$13.0
Routt, CO	$90.3	$100.4	$86.8	$83.7	$87.5	$87.8	$87.9	$82.5	$77.7	$66.7

[1] Farming values sum data for "Farm" and "Agriculture and forestry support activities."

Table N.6
Labor Earnings Trends by Select Industry Sector and County, 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Socioeconomic Study Area	**$681.9**	**$700.0**	**$709.2**	**$725.6**	**$740.6**	**$780.8**	**$813.0**	**$791.5**	**$720.8**	**$658.2**
Accommodation and food services										
Eagle, CO	$207.9	$202.2	$217.5	$230.6	$237.5	$237.7	$259.9	$267.0	$236.4	$237.3
Garfield, CO	$57.3	$56.1	$57.3	$62.2	$64.4	$68.7	$78.6	$79.4	$69.1	$62.9
Grand, CO	$35.9	$38.8	$40.4	$44.6	$41.8	$41.7	$45.3	$43.2	$38.1	$38.4
Jackson, CO	$0.9	$0.8	$1.0	$1.2	$1.3	$1.3	$1.2	$1.3	$1.1	$1.1
Mesa, CO	$96.9	$103.7	$106.4	$113.2	$113.1	$118.8	$136.2	$140.9	$129.7	$125.1
Moffat, CO	$8.3	$8.3	$8.8	$9.1	$8.9	$9.4	$9.8	$10.1	$9.8	$9.3
Rio Blanco, CO	$4.3	$0.0	$5.3	$5.3	$5.8	$6.4	$9.5	$12.0	$11.0	$9.8
Routt, CO	$56.3	$57.0	$57.7	$59.9	$61.1	$62.6	$67.3	$63.1	$56.4	$54.2
Socioeconomic Study Area	**$467.8**	**$467.1**	**$494.3**	**$526.2**	**$533.8**	**$546.7**	**$608.0**	**$616.9**	**$551.6**	**$538.2**
Arts, entertainment, and recreation										
Eagle, CO	$138.5	$139.6	$163.9	$157.5	$187.1	$209.8	$179.5	$166.7	$152.4	$151.5
Garfield, CO	$12.6	$12.6	$11.1	$11.4	$12.1	$13.1	$12.3	$13.1	$12.0	$11.7
Grand, CO	$38.9	$37.0	$36.1	$34.0	$32.8	$34.5	$35.2	$36.1	$32.9	$33.4
Jackson, CO	$0.2	$0.3	$0.3	$0.3	$0.3	$0.4	$0.2	$0.2	$0.2	$0.2
Mesa, CO	$12.0	$15.8	$16.5	$19.2	$20.5	$22.0	$23.5	$20.7	$20.1	$19.6
Moffat, CO	$0.6	$0.0	$0.7	$0.8	$0.9	$1.4	$1.6	$1.9	$1.6	$1.4
Rio Blanco, CO	$0.8	$0.0	$0.7	$0.9	$0.9	$0.6	$0.5	$0.4	$0.7	$0.8
Routt, CO	$40.6	$44.4	$45.1	$49.2	$48.1	$49.5	$47.7	$51.1	$45.7	$49.2
Socioeconomic Study Area	**$244.3**	**$249.8**	**$274.4**	**$273.4**	**$302.7**	**$331.3**	**$300.4**	**$290.2**	**$265.5**	**$267.8**

Source: US Department of Commerce 2012
Values reported in 2001 dollars were converted to 2010 dollars using the Consumer Price Index (Bureau of Labor Statistics 2012a).

Table N.7
Annual Population by County, 2000-2010[1]

Geographic Area	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010[2]
Eagle County, CO	41,961	43,238	44,227	44,995	45,893	47,205	48,476	49,803	51,049	52,513	52,126
Garfield County, CO	44,257	45,636	46,925	47,622	48,193	49,579	51,594	53,534	55,449	57,089	56,139
Grand County, CO	12,496	12,743	13,158	13,324	13,596	13,627	14,003	14,306	14,622	14,902	14,796
Jackson County, CO	1,577	1,529	1,532	1,512	1,486	1,449	1,415	1,407	1,378	1,408	1,390
Mesa County, CO	117,631	119,496	122,440	124,994	127,678	130,194	134,665	139,434	143,155	147,851	146,313
Moffat County, CO	13,147	13,065	13,193	13,106	13,175	12,956	13,115	13,348	13,585	13,728	13,818
Rio Blanco County, CO	5,986	5,868	5,951	5,923	6,007	5,945	6,176	6,373	6,522	6,779	6,620
Routt County, CO	19,815	20,210	20,469	20,893	21,162	21,398	21,859	22,491	23,135	23,688	23,447
Socioeconomic Study Area	**256,870**	**261,785**	**267,895**	**272,369**	**277,190**	**282,353**	**291,303**	**300,696**	**308,895**	**317,958**	**314,649**
Colorado	**4,326,921**	**4,425,687**	**4,490,406**	**4,528,732**	**4,575,013**	**4,631,888**	**4,720,423**	**4,803,868**	**4,889,730**	**4,972,195**	**5,049,071**
Larimer County, CO[3]	253,072	260,541	265,372	268,448	271,510	275,116	280,713	286,112	291,650	296,696	300,637
Summit County, CO	23,700	24,716	25,006	25,408	25,313	25,487	26,019	26,603	27,144	27,678	28,081
Uintah County, UT	25,215	25,786	26,395	26,561	26,994	27,661	28,662	29,920	31,009	32,931	32,434
Carbon County, WY	15,582	15,217	15,256	15,240	15,236	15,077	15,136	15,494	15,658	15,977	15,853
Sweetwater County, WY	37,552	36,899	37,428	37,450	38,026	38,739	39,749	41,470	42,358	44,133	43,621

Source: US Census Bureau 2011

[1] Population values provided as of July 1 of each year.
[2] The values for July 1, 2010 were produced by applying estimates of change in the population between April 1 and July 1 of 2010 to the 2010 Census counts. Further details on this methodology are available at http://www.census.gov/popest/methodology/intercensal_nat_meth.pdf.
[3] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.

NON-MARKET VALUATION METHODS

This section addresses economic valuation of three categories of non-market resources that are present in the study area and could potentially be affected by the alternatives. These three categories of non-market value are recreation, values of GRSG to households in the intermountain west, and value of the ranching tradition to the ranchers themselves, residents, and visitors to the region. Recreation is included because actions that promote the conservation of GRSG habitat may result in changes in recreation opportunities, such as increasing the amount of habitat for other wildlife species that may be hunted or viewed that depend on public lands, roads open or closed for recreation access, and the quality of the recreation experience.

The economic non-market values described in this appendix are not directly comparable to regional economic indicators commonly used to describe how natural resources on public lands contribute to the regional economic indicators such as output/sales, labor income, and employment. These indicators provide valuable information to the local public as well as to regional government agencies for purposes of public service and infrastructure planning. These impacts or contributions are often referred to as distributional effects as they describe the effects to the region. However, these indicators do not represent net economic value. For example, in economic terms, labor income associated with mineral production would actually be considered a cost to the producer. Similarly, expenditures by a recreation visitor associated with a visit to public lands would be viewed by the recreationist as a cost. One last example would be the total sales generated by the sale of minerals extracted from federally owned minerals: the total sales do not reflect the net economic value since the costs associated with the extraction are not accounted for (including labor income, supplies, and equipment, as well as potentially non-market costs such as those associated with pollution). This section considers the economic value of the non-market outputs, a concept describe below.

Total Non-Market Economic Value

Many of the multiple uses in the study area are not bought and sold in competitive markets. For instance, many recreational visitors to public lands pay no or low admission fees, and the presence of wild animals such as GRSG have no "market price," yet both have value to people. In some cases people gain value from using these non-market resources, such as recreation on public lands; in other cases, protection of some natural resources provides both a use value (e.g., wildlife viewing) as well as a non-use value (e.g., the value some people hold for knowing that a specific natural resource exists and is protected even if they never intend to "use" or visit it).

Economists call the sum of these two values Total Economic Value. Use values typically can be consumptive use (e.g., hunting) and/or non-consumptive, such as viewing or being present on site (e.g., camping and hiking). In contrast, non-use values occur off-site to people who derive enjoyment from knowing a natural

environment, habitat or species exists in its natural state, either for themselves (existence value) and/or future generations (bequest value). Krutilla (1967) documents the conceptual origins of these two elements of non-use value, and Freeman (2003) provides a rigorous theoretical treatment.

Non-use or existence values can potentially be enjoyed by millions if the good or service (e.g., the presence of a specific wild species such as wild salmon or rare bird species) is of widespread interest. Thus, while the non-use value per household may much lower than a value per day received by a visitor, in total, non-use values may be quite large.

Recreation Values

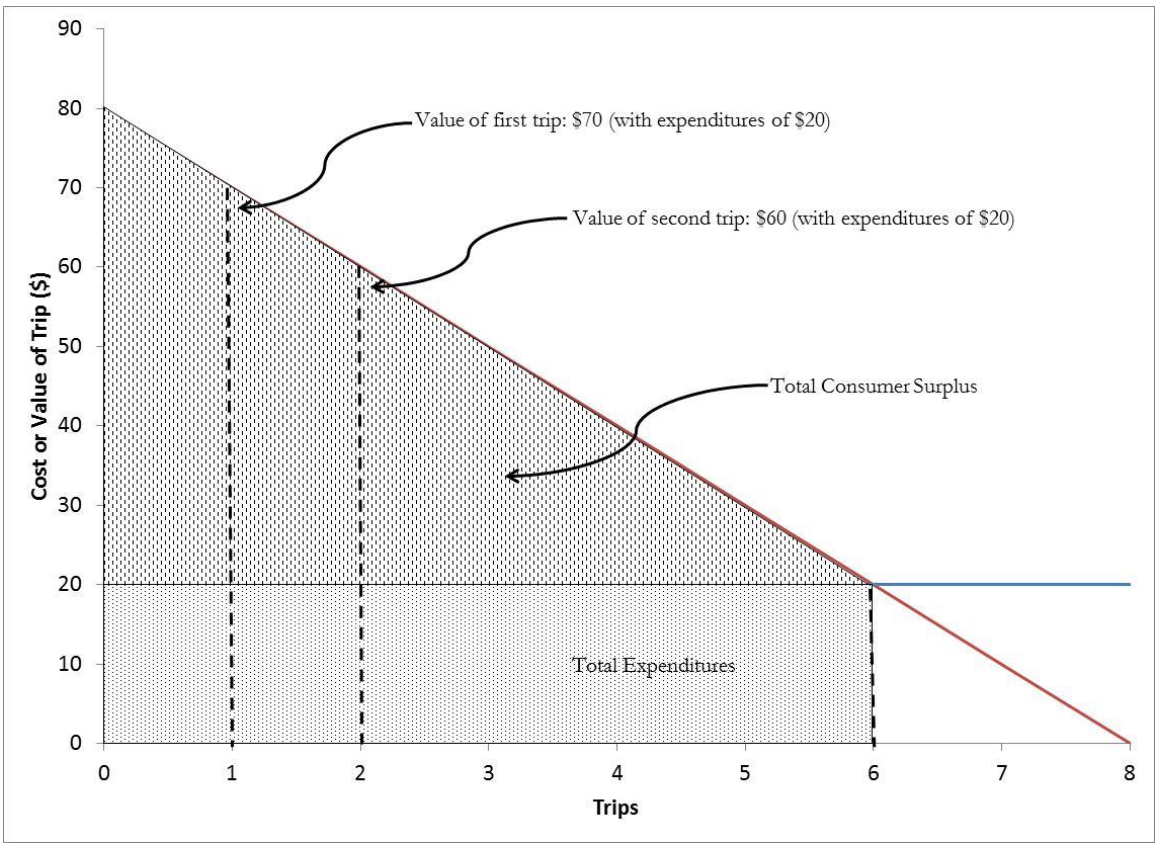
Economists measure the net economic use and non-use values as "Consumer Surplus." At its most basic level, consumer surplus is the maximum amount a person would pay minus the amount they actually have to pay. Consumer surplus, which is also sometimes referred to as "net willingness to pay," is a measure of benefit has been used by economists and federal agencies for decades (US Water Resources Council 1983; US Environmental Protection Agency 2009, 2010).

For public land recreation, especially on BLM and Forest Service recreation sites, entrance fees are typically very low or non-existent, so the value people place on these public land recreation opportunities is not fully measured simply by the entrance fees they pay. In economic terms, there is not a competitive market or a "market clearing price" for access to public recreation sites. Therefore, there can be a substantial difference between what people pay to visit a recreation site (e.g., entrance fees plus travel costs, including the value of time) and the maximum amount they would pay.

A common non-market valuation method used for recreation is the travel cost method. In this method, economists survey visitors to a recreation site and collect data on their frequency of trips, travel distance and costs incurred to access the site. Because the survey uses information from actual visitors, the travel cost method is a "revealed preference" method of valuation; economists use the travel costs as a proxy to determine the value that people gain from using the site. Variations in the travel cost across visitors, along with their respective number of trips, allow economists to statistically estimate a relationship between travel cost and quantity of trips – an aggregate demand curve for the recreation site, much like a demand curve for goods and services that are sold in competitive markets. This aggregate demand curve will tend to show that individuals with a relatively high travel cost take fewer trips on average, while individuals with a lower cost take more trips on average. From this aggregate demand curve, economists can calculate consumer surplus. Many of the consumer surplus values for recreation in the literature (Loomis 2005) and recently developed by the Forest Service (Bowker et al. 2009) rely upon the travel cost method.

Diagram N-1 provides an illustration of a demand curve for recreation on a particular site. In **Diagram N-1**, the aggregate demand is shown on an average basis, that is, for an average individual consumer. The downward-sloping diagonal line in **Diagram N-1** represents the relationship between the travel cost and quantity of trips demanded by this average consumer. In the diagram, the value of the first several trips is relatively high ($70 for the first and $60 for the second trip), while the value of the sixth trip is lower ($20 in the diagram). In a travel cost method study, these values are statistically derived from the aggregate demand calculated for the entire population. The downward slope of the demand curve corresponds to declining value associated with each trip, which is typical for most goods and services.[1] It also corresponds to the fact that visitors will take fewer trips to areas with a higher travel cost.

Diagram N-1. Consumer Demand Curve and Consumer Surplus for Recreation Trips



[1] Note that for some types of recreation use, users may gain increased value over a portion of the number of trips; for example, mountain bikers may experience increased enjoyment of subsequent trips to a single location as their trail-specific skills and knowledge increase with repeat visits. Climbers and other users may also experience similar gains over repeat visits. However, even these users will likely hit a point where the marginal value begins to decrease with more trips.

Each visitor receives a net benefit from each trip, which is measured by the difference between what they had to pay and the maximum amount they would pay for each trip. In **Diagram N-1** the net benefit for the average visitor is the difference between their actual expenditures of $20 per trip and the maximum amount they would pay for each trip. As shown, the first trip has a net benefit of $50 ($70 of value less $20 in expenditures), the second trip $40 ($60 less $20), and so on until the sixth trip. At the sixth trip the visitor's cost is the same as their benefit, and hence there is no net benefit from further trips. Thus, this gain to the visitor over and above what they spend is their "consumer surplus."

Given the large range and diversity of sites in the study area, the BLM and Forest Service did not perform original travel cost method analysis of visitation in the study area. Rather, they relied upon transferring existing recreation values from travel cost method studies such as Bowker et al. (2009) and other recreation values from the existing literature (Loomis 2005; Loomis and Richardson 2007; USFWS 2009) to the recreation activities in the study area, focusing on existing studies in the Rocky Mountain and Great Basin area (Colorado, Utah, Wyoming, Arizona, New Mexico, Idaho, Montana, and Nevada). This approach, known as "Benefit Transfer," is well-developed in academic and policy literature and has been used by federal agencies including the US Environmental Protection Agency (see Griffiths et al. 2012 for a recent listing of economic studies where benefit transfer was used), US Army Corps of Engineers, US Bureau of Reclamation, Forest Service (Forest Service 1991; also see Ervin et al. 2012 for a recent application of benefit transfer to the Mount Hood National Forest), and other agencies. Benefit transfer is widely used in academic applications as well; see Wilson and Hoehn (2006) for a series of journal articles on benefit transfer.

The BLM measures recreation activity in various units, including a "visitor hour," which represents the presence of one or more persons in an area for continuous or simultaneous periods of time aggregating 1 hour (i.e., one person for 1 hour or two persons for 30 minutes each). A "visitor day" as defined by BLM represents 12 visitor hours (BLM 2003). The BLM Recreation Management Information System provides data on recreation visitor days (RVDs); to be compatible with these units, BLM identified non-market values for various recreation activities in units of dollars per RVD. Values from economic literature, based on primary research conducted on various recreation sites, were matched to BLM and Forest Service recreation activity classifications. **Table N.8** provides a listing of the values per day representing Colorado.

Consistent with the description above of consumer surplus and the travel cost method, readers should interpret the values in **Table N.8** as the consumer surplus or the amount of value that the average visitor derives from a full day of recreation beyond their actual expenditures. Thus, a typical off-highway vehicle user would pay an average value of $51.35 more than their trip cost to have the opportunity to participate in a typical day of driving off-road vehicles.

Table N.8
Consumer Surplus for Recreation Activities

Recreation Activity Category	Consumer Surplus per Visitor Day (2012 dollars)
Backpacking	36.48
Camping	31.73
Cross Country Skiing	36.32
Fishing	49.00
Floatboating/Rafting/Canoeing	82.28
General Recreation	42.96
Hiking	107.16
Hunting	59.50
Motorboating	65.24
Mountain Biking	175.21
Off-Road Vehicle Driving/Off-Highway Vehicle	51.35
Other Recreation	47.69
Picnicking	52.27
Pleasure Driving	71.65
Rock Climbing	61.32
Sightseeing	41.33
Snowmobiling	51.75
Swimming	35.10
Waterskiing	69.23
Wildlife Viewing	38.00

Sources: Rosenberger 2012; Loomis 2005; Loomis and Richardson 2007; Bowker et al., 2009; USFWS 2009.

Table N.9 shows the total consumer surplus associated with recreation activities on BLM-administered and National Forest System lands for the Northwest Colorado sub-region, including the BLM Field Offices of Colorado River Valley, Grand Junction, Kremmling, Little Snake, and White River, as well as the Routt National Forest. RVDs on BLM lands presented in **Table N.9** is calculated directly from Report 26 from the BLM Recreation Management Information System (Report 26 provides RVDs based on recorded visitor hours – defined above – and dividing by 12). For this analysis, the BLM used average RVDs per year over the period 2008 to 2012. RVDs on National Forests are calculated from the most recent available data (Fiscal Year 2007) from the Forest Service National Visitor Use Monitoring report (Forest Service 2012). RVDs for National Forest System lands were calculated based on the total number of site visits, the "main activity" reported by recreators, and the number of hours per day reported engaging in that activity, with the number of RVDs equal to the number of hours divided by 12. Note that conservation measures for GRSG may only affect specific types and fractions of the public lands that contributed to the visitor days used to estimate the surplus values in **Table N.9**.

Table N.9
Total Consumer Surplus for Recreation in Northwest Colorado Sub-Region

Recreation Activity	Average RVDs Per Year	Total Consumer Surplus (millions of 2012 dollars)
Backpacking	147,444	$5.4
Big Game Hunting	1,050,200	$62.5
Camping	1,024,141	$32.5
Cross Country Skiing	14,828	$0.5
Fishing	63,003	$3.1
Floatboating/Rafting/Canoeing	88,881	$7.3
General Recreation	22,146	$1.0
Hiking	101,309	$10.9
Hunting – Other	122,642	$7.3
Motorboating	1,173	$0.1
Mountain Biking	101,493	$17.8
Off Road Vehicle Driving/Off-Highway Vehicle	420,761	$21.6
Other Recreation	122,373	$5.8
Picnicking	34,955	$1.8
Pleasure Driving	126,625	$9.1
Rock Climbing	4,507	$0.3
Sightseeing	66,201	$2.7
Small Game Hunting	27,927	$1.7
Snowmobiling	22,116	$1.1
Swimming	2,100	$0.1
Waterfowl Hunting	3,290	$0.2
Wildlife Viewing	29,326	$1.1
Total	**4,007,520**	**$193.8**

Source: BLM 2012; Forest Service 2012; consumer surplus per RVD shown in **Table N.8**, Consumer Surplus for Recreation Activities.

To estimate impacts on consumer surplus associated with changes in RVDs, BLM economists worked with BLM and Forest Service recreation specialists to project how RVDs for various activities would change under the alternatives. Initial projected growth rates (for Alternative A) are based on recent growth rates and projected trends, including growth rates predicted for the Rocky Mountain Region by Bowker et al. (1999). For the action alternatives, BLM and Forest Service recreational specialists projected changes in growth rates or initial shifts in RVDs based on their knowledge of local recreational facilities and the management actions that would occur under each alternative. Projected changes in consumer surplus are calculated as the product of projected changes in RVDs and the values of consumer surplus per RVD, as shown in **Table N.8**.

Values Associated with Greater Sage-Grouse Populations

Economists have long recognized that wildlife species, especially rare, threatened, and endangered species, have economic values beyond just viewing. This is supported by a series of legal decisions and technical analyses. The US Court of Appeals in 1989 first clarified that the US Department of the Interior,

in assessing damages in Natural Resource Damage Assessment cases, should include what it termed as "passive use values," that is, existence values provided to non-users of the species, as a compensable value in addition to any use value. These passive use values are also included in Oil Pollution Act damage assessments as well. The term passive values is interchangeable with the term non-use values defined previously. This ruling and subsequent analysis for Natural Resource Damage Assessment and Oil Pollution Act assessments are consistent with well-established economic theory showing that people derive value from passive use or non-use as well as active uses of resources (Krutilla 1967). Economists have devoted a great deal of conceptual and empirical work to refining concepts and developing methods to measure these passive use values.

The dominant methods are "stated preference" methods, of which the most prominent is the Contingent Valuation Method. The basic element of this method is to use a survey to construct or simulate a market or referendum for protection or improvement of a natural environment, habitat, or species, and then having the respondent indicate whether or not they would pay for an increment of protection, and if so, how much they would pay. While the method has developed a great deal of sophistication that has increased the validity of the willingness to pay responses, there is admittedly a degree of bias that can result in stated willingness to pay exceeding actual willingness to pay by a factor averaging two to three (Loomis 2011; Murphy et al. 2005; List and Gallet 2001). While not a perfect estimator of willingness to pay, the Contingent Valuation Method provides a useful means for estimating the public's passive use values.

Numerous academic papers and even entire books have been written on the Contingent Valuation Method. Mitchell and Carson (1989) was one of the first, while Alberini and Kahn (2006) is a more recent treatment. To date there have been about 7,500 Contingent Valuation Method studies in over 130 countries (Carson 2011). A number of federal agencies have used or referenced stated preference methods, including the US Bureau of Reclamation, US Environmental Protection Agency, National Park Service, and state agencies such as the California Department of Fish and Game, Idaho Fish and Game, and Montana Fish, Wildlife, and Parks. The USFWS commissioned an original Contingent Valuation Method study of the economic values the public receives from reintroduction of wolves in the areas of Idaho, Montana, and Wyoming, and used those values in an EIS on wolf reintroduction (USFWS 1994). The US Bureau of Reclamation, National Park Service, and Lower Elwha S'Klallam Tribe commissioned a Contingent Valuation Method study on the value of removal of the Elwha and Glines Canyon Dams (Meyer et al. 1995). The US Bureau of Reclamation also commissioned an original Contingent Valuation Method study on the values of providing stable river flows to benefit riparian vegetation, endangered species, and cultural resources. That study was cited by then-Secretary of the Interior Bruce Babbitt as a factor in selecting the more

protective flow regime from Glen Canyon Dam despite it having more foregone hydroelectricity (Babbitt 1996).

The BLM and Forest Service conducted a literature search to demonstrate the potential range of values that could be associated with species that are candidates for listing as threatened or endangered, such as GRSG populations. Analysts first verified there are no existing studies on Total Economic Value or non-use valuation specific to the GRSG. This is not an uncommon occurrence, as there are dozens of rare or potentially threatened species that have not been valued despite the very high policy relevance of the species and the large magnitude of economic value at stake in these policy decisions.

The BLM and Forest Service used three criteria to identify studies that are most applicable to the current analysis: (1) whether the species valuation study was located in the same geographic region as the GRSG habitat; (2) whether the species was listed or not listed as threatened or endangered; and (3) whether the species was hunted or not (implying a mix of use and non-use values).

The primary database of articles was the recent peer-reviewed journal article by Richardson and Loomis (2009), which is a compilation of the economic values of threatened, endangered, and rare species. A literature review was also conducted to determine if there had been any recent studies on GRSG or closely related species. Unfortunately, there is not a perfect match in the literature in terms of geographic region (intermountain) and a species that is both hunted and rare. **Table N.10** provides a summary of the studies with features most similar to the GRSG species.

As can be seen in **Table N.10** there is one study with a geographic region overlapping the sub-region (Mexican spotted owl), and one study on a species that was hunted at the time (wild turkey). At the time of the study, the Mexican spotted owl was a threatened species under the Endangered Species Act, and respondents were told in the survey that it was a threatened species. The whooping crane, red-cockaded woodpecker, and peregrine falcon studies involved an endangered species.

All of these studies used the Contingent Valuation Method in a mail survey. Households were asked whether they would pay a specific dollar amount, with that amount varying across individuals in the sample (i.e., the valuation questions were "closed-ended," although the wild turkey study and red-cockaded woodpecker also used an open-ended valuation question for some respondents). Researchers used the closed-ended valuation questions to generate a statistical valuation function. This valuation function exhibited internal validity: the higher the dollar amount households were asked to pay, the lower the percentage of them that would pay that dollar amount.

Table N.10
Existing Estimates of Annual Total Economic Value of Protecting Habitat for Species Similar to GRSG

Region	Species	Listed	Hunted	Annual Value per Household[b]	Change Valued
Four Corners (AZ, CO, NM, UT)	Mexican Spotted Owl	Yes	No	$58.49	Avoid extinction in 15 years in Four Corners region
New England	Wild Turkey	No	Yes	$16.72[a]	Avoid extinction in New England
Texas (also L.A., NYC, Chicago, Atlanta)	Whooping Crane	Yes	No	$43.69[a]	Avoid extinction
Maine	Peregrine Falcon	Yes	No	$32.37 (one time)	Restore self-sustaining population
South Carolina & Rest of US	Red-Cockaded Woodpecker	Yes	No	$14.69	Restore habitat to increase chance of survival to 99%

Sources: Loomis and Ekstrand 1997 (Mexican spotted owl); Stevens et al. 1991 (New England wild turkey); Bowker and Stoll 1988 (whooping crane); Kotchen and Reiling 2000 (peregrine falcon); Reaves et al. 1999 (red-cockaded woodpecker). All of these sources are as cited in Richardson and Loomis (2009).

Notes:

a. Average of estimates from the study.
b. As noted in the text, these stated preference values for household may have a degree of hypothetical bias that could overstate the actual monetary amount households would pay by a factor of two to three.

With the exception of the peregrine falcon study, which asked respondents to commit to a one-time payment, each survey asked respondents to pay annually to accomplish the stated goal (typically, preventing the species from going extinct in the region of interest, although this varied by study as the table shows). For the peregrine falcon and red-cockaded woodpecker, households were told that their payment would restore a self-sustaining population (i.e., one that would not go extinct).

The original wild turkey study provided an estimate of three values (in 1990 dollars) that were averaged and then adjusted to 2012 dollars using the Consumer Price Index, resulting in a value of $16.72 per household per year. The same procedure was used to update the 1996 dollar values of the Mexican spotted owl to 2012, resulting in values of $58.49 per household per year. The higher values for the Mexican spotted owl may be due to the large area of habitat (4.6 million acres stated in the survey and shown on a map) that would be protected in the Four Corners area by paying, and the fact the species was not a hunted species. The whooping crane values are fairly large at $43.69 per household per year; this value represents a Total Economic Value, including both use and non-use value, as some of the sample included people who actively "used" the species (as wildlife viewers).

The study values in **Table N.10** demonstrate that many people, or segments of the public, hold substantial value for protecting threatened and endangered species, which may carry over to the GRSG. However, additional studies would be needed to identify values specifically for GRSG protection. Given that protection is a public good available to all households in the intermountain west, the aggregate or intermountain regional value could be substantial.

Values Associated with Grazing Land

Public lands managed for livestock grazing provides both market values (e.g., forage for livestock) and non-market values. Many ranchers themselves value the ranching lifestyle in excess of the income generated by the ranching operations. This is evident in some ranch sales transaction data which suggests some ranch properties have sold for more than the market value of the public land forage (Bartlett et al. 2002; Taylor 2006). One of the primary reasons public lands ranchers indicate they own land is for the "tradition, values and culture" rather than primarily for profit (Tanaka et al. 2005). Many public land ranchers work elsewhere part-time and rely on the ranch for only 20 percent of their income (Hanus 2011), relying instead on outside jobs or other savings to support their ranching lifestyle. Land appreciation has also provided increased value and therefore served as an economic resource for ranchers (Tanaka et al. 2005; Torell et al. 2005). As several of these authors note, changes in public land grazing that reduce the profitability of grazing may not directly translate to withdrawal from ranching, due to the fact that economic factors are not necessarily the primary motivation for public land ranching.

Some studies have found non-market values of ranching associated with use values to residents (Mangun et al. 2005) and tourists in the form of open space and western ranch scenery (Ellingson et al. 2006). However, some others see non-market opportunity costs associated with livestock grazing that may, depending on management methods and other variables, reduce native plant species and forage for wildlife (Todres et al. 2003). The potential exists for other residents or visitors to prefer lifestyles or have lifestyle needs that are not consistent with grazing or ranching lifestyles or landscapes.

Methods available to measure the use values to residents and tourists associated with grazing land include stated preference methods similar to contingent valuation (Ellingson et al. 2006; Mangun et al. 2005). Methods for attempting to isolate any amenity values that ranchers themselves may hold include the hedonic price method. This method uses observed sale prices of ranch land as a function of the characteristics, including both conventional market factors (e.g., size of ranch and quantity of forage) but also amenity values (e.g., scenic views, presence of wildlife species, and on-site fishing or hunting opportunities) that may be provided by the ranch (Torell et al. 2005). The additional value that ranchers pay for the amenity values of the ranch provide some indication of how much they value these amenities. Using the hedonic price method to estimate a "lifestyle value" separate from the market and amenity values has yet

to be done in the literature. This may be due to the fact that lifestyle values attributed to living on a ranch or ranching is present on nearly all ranch properties sold. As such, statistically it is difficult to isolate the contribution of ranching lifestyle to differences in ranch property values as ranching lifestyle is a common feature of nearly all ranch properties sold.

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ECONOMIC IMPACT ANALYSIS METHODOLOGY

Introduction

This appendix describes the methods and data that underlie the economic impact modeling analysis. Input-output models such as the Impact Analysis for Planning (IMPLAN) model, an economic impact analysis model, provide a quantitative representation of the production relationships between individual economic sectors. Thus, the economic modeling analysis uses information about physical production quantities and the prices and costs for goods and services. The inputs required to run the IMPLAN model are described in the following narrative and tables. The resulting estimates from the IMPLAN model, by alternative, are in **Chapter 4**, Environmental Consequences, **Section 4.24**, Social and Economic Conditions. The first portion of the following information describes general aspects of the IMPLAN model and how it was used to estimate economic impacts. The remaining sections provide additional detailed data used in the analysis for livestock grazing, recreation, and oil and gas.

The IMPLAN Model

IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the ripple effect (also called the multiplier effect) of changes in economic sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly impacted) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

This analysis used IMPLAN 2011; prior to running the model, cost and price data were converted to a consistent dollar year (2011) using sector-specific adjustment factors from the IMPLAN model. The values in this appendix are expressed in year 2011 dollars.

The current IMPLAN model has 440 economic sectors, of which 241 are represented in the Primary and 293 are represented in the Secondary Socioeconomic Study Area counties. This analysis involved direct changes in economic activity for 33 IMPLAN economic sectors, as well as changes in all other related sectors due to the ripple effect. The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the Primary and Secondary Socioeconomic Study Areas. As a result, the calibrated model does a better job of generating multipliers and the subsequent impacts that reflect the interaction between and among the sectors in the Primary and Secondary Socioeconomic Study Areas compared to a model using unadjusted national coefficients. Key variables used in the IMPLAN model were filled in using data specific to the Primary and Secondary Socioeconomic Study Areas, including employment estimates, labor earnings, and total industry output.

The trade data available in the current version of IMPLAN (Version 3.0) make it possible to do multi-region analysis to track how an impact on any of the IMPLAN sectors in the study area affects production in any of the sectors in any other region of the US. For this analysis, this feature allowed the estimation of how an impact in the primary study area disperses into the secondary study area, and how these effects in the secondary study area create additional local effects in the primary study area. As a result, it was possible to estimate not only the jobs and income generation in the primary study area, but to also estimate how the economic activity in the primary study area affected jobs and income generation in the secondary study area.

Livestock Grazing

Economic impacts from changes to livestock grazing are a function of the amount of forage available and the economic value of forage.

Forage availability was measured in Animal Unit Months (AUMs), with one AUM defined as the amount of forage needed to feed a cow, one horse, or five sheep for one month. For Forest Service data, measurements in AUMs were also obtained. Data were obtained from the BLM's Rangeland Administration System (BLM 2012) and from the Forest Service's INFRA range module (Forest Service 2013). Two types of AUM measures were used: Active AUMs and Billed AUMs. Active AUMs measure the amount of forage from land available for grazing. The Forest Service designates this measure "permitted" AUMs. Billed AUMs measure the amount of forage that the BLM and Forest Service bill for annually. The Forest Service uses the designation "authorized" AUMs. Impacts were estimated for the range between billed and active AUMs. Data were typically for 2011, except active AUMs on the Routt National Forest, for which 2013 data was used.

Forage availability was estimated for Alternatives A and C, where Alternative A used the current data (obtained as explained above), and where Alternative C discounted that data to remove all AUMs in GRSG habitat (all designated habitat [ADH]). The estimate of the share of AUMs in GRSG habitat was based on comparing 336,951 currently permitted AUMs in ADH (per **Chapter 4**, Environmental Consequences, **Section 4.13**, Range Management) with total active AUMs obtained as explained above (476,652)[1]. This generated a factor of 70.69 percent of AUMs in GRSG habitat. This factor was used to discount billed and active AUMs, as shown in **Table N.11** below. AUMs are distinguished between sheep AUMs and cattle and other animals to allow different valuation of forage, as explained further below.

Table N.11
Estimated Annual Animal Unit Months

	Alternative A					
	Active			Billed		
Item	**Cattle and Other**	**Sheep**	**Total**	**Cattle and Other**	**Sheep**	**Total**
Initial AUMs (Alternative A)	388,346	88,306	476,652	278,963	60,732	339,695
Share in ADH	70.69%	70.69%	70.69%	70.69%	70.69%	70.69%
AUMs in ADH	274,527	62,424	336,951	197,203	42,932	240,134
AUMs not in ADH (Alternative C)	113,820	25,881	139,701	81,761	17,800	99,561

Sources: Calculated based on data from BLM 2012, Forest Service 2013, and share of AUMs in ADH from **Chapter 4**, Environmental Consequences, **Section 4.13**, Range Management.

The economic value of forage is estimated based on the value of production associated with the forage. Values for cattle and sheep are estimated separately, with the value of forage for other animals considered equivalent to the value for cattle.

Due to price fluctuations, average per-AUM values for cattle and sheep are based on the 2002 to 2011 average value of production estimates from the (US Department of Agriculture, Economic Research Service 2012). The value for cattle is $51.19 per AUM, and the value for sheep is $58.01 per AUM in the Primary Socioeconomic Study Area (in 2011 dollars). Including indirect and induced impacts, the value of one AUM in the Primary Socioeconomic Study Area for cattle is $105.97 and for sheep is $132.61 (in 2011 dollars). **Table N.12** shows the economic impact assumptions for cattle and sheep. The direct economic impact is the estimated change in livestock output per AUM; IMPLAN generates the indirect and induced impacts.

[1] Because permitted AUMs include active and suspended AUMs (in BLM terminology), this comparison of total active AUMs with ADH permitted AUMs may overestimate the loss of AUMs under Alternative C.

Table N.12
Assumptions for Analysis of Impacts on Output for Livestock Grazing

Economic Impact	Primary Study Area	Primary and Secondary Study Area
Cattle		
Direct Economic Impact ($/AUM)	$51.19	$51.19
Indirect Economic Impact ($/AUM)[1]	$45.51	$45.69
Induced Economic Impact ($/AUM)[2]	$9.26	$9.34
Total Economic Impact ($/AUM)	$105.97	$106.21
Multiplier (Total Impact/Direct Impact)	2.07	2.07
Sheep		
Direct Economic Impact ($/AUM)	$58.01	$58.01
Indirect Economic Impact ($/AUM)[1]	$60.89	$61.22
Induced Economic Impact ($/AUM)[2]	$13.71	$13.82
Total Economic Impact ($/AUM)	$132.61	$133.05
Multiplier (Total Impact/Direct Impact)	2.29	2.29

Note: All dollar values are in 2011 dollars.
[1] Indirect impacts reflect increased demand in sectors that directly or indirectly provide supplies to the livestock industry.
[2] Induced impacts reflect increased demand in the consumer and government sectors.

Table N.13 provides a summary of the employment impacts that would result, according to IMPLAN, based on unit changes in livestock AUMs.

Table N.13
Assumptions for Analysis of Employment Impacts for Livestock Grazing

Employment Impact	Primary Study Area	Primary and Secondary Study Area
Cattle		
Direct Employment (Jobs/1,000 AUMs)	0.000559	0.000559
Indirect Employment (Jobs/1,000 AUMs)	0.000466	0.000466
Induced Employment (Jobs/1,000 AUMs)	0.000077	0.000077
Total Employment (Jobs/1,000 AUMs)	0.001101	0.001101
Multiplier (Total Impact/Direct Impact)	1.97	1.97
Average Earnings per Job (2011 dollars)	$34,465	$34,512
Sheep		
Direct Employment (Jobs/1,000 AUMs)	0.000980	0.000980
Indirect Employment (Jobs/1,000 AUMs)	0.001091	0.001091
Induced Employment (Jobs/1,000 AUMs)	0.000116	0.000116
Total Employment (Jobs/1,000 AUMs)	0.002187	0.002187
Multiplier (Total Impact/Direct Impact)	2.23	2.23
Average Earnings per Job (2011 dollars)	$18,732	$18,769

Note: Direct, indirect, and induced employment impacts and average earnings per job are calculated using IMPLAN.

The IMPLAN sectors used to model an exogenous change in demand for livestock grazing were the following (IMPLAN sector numbers are shown in brackets): grain farming (2), all other crop farming (10), support activities for

agriculture and forestry (19), residential structures maintenance and repairs (40), wholesale trade (319), truck transportation (335), banking (354), real estate (360), accounting (368), veterinary services (379), equipment repair and maintenance (417) and labor income (NA). Cattle grazing used the following additional sector: cattle ranching and farming (11). Sheep grazing used the following additional sectors: animal production except cattle and poultry and eggs (14), retail-food and beverages (324).

Recreation

Economic impacts from recreation are a function of visits to recreation areas and expenditures per visit. Average annual visits were estimated over a 20-year period (2015 to 2034) under each alternative for the primary study area. To do this, first, visits per field office or National Forest were obtained for the latest date available (Fiscal Year 2011 for field offices and Fiscal Year 2007 for the Routt National Forest), as shown in **Table 3-87**, Estimated Number of Annual Visits by Field Office and National Forest, of **Chapter 3**, **Section 3.24**, Social and Economic Conditions (Including Environmental Justice).

Second, projected growth rates were estimated for broad types of recreational activity (e.g., camping, fishing, and pleasure driving), based on current recreation visitor days (RVDs), recent growth rates, and projected trends. Estimates of current RVDs were based on data from the BLM's Recreation Management Information System and the Forest Service's National Visitor Use Monitoring (Round 2) for the latest year available. Recent growth rates were obtained for the Rocky Mountain Region from Bowker et al. (1999).

Third, BLM and Forest Service recreational specialists projected changes in growth rates or initial shifts in RVDs under each action alternative, based on knowledge of local recreational facilities and on management actions under each alternative. The resulting projections were then broken down by local and nonlocal, day and overnight trips, for each broad recreational category, based on the BLM's and Forest Service's recreational specialists' knowledge of local recreational activities.

Only the share of nonlocal RVDs was considered in the impact analysis. This was based on the assumption that expenditures of residents of the primary study area would occur in the region regardless of the BLM's or Forest Service's actions that impact recreational opportunities; however, changes in nonresident recreation patterns would alter the amount of money entering the primary study area. Information on the origin of visitors to recreational areas is typically not available. The BLM and Forest Service estimated instead that the share of visitors (participants) that would have come from over 60 miles away from the recreational area destination, based on the local knowledge of BLM and Forest Service recreational experts. The resulting impact should therefore be thought of as an upper bound, given that the estimated share of nonlocal visitors may still include some residents from the primary study area.

Fourth, projected RVDs by nonlocals per alternative were used to estimate visits by nonlocals per alternative by applying the ratio of visits to RVDs, by field office or National Forest.

Table N.14 shows the estimated nonlocal average annual visits over the 20-year period by alternative.

Table N.14
Estimated Nonlocal Visits, Average Annual (2015–2034)

	Nonlocal Day	Nonlocal Overnight	Total Nonlocal
		Alternative A	
BLM	339,247	1,336,212	1,675,459
Forest Service	107,371	876,446	983,817
Total	446,618	2,212,658	2,659,276
		Alternative B	
BLM	331,374	1,318,099	1,649,473
Forest Service	104,315	853,836	958,152
Total	435,690	2,171,935	2,607,625
		Alternative C	
BLM	325,782	1,299,593	1,625,375
Forest Service	101,361	825,505	926,866
Total	427,143	2,125,098	2,552,241
		Alternative D and E (Proposed LUPA)	
BLM	336,846	1,332,419	1,669,265
Forest Service	106,956	874,970	981,927
Total	443,803	2,207,389	2,651,192

Source: Calculated based on Recreation Management Information System, National Visitor Use Monitoring, and Bowker et al. (1999), as described in the text.

Expenditures per party per trip by type of expenditure (e.g., restaurants, groceries, camping, and motels) were obtained from White and Gooding (2012). Based on these expenditures and average party size, expenditures per visit per person were estimated. The individual sector price indices from the IMPLAN database were used to bring estimated expenditures to 2011 dollars, and each type of expenditure was allocated to an IMPLAN sector. IMPLAN was then used to generate output, employment, and earnings multipliers per million dollars of expenditures. These multipliers were then applied to the estimated visits by alternative to obtain the resulting impacts.

The estimates for average expenditure per visit, in 2011 dollars, are $25.45 for nonlocal day trips and $146.58 for nonlocal overnight trips. **Table N.15** shows the direct, indirect, and induced output per visit in 2011 dollars.

Table N.16 provides a summary of employment impacts according to IMPLAN results, based on unit changes in the number of visits.

Table N.15
Assumptions for Analysis of Impacts on Output for Recreation Activities

Economic Impact	Primary Study Area	Primary and Secondary Study Area
Nonlocal Day Trip		
Direct Economic Impact[1]	$25.45	$25.45
Indirect Economic Impact[2]	$2.66	$3.85
Induced Economic Impact[3]	$4.73	$4.96
Total Economic Impact	$32.84	$34.26
Multiplier (total impact/direct impact)	1.29	1.35
Nonlocal Overnight Trip		
Direct Economic Impact[1]	$146.58	$146.58
Indirect Economic Impact[2]	$28.59	$28.85
Induced Economic Impact[3]	$33.97	$34.25
Total Economic Impact	$209.14	$209.67
Multiplier (total impact/direct impact)	1.43	1.43

Notes: Overnight expenditures are the simple average of expenditures on and off National Forest System lands. Details may not add to total due to rounding.
[1]Direct economic impact is the average expenditure per visit.
[2]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide support for the recreation industry.
[3]Induced impacts from IMPLAN reflect increased demand in the consumer and government sectors.

Table N.16
Assumptions for Employment Impact Analysis for Recreation Activities

Employment Impact (annual number of jobs per visit)	Primary Study Area	Primary and Secondary Study Area
Nonlocal Day Trip		
Direct Employment	0.000193	0.000186
Indirect Employment	0.000023	0.000033
Induced Employment	0.000041	0.000043
Total Employment	0.000257	0.000262
Multiplier (Total Impact/Direct Impact)	1.33	1.41
Average Earnings per Job (2011 dollars)	$34,366	$35,432
Nonlocal Overnight Trip		
Direct Employment	0.001281	0.001281
Indirect Employment	0.000254	0.000254
Induced Employment	0.000293	0.000293
Total Employment	0.001828	0.001828
Multiplier (Total Impact/Direct Impact)	1.43	1.43
Average Earnings per Job (2011 dollars)	$34,792	$34,871

Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using IMPLAN.

The IMPLAN sectors used to model an exogenous change in demand for recreation were the following (IMPLAN sector numbers are shown in brackets): retail – food and beverage (324), retail – gasoline stations (326), retail – sporting goods, hobby, book and music (328), retail – miscellaneous (330), automotive equipment rental and leasing (362), other amusement and recreation industries

(410), hotels and motels (411), other accommodations (412), food services and drinking places (413), other federal government enterprises (429).

Oil and Gas

The economic impact of oil and gas reflects drilling, completion, and production activities. Estimation of drilling, completion, and production activities was done for a 20-year period (2015 to 2034).

The number of wells drilled and the number of wells completed under the No Action Alternative (Alternative A) were estimated under two scenarios. The first is based on the average number of wells expected to be drilled or completed per year in each BLM field office's current Reasonable Foreseeable Development Scenario. The second scenario adjusts Reasonable Foreseeable Development Scenario expectations to actual spud information from the Automated Fluid Minerals Support System. This second scenario projects a considerably lower number of wells drilled and lower production. The first scenario is referred to as the high scenario and the second as the low scenario. Typically, a 95-percent completion rate was assumed (with the exception of wells drilled in the LSFO planning area, where the assumed rate was 80 percent). Drilling and completion numbers were estimated for federal surface, as well as for all surface ownership.

The BLM oil and gas specialists estimated the share of oil and gas that would intersect with GRSG ADH and PHMA using GIS. Surface acres were classified as high, medium, or low potential for oil and gas based on the available geological information. The number of wells projected to be drilled and completed that would intersect with GRSG ADH or PHMA was projected based on the expected presence of wells in areas of high, medium, or low oil and gas potential (according to Reasonable Foreseeable Development Scenarios and currently available information) and the intersection of high, medium, and low oil and gas potential areas with GRSG habitat.

The number of wells completed or drilled that would be affected by each alternative is the number that intersects with ADH or PHMA, as appropriate for each alternative:

- Alternative A – Existing areas would be available for fluid mineral leasing
- Alternative B – All PHMA would be closed to fluid mineral leasing
- Alternative C – All ADH would be closed to fluid mineral leasing
- Alternative D – All PHMA would be NSO for fluid mineral leasing
- Proposed LUPA – All PHMA would be NSO for fluid mineral leasing. In addition, federal minerals within 1 mile of leks would not be leased, and there would be NSO within 2 miles of leks in GHMA.

Due to the lack of information on the extent to which horizontal drilling would allow reaching oil and gas under surface lands closed to exploration, a mid-range estimate between Alternatives A and B was used as an estimate for the number of wells drilled and completed under the high scenario for Alternative D. The low scenario for Alternative D was based on the high scenario and adjusted for information from the Automated Fluid Minerals Support System. Estimates for the Proposed LUPA are based on those for Alternative D, with additional adjustments for the added restrictions. This allows for comparison among alternatives of the potential estimate of impacts on output, employment, and earnings, when added to the impacts of other resource areas.

Table N.17 presents the total number of wells drilled and completed in the Primary Socioeconomic Study Area for each alternative.

Table N.17
Oil and Gas Well Numbers

Item	Primary Study Area	
	Low Scenario	High Scenario
Federal Minerals, All Surface[1]		
Alternative A – Wells Drilled	9,406	18,230
Alternative A – Wells Completed	8,936	17,052
Alternative B – Wells Drilled	8,882	16,422
Alternative B – Wells Completed	8,438	15,448
Alternative C – Wells Drilled	8,808	12,893
Alternative C – Wells Completed	8,368	12,164
Alternative D – Wells Drilled	8,882	17,326
Alternative D – Wells Completed	8,438	16,250
Proposed LUPA – Wells Drilled	8,756	17,200
Proposed LUPA – Well Completed	8,318	16,132
Federal, State, and Fee Minerals, All Surface		
Alternative A – Wells Drilled	22,632	37,013
Alternative A – Wells Completed	21,500	34,708
Alternative B – Wells Drilled	22,108	35,205
Alternative B – Wells Completed	21,002	33,104
Alternative C – Wells Drilled	22,034	31,676
Alternative C – Wells Completed	20,932	29,820
Alternative D – Wells Drilled	22,108	36,109
Alternative D – Wells Completed	21,002	33,906
Proposed LUPA – Wells Drilled	21,982	35,983
Proposed LUPA – Wells Completed	20,882	33,788

Sources: Elaborated by BLM staff based on field office Reasonable Foreseeable Development Scenarios and available information

[1] Estimates for federal minerals include a small area of fee minerals under federal surface (reverse split estate). This area is approximately 0.9 percent of the total surface in ADH and 2.4 percent of the total surface in PHMA.

The production per new well was assumed based on the typical production of existing wells in the area. A linear decline in production of each new well was assumed at a 5-percent rate (20-year life for each well). Wells were assumed to start production on January 1 of each year of completion. Total oil and gas production under Alternative A was based on multiplying production per well and the number of wells drilled and completed (estimated as described above). Oil and gas production of existing wells was not included because they would not be affected by GRSG habitat management alternatives[1]. The production that would be affected by each alternative is proportional to the share of wells affected by GRSG habitat, whether ADH or PHMA, as appropriate for each alternative. **Table N.18** presents the projected quantity of oil and gas over the 20-year forecast period on federal minerals and on federal, state, and fee minerals.

Table N.18
Projected Oil and Gas Production, 20-Year Period

Alternative A		Alternative B		Alternative C		Alternative D		Proposed LUPA	
Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
Low Scenario									
Federal Minerals, All Surface									
14,338	22,363	13,403	16,461	13,143	14,054	13,474	18,904	13,283	18,635
Federal, State, and Fee Minerals, All Surface									
32,900	49,023	31,906	42,253	31,487	39,937	32,025	45,137	31,842	44,879
High Scenario									
Federal Minerals, All Surface									
27,360	42,674	24,539	30,136	19,105	20,430	25,949	36,405	25,761	36,141
Federal, State, and Fee Minerals, All Surface									
53,112	79,139	50,291	66,601	44,857	56,895	51,701	72,870	51,521	72,617

Sources: Elaborated by BLM staff based on field office Reasonable Foreseeable Development Scenarios and available information
BCF = billion cubic feet; MMBO = million barrels

The costs of drilling and completing wells and producing oil and gas also are relevant for the economic impact analysis. Cost of completion or drilling per well were obtained from 2009 data available for Southwest Wyoming.[2] Price indices from the IMPLAN database were used to bring estimated expenditures to 2011 dollars. IMPLAN was then used to generate output, employment, and earnings multipliers per million dollars of expenditures. These multipliers were then applied to the estimated expenditures with drilling and completion by alternative to obtain the resulting impacts. Multipliers for oil and gas drilling and completion are based not only on expenditures made directly with oil and gas

[1] News wells in existing leases would also not be affected. The current estimates may, therefore, overestimate the impacts of the action alternatives.
[2] Amendment 6 – Resource Management Plans in Support of Wyoming Sage Grouse Policy Project for BLM. Average for conventional wells in four BLM field offices, Kemmerer, Pinedale, Rawlins, and Rock Springs.

drilling and completion, but also on expenditures made directly by oil and gas companies with site preparation, consumables, tangibles, equipment rentals, engineering services, day labor, trucking, and communication associated with oil and gas well drilling and completion. These non-drilling and non-support activities expenditures make up nearly 50 percent of total well costs and impact the multipliers used in this EIS.

Table N.19 provides a summary of the costs of drilling and completion used for the economic analysis.

Table N.19
Assumptions for Analysis of Economic Impacts for Oil and Gas Well Drilling and Completion

Economic Impact	Primary Study Area	Primary and Secondary Study Area
	Drilling Impacts	
Total Drilling Costs	$1,508,072	$1,508,072
Total Local Drilling Costs[1]	$1,342,184	$1,342,184
Local Direct Impact ($/well)	$1,342,184	$1,342,184
Local Indirect Impact ($/well)	$304,672	$309,819
Local Induced Impact ($/well)	$412,742	$416,457
Local Total Impact ($/well)[2]	$2,059,598	$2,068,459
Multiplier (total impact/direct impact)	1.53	1.54
	Completion Impacts	
Total Completion Costs	$1,191,260	$1,191,260
Total Local Completion Costs[1]	$736,199	$736,199
Local Direct Impact ($/well)	$736,199	$736,199
Local Indirect Impact ($/well)	$191,775	$194,748
Local Induced Impact ($/well)	$233,518	$235,675
Local Total Impact ($/well)[2]	$1,161,492	$1,166,621
Multiplier (total impact/direct impact)	1.58	1.58

Source: Drilling and completion costs (the first row in each part of the table) are from Amendment 6 – Resource Management Plans in Support of Wyoming Sage Grouse Policy Project for BLM. Remaining data is from IMPLAN, as described in the text.
[1]The local cost shares were based on the percent of total drilling or completion costs that would be spent on goods and services purchased from the local economy, assuming similar local shares to those estimated for Southwest Wyoming in the source document.
[2] Total impacts estimated using IMPLAN include direct, indirect, and induced impacts.

Table N.20 provides the assumptions used to determine the economic impact associated with the production of oil and gas. For the analysis, the BLM estimated a nonlabor production cost (for gas) of $1.51 per thousand cubic feet and $7.44 per barrel of oil, in year 2011 dollars, based on data from the Energy Information Administration for the Rocky Mountain Region (Energy Information Administration 2013).

Table N.20
Assumptions for Analysis of Economic Impacts on Output for Oil and Gas Production

Economic Impact	Primary Study Area	Primary and Secondary Study Area
Oil Production (per million barrels)		
Direct Economic Impact[1]	$88,260[2]	$88,260[3]
Indirect Economic Impact[4]	$15,246	$15,423
Induced Economic Impact[5]	$4,554	$4,613
Total Economic Impact	$108,061	$108,296
Multiplier (total impact/direct impact)	1.22	1.23
Gas Production (per million cubic feet)		
Direct Economic Impact[1]	$3,960.00	$3,960.00
Indirect Economic Impact[4]	$684.07	$691.97
Induced Economic Impact[5]	$204.33	$206.98
Total Economic Impact	$4,848.40	$4,858.95
Multiplier (total impact/direct impact)	1.22	1.23

Note: All dollar values are in year 2011 dollars.
[1]Direct economic impact is the market value of output.
[2]Based on an oil price of $88.26 per barrel, which is the 2011 Colorado Crude Oil First Purchase Price reported by the US Energy Information Administration (2013).
[3]Based on a gas price of $3.96 per thousand cubic feet, which is the 2010 Colorado Natural Gas Wellhead Price reported by the US Energy Information Administration (2013).
[4]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide supplies to the oil and gas industry.
[5]Induced impacts from IMPLAN reflect increased demand in the consumer sectors.

The forecasted number of wells and production used for estimating employment impacts is the same as for estimating impacts on labor earnings and output. **Table N.21** shows the direct and total employment impacts attributable to drilling and completion.

Table N.22 shows the direct and total employment impacts associated with production.

Table N.21
Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion

Employment Impact	Primary Study Area	Primary and Secondary Study Area
Drilling Impacts		
Direct Employment (jobs/well)	7.1	7.1
Indirect Employment (jobs/well)	2.5	2.5
Induced Employment (jobs/well)	3.5	3.6
Total Employment Impact (jobs/well)	13.1	13.2
Multiplier (Total Impact/Direct Impact)	1.85	1.86
Average Earnings per Job (2011 dollars)	$58,638	$58,573

Table N.21
Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion

Employment Impact	Primary Study Area	Primary and Secondary Study Area
Completion Impacts		
Direct Employment (jobs/well)	4.6	4.6
Indirect Employment (jobs/well)	1.6	1.6
Induced Employment (jobs/well)	2.0	2.0
Total Employment Impact (jobs/well)	8.2	8.2
Multiplier (Total Impact/Direct Impact)	1.79	1.79
Average Earnings per Job (2011 dollars)	$53,015	$52,973

Note: Direct and total employment impact and average earnings per job are calculated using IMPLAN.

Table N.22
Assumptions for Employment Impact Analysis for Oil and Gas Production

Employment Impact (annual number of jobs per thousand barrels or million cubic feet)	Primary Study Area	Primary and Secondary Study Area
Oil Production (per thousand barrels)		
Direct Employment	0.017475	0.017475
Indirect Employment	0.101764	0.102558
Induced Employment	0.039011	0.039540
Total Employment	0.158250	0.159574
Multiplier (Total Impact/Direct Impact)	9.06	9.13
Average Earnings per Job (2011 dollars)	$53,016	$52,958
Gas Production (per million cubic feet)		
Direct Employment	0.000784	0.000784
Indirect Employment	0.004566	0.004602
Induced Employment	0.001750	0.001774
Total Employment	0.007100	0.007160
Multiplier (Total Impact/Direct Impact)	9.06	9.13
Average Earnings per Job (2011 dollars)	$53,016	$52,958

Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using IMPLAN.

The analysis of potential changes in tax revenues is based on tax rates of 12.5 percent of taxable value for federal mineral royalties and 5 percent of taxable value for state severance taxes (Colorado severance tax rates depend on production value but are 5 percent for production valued over $300.00). Taxable value was assumed to be 87.5 percent of value of sales based on a report from the Colorado Oil and Gas Association (Colorado Oil and Gas Association 2011). **Table N.23** shows calculations of the impact of management alternatives on annual tax collection from oil and gas production.

Table N.23
Tax Collections from Oil and Gas Production Averaged Annually over 20-Year Period, Relative to Alternative A, 2011$

	Alternative B		Alternative C		Alternative D		Proposed LUPA	
	Gas (MMCF)	Oil (MBO)	Gas (MMCF)	Oil (MBO)	Gas (MMCF)	Oil (MBO)	Gas (MMCF)	Oil (MBO)
Low Scenario								
Total production	-934,279	-5,902	-1,195,121	-8,309	-863,321	-3,459	-1,054,946	-3,728
Prices	$3,960	$88,260	$3,960	$88,260	$3,960	$88,260	$3,960	$88,260
Assessed valuation	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%
Assessed value ($ thousands)	-$3,237,276	-$455,828	-$4,141,094	-$641,664	-$2,991,408	-$267,165	-$3,655,390	-$287,926
Federal royalties rate	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Federal royalty tax ($ thousands)	-$404,659	-$56,979	-$517,637	-$80,208	-$373,926	-$33,396	-$456,924	-$35,991
State severance rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
State severance tax ($ thousands)	-$161,864	-$22,791	-$207,055	-$32,083	-$149,570	-$13,358	-$182,769	-$14,396
Total taxes ($ thousands)	-$566,523	-$79,770	-$724,692	-$112,291	-$523,496	-$46,754	-$639,693	-$50,387
Annual average taxes ($ thousands)	-$28,326	-$3,988	-$36,235	-$5,615	-$26,175	-$2,338	-$31,985	-$2,519
High Scenario								
Total production	-2,821,203	-12,538	-8,255,266	-22,244	-1,410,601	-6,269	-1,599,033	-6,534
Prices	$3,960	$88,260	$3,960	$88,260	$3,960	$88,260	$3,960	$88,260
Assessed valuation	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%
Assessed value ($ thousands)	-$9,775,468	-$968,311	-$28,604,496	-$1,717,867	-$4,887,734	-$484,155	-$5,540,649	-$504,571
Federal royalties rate	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Federal royalty tax ($ thousands)	-$1,221,934	-$121,039	-$3,575,562	-$214,733	-$610,967	-$60,519	-$692,581	-$63,071
State severance rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
State severance tax ($ thousands)	-$488,773	-$48,416	-$1,430,225	-$85,893	-$244,387	-$24,208	-$277,032	-$25,229
Total taxes ($ thousands)	-$1,710,707	-$169,454	-$5,005,787	-$300,627	-$855,353	-$84,727	-$969,614	-$88,300
Annual average taxes ($ thousands)	-$85,535	-$8,473	-$250,289	-$15,031	-$42,768	-$4,236	-$48,481	-$4,415

Source: Production volumes elaborated by BLM staff based on field office Reasonable Foreseeable Development Scenarios and available information. Prices are from Energy Information Administration (2013). Assessed valuation percentage is from Colorado Oil and Gas Association (2011).
MMCF = million cubic feet; MBO = thousand barrels

The IMPLAN sectors used to model an exogenous change in demand for oil and gas well drilling were the following (IMPLAN sector numbers are shown in brackets): drilling oil and gas wells (28), support activities for oil and gas operations (29), construction of new manufacturing structures (35), construction of other new structures (36), wholesale trade (319), truck transportation (335), telecommunications (351), commercial and industrial equipment leasing (365), architectural and engineering services (369). In the case of oil and gas production, the sector used was oil and gas extraction (20).

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Appendix P

Response to Comments on the Draft Land Use Plan Amendment/Environmental Impact Statement

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APPENDIX P
RESPONSE TO COMMENTS ON THE DRAFT LAND USE PLAN AMENDMENT/ENVIRONMENTAL IMPACT STATEMENT

P.1 INTRODUCTION

After publishing the Draft LUPA/EIS, the BLM and Forest Service held a 90-day public comment period to receive comments on the Draft LUPA/EIS. The BLM and Forest Service received written comments on the Draft LUPA/EIS by mail, email, and submissions at the public meetings and oral comments transcribed at public meetings. Comments covered a wide spectrum of thoughts, opinions, ideas, and concerns. The BLM and Forest Service recognize that commenters invested considerable time and effort to submit comments on the Draft LUPA/EIS and developed a comment analysis methodology to ensure that all comments were considered, as directed by NEPA regulations.

The BLM and Forest Service have reviewed and are responding to all substantive public comments. The BLM and Forest Service developed a systematic process for responding to comments to ensure all substantive comments were tracked and considered. Upon receipt, each comment letter was assigned an identification number and logged into the BLM's comment analysis database, CommentWorks, which allowed the BLM and Forest Service to organize, categorize, and respond to comments. Substantive comments from each letter were coded to appropriate categories based on the content of the comment, retaining the link to the commenter. The categories generally follow the sections presented in the Draft LUPA/EIS, though some relate to the planning process or editorial concerns.

Comments similar to each other were grouped under a topic heading, and the BLM and Forest Service drafted a statement summarizing the issues contained in the comments. The responses were crafted to respond to the comments, and, if warranted, a change to the EIS was made.

Although each comment letter was diligently considered, the comment analysis process involved determining whether a comment was substantive or nonsubstantive in nature. In performing this analysis, BLM and Forest Service relied on the CEQ's regulations to determine what constituted a substantive comment.

A substantive comment does one or more of the following:

- Questions, with a reasonable basis, the accuracy of the information and/or analysis in the Draft LUPA/EIS
- Questions, with a reasonable basis, the adequacy of the information and/or analysis in the Draft LUPA/EIS
- Presents reasonable alternatives other than those presented in the Draft LUPA/EIS that meet the purpose and need of the proposed action and addresses significant issues
- Questions, with a reasonable basis, the merits of an alternative or alternatives
- Causes changes in or revisions to the proposed action
- Questions, with a reasonable basis, the adequacy of the planning process itself

Additionally, the BLM's NEPA Handbook (H-1790-1) identifies the following types of substantive comments:

- Comments on the Adequacy of the Analysis: Comments that express a professional disagreement with the conclusions of the analysis or assert that the analysis is inadequate are substantive in nature but may or may not lead to changes in the Proposed LUPA/Final EIS. Interpretations of analyses should be based on professional expertise. Where there is disagreement within a professional discipline, a careful review of the various interpretations is warranted. In some cases, public comments may necessitate a reevaluation of analytical conclusions. If, after reevaluation, the manager responsible for preparing the EIS (Authorized Officer) does not think that a change is warranted, the response should provide the rationale for that conclusion.
- Comments That Identify New Impacts, Alternatives, or Mitigation Measures: Public comments on a Draft EIS that identify impacts, alternatives, or mitigation measures that were not addressed in the draft are substantive. This type of comment requires the Authorized Officer to determine whether it warrants further consideration. If it does, the Authorized Officer must determine whether the new impacts, new alternatives, or new mitigation measures should be

analyzed in the Final EIS, a supplement to the Draft EIS, or a completely revised and recirculated Draft EIS.

- Disagreements with Significance Determinations: Comments that directly or indirectly question, with a reasonable basis, determinations regarding the significance or severity of impacts are substantive. A reevaluation of these determinations may be warranted and may lead to changes in the Final EIS. If, after reevaluation, the Authorized Officer does not think that a change is warranted, the response should provide the rationale for that conclusion.

Comments that failed to meet the above description were considered nonsubstantive. Many comments received throughout the process expressed personal opinions or preferences, had little relevance to the adequacy or accuracy of the Draft LUPA/EIS, represented commentary regarding resource management and/or impacts without any real connection to the document being reviewed, or were considered out of scope because they dealt with existing law, rule, regulation, or policy. These comments did not provide specific information to assist the planning team in making changes to the alternatives or impact analysis in the Draft LUPA/EIS and are not addressed further in this document. Examples of nonsubstantive comments include the following:

- The best of the alternatives is Alternative D (or A, B, or C).
- The preferred alternative does not reflect balanced land management.
- More land should be protected as wilderness.
- BLM needs to change the Taylor Grazing Act and charge higher grazing fees.
- I want the EIS to reflect the following for this area: no grazing, no logging, no drilling, no mining, and no OHVs.
- More areas should be made available for multiple uses (e.g., drilling, OHVs, and ROWs) without severe restrictions.

Opinions, feelings, and preferences for one element or one alternative over another, and comments of a personal and/or philosophical nature, were all read, analyzed, and considered. However, because such comments are not substantive in nature, the BLM and Forest Service did not include them in the report and did not respond to them. While all comments were reviewed and considered, comments were not counted as "votes." The NEPA public comment period is neither considered an election, nor does it result in a representative sampling of the population. Therefore, public comments are not appropriate to be used as a democratic decision-making tool or as a scientific sampling mechanism.

Comments citing editorial changes to the document were reviewed and incorporated. The Proposed LUPA/Final EIS has been technically edited and revised to fix typographic errors, missing references, definitions, and acronyms, and other clarifications as needed.

Copies of all comment documents received on the Draft LUPA/EIS are available by request from the BLM's Colorado State Office. Comments received by mail, email, and at meetings, or delivered orally during the public meetings are tracked by commenter name and submission number.

P.1.1 Campaign Letters

Several organizations and groups held standardized letter campaigns for the GRSG effort through which their constituents were able to submit the standard letter or a modified version of the letter indicating support for the group's position on the BLM and Forest Service LUPA actions. Individuals who submitted a modified standard letter generally added new comments or information to the letter or edited it to reflect their main concern(s). Modified letters with unique comments were given their own letter number and coded appropriately. All commenters who used an organization's campaign letter were tracked in the BLM and Forest Service commenter list and are available from the BLM and Forest Service upon request.

P.1.2 How This Appendix is Organized

This appendix is divided into three main sections. The first section, Introduction, provides an overview of the comment-response process. The second section, Issue Topics, Responses, and Comments, is organized by the primary topic and then by specific issue subtopics that relate to an aspect of NEPA, the BLM and Forest Service planning processes, or specific resources and resource uses. For example, all comment summaries that relate to Greater Sage-Grouse (GRSG) fall under Section 7, Greater Sage-Grouse. This includes subsections such as Best Available Information and Baseline Data, Range of Alternatives, and Impacts. Each topic or subtopic contains a statement that summarizes all substantive comments received on that topic or subtopic and the BLM's and Forest Service's response to the summary statement. Excerpts of all substantive comments are posted on the project website: http://www.blm.gov/co/st/en/BLM_Programs/wildlife/sage-grouse/0.html.

The terms preliminary priority management area (PPMA) and preliminary general management area (PGMA) were used in the Draft EIS to describe the relative prioritization of areas for GRSG conservation. These are BLM and Forest Service terms used to differentiate the degree of managerial emphasis a given area would have relative to GRSG. As the BLM and Forest Service moved from a Draft EIS to a Proposed LUPA/Final EIS, such prioritizations are necessarily no longer "preliminary" in nature. As such, they have been replaced with the terms Priority Habitat Management Area (PHMA) and General Habitat

Management Area (GHMA). Comments on the Draft LUPA/EIS referred to PPMA and PGMA. As such, the summary statements also use these terms. However, responses use the terminology used in the Proposed LUPA/Final EIS (PHMA and GHMA).

The third section, Commenter Lists, provides the names of individuals who submitted unique comment letters (not campaign letters) on the Draft LUPA/EIS.

P.2 TOPICS, RESPONSES, AND COMMENTS

Section 4 – NEPA

Section 4.2 – Cooperating Agency Relationships

Summary
The BLM did not coordinate with state and local agencies that would be adversely economically affected by the actions considered in the EIS. Additionally, the BLM did not coordinate with Garfield County School District on development of the EIS.

Response
Both the CEQ and BLM planning regulations define cooperating agency status, including what it is, who is eligible to become a cooperating agency, and how the lead agency should invite participation as a cooperating agency (40 CFR 1501 and 1508; 43 CFR 1601.0-5). Cooperating relationships are limited to government entities: state agencies, local governments, tribal governments, and other federal agencies that have jurisdiction by law or special expertise. To be a cooperating agency, the local agency must meet the eligibility criteria set out in regulation and policy. BLM policy does not define coordinating agencies (BLM Desk Guide to Cooperating Agency Relationships and Coordination with Intergovernmental Partners, pages 21 and 31, respectively).

These relationships were described in the Draft LUPA/EIS, Section 6.3, Cooperating Agencies (page 986). On January 20, 2012, the BLM wrote to 80 local, state, federal, and tribal representatives, inviting them to participate as cooperating agencies for the Northwest Colorado Greater Sage-Grouse LUPA/EIS. Twenty-two agencies agreed to participate on the EIS as designated cooperating agencies, all of which have signed Memoranda of Understanding with the Northwest District Office (Table 6.1, Cooperating Agencies).

In addition to the BLM's invitations to a wide variety of agencies to participate as cooperating agencies, the BLM published the following statement in the Notice of Intent, published in the Federal Register on December 9, 2011:

> Federal, State, and local agencies, along with other stakeholders that may be interested or affected by the BLM's or Forest Service's decision

on this proposal are invited to participate in the scoping process and, if eligible, may request or be requested by the BLM to participate as a cooperating agency.

The City of Rifle was one of the 80 invited agencies; however, the City did not accept the invitation. While the BLM did formally invite the State of Colorado, a specific participation invitation letter was not sent to the Colorado River Fire Rescue Regional Fire Authority.

DOI regulations (43 CFR 46.225(c)) require the BLM, as lead agency, to consider any request by a government entity to participate as a cooperating agency (BLM Desk Guide to Cooperating Agency Relationships and Coordination with Intergovernmental Partners, pages 8 and 9). From the time that the Notice of Intent was published and throughout the development of the EIS, an agency could notify the BLM to request cooperating agency status. However, the BLM did not receive this notification from the Colorado River Fire Rescue Regional Fire Authority or any other agency or entity to request cooperating agency status during development of the Draft LUPA/EIS nor in any of the Draft LUPA/EIS comment letters; as a result, only the agencies described in Section 6.3, Cooperating Agencies (page 986) were cooperating agencies in development of the EIS.

Section 4.3 – Range of Alternatives

Summary

The comments were focused on several issues related to the alternatives presented in the Draft LUPA/EIS:

1. Commenters believe that the preferred alternative does not meet the stated purpose of and need for action because they believe that it is not a rigorous and scientifically sound approach.
2. Commenters feel that the alternatives are all largely the same, and that the BLM and Forest Service need to provide more distinction (range) between the alternatives.
3. The BLM and Forest Service need to consider the alternatives presented by cooperating agencies and environmental organizations, including the Garfield County alternative, the Sage-Grouse Recovery Alternative, and alternatives for the listing of the species or not listing the species.

Response

1. In accordance with NEPA, the BLM and Forest Service have discretion to establish the purpose of and need for action (40 CFR 1502.13). CEQ regulations direct that an EIS "…shall briefly specify the underlying purpose of and need for action to which the agency is responding in proposing the alternatives including the proposed

action" (40 CFR 1502.13). Also, under the CEQ regulations, the BLM and the Forest Service are required to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources as provided by section 102(2)(E) of the Act [NEPA]." (40 CFR 1501.2(c)). The breadth or narrowness of the purpose of and need for action statement has a substantial influence on the scope of the subsequent analysis. The purpose of and need for action statement provides a framework for issue identification and will inform the rationale for alternative selection. The range of alternatives developed are intended to meet the purpose of and need for action and address the issue; thereby, providing a basis for eventual selection of an alternative in a decision (BLM NEPA handbook and Forest Service Handbook 1909.15 – National Environmental Policy Act Handbook Chapter 10 – Environmental Analysis).

As stated in the Draft LUPA/EIS, Section 1.2, Purpose of and Need for the Land Use Plan Amendments (page 6), the BLM and the Forest Service prepared the Northwest Colorado LUPA with an associated EIS to be applied to lands with GRSG habitat. This effort responds to the USFWS's March 2010 "warranted, but precluded" Endangered Species Act listing petition decision, and that existing regulatory mechanisms in BLM and Forest Service LUPs was inadequate to protect the species and its habitat. The range of alternatives, including the preferred alternative and its components (such as the disturbance caps), focus on areas affected by threats to GRSG habitat identified by USFWS in the March 2010 listing decision. Formulated by the planning team and with input from the cooperating agencies, the preferred alternative represents those goals, objectives, and actions determined to be most effective at resolving planning issues, balancing resource use at this stage of the process, and meet the stated purpose of and need for action. While collaboration is critical in developing and evaluating alternatives, the final designation of a preferred alternative remains the exclusive responsibility of the BLM and Forest Service. See the Draft LUPA/EIS, Section 1.2, Purpose of and Need for the Land Use Plan Amendments (page 6) and Section 2.7, Considerations for Selecting a Preferred Alternative (pages 41-42) for further details.

2. The BLM and the Forest Service considered a range of alternatives during the GRSG planning process in full compliance with the NEPA. The CEQ regulations (40 CFR 1502.14(a)) require that the BLM and the Forest Service consider a range of alternatives that respond to "the underlying purpose and need" for the project (40 CFR 1502.13); therefore, the range of alternatives is thus limited to alternatives that meet the identified purpose of and need for action.

While there are many possible alternatives or actions to manage BLM-administered and National Forest System lands and GRSG in the planning area, the BLM and the Forest Service fully considered the planning issues and criteria developed during the scoping process to determine a reasonable range of alternatives. Further, CEQ regulations and Forest Service directives (FSM 1950 and FSH 1909.15) give the deciding official discretion to determine the appropriate range of alternatives and to select the alternative that best meets the stated purpose of and need for action. As a result, four alternatives that meet the purpose of and need for action and best address the issues and concerns identified by the affected public were analyzed in detail in the Draft LUPA/EIS. The range of alternatives in the Draft LUPA/EIS represented a full spectrum of options including a no action alternative (current management, Alternative A).

As described in the Draft LUPA/EIS, Section 2.3, Alternative Development Process (page 34), the Northwest Colorado Greater Sage-Grouse LUPA/EIS planning team employed the BLM and Forest Service planning process to develop a reasonable range of alternatives for the LUPA. The BLM and Forest Service complied with NEPA and the CEQ implementing regulations at 40 CFR 1500 in the development of alternatives for the Draft LUPA/EIS, including seeking public input and analyzing reasonable alternatives. The alternatives include management options for the planning area that would modify or amend decisions made in the field office LUPs, as amended, to meet the planning criteria, to address issues and comments from cooperating agencies and the public, or to provide a reasonable range of alternatives. Since this is a plan amendment to address GRSG conservation, many decisions from the field office LUPs are acceptable and reasonable. In these instances, there was no need to develop alternative management prescriptions.

Public input received during the scoping process was considered to ensure that all issues and concerns would be addressed, as appropriate, in developing the alternatives. The planning team developed planning issues to be addressed in the LUPA, based on broad concerns or controversies related to conditions, trends, needs, and existing and potential uses of planning area lands and resources.

Additionally, the three resulting action alternatives (Alternatives B, C, and D) offer a range of possible management approaches for responding to planning issues and concerns identified through public scoping, and to maintain or increase GRSG abundance and distribution in the planning area. While the goal is the same across alternatives, each alternative contains a discrete set of objectives

and management actions and constitutes a separate LUPA with the potential for different long-range outcomes and conditions.

The relative emphasis given to particular resources and resource uses differs as well, including allowable uses, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives. Meaningful differences among the four alternatives are described in Table 2-2, Comparative Summary of Alternatives, in the Draft LUPA/EIS, Section 2.8, Summary Comparison of Alternatives (page 42).

3. Based on this alternative development process, the BLM considered input from cooperating agencies, environmental organizations, tribal governments, and the public. As described in the Draft LUPA/EIS Section 2.4.2, Alternative B (page 39), the BLM used the GRSG conservation measures in *A Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) to form BLM management direction under Alternative B, which is consistent with the direction provided in BLM Washington Office Instruction Memorandum 2012-044 (the BLM must consider all applicable conservation measures developed by the NTT in at least one alternative in the land use planning process).

   During scoping for the Northwest Colorado Greater Sage-Grouse LUPA/EIS, individuals and conservation groups submitted management direction recommendations for protection and conservation of GRSG and its habitat, including the Sage-Grouse Recovery Alternative and proposed disturbance cap. The recommendations, in conjunction with resource allocation opportunities and internal sub-regional BLM input, were reviewed in order to develop BLM management direction for GRSG under Alternative C (Draft LUPA/EIS, Section 2.4.3, Alternative C [page 39]).

   Alternative D incorporates adjustments to the NTT Report (NTT 2011) to provide a balanced level of protection, restoration, enhancement, and use of resources and services to meet ongoing programs and land uses. Alternative D was developed in full cooperation with the cooperating agencies and incorporated agencies' concerns with socioeconomic issues.

   The Garfield County Alternative was analyzed but not considered in detail in the Draft LUPA/EIS primarily because it is contained within the existing range of alternatives (Draft LUPA/EIS, Section 2.6.2, Garfield County Alternative [page 41]). However, the BLM included the alternative as an appendix and requested public comment on it.

Based on the public input, the BLM would analyze the alternative and the public comments, then make the determination if it would be part of the Proposed Action in the Proposed LUPA/Final EIS. Portions of the Garfield County Alternative informed the Proposed LUPA/Final EIS, particularly in those areas within GRSG habitat that contain unique terrain features or habitat use by GRSG.

While the State of Colorado did not submit a complete alternative or elements to be considered as part of another alternative, the BLM considered the Colorado Department of Natural Resources' Colorado Greater Sage-Grouse Conservation Plan: The Colorado Package (Draft LUPA/EIS, Appendix N) in its cumulative effects analysis (Draft LUPA/EIS, Section 5.4, Special Status Species – Greater Sage-Grouse [page 944]).

Whether the GRSG is determined for listing by USFWS is outside the jurisdiction of the BLM and Forest Service and beyond the scope of this EIS. As noted in the purpose of and need for action statement, the BLM and Forest Service were to consider regulatory mechanisms that would protect the species and its habitat. As such, the BLM and Forest Service did not develop alternatives based on whether USFWS chooses to list or not list the GRSG.

Section 4.5 – GIS Data and Analysis

Summary

Commenters noted several issues with the GIS data and analysis conducted in the Draft LUPA/EIS:

- The maps and data layers do not provide enough detail to address "local ecological site variability." The data are too course and do not provide assurances to more localized decision making; some habitat type areas are inaccurately identified in the maps.
- The BLM used old data layers to develop maps; the BLM should use the newer data layers that CPW produced.
- The BLM should consider additional variables in the CPW data model to better represent the PPH (now known as PHMA) and PGH (now known as GHMA) areas.

Response

Before beginning the Northwest Colorado Greater Sage-Grouse LUPA/EIS and throughout the planning effort, the BLM and the Forest Service considered the availability of data from all sources, adequacy of existing data, data gaps, and the type of data necessary to support informed management decisions at the land-use plan level. The data needed to support broad-scale analysis of the planning area are substantially different than the data needed to support site-specific analysis of projects. The LUPA/EIS data and information is presented in map and

table form and is sufficient to support the broad scale analyses required for land use planning.

Additionally, the BLM and the Forest Service consulted with, and collected and incorporated data from other agencies and sources, including but not limited to the USFWS, Colorado Parks and Wildlife (CPW), Office of Surface Mining, Colorado State Land Board, and the US Department of Energy. Considerations included but were not limited to GRSG habitat delineated by CPW, threatened and endangered species habitats, deer and elk herd management areas, fluid mineral development areas, solid mineral development areas, and mineral potential areas. The CPW is continually collecting and refining population and habitat data for species, and the Draft LUPA/EIS notes that the BLM and Forest Service would incorporate any refinements or updates once the data was made available by CPW. To date, CPW has neither published nor provided the newer data for use for the Proposed LUPA/Final EIS.

As a result of these actions, the data gathered by the BLM and the Forest Service is of the appropriate scale and provided an adequate analysis that led to an adequate disclosure of the potential environmental consequences of the alternatives.

Section 4.6 – Indirect Impacts

Summary
The BLM has not considered the direct, indirect, and cumulative socioeconomic impacts of the proposed action on the Grand River Health District. Any restrictions on oil and gas production in Garfield County would have detrimental effects on the Grand River Health District, due to the funding they receive through tax revenues generated by oil and gas development.

Response
The Draft LUPA/EIS provides an adequate discussion of the environmental consequences, including the cumulative impacts, of the presented alternatives. As required by 40 CFR 1502.16, the Draft LUPA/EIS provides a discussion of the environmental impacts of the alternatives, including the proposed action, any adverse environmental effects that cannot be avoided should the alternatives be implemented, the relationship between short-term uses and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources that would be involved in the proposal should it be implemented. The Draft LUPA/EIS provided sufficiently detailed information to aid in determining whether to proceed with the preferred alternative or make a reasoned choice among the other alternatives in a manner such that the public could have an understanding of the environmental consequences associated with the alternatives, in accordance with 40 CFR 1502.1.

Land use plan-level analyses are typically broad and qualitative rather than quantitative or focused on site-specific actions (BLM Land Use Planning

Handbook H-1601-1, Chapter II, A-B at 11-13 and Chapter IV, B at 29; Forest Service Handbook 1909.12 – Land Management Planning). The Draft LUPA/EIS contains only planning actions and does not include any implementation actions. A more quantified or detailed and specific analysis would be required only if the scope of the decision included implementation actions. As specific actions that may affect the area come under consideration, the BLM and the Forest Service will conduct subsequent NEPA analyses that include site-specific project and implementation-level actions. The site-specific analyses will tier to the plan-level analysis and expand the environmental analysis when more specific information is known. In addition, as required by NEPA, the public will be offered the opportunity to participate in the NEPA process for implementation actions.

Impacts were considered on numerous resources, resource uses, and socioeconomic conditions, which include the issues and populations serviced by the Grand River Health District. See Draft LUPA/EIS, Section 4.24, Social and Economic Impacts (Including Environmental Justice) (page 894).

Section 4.7 – Cumulative Impacts

Summary
The BLM failed to disclose the impacts resulting from the GRSG being listed.

Response
Analyzing the impacts as a result of assuming that the GRSG may be listed under the ESA is outside the scope of this LUPA. The purpose of and need for this LUPA is to address inadequacy of regulatory mechanisms that were identified as one of the listing factors for GRSG in the USFWS finding on the petition to list GRSG. The USFWS identified the principal regulatory mechanism for the BLM and Forest Service as conservation measures in LUPs. In response to the USFWS findings, as well as the BLM and Forest Service's requirement to manage sensitive species, the BLM and Forest Service are preparing LUPAs with associated EISs to evaluate the incorporation of conservation measures for GRSG. Because the purpose of the LUPAs is to identify and potentially incorporate appropriate conservation measures to conserve, enhance, and restore GRSG habitat by reducing, eliminating, or minimizing threats to that habitat, the alternatives in this EIS focus on those conservation measures that can be incorporated into the LUPs.

Section 4.9 – Mitigation Measures

Summary
The BLM and Forest Service need to include a monitoring, mitigation, and adaptive management plan/framework in the Proposed LUPA/Final EIS that will include specific criteria for determining GRSG conservation success and how the disturbance percentages will be calculated.

The BLM and Forest Service need to define when mitigation would be used and have enough specificity in the mitigation and monitoring plans to implement them in development actions.

Response
Draft LUPA/EIS Appendix G, Surface Reclamation Plan, refers to the White River Field Office because it originated in that field office. The plan would be adopted for the Northwest Colorado Greater Sage-Grouse LUPAs, as specified in Draft LUPA/EIS Chapter 2, Alternatives. The appendix has been updated to make it specific to the Northwest District and the Colorado Greater Sage-Grouse LUPA.

Mitigation, monitoring, and adaptive management framework plans have been added to the Proposed LUPA/Final EIS; see Chapter 2, Section 2.6, Adaptive Management, Monitoring, and Mitigation, and Appendices F, Greater Sage-Grouse Monitoring Framework, and G, Greater Sage-Grouse Mitigation Strategy. Mitigation will be applied to all implementation actions and decisions that take place on BLM-administered and National Forest System lands within GRSG habitat during the life of this plan. The Regional Mitigation Framework was developed to follow the BLM's Regional Mitigation Manual MS-1794, Forest Service Handbook FSH 1909.15, and CEQ 40 CFR 1508.20.

The mitigation framework, through the mitigation hierarchy, guides the BLM and Forest Service to provide a net conservation gain. The hierarchy direction is to:

1. Avoid impacts entirely by not taking a certain action or parts of an action.
2. If unable to avoid, minimize impacts by limiting the degree or magnitude of an action or parts of an action.
3. If avoidance or minimizing is not possible, compensate impacts associated with future implementation actions.

If residual impacts on GRSG from implementation-level actions remain after applying avoidance or minimization measures, then compensatory mitigation projects will be used to offset the residual impacts in an effort to achieve the land use plan goals and objectives. As articulated in Appendix G, compensatory mitigation will occur on sites that have the potential to yield the greatest conservation benefit to the GRSG, regardless of land ownership. These sites should be sufficiently "durable." According to BLM Draft Manual Section 1794, Regional Mitigation Manual, durability is defined as "the administrative, legal, and financial assurances that secure and protect the conservation status of a compensatory mitigation site, and the ecological benefits of a compensatory mitigation project, for at least as long as the associated impacts persist." Although Draft Manual Section 1794 has not been finalized, the BLM will continue to consider the guidance set forth therein as it undertakes the land use planning effort. The BLM is appropriately considering and evaluating the

guidance set forth in Draft Manual Section 1794, in addition to any other relevant internal agency guidance, through the GRSG planning process.

Specific mitigation strategies, based on the Regional Mitigation Framework, will be developed by regional teams (at the WAFWA Management Zone level) within 1 year of the issuance of the Record of Decision. These strategies will guide the application of the mitigation hierarchy to address GRSG impacts within that WAFWA Management Zone. The WAFWA Management Zone Regional Mitigation Strategy will be applicable to BLM-administered and National Forest System lands within the Management Zone boundaries. Subsequently, the BLM and Forest Service NEPA analyses for implementation-level decisions that might impact GRSG will include analysis of mitigation recommendations from the relevant WAFWA Management Zone Regional Mitigation Strategies.

The monitoring framework in Appendix F outlines the methods that the BLM and Forest Service will use to monitor and evaluate the implementation and effectiveness of the plan to conserve the species and its habitat at the landscape scale. The regulations for the BLM (43 CFR 1610.4-9) and the Forest Service (36 CFR 219.12) require that LUPs establish intervals and standards, as appropriate, for monitoring and evaluations, based on the sensitivity of the resource to the decisions involved.

Implementation monitoring results will provide information to allow the BLM and Forest Service to evaluate the implementation of decisions from the BLM Resource Management Plans (RMPs) and Forest Service Land and Resource Management Plans (LRMPs) to conserve GRSG and its habitat. Effectiveness monitoring will provide the information to evaluate whether BLM and Forest Service actions achieve the objective of the planning strategy (BLM Instruction Memorandum 2012-044), which is to conserve GRSG populations and its habitat.

Monitoring efforts will include data for measurable quantitative indicators of sagebrush availability, anthropogenic disturbance levels, and sagebrush conditions. This information will assist the BLM and the Forest Service in identifying whether or not they are achieving their LUP goals and objectives, reaching an adaptive management soft or hard trigger, as well as providing information relative to the disturbance cap. Specifically, habitat degradation (percent of human activity in a biologically significant unit), habitat availability (percent of sagebrush in a biologically significant unit), and habitat degradation intensity (density of energy facilities and mining locations) will be gathered to inform the disturbance cap objective.

Adaptive management is a systematic approach for improving resource management by learning from management outcomes. An adaptive approach involves exploring alternative ways to meet management objectives, anticipating the likely outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the

impacts of management actions, and then using the results to update knowledge and adjust management actions accordingly.

Incorporating adaptive management into the Northwest Colorado Great Sage-Grouse LUPA/EIS will ensure a degree of certainty that the decisions in the plan will effectively contribute to the elimination or adequate reduction of one or more threats to the GRSG and its habitat. The adaptive management approach incorporates a set of triggers in the plan, a soft and hard trigger. These triggers were developed to inform the BLM and Forest Service as to when the federal agency needs to take action to address a declining trend in GRSG populations or habitat figures.

Soft triggers represent an intermediate threshold indicating that management changes are needed at the project/implementation level to address habitat and population losses. Hard triggers represent a threshold indicating that immediate action is necessary to stop a severe deviation from GRSG conservation goals and objectives as set forth in the BLM and Forest Service LUPs. The adaptive management soft and hard triggers and land use planning responses to these triggers are described and analyzed fully in this EIS. Refer to Proposed LUPA/Final EIS Section 2.6.1, Adaptive Management Plan, for a complete description of the adaptive management strategy.

The agencies will use the data collected from monitoring (Proposed LUPA/Final EIS Appendix F, Greater Sage-Grouse Monitoring Framework) to identify any changes in habitat conditions related to the goals and objectives of the plan. The BLM and Forest Service will use the information collected through monitoring to determine when adaptive management triggers are met.

Section 5 – Federal Land Policy and Management Act

Summary

The alternatives are overly focused on protecting GRSG and none of them meet the FLPMA or MUSYA multiple use mandate requirements.

Response

As stated in the Draft LUPA/EIS, Section 2.2, Introduction to Resource Management Plan Amendment Alternatives (page 34), the alternatives "meet the purpose of and need for the LUP or LUPA." The LUPA is a targeted amendment specifically addressing goals, objectives, and conservation measures to conserve GRSG and to respond to the potential of it being listed (see also Draft LUPA/EIS, Section 1.2, Purpose of and Need for the Land Use Plan Amendments [page 6]).

The BLM's FLPMA (Section 103(c)) defines "multiple use" as the management of public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people. Accordingly, the BLM is responsible for the complicated task of striking

a balance among the many competing uses to which BLM-administered lands can be put. The BLM's multiple-use mandate does not require that all uses be allowed on all areas of BLM-administered lands. The purpose of the mandate is to require the BLM to evaluate and choose an appropriate balance of resource uses which involves tradeoffs between competing uses. The FLPMA also directs the BLM to develop and periodically revise or amend its RMPs, which guide management of BLM-administered lands, and provides an arena for making decisions regarding how lands would be managed and used.

It is consistent with the BLM's multiple-use mission to undertake a targeted planning process geared toward identifying and embedding appropriate GRSG conservation measures in RMPs, while allowing other uses of the public lands such as livestock grazing, traditional and renewable energy, and recreation to continue.

Consistent with the Multiple-Use Sustained-Yield Act of 1960 (MUSYA; 16 USC 528–531), the Forest Service manages National Forest System lands to sustain the multiple use of its renewable resources in perpetuity while maintaining the long-term health and productivity of the land. Resources are managed through a combination of approaches and concepts for the benefit of human communities and natural resources. Land management plans guide sustainable, integrated resource management of the resources within the plan area in the context of the broader landscape, giving due consideration to the relative values of the various resources in particular areas. The Forest Service is required by statute to have a national planning rule: the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976, requires the Secretary of Agriculture to issue regulations under the principles of the MUSYA for the development and revision of land management plans.

The Northwest Colorado Greater Sage-Grouse LUPA/EIS is a targeted amendment specifically addressing goals, objectives, and conservation measures to conserve GRSG and to respond to the potential of it being listed (see Draft LUPA/EIS, Section 1.2, Purpose of and Need for the Land Use Plan Amendments [page 6]). Both the BLM and Forest Service planning processes allow for analysis and consideration of a range of alternatives in the Draft LUPA/EIS that identified and incorporated appropriate regulatory mechanisms to conserve, enhance, and restore GRSG habitat and to eliminate, reduce, or minimize threats to this habitat to ensure that a balanced management approach was recommended. The Draft LUPA/EIS includes alternatives that provide a greater and lesser degree of restrictions in various use programs, but would not eliminate or invalidate any valid existing development rights.

Additionally, the BLM and the Forest Service developed the Northwest Colorado Greater Sage-Grouse Draft LUPA/EIS with involvement from cooperating agencies (see Draft LUPA/EIS, Section 6.3, Cooperating Agencies

[page 986]), including CPW, Garfield County, and 20 others, to ensure that a balanced multiple-use management strategy to address the protection of GRSG while allowing for utilization of renewable and nonrenewable resources on the BLM-administered and National Forest System lands.

Section 5.2 – Consistency with Other State, County, or Local Plans

Summary

The actions considered in the alternatives conflict with local and state agency plans and policies; furthermore, the BLM and Forest Service did not coordinate with agencies to ensure that conservation measures are as consistent as possible with other planning jurisdictions.

Response

The BLM and Forest Service LUPs and amendments strive for consistency with officially approved or adopted resource-related plans of Native American tribes, other federal agencies, and state and local governments to the extent that these resource-related plans comport with FLPMA and other federal laws and regulations (see 43 CFR 1610). The BLM and Forest Service have worked closely with state and local governments during preparation of the Draft LUPA/EIS. The Draft LUPA/EIS lists the cooperating agencies actively involved in the planning process in Section 6.4, Coordination and Consistency (page 988). The BLM and Forest Service work to find a balance among uses and needs as reflected in these local government plans and has done so in the preparation of the LUPA/EIS; a list of these plans can be found in the Draft LUPA/EIS, Section 1.7, Relationship to Other Policies, Plans, and Programs (page 26). While the BLM and Forest Service are not obligated to seek consistency, the agencies are required to describe the inconsistencies between the proposed action and other plans, policies, and controls within the EIS. This information has been updated in the Proposed LUPA/Final EIS.

The BLM and Forest Service coordinate with cooperating agencies commensurate with each agency's recognized jurisdiction or expertise. In areas where the State of Colorado has clear jurisdiction, such as wildlife populations, the BLM and Forest Service have worked closely with that agency. In cases where a county or agency has expertise, such as local county socioeconomic information, the BLM and Forest Service have worked closely with the group to incorporate the information into the EIS.

In addition, all BLM land use plans or plan amendments and revisions must undergo a 60-day Governor's consistency review prior to final approval to ensure consistency with state and local plans, policies, and programs.

Section 6 – Other Laws

Summary

The BLM and Forest Service have failed to document how the EIS and actions considered in the EIS comply with other laws, including all Onshore Orders regulating oil and gas development, the Energy Policy Act of 2005 and Energy Policy and Conservation Act of 2000, other multiple use mandates (e.g., MUSYA, Forest and Rangeland Renewable Resources Planning Act of 1974, National Forest Management Act of 1976), and compliance with other federal agency regulations (e.g., Federal Regulatory Energy Commission).

Response

The Draft EIS Section 2.5 and Final EIS Section 2.7.2, Management Common to All Alternatives, state that all alternatives would comply with state and federal laws, regulations, policies, and standards, and implement actions originating from laws, regulations, and policies. Additionally, in Draft and Final EIS Section 1.6, Planning Criteria, the BLM has a criterion stating that all BLM alternatives would comply with existing laws, regulations, and policies. The BLM and Forest Service have reviewed all actions in the Proposed LUPA and found them to be consistent and within the bounds of all required laws, regulations, and policies.

Section 7 – Greater Sage-Grouse

Section 7.1 – NTT Report/Findings

Summary

Commenters had two opposing views regarding the National Technical Team (NTT) report. One group suggested that the BLM and Forest Service should not use the NTT Report and only follow existing agency policy for conserving GRSG. The agencies have not justified the need for using the NTT Report as the basis for GRSG management direction. Another group suggested that the BLM and Forest Service did not go far enough and watered-down the conservation measures that were recommended in the NTT Report; the findings should have been used as is, without any changes.

Response

A National Technical Team (NTT) was formed as an independent, science-based team made up of representatives from the BLM, USFWS, Natural Resources Conservation Service, US Geological Survey, and state wildlife agencies from Colorado, Nevada, Oregon, Idaho, and Utah to ensure that the best information about how to manage the GRSG is reviewed, evaluated, and provided to the BLM and the Forest Service during this planning process. The group produced a report in December 2011 that identified science-based management considerations to promote sustainable GRSG populations. The resultant *Report on National Greater Sage-Grouse Conservation Measures* (NTT 2011) used the best current scientific knowledge to guide the BLM and Forest Service planning

efforts through management considerations to ameliorate threats, focused primarily on priority GRSG habitats on BLM-administered and National Forest System lands. In a letter to Secretary Salazar, dated January 15, 2013, more than 100 scientists endorsed the NTT Report, stating that it, "represented comprehensive compilation of the scientific knowledge needed for conserving Sage-Grouse" and that it "offers the best scientifically supportable approach to reduce the need to list Sage-Grouse as a Threatened or Endangered species."

The range of alternatives is based upon analysis of public scoping comments as well as information provided in the NTT Report and state management plans. GRSG conservation measures in the NTT Report were used to form BLM and the Forest Service management direction under at least one alternative (Alternative B), which is consistent with the direction provided in BLM Washington Office Instruction Memorandum 2012-044 ("The BLM must consider all applicable conservation measures developed by the NTT in at least one alternative in the land use planning process") and the Forest Service's Interim Conservation Recommendations for Greater Sage-Grouse and Greater Sage-Grouse Habitat (2012).

The alternatives represent different approaches to balancing resources and resource use among competing human interests, land uses, and the conservation of natural and cultural resource values, while sustaining and enhancing ecological integrity across the landscape, including plant, wildlife, and fish habitat. For example, Alternative D incorporates adjustments to the NTT Report based on cooperating agency input to provide a balanced level of protection, restoration, enhancement, and use of resources and services to meet ongoing programs and land uses. Anthropogenic surface disturbance would be managed to not exceed 5 percent in ecological sites that support sagebrush within PPH (now known as PHMA) (Figure 2-1, Ecological Sites Supporting Sagebrush in Preliminary Priority Habitat, in Appendix B, Figures). Additional information on disturbance cap management under Alternative D can be found in Appendix E, Disturbance Cap Management. Under Alternative D, the White River Field Office Reclamation Plan (Appendix F, Surface Reclamation Plan) would be followed for reclamation of lands to go back into rotation under the disturbance caps. See Proposed LUPA/Final EIS Section 2.7, Draft LUPA/EIS Alternatives, for additional information related to how the NTT was used in alternative development.

In addition to the NTT Report, the BLM and Forest Service used the Conservation Objectives Team (COT) report based upon the best scientific and commercial data available at the time that identifies key areas for GRSG conservation, key threats in those areas, and the extent to which they need to be reduced for the species to be conserved, and the *Summary of Science, Activities, Programs, and Policies That Influence the Rangewide Conservation of Greater Sage-Grouse (*Centrocercus urophasianus*)* (referred to as the BER) as additional sources of baseline information and management objectives (see further discussion below in Section 7.3, Greater Sage-Grouse COT, of this report).

Section 7.3 – COT Report

Summary

Commenters had two opposing views regarding the Conservation Objectives Team (COT) report. One group considered the report overly biased and did not represent the best available information; therefore, it should not have been used as the basis of the EIS alternatives. The other group suggested the BLM and Forest Service did not go far enough with the alternatives, and should have taken the actions directly or been consistent with the COT Report conservation objectives.

Response

In March 2012, the USFWS initiated a collaborative approach to develop range-wide conservation objectives for the GRSG to inform the 2015 decision about the need to list the species and to inform the collective conservation efforts of the many partners working to conserve the species. In March 2013, this team of State and USFWS representatives released the COT report that identifies key areas for GRSG conservation, key threats in those areas, and the extent to which they need to be reduced for the species to be conserved. The methodology used to assess the threats was developed by the team of state and USFWS representatives and was accepted as scientifically valid for the type of study undertaking, and utilized the best scientific and commercial data available at the time. The report served as guidance to federal land management agencies, state GRSG teams, and others in focusing efforts to achieve effective conservation for this species. Specifically, the COT was used to assess the populations and habitat threats in the current conditions of GRSG range.

The COT objectives were the basis for the USFWS-identified suite of conservation objectives to ameliorate threats to the GRSG populations and habitat. The BLM and Forest Service compared the range of alternatives with the COT objectives because they are the standard against which the USFWS will determine the effectiveness of the eventual proposed alternative. During formulation of the Proposed LUPA/Final EIS, the BLM and Forest Service also met with partners to determine which actions would meet the COT Report objectives to the greatest extent practicable. The BLM and Forest Service found that all of the alternatives considered within this planning process are consistent with conservation measures and objectives outlined in the COT Report and follow the basic principles of avoiding the impact of an activity, minimizing impacts by limiting the degree of activity, and mitigating for an impact by improving or enhancing GRSG habitat. Each of the alternatives considers different means for accomplishing this strategy (see Draft LUPA/EIS, Section 1.1.1, Overview, Chapter 2, Alternatives, and Chapter 4, Environmental Consequences, for references to how the reports and other information were used in alternative development).

The alternatives represent different degrees of and approaches to balancing resources and resource use among competing human interests, land uses, and the conservation of natural and cultural resource values, while sustaining and enhancing ecological integrity across the landscape, including plant, wildlife, and fish habitat. Each of the alternatives considers different means for accomplishing three points noted above. For example, some alternatives emphasize avoidance of impacts, while other alternatives emphasize minimization and mitigation.

While there was consistent guidance during alternatives development, such as BLM Washington Office Instruction Memorandum 2012-044, the BLM and Forest Service needed to vary management options across sub-regions to accommodate local issues and specific state and Forest Service requirements.

Chapter 4 incorporated the table for how the BLM and Forest Service addressed the threats to the populations in Colorado. See Table 4-2, Comparison of Alleviated Threats to Grouse in Colorado by Alternative.

Section 7.5 – Range of Alternatives

Summary
Commenters had specific issues that they felt the BLM and Forest Service should have considered in the range of management actions specific to GRSG:

- The BLM and Forest Service should add an Enhanced Mitigation/Expanded Use Authorization Program to the range of alternatives, such as the Colorado Habitat Exchange.
- The BLM and Forest Service failed to consider a full range of alternatives regarding the No Surface Occupancy (NSO) buffer; they only considered the 4-mile NSO buffer and need to consider other buffer distances.
- The BLM and Forest Service should include a discussion/table that describes how the alternatives compare in protecting GRSG.
- The BLM and Forest Service should include some incentives, including monetary compensation, to preserve GRSG habitat on private lands.

Response
As noted above in the response in Section 4.3, NEPA Range of Alternatives, of this report, Draft LUPA/EIS, Section 2.3, Alternative Development Process (page 34) describes how the Northwest Colorado Greater Sage-Grouse LUPA/EIS planning team employed the BLM and Forest Service planning process to develop a reasonable range of alternatives for the LUPA. The BLM and Forest Service complied with NEPA and the CEQ implementing regulations at 40 CFR 1500 in the development of alternatives for this draft LUPA/EIS, including seeking public input and analyzing reasonable alternatives while still meeting the

stated purpose of and need for action. The alternatives include management options for the planning area that would modify or amend decisions made in the field office LUPs, as amended, to meet the planning criteria, to address issues and comments from cooperating agencies and the public, or to provide a reasonable range of alternatives. Since this is a LUPA to address GRSG conservation, many decisions from the field office LUPs are acceptable and reasonable. In these instances, there was no need to develop alternative management prescriptions.

As previously noted, the relative emphasis given to particular resources and resource uses differs as well, including allowable uses, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives. Meaningful differences among the four alternatives are described in the Draft LUPA/EIS, Section 2.8, Summary Comparison of Alternatives (page 42) and Table 2-2, Comparative Summary of Alternatives (page 42).

Additionally, the 4-mile buffer for GRSG habitat protection is supported and was derived from research performed by several noted GRSG scientists including Holloran 2005, Walker et al. 2007, Tack 2009, and Johnson et al. 2011. For example, from the NTT Report:

> Impacts as measured by the number of males attending leks are most severe near the lek, remain discernible out to more than 4 miles (Holloran 2005, Walker et al. 2007, Tack 2009, Johnson et al. 2011), and often result in lek extirpations (Holloran 2005, Walker et al. 2007). Negative effects of well surface occupancy were apparent out to 3.1 miles, the largest radius investigated, in 2 of 7 study areas in Wyoming (Harju et al. 2010). Curvilinear relationships show that lek counts decreased with distance to the nearest active drilling rig, producing well, or main haul road and that development within 3 to 4 miles of leks decrease counts of displaying males (Holloran 2005).
>
> All well-supported models in Walker et al. (2007) indicate a strong negative effect, estimated as proportion of development within either 0.5 miles or 2 miles, on lek persistence. A model with development at 4 miles had less support, but the regression coefficient indicated that negative impacts within 4 miles were still apparent. Two additional studies reported negative impacts apparent out to 8 miles on large lek occurrence (more than 25 males; Tack 2009) and out to 11.7 miles on lek trends (Johnson et al. 2011), the largest scales evaluated.

Mitigation and monitoring frameworks were introduced in the Draft LUPA/EIS in Chapter 2 (Alternatives), Appendix I (Required Design Features, Preferred Design Features, and Suggested Design Features, Regional Mitigation Strategy), and Appendix J (Greater Sage-Grouse Draft Monitoring Framework). An

adaptive management strategy was also introduced in Chapter 2 of the Draft LUPA/EIS. A more detailed mitigation framework, monitoring framework, and adaptive management strategy have been incorporated into Proposed LUPA/Final EIS Chapter 2, Section 2.6, Adaptive Management, Monitoring, and Mitigation, and Appendices F, Greater Sage-Grouse Monitoring Framework, and G, Greater Sage-Grouse Mitigation Strategy.

Further detailed descriptions of the mitigation, monitoring, and adaptive management frameworks are available in Section 4.9, NEPA Mitigation Measures, of this report.

The Northwest Colorado mitigation strategy, described in Proposed LUPA/Final EIS Section 2.6.3, Regional Mitigation, and the criteria for exceptions and modifications in the stipulations appendix allow for offsite mitigation by providing incentives to allow for impacts on GRSG or its habitat to be offset by mitigation on private or state land if an overall benefit to GRSG or its habitat is realized.

Section 7.6 – Best Available Information Baseline Data

Summary
Commenters provided several references and studies that the BLM and Forest Service did not consider in the Draft LUPA/EIS but should include or consider in the Proposed LUPA/Final EIS. Also, commenters questioned the accuracy and validity of the NTT Report.

Response
The CEQ regulations require an environmental impact statement to:

> …succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The description shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced. Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues. (40 CFR 1502.15)

Additionally, the Northwest Colorado Greater Sage-Grouse LUPA/EIS is a programmatic NEPA effort to conserve GRSG and its habitat across a broad geographic area. As such, the BLM described the current conditions and trends in the affected environment broadly, across a range of conditions, appropriate to program-level land use planning actions.

Programmatic documents are regional in scope and place emphasis on developing broad environmental policies, programs, and plans. Site-specific data is important during implementation level decisions, which may be tiered to the

decisions made in this document. Data scales include broad-scale, mid-scale, fine-scale, and site-scale. For this planning document, it is appropriate to utilize data at the mid-scale (e.g., WAFWA Management Zones) and fine-scale (e.g., sub-region data). For this document, the best available information was used as generated and provided by the organizations and agencies with authority and special expertise to provide that information on a planning scale.

Before beginning the Northwest Colorado Greater Sage-Grouse LUPA/EIS and throughout the planning effort, the BLM and the Forest Service considered the availability of data from all sources, adequacy of existing data, data gaps, and the type of data necessary to support informed management decisions at the land-use plan level. The data needed to support broad-scale analysis of the planning area are substantially different than the data needed to support site-specific analysis of projects. The LUPA/EIS data and information is presented in map and table form and is sufficient to support the broad scale analyses required for land use planning.

The BLM and the Forest Service used the most recent and best information available that was relevant to a land-use planning-level analysis, including the Baseline Environmental Report (BER; Manier et al. 2013). The BER assisted the BLM and the Forest Service in summarizing the effect of their planning efforts at a range-wide scale, particularly in the affected environment (Chapter 3) and cumulative impacts (Chapter 5) sections, as well as reviewed opposing science or information.

Additionally, the BLM and the Forest Service consulted with, collected, and incorporated data from other agencies and sources, including but not limited to the USFWS, CPW, Office of Surface Mining, Colorado State Land Board, and US Department of Energy. Data included GRSG habitat delineated by CPW, threatened and endangered species habitats, deer and elk herd management areas, fluid mineral development areas, solid mineral development areas, and mineral potential areas.

Several commenters provided additional citations, references, and information to be considered as part of the baseline information and affected environment in the EIS. Many of these references, data, and information related to GRSG or sagebrush habitat. The information has been reviewed by the BLM and Forest Service. Several of the references had already been included or cited in the document, some references were essentially the same as information already included, and some of the information was new and incorporated into the Proposed LUPA/Final EIS. Specific instances where the information was incorporated into the document are noted under the topic-specific response with a reference to where the reader can find it in the Proposed LUPA/Final EIS.

As a result of these actions, the BLM and the Forest Service gathered the necessary data essential to make a reasoned choice among the alternatives analyzed in detail in the Draft LUPA/EIS, and provided an adequate analysis that

led to an adequate disclosure of the potential environmental consequences of the alternatives. The BLM and the Forest Service have thoroughly considered the alternatives and environmental consequences of the alternatives in the Draft LUPA/EIS to enable the decision maker to make an informed decision, as required by the NEPA.

Section 7.7 – Impact Analysis

Summary

The BLM and Forest Service should revise some of the assumptions, such as the assumption that the analysis did not include historic or potential habitat. The assumption that historic and potential habitat is not considered in the analysis is inappropriate. Also, the BLM and Forest Service did not do enough analysis for actions in the priority habitat areas (PPH or PHMA).

Response

As required by 40 CFR 1502.16, the Draft LUPA/EIS provided a discussion of the environmental impacts of the alternatives including the proposed action, any adverse environmental effects that cannot be avoided should the alternatives be implemented, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources that would be involved in the proposal should it be implemented. Additionally, the Draft LUPA/EIS and Proposed LUPA/Final EIS provide detailed discussion about the assumptions used in the impact analysis (see Proposed LUPA/Final EIS Section 4.2, Analytical Assumptions). As noted in the chapter, several overarching assumptions were made in order to facilitate the analysis of the project impacts. These assumptions set guidelines and provided reasonably foreseeable projected levels of development that would occur in the planning area during the planning period. The assumptions do not constrain or redefine the management objectives and actions proposed for each alternative. Therefore, the LUPA/EIS provided sufficiently detailed information to aid in determining whether to proceed with the preferred alternative or make a reasoned choice among the other alternatives in a manner such that the public could have an understanding of the environmental consequences associated with the alternatives, in accordance with 40 CFR 1502.1.

Land use plan-level analyses are typically broad and qualitative rather than quantitative or focused on site-specific actions (BLM Land Use Planning Handbook H-1601-1, Chapter II, A-B at 11-13, and Chapter IV, B at 29; Forest Service Handbook 1909.12 – Land Management Planning). The LUPA/EIS contains only planning actions and does not include any implementation actions. A more quantified or detailed and specific analysis would be required only if the scope of the decision included implementation actions. Based on this, the impacts on PHMA are discussed in Proposed LUPA/Final EIS Chapter 4, Environmental Consequences. As specific actions that may affect the area come

under consideration, the BLM and the Forest Service will conduct subsequent NEPA analyses that include site-specific project and implementation-level actions.

Section 7.8 – Cumulative Impact Analysis

Summary
Commenters suggested that the BLM and Forest Service did not address the cumulative impacts of the GRSG actions on non-BLM-administered or National Forest System lands, and that the BLM and Forest Service should include a table or section that compares the anticipated outcomes of each alternative in protecting GRSG populations.

Response
As noted previously in Sections 4.6 (NEPA Indirect Impacts), 4.7 (NEPA Cumulative Impacts), and 7.7 (Greater Sage-Grouse Impact Analysis) of this report, the BLM and Forest Service complied with the CEQ regulations for developing the direct, indirect, and cumulative impacts analysis.

Draft LUPA/EIS Chapter 4, Table 4.6, Comparison of Alleviated Threats to Greater Sage-Grouse in Northwest Colorado by Alternative (page 188), provides an overview of how each threat would be alleviated on BLM-administered and National Forest System lands. In addition to this table, the BLM and Forest Service prepared a cumulative impact analysis in the Draft LUPA/EIS, Section 5.4, Special Status Species – Greater Sage-Grouse (page 944), that describes the cumulative impacts from each threat on all habitat and land ownerships. It would be difficult to prepare a table that shows how threats would be alleviated on private lands, but the Colorado Package also identifies GRSG conservation activities that are happening or are planned to happen on private lands. In addition, the BLM and Forest Service have prepared a Tier II Cumulative Effects Analysis completed at the WAFWA Management Zone 2 level that is included in the Proposed LUPA/Final EIS.

Section 7.9 – Mitigation Measures

Summary
The BLM and Forest Service need to consider a comprehensive mitigation and monitoring program for GRSG that includes explicit criteria for determining the adequacy of the management actions.

Response
Mitigation and monitoring frameworks were introduced in the Draft LUPA/EIS in Chapter 2 (Alternatives), Appendix I (Required Design Features, Preferred Design Features, and Suggested Design Features, Regional Mitigation Strategy), and Appendix J (Greater Sage-Grouse Draft Monitoring Framework). An adaptive management strategy was also introduced in Chapter 2 of the Draft LUPA/EIS. A more detailed mitigation framework, monitoring framework, and

adaptive management strategy have been incorporated into Proposed LUPA/Final EIS Chapter 2, Section 2.6, Adaptive Management, Monitoring, and Mitigation, and Appendices F, Greater Sage-Grouse Monitoring Framework, and G, Greater Sage-Grouse Mitigation Strategy.

Further detailed descriptions of the mitigation, monitoring, and adaptive management frameworks are available in Section 4.9, NEPA Mitigation Measures, of this report.

Section 32.2 – Disturbance Cap

Summary
Commenters felt there was no methodology or scientific backing for establishing the disturbance cap in the alternatives, and that the BLM and Forest Service needed to demonstrate more range in the disturbance cap amounts presented in the alternatives.

Response
The BLM and Forest Service used recommendations specific to each alternative to determine the disturbance cap level. For example, the BLM based the disturbance cap for Alternative B on the NTT Report. Conservation measures included in Alternative B focus primarily on GRSG PHMA and include a 3 percent disturbance cap in PHMA. PHMA areas have the highest conservation value to maintaining or increasing GRSG populations.

For Alternative C, conservation measures were mostly focused on all designated habitat (i.e., PHMA, GHMA, and LCHMA). These areas have been identified by CPW in coordination with respective BLM offices, and include a 3 percent cap on disturbance in ADH. The 3 percent disturbance cap for Alternatives B and C has been incorporated as-is from the NTT Report and conservation group alternatives; the BLM did not modify the disturbance caps in the alternatives.

For Alternative D, the BLM intended to protect those areas that were most important for GRSG within PHMA to protect the best of the best habitat. The BLM utilized information from the Wyoming Core Strategy to support consideration of the 5 percent disturbance cap with the goal of presenting a reasonable edge of the range of alternatives with a higher percentage.

As part of the Proposed LUPA/Final EIS, the BLM has provided additional clarification on the disturbance caps and guidance for how they would be implemented and accounted for and what data are appropriate for determining disturbance. While the caps would set a particular level of disturbance, the implementation of the disturbance caps would occur after the LUPA is approved in the ROD. The BLM inventoried the habitat with the best available info at the time of the Draft LUPA/EIS, but would also do additional in-depth analysis and inventory within Management Zones at the implementation stage.

Section 9 – Noise

Summary
The BLM and Forest Service should consider additional studies that suggest noise can greatly affect GRSG, such as Blickley 2010, Patricelli 2012 and Blickley 2012. These studies show that noise limits should be imposed in the LUPA.

Response
As noted previously in Section 7.6, Greater Sage-Grouse Best Available Information Baseline Data, of this report, the BLM and the Forest Service complied with CEQ regulations in describing the affected environment. The suggested studies and references put forth by the commenters were reviewed by the BLM and Forest Service to determine if they presented new information. The BLM and Forest Service determined that the information was already included in the draft EIS (Section 4.4.2, Greater Sage-Grouse [page 505]).

Restrictions on noise can be found in **Appendix I**, Required Design Features, Preferred Design Features, and Suggested Design Features.

Section 10 – Climate Change

Summary
The BLM and Forest Service failed to include a climate change alternative and failed to evaluate the potential effectiveness of climate change management actions on lessening the threat to GRSG.

Response
The Proposed LUPA/Final EIS does disclose the potential effects associated with global climate change on the GRSG (Draft LUPA/EIS, Section 4.18, Climate Change [page 804]). However, pursuant to 40 CFR 1500.1(b), information must be "of high quality" in order to be considered in the analysis. As explained in the EIS, it is speculative to attempt to predict the specific nature or magnitude of such changes. As noted on page 805:

> In summary, climate change has the potential to have profound impacts for those critical habitats that support GRSG populations within the planning area. As the temperatures warm and precipitation patterns change this may change vegetation communities which may cause impacts on GRSG. These climate changes, along with current non-climate related stressors may have profound impacts on GRSG in the long term.

The Proposed LUPA/Final EIS was refined with additional climate change information from the Rapid Ecological Assessment for the region. See Proposed LUPA/Final EIS Section 4.19, Climate Change, for additional details on the included information.

Section 10.2 – Best Available Information Baseline Data

Summary
The BLM and Forest Service should have applied the Colorado Plateau Rapid Ecological Assessment information across the entire planning area.

Response
The BLM and Forest Service did consider and use the Colorado Plateau Rapid Ecological Assessment and cited the document in the impacts on climate change section. Bryce, et. al. is cited in the Draft LUPA/EIS, Section 4.28.11, Climate Change [page 930].

Section 12 – Fire and Fuels

Summary
The BLM and Forest Service need to follow all current applicable policy and guidance documents related to wild fire, including Washington Office Instruction Memorandum 2013-128.

Response
The BLM and Forest Service did consider Instruction Memorandum 2013-128 in the EIS development; the BMPs from the Instruction Memorandum were included in the Draft LUPA/EIS and have been analyzed in Appendix O, Greater Sage-Grouse Wildfire and Invasive Species Habitat Assessment.

Section 12.1 – Range of Alternatives

Summary
The BLM and Forest Service need to modify the alternatives for fire management actions to 1) not count habitat loss due to wild fires in the disturbance cap; 2) not place protection of the GRSG over protecting life and property; and 3) include additional conservation measures to alternatives, such as not reduce canopy cover to less than 15 percent on all designated habitat, apply appropriate seasonal restrictions to all designated habitat, and include a risk analysis for a prescribed burn/natural ignition fire.

Response
The BLM and Forest Service considered the recommendations made from the cooperating agencies as well as the input provided by the public. This information was reviewed for content against the current range of alternatives. The recommendations were found to fall within the range of alternatives. Additional coordination with cooperating agencies between the Draft LUPA/EIS and Proposed LUPA/Final EIS resulted in changes that are presented in the Proposed LUPA/Final EIS (see Section 1.10, Changes Between the Draft Land Use Plan Amendment/Environmental Impact Statement and the Proposed Land Use Plan Amendment/Final Environmental Impact Statement).

For additional information regarding the disturbance cap and the suite of GRSG-related conservation measure comments and responses, see Section 32.2, Greater Sage-Grouse Disturbance Cap, and Section 7.5, Greater Sage-Grouse Range of Alternatives, of this report.

Section 12.3 – Impact Analysis

Summary

Commenters noted that the assumptions for the fire impacts analysis were flawed and requested that the BLM and Forest Service to include a strategy for identifying sagebrush landscapes that are at risk from fire in order to avoid conversion of landscapes to being dominated by invasive species.

Response

As noted in Section 7.7, Greater Sage-Grouse Impact Analysis, of this report, the BLM and Forest Service complied with CEQ guidance, and the methodology and assumptions provide an adequate starting point for discussion of the environmental consequences, including the cumulative impacts, of the presented alternatives. For the fire and fuels section, the Draft LUPA/EIS described the methodology and assumptions used for conducting the impact analysis in Section 4.7.2, Methodology and Assumptions (page 604).

In regards to the request for a fire strategy, land use plan-level analyses are typically broad and qualitative rather than quantitative or focused on site-specific actions (BLM Land Use Planning Handbook H-1601-1, Chapter II, A-B at 11-13 and Chapter IV, B at 29; Forest Service Handbook 1909.12 – Land Management Planning). The LUPA/EIS contains only planning actions and does not include any implementation actions. A more quantified or detailed and specific analysis would be required only if the scope of the decision included implementation actions. As specific actions that may affect the area come under consideration, the BLM and the Forest Service will conduct subsequent NEPA analyses that include site-specific project and implementation-level actions, such as developing local fire and week management strategies. Any future site-specific analyses will tier to the plan-level analysis and expand the environmental analysis when more specific information is known. In addition, as required by NEPA, the public will be offered the opportunity to participate in the NEPA process for implementation actions.

Section 13.5 – Predation

Summary

The BLM and Forest Service need to consider additional information about raven predation on GRSG. There is abundant research on raven predation on GRSG and other species (Boarman 1993, 2003; Bedrosian and Craighead 2010; and Bui 2009).

Response
The BLM and Forest Service described the effects of predation on GRSG in the Draft LUPA/EIS; the information used here and in the affected environment was taken from the BER. The BLM and Forest Service have authority to manage the habitat and have provided analysis to describe how the numerous management actions across the range of alternatives could affect the habitat and indirectly the effects of predation. Altering sagebrush habitat can create an influx of predators into an area that could result in a population decline for GRSG. Roads, fences, power lines, trails and other disturbances may make access easier for potential predators and increase risks to the species. The EIS calls for measures that will substantially reduce disturbances in the bird's habitat, thus reducing predation risk. This information can be found Proposed LUPA/Final EIS Section 4.5, Special Status Species.

Section 14 – Lands and Realty

Section 14.1 – Range of Alternatives

Summary
The BLM and Forest Service should modify Alternative D to include statements that the BLM and Forest Service will strive to retain public ownership of PHMA and acquire non-federal lands important to GRSG, as well as the criteria and processes for determining what constitutes a healthy and stable or increasing GRSG population and what constitutes an adverse effect on GRSG due to habitat loss and disruptive activities.

Response
As noted above in the response in Section 4.3, NEPA Range of Alternatives, of this report, Draft LUPA/EIS, Section 2.3, Alternative Development Process (page 34) describes how the Northwest Colorado Greater Sage-Grouse LUPA/EIS planning team employed the BLM and Forest Service planning process to develop a reasonable range of alternatives for the LUPA. The BLM and Forest Service complied with NEPA and the CEQ implementing regulations at 40 CFR 1500 in the development of alternatives for the Draft LUPA/EIS, including seeking public input and analyzing reasonable alternatives. The alternatives include management options for the planning area that would modify or amend decisions made in the field office LUPs, as amended, to meet the planning criteria, to address issues and comments from cooperating agencies and the public, or to provide a reasonable range of alternatives.

Under the preferred alternative (Alternative D), the BLM and Forest Service will retain public ownership of PHMA except for disposal of tracts that are not capable of altering GRSG populations (Draft LUPA/EIS, Section 4.5.3, Direct and Indirect Impacts on Lands and Realty [page 585] and Table 2.4, Description of Alternatives B, C, and D [page 148]), and GRSG habitat values will be considered when acquiring lands (Table 2.4, page 149). Exiting criteria define a

healthy and stable or increasing GRSG population, as well as what constitutes an adverse effect on GRSG populations (Manier et al. 2013) and was referenced in the Draft LUPA/EIS, Section 3.4.3, References (page 272).

During the development of the Proposed LUPA/Final EIS, the BLM and Forest Service considered the comments in the context of whether to change management actions and mitigation measures to meet the purpose of and need for the action. The outcome of these meetings resulted in clarifications and edits to the alternatives and impacts analysis (see Proposed LUPA/Final EIS Section 1.10, Changes Between the Draft Land Use Plan Amendment/Environmental Impact Statement and the Proposed Land Use Plan Amendment/Final Environmental Impact Statement).

Section 14.2 – Best Available Information Baseline Data

Summary
The BLM and Forest Service did not use scientific studies when establishing the areas around leks. The BLM and Forest Service need to double check the miles of transmission line presented in Table 3.14 because the numbers appear to overestimate the amount of lines.

Response
As noted in Section 7.6, Greater Sage-Grouse Best Available Information Baseline Data, of this report, the BLM and the Forest Service complied with CEQ regulations in describing the affected environment. Of the suggested studies and references put forth by the commenters (Manier et al. 2013), the BLM and Forest Service reviewed them to determine if they presented new information that would need to be incorporated into the Proposed LUPA/Final EIS, were references already included in the draft EIS, or if the references provided the same information as already used or described in the Draft LUPA/EIS. The BLM and Forest Service determined that the data presented in Table 3.14 is taken from the BER, and while it is coarse data, represents a source of best available data.

Section 15 – Leasable Minerals

Section 15.1 – Range of Alternatives

Summary
The BLM and Forest Service need to consider additional actions or clarifications to existing actions within the range of alternatives. Some of the management actions are not compliant with current management policies and guidance, such as BLM Instruction Memorandum 2013-151 regarding bond amounts.

Response
As noted in Sections 4.3, NEPA Range of Alternatives, and 7.5, Greater Sage-Grouse Range of Alternatives, of this report, the BLM and the Forest Service

complied with CEQ regulations in developing the range of alternatives and the spectrum of actions considered all meet BLM and Forest Service regulations, policy and guidance. The alternatives include management options for the planning area that would modify or amend decisions made in the field office LUPs, as amended, to meet the planning criteria, to address issues and comments from cooperating agencies and the public, or to provide a reasonable range of alternatives. Since this is a LUPA to address GRSG conservation, many decisions from the field office LUPs are acceptable and reasonable. In these instances, there was no need to develop alternative management prescriptions.

Also as previously noted, the relative emphasis given to particular resources and resource uses differs as well, including allowable uses, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives. Meaningful differences among the four alternatives are described in Draft LUPA/EIS, Section 2.8, Summary Comparison of Alternatives (page 42) and Table 2-2, Comparative Summary of Alternatives (page 42).

The BLM is not suggesting to increase bond amounts on existing leases in the preferred alternative, but rather to ensure that sufficient bond amounts are in place in order for the operator to complete reclamation activities in GRSG habitat.

During the development of the Proposed LUPA/Final EIS, the BLM and Forest Service considered the comments to determine whether changes to the management actions and mitigation measures were warranted. The outcome of these meetings resulted in noted clarifications and edits to the alternatives, including conservation objectives, and impacts analysis (see Proposed LUPA/Final EIS Section 1.10, Changes Between the Draft Land Use Plan Amendment/Environmental Impact Statement and the Proposed Land Use Plan Amendment/Final Environmental Impact Statement).

Section 15.2 – Best Available Information Baseline Data

Summary
The BLM and Forest Service need to consider additional research sources regarding the effects of oil and gas development on GRSG populations.

Response
As noted previously in Section 7.6, Greater Sage-Grouse Best Available Information Baseline Data, the BLM and Forest Service complied with CEQ regulations in describing the affected environment. The suggested studies and references put forth by the commenters were reviewed by the BLM and Forest Service to determine if they presented new information that would need to be incorporated into the Proposed LUPA/Final EIS. The BLM and Forest Service

determined that the information was already included in the draft EIS (Section 4.13.3, Direct and Indirect Impacts on Range Management [page 701]).

Section 15.3 – Impact Analysis

Summary
The BLM and Forest Service have failed to adequately disclose the impacts of the noted restrictions on oil and gas operations. The analysis presented in the Draft EIS is insufficient to provide the public a full understanding of how oil and gas operations would be adversely impacted by the conservation measures outlined in the Draft EIS.

The BLM and Forest Service need to provide further analysis to show the effectiveness of using a less restrictive action/mitigation rather than a more restrictive one. The oil and gas analysis was overly biased in presenting adverse effects from oil and gas developed and not presenting the adverse effects created by other programs/uses.

Response
As noted previously in Sections 4.6 (NEPA Indirect Impacts), 4.7 (NEPA Cumulative Impacts), and 7.7 (Greater Sage-Grouse Impact Analysis) of this report, the BLM and Forest Service complied with the CEQ regulations in developing the direct, indirect, and cumulative impacts analyses.

Oil and gas development is one of the main USFWS-identified threats to GRSG and their habitat in northwest Colorado (Draft LUPA/EIS, Table 2.1, USFWS-Identified Threats to GRSG and Their Habitat and Applicable BLM/USFS LUP Resource Programs for Addressing Threats [page 36]); as such, the EIS thoroughly analyzes impacts on oil and gas development on GRSG. The impacts from leasable mineral development on GRSG and GRSG habitat are discussed in the Draft LUPA/EIS, Section 4.4.2, Greater Sage-Grouse (page 505).

Impacts from the management actions and conservation measures on leasable mineral development are also thoroughly discussed and analyzed in Section 4.8, Minerals (Leasable) (page 619), as well as Section 4.24.3, Socioeconomic Impacts.

Section 15.5 – Mitigation Measures

Summary
Additional reclamation bonding requirements are unnecessary as both federal and state government require bonding, and the additional requirements go against current regulations (43 CFR 3104 and 36 CFR 228 Subpart E).

Response
The BLM and Forest Service are not proposing to add new lease stipulations or bonding requirements developed under this LUPA to existing leases. The BLM

will work with the lessees, operators, or other project proponents to avoid, reduce, and mitigate adverse impacts to the extent compatible with lessees' rights to drill and produce fluid mineral resources. The BLM will work with the lessee, operator, or project proponent in developing an application for permit to drill for the lease to avoid or minimize impacts to GRSG or its habitat and will ensure that the best information about the GRSG and its habitat informs and helps guide development of such federal leases. Where warranted, the BLM will use Conditions of Approval to mitigate impacts on other resources to be disclosed and analyzed in subsequent site-specific NEPA analyses. This approach is consistent with BLM's authority under the Mineral Leasing Act, as amended, and regulations promulgated under the Act. Conditions of can be applied at the project-approval stage when warranted by resource concerns. Existing oil and gas or other mineral lease rights will be honored. When an oil and gas lease is issued, it constitutes a valid existing right; BLM cannot unilaterally change the terms and conditions of the lease. Existing leases will not be affected by new closures and/or areas administratively unavailable for lease. Existing leases will not be terminated until the lease expires.

Based on site– or project-specific environmental analysis, Conditions of Approval could be applied at the Application for Permits to Drill and Sundry Notice stages and subsequent development stages to mitigate potential impacts from oil and gas operations within existing lease areas, provided the leaseholder's right to develop the lease remains intact.

Section 16 – Livestock Grazing

Section 16.1 – Range of Alternatives

Summary

Commenters were divided on what changes would need to be made to alternatives. Some commenters wanted alternatives for livestock grazing changed to be consistent with the multiple-use mandate, and for the BLM and Forest Service to incorporate a range of BMPs focused on range management.

Other commenters wanted the livestock grazing alternatives to include terms and conditions for grazing permits that assure that GRSG habitat requirements are met, are consistent with NTT recommendations, and that conservation measures prevent adverse impacts from livestock range improvement projects on GRSG habitat. Additionally, the BLM should consider drought in the habitat objectives and apply BLM Instruction Memorandum 2013-094.

Response

As noted in Sections 4.3, NEPA Range of Alternatives, and 7.5, Greater Sage-Grouse Range of Alternatives, of this report, the BLM and the Forest Service complied with CEQ regulations, policy, and guidance in developing the range of alternatives and the spectrum of actions considered. The BLM and Forest Service considered a range of reasonable alternatives during the planning

process in full compliance with the NEPA. The CEQ regulations (40 CFR 1502.1) require that the BLM and Forest Service consider reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment.

While there are many possible alternatives or actions to manage public lands and GRSG in the decision area, the BLM and Forest Service used the scoping process to determine a range of reasonable alternatives. As a result, four alternatives were analyzed in detail in the Draft LUPA/EIS, and five alternatives are analyzed in the Proposed LUPA/Final EIS; these alternatives best address the livestock grazing issues and concerns identified by the affected public. The range of alternatives in the Draft LUPA/EIS represented a full spectrum of options, including a no action alternative (current management, Alternative A).

The BLM and Forest Service recognize that there could be a large number of variations of alternatives put forth in the planning process. However, the BLM and Forest Service are not required to analyze in detail each variation, including those variations determined not to meet the purpose of and need for the LUPA or those alternatives determined to be unreasonable given BLM and the Forest Service mandates, policies, and programs, including the FLPMA, Multiple Use and Sustained Yield Act, and other federal laws and regulations applicable to public lands. The alternatives include management options for the planning area that would modify or amend decisions made in the field office LUPs, as amended, to meet the planning criteria, to address issues and comments from cooperating agencies and the public, or to provide a reasonable range of alternatives. Since this is a LUPA to address GRSG conservation, many decisions from the field office LUPs are acceptable and reasonable. In these instances, there was no need to develop alternative management prescriptions.

Each of the alternatives considered and analyzed in detail in the Draft LUPA/EIS achieves the purpose of and need for the LUPA, is implementable, and addresses all significant issues. The preferred alternative was the result of a broad range of analysis and public input and represents a balanced, multiple-use management strategy that conserves GRSG and responds to the potential of it being listed.

The relative emphasis given to particular resources and resource uses differs as well, including allowable uses, restoration measures, and specific direction pertaining to individual resource programs. When resources or resource uses are mandated by law or are not tied to planning issues, there are typically few or no distinctions between alternatives. Meaningful differences among the four alternatives are described in the Draft LUPA/EIS, Section 2.8, Summary Comparison of Alternatives (page 42) and Table 2-2, Comparative Summary of Alternatives (page 42).

During the development of the Proposed LUPA/Final EIS, the BLM and Forest Service considered the comments to determine whether changes to the

management actions and mitigation measures were warranted. The outcome of these meetings resulted in noted clarifications and edits to the alternatives for livestock grazing and impacts analysis (see Proposed LUPA/Final EIS Table 2.8, Description of Alternatives B, C, D, and BLM and Forest Service Proposed LUPAs, Range Management Objectives, and Section 4.14, Range Management.

Section 16.2 – Best Available Information Baseline Data

Summary

The BLM and Forest Service need to consider the additional referenced information in the EIS (Beschta, R. L., D. L. Donahue, D. A. DellaSala, J. J. Rhodes, J. R. Karr, M. H. O'Brien, T. L. Fleischner, and C. Deacon-Williams. 2012. Adapting to climate change on western public lands: addressing the ecological effects of domestic, wild, and feral ungulates; and Reisner, M. D., J. B. Grace, D. A. Pyke, and P. S. Doescher. 2013. Conditions favouring *Bromus tectorum* dominance of endangered sagebrush steppe ecosystems).

Response

As noted previously in Section 7.6, Greater Sage-Grouse Best Available Information Baseline Data, of this report, the BLM and the Forest Service complied with CEQ regulations in describing the affected environment. Of the suggested studies and references put forth by the commenters, the BLM reviewed them to determine if they presented new information that would need to be incorporated into the Proposed LUPA/Final EIS, were references already included in the draft EIS, or if the references provided the same information as already used or described in the Draft LUPA/EIS. The Draft LUPA/EIS (Section 4.18, Climate Change [page 804]) discloses the impacts that livestock grazing has to vegetation as an additive adverse impact to change wrought by climate change in the context of overgrazing. Much of what is discussed in the references is already addressed in the assumptions for vegetation impacts (Draft LUPA/EIS Section 4.6.2, Methodology and Assumptions [page 587]) and the assumptions for range management (Draft LUPA/EIS Section 4.13.2, Methodology and Assumptions [page 699]). Additionally, complete livestock removal and the associated impacts are discussed in detail (Draft LUPA/EIS Section 4.13.4, Summary of Impacts on Range Management [page 711]). The reference suggested by the commenter also provides information for more comprehensive analysis of the impacts of range management on vegetation; see Section 4.6.3, Direct and Indirect Impacts on Vegetation, Changes in Vegetative Cover.

Section 16.3 – Impact Analysis

Summary

The BLM and Forest Service failed to provide adequate analysis of the impacts from the alternatives on livestock grazing, as well as the effects of livestock grazing on GRSG and its habitat. There is no mention of the positive benefits of

livestock grazing on GRSG or the negative effect that prioritizing GRSG over livestock grazing may have on the livestock industry.

Response
As noted previously in Sections 4.6 (NEPA Indirect Impacts), 4.7 (NEPA Cumulative Impacts), and 7.7 (Greater Sage-Grouse Impact Analysis) of this report, the BLM and Forest Service complied with the CEQ regulations for developing the direct, indirect, and cumulative impacts analysis.

The impacts from livestock grazing on GRSG and GRSG habitat are discussed in the Draft LUPA/EIS, Section 4.4.2, Greater Sage-Grouse (page 505); impacts from the management actions and conservation measures on livestock grazing are discussed in Section 4.13, Range Management (page 699). The socioeconomic impacts are discussed in Section 4.24, Social and Economic Impacts (Including Environmental Justice) (page 894).

Section 16.4 – Cumulative Impact Analysis

Summary
The BLM and Forest Service failed to include the direct and indirect cumulative impacts of the GRSG conservation actions on the livestock industry or the impacts of the actions on private lands. No mention is made of impacts to private land livestock grazing operations from alternatives that would reduce livestock grazing on federal land.

Response
As noted previously in Sections 4.6 (NEPA Indirect Impacts), 4.7 (NEPA Cumulative Impacts), and 7.7 (Greater Sage-Grouse Impact Analysis) of this report, the BLM and Forest Service complied with the CEQ regulations for developing the direct, indirect, and cumulative impacts analysis.

The impacts from livestock grazing on GRSG and GRSG habitat are discussed in the Draft LUPA/EIS, Section 4.4.2, Greater Sage-Grouse (page 505); impacts from the management actions and conservation measures on livestock grazing are discussed in Section 4.13, Range Management (page 699). The socioeconomic impacts are discussed in Section 4.24, Social and Economic Impacts (Including Environmental Justice) (page 894).

Cumulative impacts on livestock grazing are discussed in the Draft LUPA/EIS, Section 5.11.

Section 16.5 – Mitigation Measures

Summary
The Draft LUPA/EIS lacks specificity to explain how the BLM and Forest Service will monitor for and treat invasive species associated with existing range improvements in GRSG designated habitat.

Response
As noted previously in Section 4.6 (NEPA Indirect Impacts) of this report, land use plan-level analyses are typically broad and qualitative rather than quantitative or focused on site-specific actions (BLM Land Use Planning Handbook H-1601-1, Chapter II, A-B at 11-13 and Chapter IV, B at 29; Forest Service Handbook 1909.12 – Land Management Planning). The Draft LUPA/EIS contains only planning actions and does not include any implementation actions. A more quantified or detailed and specific analysis would be required only if the scope of the decision included implementation actions. As specific actions that may affect the area come under consideration, the BLM and the Forest Service will conduct subsequent NEPA analyses that include site-specific project and implementation-level actions.

Mitigation and monitoring frameworks were introduced in the Draft LUPA/EIS in Chapter 2 (Alternatives), Appendix I (Required Design Features, Preferred Design Features, and Suggested Design Features, Regional Mitigation Strategy), and Appendix J (Greater Sage-Grouse Draft Monitoring Framework). An adaptive management strategy was also introduced in Chapter 2 of the Draft LUPA/EIS. A more detailed mitigation framework, monitoring framework, and adaptive management strategy have been incorporated into Proposed LUPA/Final EIS Chapter 2, Section 2.6, Adaptive Management, Monitoring, and Mitigation, and Appendices F, Greater Sage-Grouse Monitoring Framework, and G, Greater Sage-Grouse Mitigation Strategy.

Further detailed descriptions of the mitigation, monitoring, and adaptive management frameworks are available in Section 4.9, NEPA Mitigation Measures, of this report.

Section 17 – Locatable Minerals

Section 17.1 – Range of Alternatives

Summary
The USFWS requested some additional mitigation measures to be considered in the range of alternatives for locatable minerals (mining operations), such as ensuring that reclamation is conducted to meet GRSG habitat objectives and ensuring that reclamation of an existing mine does not replace off-site compensatory mitigation for mine disturbances.

Response
As discussed previously under Sections 4.3, NEPA Range of Alternatives, and 7.5, Greater Sage-Grouse Range of Alternatives, of this report, the BLM and the Forest Service complied with CEQ regulations in developing the range of alternatives and the spectrum of actions considered all meet BLM and Forest Service regulations, policy, and guidance.

During the development of the Proposed LUPA/Final EIS, the BLM and Forest Service met with the USFWS to consider changes to the management actions and mitigation measures. The outcome of these meetings resulted in noted clarifications and edits to the alternatives and impacts analysis (see Proposed LUPA/Final EIS Section 1.10, Changes Between the Draft Land Use Plan Amendment/Environmental Impact Statement and the Proposed Land Use Plan Amendment/Final Environmental Impact Statement).

Section 20 – Recreation

Summary
The Draft LUPA/EIS contains conflicting impact analysis statements regarding the effects of closures and restrictions on dispersed camping and other recreational activities.

Response
The conflict arose from a typographic error in the Draft LUPA/EIS. The referenced section should note that it refers to Alternative C, not Alternative D, as Alternative C is the most restrictive of the alternatives analyzed in the EIS. This error has been corrected in the Proposed LUPA/Final EIS; see Section 4.13, Recreation.

Section 22 – Socioeconomics and Environmental Justice

Section 22.2 – Best Available Information Baseline Data

Summary
The BLM and Forest Service need to use more current and site-specific data, including new data from 2012. The BLM and Forest Service also need analyze disadvantaged communities by place of residence, not just county of residence.

Response
As noted previously in Section 7.6, Greater Sage-Grouse Best Available Information Baseline Data, of this report, the BLM and the Forest Service complied with CEQ regulations in describing the affected environment. The BLM and Forest Service used the best available data at the time of elaboration of the Draft LUPA/EIS.

The BLM and Forest Service described the affected area at a geographic level, the county level, that would support the analysis of potential socioeconomic and environmental justice impacts. The county level of analysis is appropriate for the programmatic nature of the action in this EIS. Potential disproportionately high and adverse human health and environmental effects on these communities from implementation actions would be analyzed during assessment of site-specific projects.

Section 22.3 – Impact Analysis

Summary

The Draft LUPA/EIS analysis underestimates/understates the economic hardships that restrictive management actions would impose on planning area operators, communities, and services. The Draft LUPA/EIS also does not disclose the indirect impacts on communities and services that were raised by commenters during scoping, such as the effects of more restrictions resulting in less support emergency services, thereby resulting in harm to life and property. Also, the analysis was overly generalized and did not provide county-specific impacts. The analysis methodology is inadequate to provide a comprehensive analysis of direct, indirect, and cumulative analysis of the socioeconomic impacts on the planning area communities. Finally, the Draft LUPA/EIS is biased in favor of nonmarket valuation methods.

Response

As noted previously in Sections 4.6 (NEPA Indirect Impacts), 4.7 (NEPA Cumulative Impacts), and 7.7 (Greater Sage-Grouse Impact Analysis) of this report, the BLM and Forest Service complied with the CEQ regulations for developing the direct, indirect, and cumulative impacts analysis.

Socioeconomic impacts assessed include impacts on output, employment, earnings and tax revenues in the affected area, non-market values, population and public services, specific groups and communities as well as environmental justice impacts. See the Draft LUPA/EIS, Section 4.24, Social and Economic Conditions (Including Environmental Justice) (page 894).

In response to comments, the BLM and Forest Service revised the impact analysis as follows:

- The analysis of impacts through oil and gas production were revised to correct an unintentional miscalculation in the estimates of the value of gas production and associated employment, provide additional information on the projected geographic distribution of production, and expand the qualitative discussion of specific measures included in management alternatives.
- Additional discussion of impacts on counties was included where possible and appropriate, including an expanded discussion of fiscal impacts on counties and other local jurisdictions such as fire districts.
- A brief qualitative discussion of the effect of potential impacts of ROW restrictions on local energy rates was included.
- The social impacts analysis of the effects of management alternatives on local communities and public services was expanded.

- An expanded discussion of the potential impacts of disturbance caps was included.
- A brief explanation of impacts on BLM administrative costs was included.

The BLM also revised the impacts analysis to present the impacts of each management alternative relative to current management.

Further, the BLM and Forest Service found that several aspects commented on are appropriately addressed in the Draft LUPA/EIS. Although the discussion of impacts on counties and local communities was expanded to the extent possible, the distribution of estimated impacts on counties, cities, and towns depends on the location of expenditures associated with economic activities. This location is often not known at the county, city, or town level, based on the available data. In addition, because economic activity in one community or county typically has socioeconomic effects in other communities and counties with shared trade and commuter linkages, the impacts are often best assessed at the multi-county level. The BLM and Forest Service consider the assessment of potential nonmarket values associated with the use of BLM-administered and National Forest System lands important to recognize. A complete assessment of the economic effects of the management alternatives would include effects on values not mediated by markets or captured in market prices. The impacts discussion focuses on those nonmarket values where impacts are most likely to be felt by the choice of management alternatives.

Section 23 – Soil

Summary
The Draft LUPA/EIS fails to consider the effects of livestock grazing in erosion calculations and plant community degradation.

Response
As noted previously in Sections 4.6 (NEPA Indirect Impacts), 4.7 (NEPA Cumulative Impacts), and 7.7 (Greater Sage-Grouse Impact Analysis) of this report, the BLM and Forest Service complied with the CEQ regulations for developing the direct, indirect, and cumulative impacts analysis. Draft LUPA/EIS, Section 4.16, Soil and Water Resources, Impacts from Range Management on Soil and Water Resources (page 775), discusses the effects of livestock grazing on vegetation (ground cover) and the elevated potential for soil erosion.

Draft LUPA/EIS, Section 4.6, Vegetation (Forests, Rangelands, Riparian and Wetlands, and Noxious Weeds), Impacts from Range Management on Vegetation (page 594), discusses the effects of livestock grazing on vegetation.

Section 24 – Travel Management

Section 24.1 – Range of Alternatives

Summary
The Draft LUPA/EIS failed to provide changes to unrestricted motorized travel or open motorized routes to protect GRSG, which does not comply with the BLM's open road minimization requirements. Also, the BLM and Forest Service need to consider additional measures under the alternatives.

Response
As discussed previously under Sections 4.3 (NEPA Range of Alternatives) and 7.5 (Greater Sage-Grouse Range of Alternatives) of this report, the BLM and the Forest Service complied with CEQ regulations in developing the range of alternatives and the spectrum of actions considered all meet BLM and Forest Service regulations, policy, and guidance.

During the development of the Proposed LUPA/Final EIS, the BLM and Forest Service met with USFWS to consider changes to the management actions and mitigation measures. The outcome of these meetings resulted in noted clarifications and edits to the alternatives and impacts analysis (see Proposed LUPA/Final EIS Section 1.10, Changes Between the Draft Land Use Plan Amendment/Environmental Impact Statement and the Proposed Land Use Plan Amendment/Final Environmental Impact Statement).

There are several management actions in the Draft LUPA/EIS that do aim to minimize road construction and also would make open OHV areas in PHMA limited to existing routes.

Under the NTT Action 1, Alternatives B, C, and D all limit motorized travel: "(PPH) (now known as PHMA) Limit motorized travel to existing roads, primitive roads, and trails at a minimum." Alternative A is the No Action/Current Management. Draft LUPA/EIS, Section 4.11.3, Impacts from Travel Management on Travel Management (page 681) identifies that Alternatives B, C, and D would change 574,100 acres from Open to Limited in PHMA. Areas in PHMA would become Limited under Alternatives B, C, and D and would not be open to unrestricted cross-country motorized travel.

NTT Action 3 identifies the following objective: "(PPH) (now known as PHMA) Complete activity level travel plans within 5 years of the ROD." Alternative A (Table 2.3, Description of Alternatives A and B [page 52]) identifies that travel management route designation is being completed as a part of the RMP revision process for CRVFO, GJFO, and KFO. The LSFO RMP requires that transportation plans be completed in all Limited travel management areas within 5 years of the LUP ROD, per Colorado State BLM policy. The Roan Plateau RMP identifies developing and maintaining a travel management plan and the White River RMP identifies that a travel management plan will be initiated upon

approval. Activity level plans have already been completed for the Routt National Forest.

Section 24.5 – Mitigation Measures

Summary
Further explanation is needed to clarify how to measure for adverse effects on GRSG.

Response
Mitigation and monitoring frameworks were introduced in the Draft LUPA/EIS in Chapter 2 (Alternatives), Appendix I (Required Design Features, Preferred Design Features, and Suggested Design Features, Regional Mitigation Strategy), and Appendix J (Greater Sage-Grouse Draft Monitoring Framework). An adaptive management strategy was also introduced in the Draft LUPA/EIS, Section 2.10.2, Adaptive Management (page 192). A more detailed mitigation framework, monitoring framework, and adaptive management strategy have been incorporated into Proposed LUPA/Final EIS Chapter 2, Section 2.6, Adaptive Management, Monitoring, and Mitigation, and Appendices F, Greater Sage-Grouse Monitoring Framework, and G, Greater Sage-Grouse Mitigation Strategy.

Further detailed descriptions of the mitigation, monitoring, and adaptive management frameworks are available in Section 4.9, NEPA Mitigation Measures, of this report.

Section 26 – Vegetation Sagebrush

Section 26.1 – Range of Alternatives

Summary
The Draft LUPA/EIS should include additional conservation measures from the COT in one or more alternatives, including controls for preventing the spread of invasive, nonnative plants.

Response
The Draft LUPA/EIS contains an entire appendix (Appendix I, Required Design Features, Preferred Design Features, and Suggested Design Features, Regional Mitigation Strategy) that articulates Required Design Features (RDFs), Preferred Design Features (PDFs), and Suggested Design Features (SDFs). While the list of design features in Appendix I is thorough, the list is not intended to be exhaustive. Additional design features could be developed and implemented to help achieve resource objectives. Design features include state-of-the-art measures applied on a site-specific basis to avoid, minimize, reduce, rectify, or compensate for adverse environmental or social impacts. They are applied to management actions to help achieve desired outcomes for safe, environmentally responsible resource development by preventing, minimizing, or mitigating

adverse impacts and reducing conflicts. Design features also can be proposed by project applicants for activities on BLM-administered and National Forest System lands (e.g., for gas drilling). Design features not incorporated into the permit application by the applicant may be considered and evaluated through the environmental review process and incorporated into the use authorization as Conditions of Approval or ROW stipulations. Standard Conditions of Approval and ROW stipulations from each LUP would apply to site-specific analysis. Additional design features, Conditions of Approval, and ROW stipulations could be developed to meet resource objectives based on local conditions and resource specific concerns.

As noted previously in Sections 4.3 (NEPA Range of Alternatives) and 7.3 (Greater Sage-Grouse COT) of this report, all alternatives considered within this planning process are consistent with conservation measures and objectives outlined in the COT Report and follow the basic principles of avoiding the impact of an activity, minimizing impacts by limiting the degree of activity, and mitigating for an impact by improving or enhancing GRSG habitat. Each of the alternatives considers different means for accomplishing this strategy. For example, some alternatives emphasize avoidance of impacts, while other alternatives emphasize minimization and mitigation.

Section 26.2 – Best Available Information Baseline Data

Summary
The BLM and Forest Service failed to consider research by CPW on the range of canopy cover preferred by GRSG.

Response
As noted previously in Sections 4.5 (NEPA GIS Data and Analysis) and 7.6 (Greater Sage-Grouse Best Available Information Baseline Data) of this report, the BLM and the Forest Service consulted with, collected, and incorporated data from other agencies and sources, including but not limited to the USFWS and CPW. The BLM reviewed the current research by CPW on the range of canopy cover preferred by GRSG to determine if it presented new information that would need to be incorporated into the Proposed LUPA/Final EIS. The BLM provided clarification in the Proposed LUPA/Final EIS Section 2.6.1, Adaptive Management Plan, to allow for the consideration of new information as it becomes available.

Section 26.5 – Mitigation Measures

Summary
Commenters requested clarification on several mitigation measures including what would be appropriate plant regrowth or cover requirements, thresholds for determining when mitigation standards have been met, and procedures for monitoring mitigation measures. Additionally, the Draft LUPA/EIS needs to

explicitly state the required methodology to use when determining whether a mitigation standard has been met or not.

Response
The Proposed LUPA/Final EIS has been corrected in response to comments requesting clarification of certain mitigation language. Mitigation and monitoring frameworks were introduced in the Draft LUPA/EIS in Chapter 2 (Alternatives), Appendix I (Required Design Features, Preferred Design Features, and Suggested Design Features, Regional Mitigation Strategy), and Appendix J (Greater Sage-Grouse Draft Monitoring Framework). An adaptive management strategy was also introduced in the Draft LUPA/EIS, Section 2.10.2, Adaptive Management (page 192). A more detailed mitigation framework, monitoring framework, and adaptive management strategy have been incorporated into Proposed LUPA/Final EIS Chapter 2, Section 2.6, Adaptive Management, Monitoring, and Mitigation, and Appendices F, Greater Sage-Grouse Monitoring Framework, and G, Greater Sage-Grouse Mitigation Strategy.

Further detailed descriptions of the mitigation, monitoring, and adaptive management frameworks are available in Section 4.9, NEPA Mitigation Measures, of this report.

Section 27 – Vegetation, Riparian

Section 27.1 – Range of Alternatives

Summary
The BLM and Forest Service should include management actions to address pinyon-juniper incursions within the range of alternatives.

Response
The original direction that initiated this planning process for the BLM can be found in BLM Instruction Memorandum 2012-44. The BLM was tasked with analyzing the conservation in the NTT Report:

> The conservation measures developed by the NTT and contained in Attachment 1 must be considered and analyzed, as appropriate, through the land use planning process by all BLM State and Field Offices that contain occupied GRSG habitat.

As such, creation of new conservation measures that were not contained in the NTT Report is out of scope for this planning process.

Section 27.2 – Best Available Information Baseline Data

Summary
The BLM and Forest Service need to expand on the information presented in the affected environment, specifically for acreage of GRSG habitat in riparian

areas that is not meeting proper functioning condition, and to explain what irrigated lands are on BLM-administered and National Forest System lands.

Response
As noted previously in Section 7.6 (Greater Sage-Grouse Best Available Information Baseline Data) of this report, the BLM and the Forest Service complied with CEQ regulations in describing the affected environment. Additionally, as noted in Section 4.5, NEPA GIS Data and Analysis, of this report, the BLM and the Forest Service consulted with and collected and incorporated data from other agencies and sources, including but not limited to the US Geological Survey, CPW, and USFWS, as well as consulted on the analysis and the incorporation of available data into the LUPA/EIS with its cooperating agencies and other agencies with jurisdiction or expertise. The combination of all of these data are summarized in the affected environment section and reflect the current status and condition of habitat that is or isn't meeting PFC. The BLM has further reviewed the information and determined that the acreage amounts are accurate and at the appropriate scale for a planning level analysis.

There are a number of acres of previously cultivated lands returned to the BLM through the Bankhead Jones Act. Additionally, at the scale used for classification of land uses, vegetation treatments on BLM-administered lands can be misidentified as irrigated or cultivated from aerial photography. These two factors contributed to a number of acres being identified as irrigated or cultivated on BLM-administered land.

Section 29 – Water

Summary
The BLM and Forest Service need to include a list of impaired watersheds as part of the affected environment to more accurately discuss potential impacts on the watersheds from actions. Additionally, the impact analysis for watersheds is based on inaccurate assumption that all streams and waterbodies are currently meeting State Water Quality Standards.

The water impact analysis needs further discussion to support the claim that longer directional drilling reaches would increase the likelihood for impacts on groundwater quality.

Response
As noted previously in Section 7.6 (Greater Sage-Grouse Best Available Information Baseline Data) of this report, the BLM and the Forest Service complied with CEQ regulations in describing the affected environment. Additionally, as noted in Section 4.5, NEPA GIS Data and Analysis, of this report, the BLM and the Forest Service consulted with and collected and incorporated data from other agencies and sources, including but not limited to the US Geological Survey, CPW, and USFWS, as well as consulted on the

analysis and the incorporation of available data into the LUPA/EIS with its cooperating agencies and other agencies with jurisdiction or expertise.

The BLM and Forest Service did not make an assumption that all streams and water bodies are currently meeting State Water Quality Standards. The BLM and Forest Service did make the assumption that soil and water resources would be managed to meet Standards 1 and 5 of the BLM Colorado Public Land Health Standards (BLM 1997) and the Routt Forest Water and Aquatic Soils Standards and Guidelines (Forest Service 1997). There is no specific state designation/identification of impaired watersheds, only for impaired surface waters, which are identified by stream and segment. A list of these impaired segments can be found in Regulation 93 (Colorado's Section 303[D] List of Impaired Waters and Monitoring and Evaluation List) at: http://www.colorado.gov/cs/Satellite/CDPHE-WQ/CBON/1251596877171. Information for all impaired waterbodies/stream segments within GRSG habitat was summarized. The most common impairments identified across river basins relative to management actions are sediment, selenium and iron. Potential impacts on water quality (including impaired stream segments) from management actions proposed across all alternatives are detailed in Chapter 4.

The impact analysis for surface water quality in all basins within the project area is based on the most recent, best available, and most comprehensive water quality data supplied by Colorado Department of Public Health and Environment, Water Quality Control Division, the state agency charged with implementation of the Clean Water Act. Review and revision of water quality classifications and standards is an ongoing process and is based on water quality data collected and submitted by the agency's Environmental Data Unit. Data is also obtained from US Geological Survey, Riverwatch, and third parties, including federal land management agencies. State and federal law require this review at least once every 3 years. The public can access data that informs regulation and standard development here: http://www.colorado.gov/cs/Satellite?c=Page&childpagename=CDPHE-WQ%2FCBONLayout&cid=1251597394826&pagename=CBONWrapper

For more information on the review and revision of water quality classifications and standards, as well as the triennial review schedule for each of Colorado's river basins, please see pages 19 through 21 in the following guide:

http://www.yourwatercolorado.org/cfwe-education/water-is/water-quality/54-citizens-guide-to-colorado-water-quality-protection

Directional wells have a longer well bore to achieve the same bottom hole location as a vertical well. Drilling and well casing may also be more complicated than vertical wells due to the bends in the well bore to achieve the horizontal distance. Typical BLM requirements for drilling would require vertical surface casing to a depth below know aquifers (before the production well bore bends to become directional), to minimize the risk of contaminating freshwater

aquifers during drilling or due to well integrity failure. Good industry drilling standards, better drilling equipment and better casing and cementing methods reduce the danger of "loosing drilling fluid" or casing and cementing failure, but there is some increased risk inherent in directional drilling. This means there is a higher potential for groundwater contamination during drilling, completion and hydraulic fracturing for directional drilling, due to the loss of fluids or failure of well casing and cementing. Longer reaches for directional drilling may increase this risk.

Section 30 – Wild Horse and Burros

Summary
The BLM should link the Colorado Monitoring Framework with the vegetation studies. Additionally, BLM should have considered appropriate management levels for drought conditions in the range of alternatives.

Response
The BLM established appropriate management levels for each herd management unit in each of its relevant existing land use plans for the field offices in Northwest Colorado. Establishing new appropriate management levels in the Greater Sage-Grouse LUPA is out of this project's scope.

A monitoring framework was introduced in the Draft LUPA/EIS in Chapter 2 (Alternatives) and Appendix J (Greater Sage-Grouse Draft Monitoring Framework). A more detailed monitoring framework has been incorporated into Proposed LUPA/Final EIS Chapter 2, Section 2.6.2, Monitoring of the Greater Sage-Grouse Planning Strategy, and Appendix F, Greater Sage-Grouse Monitoring Framework. Further, a detailed description of the monitoring framework is available in Section 4.9, NEPA Mitigation Measures, of this report.

Section 32 – Weeds

Summary
The Draft LUPA/EIS should have considered a cohesive weed management program and the effects of cheatgrass incursions and presence on GRSG and sagebrush habitat.

Response
As noted previously in Sections 4.6 (NEPA Indirect Impacts), 4.7 (NEPA Cumulative Impacts), and 7.7 (Greater Sage-Grouse Impact Analysis) of this report, the BLM and Forest Service complied with the CEQ regulations for developing the direct, indirect, and cumulative impacts analysis.

The Draft LUPA/EIS assesses and discloses the environmental impacts associated with invasive and noxious weeds from proposed management actions of other resources and resource uses in Section 4.6, Vegetation (Forests, Rangelands, Riparian and Wetlands, and Noxious Weeds) (page 587). A

discussion of the impacts from noxious weeds on GRSG and its habitat can be found in Section 4.4.2, Greater Sage-Grouse (page 505).

Section 32.1 – Lands with Wilderness Characteristics

Summary
The existing lands with wilderness characteristics inventories are out of date, and the BLM failed to conduct updated inventories for lands with wilderness characteristics.

Response
As noted in the Draft LUPA/EIS, Section 3.20, Lands with Wilderness Characteristics (page 395), the purpose of and need for the National Greater Sage-Grouse planning effort is limited to making land use planning decisions specific to the conservation of GRSG habitats. No decisions related to the management of lands with wilderness characteristics will be made as part of this planning effort; therefore, management of lands with wilderness characteristics is considered outside the scope of this plan amendment process. Impacts on lands with wilderness characteristics from the alternatives being analyzed for this planning effort are presented in the Draft LUPA/EIS, Section 4.20, Lands with Wilderness Characteristics (page 821).

As part of the original FLPMA Section 603-mandated inventories, inventories were conducted during past RMP revisions and amendment efforts, and through other various lands with wilderness characteristics inventory updates that have recently taken place. Inventories for wilderness characteristics were conducted for each field office, including some ongoing inventories and reflect the most up-to-date lands with wilderness characteristics baseline information for this planning area. For inventories that were conducted after 2011, findings were documented following guidance in BLM Instruction Memorandum 2011-154, Requirement to Conduct and Maintain Inventory Information for Wilderness Characteristics and to Consider Lands with Wilderness Characteristics in Land Use Plans, which is now encompassed in BLM Manuals 6310 and 6320. Lands with wilderness characteristics inventories will be updated for any site-specific project NEPA analyses that are conducted in the planning area to determine if a project will have impacts on lands with wilderness characteristics identified through previous or updated inventory efforts.

Wilderness characteristics assessments are not applicable to National Forest System lands.

P.3 COMMENTER LIST

Table P.1 provides the names of individuals and others that submitted unique comment letters (not campaign letters) on the Draft LUPA/EIS.

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Individuals	
Albers, Marcus	
Alderson, George	
Alderson, George	
Alexander, Sam	
Anderson, William	
Arvidson, Matthew	
Atteyaih, Matthew	
Backlund, John	
Baldwin, Kevin E.	
Barr, Deb	
Barrett, Linn	
Barrett, Linn D.	
Bates, Jeff	
Bergstrom, Dustin	
Berkowitz, Hannah	
Betz, Kelsie	
Bock, Nathan	
Bonczynski, Mike	
Braden, Scott	
Bridges, Gary	
Briggs, Caroline	
Bristow, Dave	
Brown, Deirdre	
Brown, J. Paul	
Brown, Jason	
Brown, Jessica	
Brown, Susan	
Burch, Jan	
Burgen, Julia	
Byars, Katrina	
Byers, Peg	
Calicuria, Patrick	
Cameron, Carol	
Canton, Jacky	
Carn, Carl	
Carwile, Terry	
Chadwick, Carter	
Chadwick, Johanna	

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Clark, Laura	
Collins, Steve	
Cook, Elizabeth	
Couey, Carrie	
Couey, Kelly	
Crawford, Joyce	
Davies, Shauna	
Davis, J	
Davis, Sean	
Dick, M	
Dimand, Mary Ann	
Donovan, Katie	
Dowling, Theodora	
Durrett, Gregory	
Epstein, Susan	
Esterbrook, Kay	
Fenner, Jacob	
Ferguson, Peter	
Feuerborn, Theresa	
Frank, Rebecca	
Frontczak, Susan Marie	
Fuller, Mark	
Geer, Caye	
Goldberg, David	
Golden, Peter	
Goodge, Michelle	
Goodrich, Lisa	
Gowen, Mark	
Granias, Susan	
Gray, Ethan	
Greslin, Betsy	
Grieger, Shawna	
Grimm, Evelyn	
Grobe, Charles G.	
Groll, Stacie	
Groves, Erik	
Guidi, Rita	
Hansen, Sue	
Hanson, Abigail	

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Hanzel, Karl	
Hasselbrink, Robert	
Hawkins, Mike	
Hemmer, Justin	
Henderson, David	
Henebry, Carla	
Holland, Susan	
Hollon, Hollie	
Holm, Gregory	
Honnecke, Marcus	
Hudson, Marie	
Hughey, Ronald E.	
Hunsen, Justin	
Hunt, Claire	
Hurowitz, Mike	
Jacobson, Claudia	
Jauhola, Christine	
Javier, Jamie	
Johnson, Cheryl	
Johnson, Dan	
Johnson, Janet	
Jolley, Kent	
Jorgensen, Pam	
Kastel, Diane	
Kessler, Matthew	
Kline, Jane	
Krueger-Koplin, Suzanne	
Kurtz, Maya	
Ladd, Brenda	
Ladd, Frank	
Ladd, Jonathan	
Lambeth, Ron	
Laursoo, Marlis	
Lewers, Elaine	
Lilly, Nakia	
Lim, Sarah	
Lipson, Pete	
Littlehawk-Calicuria, Sheila	
Loeffelholtz, Marie	

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Long, Kevin	
Ludgin, Scott	
Maggied, Michael	
Marah, Bartie	
Marjie,	
Marxuach, Antonio	
Massaro, Patrick	
Mathers, Thomas J	
Matheson, Diana	
May, David	
Maysmith, Pete	
McAfee, Gina	
McAfee, Mary	
McAfee, Oralie	
McCallum, Jim	
McCarty, Donna	
McCoy, Hazel	
McGrew, Joanne	
McManus, Denise	
McManus, Joseph	
McNeal, Michael	
McStay, Wes	
Merrill, Nancy	
Millette, Robert	
Morgan, Michael C	
Morris, David	
Murray, Sandra	
Nash, Jacob	
Nelson, Sasha	
Newman, Ricki	
Oden, Marilyn	
Oden, Marilyn	
Odor, Jeff	
Olsen, Joyce	
Orbanek, Emily	
Palmer, Marilyn	
Patrick, Todd	
Pederson, Margaret	
Pentecost, Roy	

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Pohle, Linda	
Pomeroy, Sean	
Powers, Linda	
Price, Laurie	
Quinty, Austin	
Rechel, Eric	
Redd, Kenny	
Reece-Long, Gina	
Reed, Kenneth	
Reynolds, Steven	
Richards, William	
Riley, Kathleen	
Robinson, Robert	
Roley, Mittch	
Romance, Maggie	
Rose, Kathryn	
Ross, Guy	
Rovner, Jefferey	
Rudin, David	
Safken, Melody	
Sanchez, David	
Savage, Harlin	
Savett, Adam	
Schafer-Lisowski, Lois	
Schafer-Lisowski, Lois	
Schenk, Sherry	
Schlollenberger, Scott	
Schmandt, Danielle	
Schneider, Ken	
Schultz, Carol	
Scissors, Ken	
Sealing, Clee	
Sealing, Clee	
Shaffer, Linda	
Shaw, Rex	
Shepard, Janice	
Shepherd, Janice	
Sheridan, Janet	
Showalter, David	

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Sikkema, Justin	
Sisk, Sidney	
Slaughter, Kathy	
Smith, Jesse	
Smith, Rocky	
Smith, Susan	
Sosa, Rodolfo	
Spehar, Jim	
Srelitz, Katherine	
Starr, Shirley	
Starr, Zuzana	
Steitz, Jim	
Stevenson, Hillary	
Storey, Porter	
Storrs, Andrea	
Storrs, Andrea	
Storrs, Andrea	
Stout, Gene	
Strelitz, Joy	
Strelitz, Mark	
Strelitz, Matthew	
Streliz, Paul	
Streliz, Rebecca	
Strosburg, Lynn	
Sundgren, Kent	
Swain, Frank	
Teklu, Axum	
Terry, Susan	
Thom, Mary	
Tice, Elizabeth	
Umbarger, Brian	
Unfred, Craig	
Unruh, Jerry D.	
Uphoff, Chris	
Van Hoven, Sue	
Vanderloop, Celia	
Vaughn, Colton	
Visinttainer, Gary	
Vollmar, Denise	

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Vollmar, Mark	
Vyhnal, Kristin	
Warner, Barbara	
Weber, Fred	
Weber, Robyn	
Weinrich, Jean	
Weinstein, Joseph	
Westley, Raelyn	
White, Dennis	
Wickens, Thomas	
Wilkop, Lindsay	
William, Steve	
Williams	
Wilson, Brent	
Wilson, W.L.	
Winton, Lauren	
Wisen, Kate	
Wizer, Joyce	
Wood, Margaret	
Wuerthner, George	
Wunder, Mitch	
Wussow, Megan	
Yazzie, Jane	
Zogg, Paul	
Zuboy, Jarrett	
Others	
Samson, Mike	AGNC
Steve, Steve	American Bird Conservancy
	American Bird Conservancy
Ranger, Richard	American Petroleum Institute
Applegate, David	Anadarko
Owens, Nick	Anadarko
Alward, Richard	Aridlands Natural Resource Consulting
Monger, Doug	Associated Governments of Northwest Colorado
Samson, Mike	Associated Governments of Northwest Colorado
Edmunds, Daly	Audubon Rockies
Crowder, Kent	Board of County Commissioners of Jackson County
Winkler, Randy	City of Rifle
Petersen, Bonnie	Club 20

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Jones, Scott	COHVCO
Lane, John F.	COHVCO
Manuello, Gene	Colorado Cattlemen's Association
Minnick, Tamera	Colorado Mesa University
Sanderson, Stuart	Colorado Mining Association
Casper, Andrew	Colorado Oil and Gas Association
Rhule, Rex	Colorado River Fire Rescue
Miller, Randall	Colorado Snowmobile Association
O'Neill, Suzanne	Colorado Wildlife Federation
Visintainer, Gary	Colorado Wool Growers Association
Danni Dey, Eileen	ConocoPhillips Company
Schafer, Luke	Conservation Colorado
	Conservation Colorado
Hill, Jon	Cripple Cowboy Cow Outfit, Inc.
Marx, Nick	De Beque Fire Protection District
Salvo, Mark	Defenders of Wildlife
Robertson, Scott	Douglas Creek Conservation District
Gordon, Bruce	EcoFlight
Chamberlain, Stephen P.	Energy Investments, Inc.
Clark, Michael	Enirgi Natural Resources USA Corp
Bohan, Suzanne	EPA
Jankovsky, Tom	Garfield County
Martin, John	Garfield County
Martin, John	Garfield County
Samson, Mike	Garfield County
Jankovsky, Tom	Garfield County Board of County Commissioners
Samson, Mike	Garfield County Board of County Commissioners
Haptonstall, Ken	Garfield County School District
Bumgarner, Gary	Grand County
Linke, Merrit	Grand County
Newberry, James	Grand County
Coombs, James	Grand River Health
Korte, Nic	Grand Valley Audubon Society
Silbert, Shelly	Great Old Broads for Wilderness
Naatz, Dan	Independent Petroleum Association of America
Joy, Matthew	Jorden Bischoff & Hiser, P.L.C.
Kimball, Spencer	Mesa County
Ritschard, Mike	Middle Park Farm Bureau
Kinkaid, John S.	Moffat County

Table P.1
Individuals and Others That Submitted Unique Comment Letters on Northwest Colorado GRSG Draft LUPA/EIS

Name	Organization
Pomper, Elizabeth	National Audubon Society
Zimmerman, Kathleen	National Wildlife Federation
Riley, Terry Z	North American Grouse Partnership
Riley, Terry Z.	North American Grouse Partnership
Anderson, Phillip	North Park Stockgrowers Association
Braun, Jeff	Nucor
Oldland, Reuben	Oldland Brothers, Inc.
Hornung, Elisha	Pacificorp
Zogg, Paul	Pinto Valley Ranch
Hilding, Nancy	Prairie Hills Audubon Society
Moseley, Claire	Public Lands Advocacy
Van Liew, Dustin	Public Lands Council
Huemoeller, Kelly	QEP Resources, Inc.
Smith, Mike	QEP Resources, Inc.
Bolton, Shawn	Rio Blanco County
Eskelson, Jefferey	Rio Blanco County
Hill, Jon	Rio Blanco County
Sprague, Mark	Rio Blanco County
Ritschard, Michael	Ritschard Cattle Co.
Liguori, Sherry	Rocky Mountain Power
Mueller, Megan	Rocky Mountain Wild
Delia G.,	Sierra Club
Groll, Stacie	Sierra Club and Conservation Colorado member
Stewart, Scott	The High Lonesome Ranch
Kram, Megan	The Nature Conservancy
Culver, Nada	The Wilderness Society
Arnett, Edward B.	Theodore Roosevelt Conservation Partnership
Cook, Rodney S.	Timberlake Ranch, LLC
Riggle, Don	Trails Preservation Alliance
Miller, Garry	TransWest
Luke, Forrest	Trapper Mining Inc.
Lempke, Douglas A.	Tri-State Generation & Transmission Association, Inc.
Petersen, Carol	Troublesome Valley Ranch
Nettleton, Jerry M	Twentymile Coal, LLC
Linner, Susan	USFWS
T. Wright,	Vermillion Ranch Limited Partnership
van West, Rein	Western Colorado Congress
Nicke, Andy	Western Colorado Jobs Alliance
Sgamma, Kathleen	Western Energy Alliance

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Name	Organization
Bruner, Travis	Western Watersheds Project
Bruner, Travis	Western Watersheds Project
Hendrickson, Callie	White River and Douglas Creek Conservation Districts
Thompson, Leonard	White River Conservation District
	Wild Earth Guardians
	Wild Earth Guardians
Silbert, Shelley	WildEarth Guardians
Shoemaker, Sloan	Wilderness Workshop
Holloran, Matt	Wyoming Wildlife Consultants, LLC