Appendix T

San Juan National Forest Biological Evaluation and Bureau of Land Management Sensitive Species Analysis

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1 U.S. FOREST SERVICE TERRESTRIAL WILDLIFE BIOLOGICAL EVALUATION

1.1 Introduction

This biological evaluation (BE) discloses the potential influences on the revision of the U.S. Forest Service (USFS) San Juan National Forest (SJNF) Land and Resource Management Plan (LRMP) on USFS Rocky Mountain Region (Region 2) sensitive. The list of Region 2 Regional Forester sensitive species was updated on June 10, 2011.

The Forest Service Manual (FSM) 2670 directs the USFS to develop and implement management practices to ensure that sensitive species do not become threatened or endangered because of USFS actions (FSM 2670.22). Sensitive species are those plant and animal species identified by a Regional Forester for which population viability is a concern as evidenced by a) significant current or predicted downward trends in population numbers or density or b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (FSM 2670.5).

FSM 2670 directs the USFS to prepare BEs for projects, as part of the National Environmental Policy Act of 1969 (NEPA) process, to determine the potential effects from those projects on sensitive species and to ensure that USFS actions do not contribute to loss of viability of threatened, endangered, proposed, or sensitive plant and animal species or contribute to a trend towards federal listing of any species under the Endangered Species Act (ESA) (FSM 2672.41 and 2670.32). A BE is as a documented review of USFS programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, proposed, or sensitive species (FSM 2670.5).

1.1.1 Project Description

The LRMP would guide relevant resource management programs, practices, uses, and protection measures. The associated Final Environmental Impact Statement (FEIS) examines potential environmental effects that could occur as a result of implementing projects associated with the LRMP.

The key decisions made in this integrated plan for long-term management of the SJNF are:

- Establishment of desired outcomes, including multiple-use goals and objectives.
- Establishment of management requirements, including criteria that would be applied to guide day-to-day activities. These are primarily expressed as standards and guidelines and other design criteria.
- Establishment of management area direction, including identifying allowable uses, or allocations, restrictions, and prohibitions. All lands within the planning area are allocated to one of seven management areas, or zones, that reflect different levels of development and suitable uses or activities.
- Designation of suitable timber land and establishment of allowable sale quantity.
- Establishment of monitoring and evaluation requirements.

1.1.2 Project Area

The project area is the SJNF boundary, located in southwest Colorado at the junction of the Southern Rockies and the Colorado Plateau ecoregions. The Colorado Plateau portion is characterized by sedimentary geology dominated by deep canyons and mesas. The Southern Rocky Mountains portion is characterized by mountains with mixed geology. Life zones represented in the planning area include Semi-Desert, Lower Montane, Upper Montane, Subalpine, and Alpine. The area encompasses about 1,864,831 acres of National Forest Service (NFS) land and includes lands in Archuleta, Conejos, Dolores, Hinsdale, La Plata, Mineral, Montezuma, Montrose, Rio Grande, San Juan, and San Miguel Counties. The west border of the planning area is the Utah state line. The southern border of the planning area is the New Mexico state line. The eastern border is the Continental Divide. The northern border covers the administrative boundaries with the Rio Grande, Gunnison, Grand Mesa, and Uncompahgre National Forests.

1.1.3 Alternatives

Four issues drove the development of four alternatives:

- Issue 1. Balancing Management between the Ideas of Maintaining "Working Forest and Rangelands" and Retaining "Core Undeveloped Areas"
- Issue 2. Providing for Recreation and Travel Management within a Sustainable Ecological Framework
- Issue 3. Management of Special Areas Designations and Unique Landscapes
- Issue 4. Oil and Gas Leasing and Development

The four alternatives are summarized below:

Alternative A (No Action): Alternative A represents the continuation of current management direction under the existing USFS land management plans. Alternative A meets the requirements of NEPA (40 Code of Federal Regulations [CFR] 1502.14) that a No Action Alternative be considered. "No Action" means that the alternative reflects the implementation of existing management goals, objectives, and management practices based on the existing land use plans. Alternative A also serves as the baseline for comparing and contrasting the impacts of the other alternatives. Alternative A is based on reasonably foreseeable actions, existing planning decisions and policies, and existing land use allocations and programs.

The activities projected under Alternative A are based more on historical and expected output levels than on projections of outputs from the earlier land management plans. For example, the SJNF has been selling about one-half as much timber as was estimated in the existing plan due to both budget constraints and lower demand for wood products and periodically revised adjustments of the capacity of the SJNF to supply timber. Continuation of current management reflects this adjustment to program activities.

Alternative B (Preferred Alternative): Alternative B, the Preferred Alternative, provides for a mix of multiple-use activities, with a primary emphasis on maintaining most of the large, contiguous blocks of undeveloped lands, enhancing various forms of recreation opportunities, and maintaining the full diversity of uses and active forest and rangeland vegetation management. Alternative B focuses on balancing the goals of maintaining "working forest and rangelands" and of retaining "core, undeveloped lands." Uses and activities that require roads, such as timber harvesting and oil and gas development, would be mostly focused in areas that already have roads. Relatively undeveloped areas and areas that currently do not have roads would, for the most part, remain that way. The alternative provides direction considered most responsive to the issues and management concerns raised during public scoping. Alternative B is described in detail in the LRMP.

Alternative B also incorporates the goals of the USFS's Strategic Plan (36 CFR 219.12(f)(6).

The Responsible Official, the Regional Forester, has identified Alternative B as the Preferred Alternative in the FEIS.

Alternative C: Alternative C provides for a mix of multiple-use activities with a primary emphasis on maintaining the undeveloped character of the planning area. Production of goods from vegetation management would continue, but might be secondary to other non-commodity objectives. Under Alternative C, production of goods and services would be more constrained than that proposed under Alternatives A, B, and D. And, in some cases and in some areas, uses would be excluded in order to protect sensitive resources. Alternative C identifies more resources and areas for special designation than the other alternatives. Management provisions under this alternative would emphasize the undeveloped character of large blocks of contiguous land and non-motorized recreational activities to a greater degree than would any of the other alternatives.

Alternative D: Alternative D, as reflected in its land allocations, provides for a mix of multiple-use activities, with a primary emphasis on the "working forest and rangelands" concept in order to produce a higher level of commodity goods and services when compared to the other alternatives.

The differences between the four alternatives and their potential implications to sensitive species can be analyzed by the different management areas they are associated with. Management areas outline uses and activities that may occur in them. All SJNF lands have been allocated to one of seven management areas that range from areas where natural processes dominate and shape the landscape to areas that are highly developed. In general, those alternatives that allow a higher level of management intensity may also require a higher level of management attention to the protection and maintenance of habitats for species that are sensitive to habitat alteration and/or human disturbances. A summary of the differences in management areas by alternative is displayed below.

1.1.4 Management Area Allocations

The management area prescriptions, which represent the allocation of SJNF lands to various emphases, have been assigned to land areas of the on the SJNF as follows in Table T.1.

Table T.1: Management Area Allocations on San Juan National Forest Lands

Management Area Allocations	Preferred Alternative (acres)
MA 1 - These are areas of the SJNF where natural processes would dominate and determine the vegetative characteristics of wildlife habitats. These areas include the Weminuche, Lizard Head, and South San Juan wildernesses, the Piedra Area, and other undeveloped areas identified for limited management, including the west half of the Hermosa roadless area, the San Miguel roadless area and areas adjacent to existing wilderness.	598,517
MA 2 - These are areas of the SJNF that would be managed as special areas and unique landscape areas. These areas include research natural areas, special botanical areas, and archaeological areas.	91,985
MA 3 - These are areas of the SJNF that would be managed as natural landscapes with limited management. They are relatively unaltered lands and places where natural ecological processes would operate primarily free from human influences. Succession, fire, insects, disease, floods, and other natural processes and disturbance events would predominantly shape the composition, structure, and landscape patterns of wildlife habitats.	596,119
MA 4 - High-use recreation emphasis areas: These areas are places with relatively high levels of recreation use that would be managed in order to provide for a broad spectrum of visitors. They include popular recreation destinations such as lakes and campgrounds, and travel corridors valued for their scenery, including scenic byways.	69,864
MA 5 - Areas designated as active management: These areas include roaded areas where active management would continue to occur in order to meet a variety of social, economic, and ecological objectives. These are lands where timber harvesting, oil and gas activities, and intensive livestock grazing would continue to occur and influence the composition, structure, and landscape patterns of the vegetation.	451,730
MA 7 - Public and private lands intermix: These areas are places where the SJNF is in close proximity to private lands. These areas would be a priority for fuels and vegetation treatments in order to reduce wildfire hazards. Winter range for deer and elk is a common component of MA 7s, as are seasonal closures in order to reduce animal disturbance.	49,560
MA 8 - Highly developed areas: These areas include downhill ski areas and the McPhee dam on SJNF lands.	7,056
Total Acres	**1,864,831**

The management area allocations provide for managing approximately 1.3 million acres as unroaded with limited activities and to function as core habitat areas. These protected areas are lands that would be dedicated to the protection and maintenance of biological diversity. They would serve as conservation reserves and refuges to protect the native biodiversity within them and would provide wildlife movement corridors and linkage areas that connect landscapes and habitats which facilitates the interaction of animals.

1.1.5 Overarching Land and Resource Management Plant Direction—Species Conservation

A new management plan has been developed for the SJNF (the Proposed Action). With this LRMP, there is direction that implements a systematic approach to the management of biological diversity and species conservation on the SJNF (see Appendix Q). As a basis, the management of wildlife on the SJNF is guided by laws, regulations, and policies that prescribe management requirements for the public lands. USFS 36 CFR 219.19 requires that "[f]ish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area." Regulation 36 CFR 219.26 requires that forest planning provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity would be considered throughout the planning process.

To address these requirements, the LRMP's sustainable ecosystems strategy would provide the ecological framework for the conservation and management of ecosystems, habitats, and species occurring on the SJNF. The sustainable ecosystems strategy includes a four-pronged approach that frames wildlife, fish, and plant species program direction on the SJNF: 1) the designation and management of protected areas, which include SJNF wilderness areas, the Piedra Area, Colorado Roadless Areas (CRAs), and research natural areas; 2) the application of ecosystem management using sustainable ecosystem concepts; 3) the development and application of the LRMP components (desired conditions, objectives, standards, and guidelines) that provide a framework for the management and preservation of ecosystems; and 4) the monitoring of effects of management activities on the SJNF and application of adaptive management principles in response to monitoring results. Effective monitoring and evaluation of how SJNF management activities are affecting ecosystems and wildlife, and the application of adaptive management principles, would be critical to maintaining functional, sustainable ecosystems and addressing the needs of dependent species. Refer to Section 4.0 of the LRMP for a review of the monitoring requirements.

Protected areas are lands that the USFS has dedicated to the protection and maintenance of biological diversity. They would serve as conservation reserves and refuges to protect the native biodiversity within them and would provide wildlife movement corridors and linkage areas that connect landscapes and habitats which facilitates the interaction of animals. Establishing and preserving protected areas on the SJNF is a means to maintain ecosystem diversity. Protected areas are established to ensure ongoing species diversity and maintain the population viability of native plant and animal species and communities. Approximately 566,053 acres of the SJNF are within CRAs and would be managed according to the direction of the Colorado Roadless Rule. Protected areas comprise 54% of the SJNF; 153,194 of those acres are within more restrictive upper tier CRAs. While CRAs do allow for some activities, these areas more or less are undeveloped, where management activity is limited and in overall serve as refuges that provide for wildlife movement and relatively undisturbed habitat.

Ecosystem management is the integrating component of the sustainable ecosystems strategy. Ecosystem management on the SJNF, which uses the historical range of variability (HRV) for reference, would be implemented by maintaining or restoring the composition (plant species, animal species, and vegetation types), structure (size, density, and arrangement of live and dead vegetation, stream channel attributes), function (ecological processes and disturbances), and physical environment (soils, water, and geomorphology) of ecosystems. The approach is intended to protect and maintain these ecosystems and ensure the diversity and population viability of the majority of species within them.

Wildlife species that may not be adequately recognized or protected by the above ecosystems management approach, or whose specific habitat needs or other life requirements may not be fully met under the sustainable ecosystems strategy, are given special management considerations, including the development of LRMP components that contribute to the conservation of those species. In addition, current species-specific conservation plans and strategies would be relied upon to address the needs of special status species. These plans and strategies are discussed within the applicable resource sections of the LRMP. These plans and strategies are analogous to the Nature Conservancy's fine-filter approach, which is intended to protect species with known conservation concerns (Hunter et al. 1988; Nature Conservancy 1982; Noss 1987,).

Overall, the LRMP provides management direction that is intended to provide for species diversity and population viability goals described above. The process has been to identify a range of key ecosystem elements, determine the importance of those elements to maintaining species diversity and population viability (e.g., limiting factors), define desired future conditions and land management objectives for those elements, and ensure that appropriate management standards and guidelines are in place that address the ecological needs of species and populations. In general, management standards are provided for those elements determined to have an overriding influence on species diversity or long-term population viability, while other elements that have less influence are addressed through the application of management guidelines. The relevant standards and guidelines, along with desired conditions and management objectives, and leasing stipulations, are listed in Appendix B.

1.1.6 Design Criteria

The design criteria listed below address those species for which there are species-specific design criteria. The LRMP contains over 100 additional components, including design criteria (standards and guidelines) objectives, and desired conditions that are meant to help provide for the ecological conditions in key habitat types necessary for all species. These components are outlined in Appendix M.

Standard: A standard is an approach or condition that has been determined to be necessary to meet desired future conditions and objectives, and/or to ensure the long-term viability of resources. A standard (worded as "must" or "shall") describes a course of action that must be followed or a level of attainment that must be reached. Deviations from standards would require analysis and documentation through a subsequent land management plan amendment.

Guideline: A guideline (worded as "should") is a requirement that the USFS has established to meet desired future conditions and objectives, and/or to ensure the long-term viability of resources. Guidelines are put forward in the LRMP in recognition that there may be circumstances that could generate or require alternative, more appropriate means for meeting desired future conditions and objectives, and/or to ensure the long-term viability of resources. It is also recognized that there may be limited individual circumstances where the need for a guideline no longer exists or the applicability of a guideline is otherwise altered (e.g., changes is surrounding land use that may render a guideline ineffective). In these situations a guideline has been determined to be more appropriate than a standard by allowing some flexibility in approach as conditions change and new information is obtained.

Standards

2.3.37. Bats: If abandoned mines are closed, surveys will be conducted to determine occupancy. If surveys cannot be completed, occupancy will be assumed and mine closures must allow for bat access. Abandon mines that are determined to be hazardous to bats will be closed to bats.

2.3.38. Bats: Human access at occupied caves or abandoned mines will be restricted as necessary during the following periods to maintain essential life cycle processes:

> Maternity sites - April 15 through September 1
>
> Swarming sites - August 15 through October 15 (30 minutes before sunset to 30 minutes after sunrise)
>
> Winter hibernacula - October 15 through May 15

2.3.39. Bighorn sheep (*Ovis canadensis*): During project-level planning on domestic sheep (*O. aries*) allotments, management options must be developed to prevent physical contact between domestic sheep and bighorn sheep. Actions may include but are not limited to boundary modification, livestock-type conversion, or allotment closures.

2.3.40. Bighorn sheep: Grazing permit administration in occupied bighorn sheep habitat must utilize measures to prevent physical contact between domestic sheep and bighorn sheep. Permit administration actions may include but are not limited to use of guard dogs, grazing rotation adjustments, or relocation of salting and bed grounds.

2.3.41. Bighorn sheep: Management of recreational pack goats and other domestic goats (*Capra aegagrus hircus*) must utilize measures to prevent physical contact with bighorn sheep.

2.3.42. Bighorn sheep: Domestic goats used for invasive plant control must be veterinarian certified as free of pathogens transmissible to bighorn sheep, except in areas where there is no risk of contact with bighorn sheep.

2.7.11. Grazing permit administration in occupied bighorn sheep habitat must utilize measures to prevent physical contact between domestic sheep and bighorn sheep. Permit administration actions may include but are not limited to use of guard dogs, grazing rotation adjustments, or relocation of salting and bed grounds.

2.7.12. Management of domestic sheep must utilize measures to prevent physical contact with bighorn sheep.

2.3.43. Butterflies: Management actions that could adversely impact occupied habitat used by special status butterfly species for reproduction must be designed to sustain host plant species.

Guidelines

2.3.51. Bats: Human access should be managed at caves and abandoned mines where known bat populations exist to protect bat habitat from disturbance and/or the introduction of pathogens. Management examples include, but are not limited to, seasonal or permanent closures and excluding humans by installing bat gates.

2.3.52. Bats: Where known bat concentrations of significant conservation concern are located outside caves or abandoned mines (such as in bridges structures, rock crevasse, or tree snags), human disturbance should be managed in order to protect those populations and the concentration site’s physical features.

2.3.53. Bats: On the SJNF, formal mineral withdrawal of abandoned mines for conservation of special status bat species should be pursued when demonstrated necessary to prevent loss of effective or crucial habitat due to mining activity.

2.3.54. Bats: At swarming sites, hibernacula, and maternity sites, activities that may alter the suitability of the cave or abandoned mine for bat occupation should not occur within 500 feet of the entrance, unless to rehabilitate the suitability of the site.

2.3.64. Bighorn sheep: Projects or activities that adversely impact bighorn sheep production areas reducing habitat effectiveness should be limited or avoided, using access restrictions during the following periods (see Figure 2.3.3 in the LRMP):

Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*): April 15–June 30

2.3.65. Bighorn sheep: Projects or activities that adversely impact bighorn sheep severe winter range and winter concentration areas reducing habitat effectiveness should be limited or avoided using access restrictions during the following periods:

Rocky Mountain bighorn sheep: November 1–April 15

Raptor standards and guidelines are included in Table T.2 (excerpt from rom Standard 2.3.35 and Guideline 2.3.49 in the LRMP):

Table T.2: Raptor Timing and Buffer Zone Distance Standards and Guidelines

Species	Impact/Risk	Time Frame	Buffer Distance****	Source
Bald eagle	Structural improvements *	Year round	New structures must not occur within a 0.5-mile radius of an active nest. (S)***	SJNF
	Disturbance **	November 15–July 15	Human encroachment should not occur within 0.5 mile of an active nest during the nesting season. (G)***	SJNF
Bald eagle winter roost	Structural improvements *	Year round	New structures must not occur within 0.5 mile of a communal roost site. (S)	SJNF
	Disturbance **	November 15–March 15	Human encroachment should not occur within a 0.25-mile radius (indirect line of sight) or a 0.5-mile radius (direct line of sight) of a communal winter roost site (as identified by CPW and the managing agency biologist). (G) Limit activity between 10 a.m. and 2 p.m. if encroachment will occur within buffer zones. (G)	CPW 2008
Northern goshawk	Disturbance **	March 1–August 31	Human encroachment should not occur within 0.5 mile of a nest during the nesting season. (G)	SJNF
	Structural Improvements *	Year-round	New structures should not occur within a 0.5-mile radius of an active nest. (G)	CPW 2008

*Structures include improvements such as roads, trails, radio towers, power lines, aboveground transmission corridors, and wells as proposed following nest establishment. This is not intended to include structures that historically occurred in the area prior to nest establishment.

**This does not apply to historic levels and patterns of disturbance under which the nest was established and is intended to apply to additional levels and change in disturbance patterns.

***Golden and bald eagle nest as defined under the Bald and Golden Eagle Protection Act.

****Buffer distances for some species may vary based on site-specific information, current science, and agency wildlife biologists' professional judgment. Area closures may be considered where appropriate.

Note: (S) = Standard; (G) = Guideline.

Table information is based on a variety of sources, including 2008 Colorado Parks and Wildlife Raptor Guidelines, Romin and Muck (2002) Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances, professional knowledge of local area conditions, Reynolds' (USFS 2004) recommendations specific to the SJNF, Bald and Golden Eagle Protection Act conformance, and Bureau of Land Management oil and gas standardized stipulation. Where literature and other evidence shows, exceptions may occur when individuals are adapted to human activity. Management is designed to reduce impacts during sensitive periods.

2.5.25. Activities that may cause sedimentation to amphibian habitats should be minimized.

2.5.26. Drainage of acid-mine runoff into riparian areas and wetland amphibian habitats should be avoided.

2.5.27. Agency actions should avoid or mitigate impacts within 100 feet of boreal toad (Bufo bore*as* boreas) breeding sites between May 15 and September 30 (breeding season).

2.5.28. Agency actions should maintain or improve hydrologic function and water quality of known and historic breeding sites for all sensitive and listed aquatic and amphibious species to provide for effective habitat.

2.13.29 Road and Motorized Trail Density Guideline for Ungulate Production Areas, Winter Concentration Areas, Severe Winter Range, and Critical Winter Range on SJNF Lands: The intent of this guideline is to ensure no net loss of existing habitat effectiveness within the areas listed below. In order to maintain wildlife habitat effectiveness of SJNF lands, road and motorized trail densities should be addressed when analyzing and approving management actions that affect motorized routes. Where management actions would result in road and motorized trail densities exceeding 1 mile/square mile on SJNF lands in the areas listed below, actions should be designed to maintain habitat effectiveness on SJNF lands throughout each mapped polygon. Habitat effectiveness for this guideline is considered maintained when road densities within the CPW mapped areas on SJNF lands listed below are less than or equal to 1 mile/square mile. When road densities exceed 1 mile/square mile within the CPW mapped areas on SJNF lands listed below, densities should not be increased without mitigation designed to maintain habitat effectiveness.

- Big game production areas (calving or lambing areas)
- Elk and deer severe winter range
- Elk and deer winter concentration areas
- Deer critical winter range

The following parameters and constraints will be used to calculate road and motorized trail density for wildlife:

2.13.29a Roads used to develop route density calculations include roads on NFS lands only, regardless of road ownership, that are a) open year-long or seasonally to public use and b) closed to public use, but are used for administrative access or are authorized by contract, permit, or other written authorization. Included in these calculations are maintenance level 2–5 NFS roads. Also included for this calculation are NFS trails that are designated for motorized use. Roads and motorized trails with design features sufficient to maintain habitat effectiveness (such as seasonal closures that are determined to be sufficient mitigation), as determined by the USFS biologist, should not be used for final density calculations. Non-motorized trails and those roads that are closed to all motorized use and/or are in storage are not used for route density calculations. Temporary roads to be used for 5 years or less are not included in these calculations.

2.13.29b Data used for density calculations will be based on the best available information at the time of analysis.

2.13.31 Road and Motorized Trail Density Guideline for Deer and Elk General Winter Range on SJNF Lands: Where management actions would result in road and motorized trail densities exceeding 1 mile/square mile and where CPW analysis determines that road and motorized trail densities inhibit the state's ability to meet population objectives, SJNF management actions should be designed to reduce the impacts of road density on habitat effectiveness throughout each mapped general winter range polygon. This guideline applies to the portions of each mapped general winter range polygon not covered under Guideline 2.13.29.

The following parameters and constraints will be used to calculate road and motorized trail density for wildlife:

2.13.31a Roads used to develop route density calculations include roads on NFS lands only, regardless of road ownership, that are a) open year-long or seasonally to public use and b) closed to public use, but are used for administrative access or are authorized by contract, permit, or other written authorization. Included in these calculations are maintenance level 2–5 NFS roads. Also included for this calculation are NFS trails that are designated for motorized use. Roads and motorized trails with design features sufficient to maintain habitat effectiveness (such as seasonal closures that are determined to be sufficient mitigation), as determined by the USFS biologist, should not be used for final density calculations. Non-motorized trails and those roads that are closed to all motorized use and/or are in storage are not used for route density calculations. Temporary roads to be used for 5 years or less are not included in these calculations.

2.13.31b Data used for density calculations will be based on the best available information at the time of analysis.

Land allocations and resource activities proposed for alternatives, which may affect species or their habitats, are summarized in Tables T.3 through T.9.

Table T.3: Acres of Management Areas by Alternative

Management Area	Alternative A	Alternative B	Alternative C	Alternative D
MA 1 natural processes dominate	483,869	598,517	1,016,281	497,856
MA 2 special areas and unique landscapes	8,949	91,985	86,295	59,602
MA 3 natural landscapes w/limited management	755,418	596,119	245,753	710,990
MA 4 high use recreation emphasis	148,022	69,864	46,502	79,854
MA 5 active management	454,035	451,730	426,507	454,137
MA 7 public and private lands intermix	N/A	49,560	40,679	49,547
MA 8 highly developed areas (ski areas and dams)	14,538	7,056	2,814	12,845
Total	**1,864,831**	**1,864,831**	**1,864,831**	**1,864,831**

Table T.4: Timber and Fuels Treatment Activities That May Impact Species or Their Habitats over the Life of the Land and Resource Management Plan for all Species (acres)

Management Activity	Alternative A	Alternative B	Alternative C	Alternative D
Total acres where timber harvesting may occur	721,477	707,016	478,018	719,208
Timber Treatment (NFS lands)				
Ponderosa pine acres treated	1,000 Rest* 500 PC	1,000 Rest* 500 PC	900 Rest* 400 PC	1,500 Rest* 500 PC
Warm dry mixed conifer acres treated	250 Rest* 250 PC	250 Rest* 250 PC	200 Rest* 225 PC	500 Rest* 250 PC
Cool moist mixed conifer acres treated	400 PC	250 PC	40 PC	575 PC
Aspen acres treated	400 CC	500 CC	400 CC	600 CC
Spruce-fir acres treated	100 PC	100 PC	40 PC	226 PC
Fuels Treatment				
Pinyon-juniper	500 Mastication 500 Prescribed Fire	500 Mastication 500 Prescribed Fire	500 Mastication 500 Prescribed Fire	1,000 Mastication 500 Prescribed Fire
Mixed shrubland	2,000 Mastication 1,000 Prescribed Fire	2,000 Mastication 1,000 Prescribed Fire	2,000 Mastication 1,000 Prescribed Fire	2,000 Mastication 1,000 Prescribed Fire
Ponderosa pine	1,000 Mastication 3,500 Prescribed Fire 500 Mechanical Rest**	1,000 Mastication 3,500 Prescribed Fire 500 Mechanical Rest**	1,000 Mastication 3,500 Prescribed Fire 500 Mechanical Rest**	1,500 Mastication 3,500 Prescribed Fire 500 Mechanical Rest**
Warm dry mixed conifer	1,000 Prescribed Fire 500 Mechanical Rest**	1,000 Prescribed Fire 500 Mechanical Rest**	1,000 Prescribed Fire 500 Mechanical Rest**	1,000 Prescribed Fire 500 Mechanical Rest**

Management Activity	Alternative A	Alternative B	Alternative C	Alternative D
Mixed vegetation	Up to 20,000 Fire Managed for Resource Benefit	Up to 50,000 Fire Managed for Resource Benefit	Up to 50,000 Fire Managed for Resource Benefit	Up to 50,000 Fire Managed for Resource Benefit
Spruce-fir	Up to 20,000 Fire Managed for Resource Benefit	Up to 50,000 Fire Managed for Resource Benefit	Up to 50,000 Fire Managed for Resource Benefit	Up to 50,000 Fire Managed for Resource Benefit

* Also counted as mechanical fuels acres; acres include fuel wood harvest program.
** Joint project with timber.
PC = Partial cut average acres, per year, over the life of the LRMP; Rest = Restoration harvest based on HRV; CC = Clearcut;

Table T.5: Recreation Management Activities That May Impact Species or Their Habitats over the Life of the Land and Resource Management Plan for all Species (acres)

Recreation Opportunity Spectrum	Alternative A	Alternative B	Alternative C	Alternative D
Summer Recreation Opportunity				
Rural	30,115	1,325	1,400	1,399
Roaded natural	881,687	495,545	455,615	591,076
Semi-primitive motorized	93,738	448,638	274,643	512,464
Semi-primitive non-motorized	369,118	435,171	137,885	278,360
Primitive	490,173	2,620	513,756	0
Primitive wilderness	0	481,532	481,532	481,532
Winter Recreation Opportunity				
Rural	1,643	2,866	397	2,954
Roaded natural	657,367	318,659	344,021	596,881
Semi-primitive motorized	287,471	514,037	268,378	319,863
Semi-primitive non-motorized	437,315	545,132	243,329	463,601
Primitive	0	2,605	527,174	0
Primitive wilderness	481,035	481,532	481,532	481,532
Ski Areas				
Total acres of downhill ski areas	14,491	7,714	3,350	12,596

Table T.6: Motorized Travel Land Allocations That May Impact Species or Their Habitats over the Life of the Land and Resource Management Plan for all Species (acres)

Management Activity	Alternative A	Alternative B	Alternative C	Alternative D
SJNF Motorized Travel Over Ground (acres)				
USFS not suitable	482,019	928,054	1,133,752	755,538
USFS suitable	896,400	632,500	448,992	759,602
USFS suitable opportunity areas	**486,413**	**304,278**	**282,088**	**349,692**
SJNF Motorized Travel Over Snow (acres)				
USFS not suitable	980,860	1,072,520	1,277,808	1,008,741
USFS suitable	883,972	792,312	587,024	856,091

Table T.7: Livestock Grazing Land Allocations That May Impact Species or Their Habitats over the Life of the Land and Resource Management Plan for all Species (acres)

	Alternative A	Alternative B	Alternative C	Alternative D
Livestock Grazing Acres Available on Active Allotments				
Sheep	183,733	183,733	122,670	183,733
Cattle	689,628	689,628	641,456	800,810
Livestock Grazing: Permitted Animal Unit Months				
Sheep	6,396	6,396	4,981	11,327

	Alternative A	Alternative B	Alternative C	Alternative D
Cattle	102,925	105,809	93,602	139,745

Table T.8: Oil and Gas Leasing Availability and Stipulations That May Impact Species or Their Habitats over the Life of the Land and Resource Management Plan for all Species (acres)

	Alternative A	Alternative B	Alternative C	Alternative D	No Leasing Alternative
Federal mineral acres	1,863,402	1,863,402	1,863,402	1,863,402	1,863,402
Acres available for leasing	1,337,090	1,279,811	709,335	1,338,551	0
% of federal minerals Available for Leasing	71%	68%	38%	72%	N/A
No surface occupancy	848,806	897,266	547,642	666,105	0
% of Available acres that are no surface occupancy	46%	48%	29%	36%	N/A
Timing limitation	783,302	527,489	157	45,463	0
Controlled surface use	513,893	882,532	391,150	1,033,242	0
Standard lease terms	177,162	143,722	129,069	210,570	0

Table T.9: Habitat Improvement Activities That May Impact Species or Their Habitats over the Life of the Land and Resource Management Plan for all Species (acres)

	Alternative A	Alternative B	Alternative C	Alternative D
Riparian and watershed improvement	30 acres	150 acres	300 acres	150 acres
Nokomis fritillary butterfly habitat improvement and restoration	1 site	2 sites	2 sites	0 sites
Bat habitat restoration and protection via installation of structures associated with mine closures	All	All	All	All
Terrestrial wildlife habitat improvement and restoration	1,500 acres	2,000 acres	2,000 acres	1,500 acres
Ponderosa pine restoration to support associated wildlife populations	1,000 acres	3,000 acres	3,000 acres	2,000 acres
Cool-moist mixed conifer and spruce-fir restoration to support associated wildlife populations	1,000 acres	2,000 acres	2,000 acres	1,000 acres
Winter range habitat improvement for big game	1,500 acres	5,000 acres	2,500 acres	1,500 acres
Aspen restoration to support associated wildlife populations	1,000 acres	3,000 acres	3,000 acres	1,000 acres

1.2 Species Evaluated

All sensitive species known to occur or suspected to have habitat on the SJNF are evaluated below (Table T.10). Sensitive species are from the Region 2 Regional Forester's sensitive species list that was updated on June 10, 2011. Species are grouped by mammals, birds, insects, amphibians, reptiles, fish, and plants. This information is based on the most current scientific information available including species assessments, monitoring plans, conservation assessments and plans, and recovery plans. The North American wolverine (*Gulo gulo luscus*) was proposed for listing on February 4, 2013.

Table T.10: U.S. Forest Service Sensitive Species and Habitat Associations for the San Juan National Forest

Sensitive Species	Habitat Association or Vegetation Type
Mammals (9)	
American marten *Martes americana*	Subalpine spruce-fir forests, alpine tundra, montane forests
Fringed myotis *Myotis thysanodes pahasapensis*	Pinyon-juniper and other coniferous woodlands
Gunnison's prairie dog *Cynomys gunnisoni*	Grasslands and semi-desert and montane shrublands
Hoary bat *Lasiurus cinerus*	Associated with trees; in Colorado, it is mainly found in ponderosa pine, pinyon-juniper, and riparian forest
New Mexico meadow jumping mouse *Zapus hudsonius luteus*	Mesic grass/forb/sedge riparian habitat
River otter *Lontra canadensis*	Stream and river riparian
Rocky Mountain bighorn sheep *Ovis canadensis canadensis*	Steep, high mountain terrain dominated by grass, low shrubs, rock cover and areas near open escape
Spotted bat *Euderma maculatum*	Pinyon-juniper, shrub desert, possibly riparian
Townsend's big-eared bat *Corynorhinus townsendii*	Abandoned mines and caves
Birds (18)	
American bald eagle *Haliaeetus americanus*	Forested stands around aquatic settings
American bittern *Botaurus lentiginosus*	Marsh, swamp, or bog with cattails, rushes, grasses, and sedges
American peregrine falcon *Falco peregrinus anatum*	Breeds on cliffs, often in association with riparian areas; regular breeder on the SJNF
Black swift *Cypseloides niger*	Vertical rock faces near waterfalls or in dripping caves
Boreal owl *Aegolius funereus*	Mature spruce-fir forests with high canopy closure
Brewer's sparrow *Spizella breweri*	Primarily sagebrush but also in mixed shrublands (rabbitbrush, greasewood, etc.)
Ferruginous hawk *Buteo regalis*	Grasslands and semi-desert shrub; not known to breed but a regular winter resident on the SJNF
Flammulated owl *Otus flammeolus*	Open ponderosa pine forests; dry montane conifer or aspen forests, often with dense saplings
Lewis' woodpecker *Melanerpes lewis*	Open ponderosa pine forest, riparian, and pinyon-juniper woodlands
Loggerhead shrike *Lanius ludovicianus*	Lowland riparian, pinyon-juniper woodlands, semi-desert shrublands
Northern goshawk *Accipiter gentiles*	Ponderosa pine, aspen, mixed conifer, and spruce-fir forests
Northern harrier *Circus cyaneus*	Grasslands, agricultural lands, mountain sagebrush, and marshes; requires abundant cover (same as for short-eared owl)
Olive-sided flycatcher *Contopus cooperi*	Snags and conifers, often on steep slopes, open stands, and natural openings
Purple martin *Progne subis*	Mature aspen stands near streams, springs, or ponds
Short-eared owl *Asio flammeus*	Open habitats including grasslands, marsh edges, shrub-steppe, and agricultural lands; requires taller grass cover than northern harrier

Sensitive Species	Habitat Association or Vegetation Type
Western burrowing owl *Athene cunicularia*	Prairie dog colonies with vacant burrows; grasslands, shrublands, deserts
Western yellow-billed cuckoo *Coccyzus americanus*	Riparian; gallery cottonwoods with dense understory
White-tailed ptarmigan *Lagopus leucurus*	Alpine tundra, especially with rock fields and willow carrs
Insects (1)	
Great Basin silverspot butterfly (Nokomis fritillary butterfly) *Speyeria nokomis nokomis*	Riparian; mostly tied to springs
Amphibians (2)	
Boreal toad *Bufo boreas boreas*	Damp conditions; marshes, wet meadows, streams, ponds, lakes
Northern leopard frog *Rana pipiens*	Water's edge; wet meadows, banks of marshes and ponds

1.2.1 Mammals

American Marten

Background

The American marten (*Martes americana*), also known as the pine marten or simply marten, is a carnivorous mammal roughly the size of a small house cat. It is a member of the weasel family (Mustelidae) and is one of seven species in the genus *Martes*. The only other member of the *Martes* group in North America is the fisher (*M. pennanti*), which is much larger and occurs in a much narrower geographic range than the marten. One subspecies occurs in Colorado *(M. a. origenes*) (Fitzgerald et al. 1994). Marten are primarily carnivores of small mammals and prey on a wide variety of species. They are somewhat opportunistic with the species taken and frequency of taking, which varies greatly geographically with availability (Martin 1994). The most important prey of marten in the Rocky Mountain West are red-backed voles (*Myodes* sp.), pine squirrels (*Tamiasciurus* sp.), and various species of *Microtus*. Other prey, include insects, birds, bird's eggs, and even fish. They also take carrion when available, especially during the winter (Strickland et al. 1982). During late summer and fall, soft mast is consumed, especially berries of *Vaccinium* and *Rubrus* (Buskirk and Ruggerio 1994). Changes in small mammal prey can affect the carrying capacity of marten habitat (Strickland et al. 1982). Food shortages have the greatest effect on females and juveniles due to their high energy requirements (Strickland et al. 1982). Martens mate in mid-summer, usually July or August. The female gives birth to young in dens, which are located in rock piles, beneath logs, in hollow logs, and beneath tree roots. Young are moved from natal sites to maternal sites after birth. They also use sites aboveground in large hollow trees lined with grass, moss, and leaves.

Status and Distribution

The marten is broadly distributed in North America. It extends from the spruce-fir forests of northern New Mexico to the northern limit of trees in arctic Alaska and Canada, and from the southern Sierra Nevada of California to Newfoundland Island. In Canada and Alaska, its distribution is vast and continuous, but in the western United States, its distribution is limited to mountain ranges that provide preferred habitat (Buskirk and Ruggiero 1994). The marten is primarily an inhabitant of upper montane to boreal forests in the western United States (Buskirk and Ruggiero 1994).

Habitat across the Species' Range

Marten have traditionally been considered to occupy a narrow range of habitat types. Some research suggests, however, that they are adaptable to a wide variety of forest habitats (Strickland et al. 1982). Even so, the species is closely associated with late-successional coniferous forest, especially those with complex physical ground structure (Buskirk and Ruggerio 1994). Marten prefer mesic forest conditions and forest stands with xeric conditions, or those that lack structure near the ground, are seldom used (Buskirk and Ruggerio 1994) They appear to prefer overhead cover and avoid extensive use of open areas, particularly in winter (Bennett 1984). In the central and southern Rockies they are most often associated with spruce-fir or lodgepole pine (*Pinus contorta*) and are generally absent in stands of ponderosa (*P. ponderosa*) or pinyon pine (*P. edulis*). Marten have not been recorded to favor hardwood stands over conifer-dominated stands in any part of their entire range (Buskirk and Ruggerio 1994). In Colorado, the marten occurs in most coniferous forest in the higher mountains (Fitzgerald et al. 1994).

Habitat on the San Juan National Forest

Marten habitat occurs across the SJNF at the mid-upper elevational zones and spruce-fir forest types are considered primary habitat. Although they are most commonly observed in spruce-fir forests, marten are occasionally seen in lower elevation mixed conifer forests. Structural characteristics that are important in determining overall suitability include abundant and well-distributed coarse woody debris, canopy closures >30%, with 40% to 60% considered optimal. Mature spruce-fir forests with mesic understory conditions and large amounts of large-diameter downed woody material are important to marten because they provide key habitat components for their primary prey, southern red-back vole (*Myodes gapperi*) (Allen 1983) and red squirrel (*Tamiasciurus hudsonicus*) (Fitzgerald et al. 1994). Regular and widely distributed sightings of animals and tracks on the SJNF lead to the conclusion that martens are well distributed and reasonably abundant in suitable habitat on NFS lands of the SJNF.

Primary Risk Factors

Habitat is perhaps the most important limiting and controlling factor for marten populations, particularly loss of habitat components as it effects foraging, resting, breeding, and dispersal. Other limiting factors include fragmentation and geographic isolation, prey availability, low population density, low reproductive potential, predation, competing predators, trapping, weather, parasites and disease. Marten habitat use within their home range is much more limited during the winter months.

Fringed Myotis

Background

The fringed myotis (*Myotis thysanodes*) is a member of the large-eared group of North American myotis. The most distinctive characteristic of this species, as suggested by its common name, is a conspicuous fringe of stiff hairs that protrude along the trailing edge of the tail membrane (Adams 2003). The species is particularly susceptible to human disturbances, especially near maternity colonies (O'Farrell and Studier 1980, cited in Adams 2003). Hibernation has only been documented in buildings and underground mines (Bradley and Ports 2003). The species is known to migrate, but to what extent is unclear.

Status and Distribution

The fringed myotis ranges throughout western North America, from British Columbia southward into Mexico (Adams 2003). Records are scattered throughout the mountainous regions of the Rocky Mountain states. There appears to be a large distributional gap between southwest Utah and populations in north-central Idaho and west Montana.

Habitat across the Species' Range

Although oak and pinyon woodlands appear to be used commonly by this species, it also may be found abundant in fir-pine forests (Adams 2003). Fringed myotis roosts in crevices, in buildings, underground mines, rocks, cliff faces, and bridges. Roosting in decadent trees and snags, particularly large ones, is common throughout its range in the western United States and Canada. The fringed myotis roosts have been documented in a large variety of tree species and it is likely that structural characteristics (e.g., height, decay stage) rather than tree species play a greater role in selection of a snag or tree as a roost.

Habitat on the San Juan National Forest

In Colorado, the fringed myotis ranges across saxicoline brush and Douglas-fir (*Pseudotsuga menziesii*) forest on the eastern slope near Boulder and in pinyon-juniper and ponderosa pine woodlands in other parts of the state (Armstrong et al. 1994). Specific surveys for fringed myotis have not been conducted on the SJNF, but the species is expected to utilize mostly pinyon-juniper and other forested woodlands across the forest.

Primary Risk Factors

The greatest threat and limiting factor to this bat is thought to be human disturbance of roost sites and especially hibernacula and maternity colonies, through recreational caving and mine exploration (Arizona Game and Fish Department 1993; Western Bat Working Group 1998). The impacts of White Nose Syndrome on this species are not currently known at this time. It is likely that if White Nose Syndrome were found in Colorado this species may not be as impacted as cave-obligate species. Other threats include closure of abandoned mines, renewed mining at historic sites, toxic material impoundments, pesticide spraying, vegetation conversion, fuels treatments, timber harvest, and destruction of buildings and bridges used as roosts (Western Bat Working Group 1998). Disturbance or destruction of water sources and riparian habitat may also influence fringed myotis habitat use (NatureServe 2013).

Gunnison’s Prairie Dog

Background

Gunnison's prairie dog (*Cynomys gunnisoni*) is one of five species of prairie dog, all of which are native to North America. Gunnison's prairie dog is a keystone species of the sagebrush ecosystem. They create habitat, provide food, and help keep the soil and plant communities healthy. For example, their abandoned burrows are used by burrowing owls (*Athene cunicularia*), weasels (*Mustela* sp.), snakes, badgers, and even foxes. The prairie dog is an important food source for coyote (*Canis latrans*), weasels, foxes, hawks, eagles, and the endangered black-footed ferret (*Mustela nigripes*). In addition, their burrowing helps to aerate the soil, add organic matter, and help to increase water penetration (U.S. Fish and Wildlife Service [USFWS] 2010). Gunnison’s prairie dog feeds on grasses, forbs, sedges (*Carex* sp.), and shrubs. Insects are of minor importance to its diet. Flowers and other succulent parts of forbs and shrubs are also consumed but the animals do little digging for roots and tubers (Fitzgerald et al. 1994). The species is not known to store food in its burrow. As with all species of prairie dogs and most ground squirrels, they gather grasses and forbs for nesting materials, especially in late summer. Free water is not required (Fitzgerald et al. 1994). The species is generally found in groups of several individuals and oftentimes forming colonies. They dig burrows that are used for raising young and provide cover from predators. Gunnison’s prairie dogs hibernate. In central Colorado around 10,000 feet in elevation, individuals enter burrows by October and emerge in mid-April. Hibernation periods at lower elevations are shorter and some individuals may even appear above ground in winter months (Raynor et al. 1987, cited in Fitzgerald et al. 1994). Predators include badgers (*Taxidea taxus*), golden eagles (*Aquila chrysaetos*), coyotes, bobcats (*Lynx rufus*), and red-tailed hawks (*Buteo jamaicensis*). In Colorado, prairie dogs are considered small game species and are provided no protection from harvest. Reproduction occurs May through mid-July.

Status and Distribution

Gunnison’s prairie dogs are distributed from central Colorado to central Arizona, including southeast Utah and much of the northwest half of New Mexico (NatureServe 2013). In Colorado, the species is restricted to southwest and south-central Colorado. They range in elevation from 6,000 to 12,000 feet. They are well distributed across the SJNF at lower elevations.

Habitat across the Species’ Range

Gunnison’s prairie dogs inhabit grasslands and semi-desert and montane shrublands (Fitzgerald et al. 1994). Habitat use by Gunnison’s prairie dogs differs somewhat from the black-tailed prairie dog (*Cynomys ludovicianus*) primarily due to the strikingly different geographical settings within the range distribution of these species. The black-tailed prairie dog is primarily a prairie species, while the

Gunnison's prairie dog is associated with intermountain valleys, benches, and plateaus that offer prairie-like topography and vegetation. These intermountain valleys, benches, and plateaus can range from very arid to mesic sites. Gunnison prairie dogs can occupy mesic plateaus and higher mountain valleys, as well as arid lowlands (Knowles, 2002).

Habitat on the San Juan National Forest

Habitat for Gunnison's prairie dog is found in grasslands and semi-desert and montane shrublands across the forest.

Primary Risk Factors

Of all the factors affecting Gunnison's prairie dog populations, sylvatic plague is the most significant. Recreational shooting and pest control continue to be a threat to the Gunnison's prairie dog throughout its range and contributes to the decline of the species when combined with the effects of disease. However, these threats are being monitored and managed. Agriculture, urbanization, roads, and oil and gas development each currently affect a small percentage of Gunnison's prairie dog habitat (USFWS 2008).

Hoary Bat

Background

The hoary bat (*Lasiurus cinereus*) is quite distinctive from any other bat in the Rocky Mountain states because of its large size and coloration. Hoary bats have mixed dark brownish grayish fur, tinged with white to produce a frosty or hoary effect. Hoary bats forage primarily over open areas, about treetops, and along streams and lake shores (Anderson 2002). They have a strong preference for moths, but are also known to eat beetles, flies, grasshoppers, termites, dragonflies, and wasps (Black 1972; Ross 1967). Individuals generally emerge late in the evening to feed (Shrump and Shrump 1982), but have also been seen flying on warm winter afternoons.

Status and Distribution

The hoary bat, a member of the Family Vespertilionidae, is the most widespread of all North American bats (Adams 2003). This species ranges from near the limit of trees in Canada, southward at least to Guatemala and from Brazil to Argentina and Chile. This species has been captured in all Rocky Mountain states (Adams 2003). In Colorado, individuals have been captured at elevations exceeding 9,000 feet and occur statewide from the plains to timberline (Armstrong et. al 1994). Males and females are segregated in the summer, males tending to stay in Colorado while females continue north to bear and rear young. In Colorado, males oversummer, but females are rare (Armstrong et al. 1994). Although hoary bats are thought to be highly migratory, wintering sites have not been well documented, and no specific migration routes have been discerned (Ellison et al. 2003).

Habitat across the Species' Range

Hoary bats are highly associated with forested habitats in the West (Ellison et al. 2003). The species appears to favor deciduous trees for roosts in the eastern United States, but in Colorado the species is frequently taken in ponderosa pine forest where large deciduous trees are lacking (Armstrong 1972; Ellinwood 1978). Hoary bats are solitary and roost primarily among the foliage of both coniferous and deciduous trees with good leaf cover near the end of branches 10 to 39 feet above the ground with a clear flight path below at edge of a clearing. Hoary bats have also been found to use unusual roost sites in caves, rock ledges, woodpecker holes, squirrel nests, under driftwood planks, and on the sides of buildings. The habitat use of hoary bats, particularly use of winter sites, is not well understood.

Habitat on the San Juan National Forest

Hoary bat are mostly associated with trees across the SJNF, mainly in ponderosa pine, pinyon-juniper, and riparian forest.

Primary Risk Factors

Loss of roosting habitat due to timber harvest is likely the biggest threat or limiting factor to this species. Data on hoary bat population trends are scarce; however, even in the absence of these data, there is strong evidence that this species is experiencing a downward population trend (USFS 2011a)2). Because of this species' dependence on trees with foliage for summer roosts, insect, disease and large-scale disturbances may also be a significant threat or limiting factor to hoary bat populations.

New Mexico Meadow Jumping Mouse

Background

The New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) is one of three species of *Zapus* found in North America, This subspecies, *luteus*, is endemic to the American Southwest where it is known as disjunct Pleistocene relic populations (Frey 2008). In general, the meadow jumping mouse can be recognized as having large hind legs and hind feet, and having a tail accounting for a minimum of 60% of its total length (Fitzgerald et al. 1994). The subspecies is approximately 4.8 to 5.6 inches in length. Its habitat overlaps with the western jumping mouse (*Z. princeps*) generally found at higher elevations. Distinguishing between the meadow jumping mouse and western jumping mouse is difficult having a similar size and peliage (Frey 2005). The species emerges from hibernation in early summer where most foods are insects, with roughly 20% of its diet consisting of seeds. As the season progresses the percent of seed intake increases becoming the dominant dietary component along with some fruits, fungus, and invertebrates (Fitzgerald et al. 1994; Whitaker 1963). Reproductive activities begin shortly after emerging from hibernation and can result in more than one liter per season. The species reenters hibernation in late August to mid–September.

Status and Distribution

The subspecies is known to occur from sites in eastern Arizona, New Mexico, and extreme southern Colorado. The meadow jumping mouse is not currently known to occur on the SJNF. It has been found on private lands at lower elevations in general proximity to the SJNF.

Habitat across the Species' Range

This species is found in moist grasslands and meadows, often along the edges of marshes and near free-flowing water (Morrison 1990). In habitat studies by Frey in New Mexico, the species is restricted to complex riparian habitats. Very good habitat was deemed in those areas with very dense vegetation cover over 3 feet high, with grasses and forbs dominating the areas where the species was found (Frey 2005). Beaver dams and some human-made dams on streams can produce suitable habitat for this species in montane areas, particularly at the most upstream portion of the impoundment where sedimentation deposition and periodic inundation creates moist soil and conditions and herbaceous plant growth (Frey 2006).

Habitat on the San Juan National Forest

In the summer of 2010, a study was conducted to determine presence of this species on lands administered by the SJNF and San Luis Valley Public Lands Center in southwest Colorado. No individuals were captured (Frey 2011). These surveys were conducted by expert Jennifer Frey in the best habitat available on the SJNF, which is areas of mesic grass, forb, and sedge riparian habitat. Frey (2011) also suggests that that additional surveys should focus on areas with perennial streams, no (or very little) livestock grazing, and low elevation (below 7,611 feet).

Primary Risk Factors

The primary threat to this taxon is livestock grazing, which can dramatically alter the structure and composition of herbaceous riparian vegetation. Other identified threats include drought and climate change, urbanization, water development, recreation, forest fires, flooding, loss of beaver, and conversion of riparian habitat to agricultural crops (Frey 2011).

River Otter

Background

The river otter (*Lontra canadensis*) is an elongate, robust mustelid with a thick, tapering tail. River otters feed opportunistically on aquatic animals, particularly fishes (mostly slow-moving, mid-size species), frogs, crayfish, turtles, insects, etc., and sometimes birds and small mammals. When inactive, it occupies hollow logs, space under roots, logs or overhang, abandoned beaver lodges, dense thickets near water, or burrows of other animal; such sites also are used for rearing young. River otters may travel long distances overland, particularly in snow (NatureServe 2013).

Status and Distribution

The historic range of river otter is throughout most of North America north of Mexico, except the extreme southwestern United States and was extirpated from large areas of the interior United States following European colonization but has been reintroduced in some parts of the range (e.g., Colorado, Virginia) (NatureServe 2013). The species occurs in the Colorado, Gunnison, Piedra, and Dolores Rivers. Tracks and other sign of otters have also been found in the Poudre and Laramie drainages in Larimer County (Natural Diversity Information Source 2005).

Habitat across the Species' Range

The river otter inhabits streams, lakes, ponds, swamps, marshes, estuaries (in some areas), beaver flowages, and exposed outer coast (Pacific Northwest, Alaska) that traverse a variety of other ecosystems ranging from semi-desert shrublands to montane and subalpine forests. The species requires permanent water of relatively high quality and with an abundant food base of fish or crustaceans. Generally, streams of 10 cubic feet per second or higher are required to provide suitable habitat. Other habitat features that may be important include the presence of ice-free reaches of stream in winter, water depth, stream width, and suitable access to shoreline (Natural Diversity Information Source 2005).

Habitat on the San Juan National Forest

Thirteen river otters from Wisconsin were reintroduced into the Piedra River. Between 1988 and 1991, 28 river otters from Alaska, Oregon, and California were reintroduced in the Dolores River. Dolores River otters seem to be reproducing and are distributed from the Colorado state line to Rico and on the San Miguel River. During presence/absence surveys done in 2002 by the Colorado Department of Wildlife, the Piedra River otters were distributed through the Piedra River from Williams Reservoir to Navajo Reservoir. No otters were found on the Los Pinos River though reproduction was known to occur a few years previous. On the San Juan River, sign of one otter was sited. The Animas River and the Florida River are known to have otters but were not surveyed. No methods for estimating populations have been successfully developed, and therefore no estimates of population numbers have been made.

Primary Risk Factors

Principal threats are habitat destruction and degradation, and human-caused mortality. Habitat destruction and degradation include water development resulting in stream flow and channel morphology alteration, water pollution, loss of riparian vegetation, and human settlement and recreational use along rivers and lakes. Water development is a widespread and increasing threat in most watersheds across Region 2 and may affect river otter populations at local and regional scales. Increasing human settlement, with the resulting increases in water development and recreational use, is the most immediate threat to river otter population viability in many watersheds throughout Region 2. Water pollution is a localized threat in some mountain drainages streams in Colorado and Wyoming, and a more pervasive threat in lower stream reaches. Water pollution that reduces or eliminates otter prey populations (fish and invertebrates) is a threat at local scales to some otter populations or potential habitats (Boyle 2006).

Rocky Mountain Bighorn Sheep

Background

Bighorn sheep are ungulates native to North America in the Family Bovidae. They are characterized by low reproductive rates, long life spans, and populations adapted to live near carrying capacity in relatively stable environments (Geist 1971 in Beecham et al. 2007). Bighorn sheep are social animals that live in groups most of the year. Bighorn sheep have a high degree of site fidelity, which ties them closely to areas they are familiar with, and leads to slow rates of herd expansion. Such fidelity leads to vulnerability from increased stress levels when disturbances to their home range occur (Fitzgerald et al. 1994). During spring and summer, bighorns segregate by sex and age (Fitzgerald et al. 1994). In the southern Rocky Mountains, the peak breeding season occurs from about mid-November to mid-December (Beecham et al. 2007). Most young are born in May or June, peaking in mid-June (Fitzgerald et al. 1994). Escape terrain is critical for ewes during lambing to the extent they would sacrifice high-quality forage for security (Beecham et al. 2007).

Status and Distribution

Prior to the arrival of Euro-Americans in western North America, bighorn sheep occupied mountains and river canyons as far north as southern British Columbia and southwestern Alberta, south through the Rocky Mountains into northern New Mexico, and east into the badlands of North Dakota and the Black Hills of South Dakota and Nebraska (Beecham et al. 2007). Bighorn sheep are currently found in all western states and provinces with historical records from New Mexico to British Columbia. Although bighorn sheep numbers declined dramatically with the settling of the West and are currently at less than 10% of historic numbers, they are still considered somewhat secure throughout much of their range (NatureServe 2013). However, many regional sheep herds are vulnerable because they consist of small numbers (often less than 100 animals and many biologists consider herds with less than 200 animals at risk due to extrinsic factors), are isolated from adjacent sheep populations (sometimes by large expanses of unsuitable habitat), and are threatened by disease transmitted from domestic livestock (Berger 1990; Goodson 1994; Krausman et al. 1993; Wehausen 1999 in Beecham et al. 2007). Early accounts by trappers and explorers indicate bighorn sheep were common in Colorado prior to Euro-American settlement in the mid-1800s (Moser 1962 in George et al. 2009). Available evidence indicates bighorns were widely distributed and occupied suitable habitat across a range of elevations throughout the state. In 1915, there was a statewide estimate of 7,230 bighorn sheep, 3,200 in 1958, 2,200 in 1970, 6,045 in 1988, and 7,040 in 2007 (George et al. 2009). One reason for the apparent increase in Colorado’s bighorn populations since the 1970s is a longstanding effort by CPW (formerly Colorado Division of Wildlife) to trap and translocate wild sheep for the purpose of establishing new bighorn populations or supplementing existing populations.

Habitat across the Species’ Range

Bighorn sheep are adapted to a wide variety of habitats across western North America ranging in elevation sea level to over 14,100 feet. Current distribution is confined to scattered populations in open or semi-open, often precipitous, terrain characterized by a mix of steep or gentle slopes, broken cliffs, rock outcrops, and canyons and their adjacent river benches and mesa tops.

Habitat on the San Juan National Forest

In Colorado, mountain bighorn sheep prefer high visibility habitat dominated by grass, low shrubs, and rock cover, areas near open escape terrain, and topographic relief (Fitzgerald et al. 1994). All bighorn herds on the SJNF have increased over the past 20+ years. The 2011 post-hunt population estimates were 460 bighorns for the Weminuche Data Analysis Unit, 450 bighorns for San Juans West Data Analysis Unit, 210 bighorns for the South San Juans Data Analysis Unit, and 60 bighorns for the Animas River Data Analysis Unit.

Primary Risk Factors

There are several natural factors that could influence habitat conditions for bighorn sheep. However, a primary issue involves their high susceptibility to a wide variety of diseases and parasites, many of which have been contracted from domestic sheep (Geist 1971). Limiting factors to bighorn sheep herds include deadly epizootics as a result of disease transmission from domestic goats and sheep and between bighorn herds during translocation projects; the loss of genetic variability in small herds; habitat deterioration, loss and fragmentation, human disturbance on critical winter and lambing ranges, and competition for forage and space with livestock and other ungulate species; and cougar predation on adult female sheep in remnant or recently reintroduced herds (Beecham et al. 2007). The risk of disease transmission is impossible to eliminate when bighorn and domestic sheep occupy the same range area because male bighorns are attracted to domestic ewes and/or they utilize the same foraging or watering areas. Contacts between wild and domestic sheep have frequently resulted in massive die-offs of bighorns that represent a loss of many years of costly efforts to restore the species to its former range. The loss of genetic diversity and herd memory of historical migration routes may also be irreplaceable when attempting to restore bighorns after a massive die-off. There have been no confirmed bighorn die-off events on the SJNF. There is, however, strong circumstantial evidence a mortality event occurred in 1988 after observed close proximity and presumed physical contact between domestic sheep and a small number of transplanted bighorn sheep on NFS lands in the Vallecito Creek Herd S28, which is a subpopulation of the Weminuche Data Analysis Unit. None of the transplanted bighorn sheep were known to have survived their first winter season and a complete mortality event of the transplanted animals is assumed to have occurred. Although habitat degradation from fire suppression, highways, livestock grazing, and human disturbance is of concern, the susceptibility of Rocky Mountain bighorn sheep herds to extirpation as a result of diseases that may be transmitted by domestic sheep or goats appears to be the greatest threat.

Spotted Bat

Background

The spotted bat (*Euderma maculatum*) is a desert species that is currently known to occur sporadically on the far western portion of the SJNF. Foraging has been observed in forest openings, pinyon-juniper woodlands, large riverine/riparian habitats, riparian habitat associated with small to mid-sized streams in narrow canyons, wetlands, meadows, and agricultural fields (Western Bat Working Group 1998).

Status and Distribution

The spotted bat occurs from south-central British Columbia to southern Mexico. In Colorado, spotted bats occur in the western semi-desert canyonlands (Armstrong et al. 1994).

Habitat across the Species' Range

Spotted bats have been found in a variety of habitats; however, rocky cliffs are necessary to provide suitable cracks and crevices for roosting, as is access to water (Fitzgerald et al. 1994). The species roosts by day in rock crevices located on high cliffs (Watkins 1997, cited in Adams 2003). The dependency of rock-faced cliff roosting habitat limits the spotted bat to very small geographic areas with specific geologic features (Luce 2004).

Habitat on the San Juan National Forest

Spotted bats can be found in pinyon-juniper and shrub desert habitat, as well as some riparian areas across the SJNF.

Primary Risk Factors

The availability of suitable cliff roosting sites has been indicated as a primary limiting factor for the Spotted Bat (Pierson and Rainey 1998; Storz 1995). Pierson and Rainey (1998) also speculate that, due to the spotted bats' apparent preference for open habitats for foraging, its prey base might be sensitive to overgrazing by livestock. Historically, the spotted bat has endured little impact from human disturbance because its roosts are remote. Recreational rock climbing may disturb bats in local situations (Luce 2004). Large-scale pesticide programs to control Mormon crickets (*Anabrus simplex*) and grasshoppers could affect this species by reducing the availability of prey (Luce 2004). Disturbance to hibernacula in the winter months during temperature extremes could be limiting.

Townsend's big-eared bat

Background

Townsend's big-eared bat (*Corynorhinus townsendii*) falls within the genus *Corynorhinus* of which there are five species (Kunz and Martin 1982). There are five subspecies of *Corynorhinus townsendii*, two of which occur in the West, *C.t. townsendii* and *C.t. pallescens*. There appear to be extensive zones of intergradation, making it difficult to distinguish one from the other. The subspecies occurring in Colorado is *C.t. pallescens* (Pierson et al. 1999). The distinguishing characteristic of Townsend's big-eared bat, as the name implies, is the large size of its ears or pinnae, which serve primarily as auditory devices. However, based on the orientation of the ears in while flying, it has been suggested that these structures may also provide lift in flight (Pierson et al. 1999).

Status and Distribution

The Townsend's big-eared bat (*Corynorhinus townsendii*) occurs throughout much of western North America, with some isolated populations in the eastern United States (Adams 2003). The species occurs from near sea level in California (Adams 2003) to 9,500 feet in Colorado (Armstrong et al. 1994) and up to 10,400 feet in the White Mountains of Arizona (Pierson et al. 1999).

Habitat across the Species' Range

Biotic communities utilized by the species appear to vary geographically from arid plateaus in northern Mexico to primarily riparian communities in Kansas and Oklahoma (Kunz and Martin 1982). In New Mexico and Colorado (Armstrong et al. 1994) it appears to be more associated with mesic coniferous and deciduous forest and woodlands, as well as deciduous riparian woodland and semi-desert and montane shrubland. However, the physical characteristics of habitat are much more important to the species, especially the presence of caves or mines, which provide maternal roosts, hibernacula in winter, as and day and night roosting opportunities for males and non-breeding females (Armstrong et al. 1994). Townsend's big-eared bat is a cave-dwelling species that has adapted to a variety of human-made structures, most commonly mines (Pierson et al. 1999). It has also been found in abandoned buildings with cave-like attics, water diversion tunnels, and bridges. The most critical sites for this species appear to be the winter hibernacula, which are used by both sexes, and the summer maternity roosts used by the adult females and their young (Pierson et al. 1999). Townsend's big-eared bat does not normally share these roosts with other species. In the non-winter months males and non-reproductive females have day roost, night roost, and interim roost used before young are born in the spring or in fall before hibernation (Pierson et al. 1999). Physical habitat, especially the presence of caves or mines suitable for day and night roosting and for hibernation, is probably more important than the vegetative characteristics (Armstrong et al. 1994). Roosting habitats consist most frequently of caves and abandoned mines, but also include buildings, bridges, rock crevices, and hollow trees.

Habitat on the San Juan National Forest

Although natural caves are not abundant on the SJNF, considerable habitat is available for Townsend's big-eared bat in the numerous abandoned mines left from historic mining. These mines are not evenly distributed across the forest but tend to be concentrated in certain areas, such as Silverton and La Plata Canyon. Most of these sites tend to occur at higher elevations (>9,000 feet). Surveys performed at mines on Bureau of Land Management (BLM) lands near the Dolores River Canyon have identified several occupied sites at elevations as low as 7,700 feet (Navo et al. 2001). One of the largest winter roost sites in Colorado was found in the early 1990s at a patented mine on the Mancos-Dolores District of the SJNF. Colorado Department of Wildlife (CDOW, now CPW) biologists currently monitor the site. Elsewhere, CDOW volunteers conducted exit counts and trapped bats at various abandoned mines in La Plata Canyon during the early 1990s. No Townsend's big-eared bats were recorded during these surveys, nor have there been any other confirmed reports of this species elsewhere on the SJNF.

Primary Risk Factors

The primary threat from land use plan decisions are disturbance or destruction of roost sites caused by recreational caving, mine reclamation, and renewed mining in historical districts. This species is sensitive to disturbance and has been documented to abandon roost sites after human visitation. Disturbance to hibernacula in the winter months during temperature extremes may be critical. Both roosting and foraging habitats may be affected by timber harvest practices. In addition, pesticide spraying in forested and agricultural areas may affect the prey base (Western Bat Working Group 1998). The impacts of White Nose Syndrome on this species are not currently known at this time. Townsend's big-eared bats are cave obligate species and introduction of White Nose Syndrome into their environment could be detrimental to populations in Colorado.

1.2.2 Birds

American Bald Eagle

Background

The bald eagle (*Haliaeetus leucocephalus*) is a large bird of prey with a wingspan of approximately 6 to 7 feet. It is brown in color except for the white head and tail. Bald eagles feed primarily on fish they catch or take from other fish eating birds. They will feed on waterfowl and other birds, carrion, small to medium-sized mammals, and turtles. Although the bald eagle is an opportunistic feeder, preying on a wide variety of food sources, it has a strong preference for fish (Buehler 2000). Bald eagles will feed on big game animals that have died on their winter ranges. This carrion provides an important source of food during the winter. Waterfowl, particularly dead or crippled individuals, are an important source of food when fish are not readily available (USFWS 1998).

Status and Distribution

Found throughout the United States and Canada primarily near large bodies of water or larger streams and rivers. The winter range of the bald eagle includes most of its breeding range; however, most eagles winter from southern Alaska south to Arizona, New Mexico, and Colorado (USFWS 1998).

Habitat across the Species' Range

Breeding habitat is typically associated with water but actual distance to water varies within and among populations (Buehler 2000). Nesting occurs wherever adequate fish are available. Bald eagles exhibit a strong territorial and nest site fidelity and breeding areas are often reused in successive years. Therefore, its breeding and winter habitat is typically (but not always) associated with aqueous environments including rivers, large reservoirs, natural lakes, and ocean shoreline. It is also typically associated with forested habitats in proximity to these water environments for nesting, perching, and roosting (Buehler 2000). Bald eagles are generally considered sensitive to human disturbance and most often choose breeding and roost sites some distance from disturbance regimes. However, individuals and populations exhibit a wide range of sensitivity to disturbance, as indicated by flushing studies (Buehler 2000). Colorado serves primarily as winter habitat for the bald eagle but a small, though apparently increasing, number of nesters have been reported in recent years (Winternitz 1998). In Colorado nest sites are located most commonly along rivers, reservoirs, and natural lakes, and have been documented between roughly 4,500 and 8,500 feet in elevation (Andrews and Righter 1992; Winternitz 1998).

Habitat on the San Juan National Forest

On the SJNF there have been several confirmed nest sites within the forest boundary. Some potential nesting lakes on the SJNF include McPhee Reservoir, Lemon Reservoir, Electra Lake, Williams Creek Reservoir, and Vallecito Reservoir. The larger rivers on the SJNF including the San Juan, Piedra, Los Piños, and Animas all have the potential to contain bald eagle nests now or could provide future nesting habitat. Both the larger lakes/reservoirs and rivers on NFS lands provide fall, winter, and spring habitat for migrating bald eagles.

Primary Risk Factors

Food availability is the single most important factor affecting winter eagle distribution (USFWS 1998). Loss of habitat and prey sources could reduce populations. The bald eagle is also susceptible to poaching and human disturbance during nesting. The species is recovering from habitat degradation and pesticide related problems. Bald eagles, like the peregrine falcon (*Falco peregrinus*) are very sensitive to disturbance from the initiation of courtship to young fledging. This time period is roughly from mid-December to mid or late June. During this time period it is extremely sensitive to human disturbance activities and nest abandonment and desertion of long established territories may occur.

American Bittern

Background

The American bittern (*Botaurus lentiginosus*) is a solitary bird that occupies and breeds in freshwater wetlands throughout the middle and northern portion of the United States. It stalks wetlands for its most common foods, which are generally any small animal found in a marsh. These include insects, frogs, fish, snakes, meadow mice, and salamanders (Gibbs and Reid 1992; Yaeger 1998). Bitterns are generally secretive and difficult to find and observe (British Columbia Ministry of Environment 1998; Yaeger 1998). Little is known about this species (Yanishevsky and Petring-Rupp 1998), perhaps, due to its obscure nature (Yaeger 1998). Its most distinctive feature is its call, which has a thumping, "eerie, ventriloquistic quality" (Gibbs and Reid 1992). It is brown, medium-sized, with a robust body, thick long neck, and short legs (Cramp and Simmons 1977; Hancock and Kushlan 1984 in Gibbs and Reid 1992).

Status and Distribution

The American bittern breeds in freshwater wetlands throughout the middle and northern portion of the United States and most of Canada, wintering in the southern United States and Mexico (Gibbs and Reid 1992). Its breeding range is from the southern Northwest Territories, concentrates in Canada, and extends south through the Great Plains through northern Utah, Nevada, and south-central California. On the East Coast of the United States it extends from Maine to South Carolina (National Geographic Society 1987 in Dechant et al. 2001a). It is not common in Colorado (less than five documented sightings per year as noted by Dechant et al. 2001a), and due to lack of overall data on this species and perhaps because of its secretive nature, accurate population distribution is difficult to substantiate.

Habitat across the Species' Range

American bitterns prefer the edges of freshwater shorelines with tall, emergent vegetation (Gibbs and Reid 1992; Yanishevsky and Petring-Rupp 1998). Throughout their breeding habitat and migratory range, they prefer marshes and wetlands. They have been found in wetlands of all sizes ranging from 0.1 to 1,000 hectares (Gibbs and Reid 1992), but they prefer larger wetlands (Gibbs and Reid 1992) and tend to prefer shallow water, less than approximately 4 inches, so that they can stand (Yanishevsky and Petring-Rupp 1998). Foraging habitat is often vegetation fringes and shorelines, and stands of older, dense, or dry vegetation are seemingly avoided (Gibbs and Reid 1992).

Habitat on the San Juan National Forest

The SJNF has performed no formal surveys for this species, but it is considered rare here. In 1988 the Durango Bird Club (Andrews and Righter 1992) noted the American bittern was reported to have nested at Durango in La Plata County, but has rarely been observed. Unconfirmed vocalizations were detected on two separate occasions in 2000 in the wetlands below Turtle Lake in the Falls Creek area on the Columbine District.

Primary Risk Factors

The primary limiting factor for American bittern in Region 2 appears to be loss of breeding habitat, primarily through draining and conversion of wetlands for agricultural use. In addition, agricultural use of adjoining upland grasslands, human disturbance at breeding sites, degradation of habitat by grazing livestock, siltation, eutrophication, and contamination of water supplies with herbicides may all be having detrimental effects on bitterns (Wiggins 2006). The loss of wetlands disrupts breeding grounds and foraging habitat. Reduced size of wetlands also substantially alters habitat because the American bittern prefers large wetlands to small ones (Gibbs and Reid 1992) and habitats that are not isolated from other wetland habitats (Dechant etal. 2001a). The main cause of population declines has undoubtedly been the loss of habitat (Dechant etal. 2001a). Habitat fragmentation, pollution, and degradation can result in habitat loss. Other factors may include weather, nest predation, nest parasitism, human disturbance, and hunting.

American Peregrine Falcon

Background

The peregrine falcon is a grayish, medium-sized raptor with characteristics common to most other falcons, including a conspicuously toothed and notched bill, pointed wings, and narrow tail. The male approximates the size of an American crow (*Corvus brachyrhynchos*) while the female is more comparable in size to the common raven (*Corvus corax*) (Oregon State University 2001). It is distinguished from the similarly sized prairie falcon (*Falco mexicanus*) by its typically slate gray color and its heavy “sideburns” or “moustache,” as well as its uniformly barred and spotted light underbody and wings (Peterson 1990). The species was nearly extirpated from the state of Colorado in the late 1970s, but has since to recovered to more than 100 known breeding pairs. There are approximately 14 breeding pairs known to occur on or near the SJNF, with many of these sites having been continually occupied since the mid-1980s. Peregrine falcons are primarily aerial hunters of a wide variety of avian species (USFWS 1977). Although small to medium-sized passerines make up the primary diet of peregrines, they may also occasionally take larger prey such as waterfowl (NatureServe 2013). In addition to avian prey, peregrines may rarely take small mammals, such as bats and small rodents, and even lizards (NatureServe 2013). Young recently out of the nest may occasionally prey on insects, and migrating falcons are often observed catching and eating migrating dragonflies.

Status and Distribution

The peregrine falcon breeds on every continent excluding Antarctica (Craig 1986; Hickey 1969). The three subspecies occurring in North America occupy relatively distinct geographical regions. The North American tundra species (*Falco peregrinus tundruis*) breeds in the arctic tundra then migrates as far as Argentina during the winter (Craig 1986). *F.p. pealei* resides in the Pacific coastal regions from the Aleutian Islands to northern Washington. This subspecies is generally non-migratory during the winter. *F.p .anatum* (that found on the SJNF) has the most extensive breeding range of the subspecies in North American, extending from the taiga south through the eastern and western United States to northern Mexico. Its historic breeding range excludes the central and extreme southeast portion of the United States, as well as much of central Canada.

Habitat across the Species’ Range

In the western United States, breeding grounds for the peregrine falcon most commonly occur in mountainous areas near water sources (USFWS 1977). Peregrines prefer sites within 1,300 to 2,300 feet of perennial or ephemeral water (Pagel 1995). The preference for water features in proximity to nest sites is probably associated with the peregrine’s prey base (Johnsgard 1990). Cliff structures are most often chosen for nest sites and cliffs are the only sites known in Colorado, but ground nesting has been commonly documented in most arctic areas. The peregrine hunts over a variety of habitat types and uses large hunting territories, extending to a radius of 12 to 18 miles from its nest site (Craig 1986). However, its hunting range is often skewed to favor watercourses (Towry 1984). Preferred hunting habitats include meadows and large open parks, river bottoms, marshes, lakes, cropland, and other features that attract abundant bird life (USFWS 1977). Foraging habitat often includes lookout perches on cliffs or tall trees and snags (Craig 1986).

Habitat on the San Juan National Forest

On the SJNF and throughout Colorado, breeding territories are found almost exclusively on high walls of tall cliffs in river gorges and along mountainsides (Craig 1986). Suitable breeding habitat for the peregrine falcon is present on all districts of the SJNF, and occupied sites occur on nearly all the major drainages (Dolores, Animas, Pine, Piedra, and San Juan Rivers). Breeding sites on the SJNF are usually occupied March through August. Typical nesting locations in Colorado range from 4,500 to 9,000 feet (Colorado Partners in Flight 2000) but on the SJNF exceed 10,500 feet at several sites. A definite preference is noted for south-facing, inaccessible cliffs with multiple ledges, which are used for nesting, roosting, eating, and food transfer (USFWS 1977). The preference for a southern exposure tends to increase with increasing latitude (USFWS 1977). Vertical rise on cliff faces generally exceed 100 feet with typical cliffs ranging between 200 to 300 feet (USFWS 1977), but on the SJNF cliff faces average greater than 300 feet and exceed 600 feet at a number of sites. Preferred cliffs generally rise high above the adjacent landscape and offer a good vantage point for prey and predators.

Primary Risk Factors

Limiting factors include limited suitable nesting habitat, prey availability, fragmentation of hunting territories, limited recruitment of young into the population, weather, predation, competition, sensitivity to pesticides, parasites and disease, and sensitivity to human disturbance.

Black Swift

Background

The black swift (*Cypseloides niger*) is the single representative of the nine species in the genus *Cypeseloides* to occur north of Sinaloa, Mexico (Chantler and Driessens 1995). This species has the unique characteristic of nesting in colonies on cliffs in close association with mountain waterfalls, often within the spray zone of rushing water. Although this species was first identified in Colorado in 1881 near Silverton (Knorr 1961), breeding in the state was not confirmed until 1949 (Knorr and Baily 1950). Breeding occurs June through mid-September.

Status and Distribution

The black swift is sparsely distributed in isolated colonies over western North America with Colorado populations representing a relatively large proportion of the known world population for this species (Boyle 1998a). The black swift is a neotropical migrant ranging as far south as Columbia during its winter migration (Stiles and Negret 1994). They have been observed roosting in Columbia in a steep river gorge in which swifts, in loose intraspecific colonies, clung to cliff walls overlooking the river (Stiles and Negret 1994).

Habitat across the Species' Range

Although the black swift primarily occurs in mountain regions in its continental range it has also been identified in the western coastal cliff regions on the Pacific in California (Chantler and Driessens 1995). In its mountainous habitats it forages over a range of habitats but is highly specific in its breeding site preference. Nest sites are almost always located on precipitous cliffs near or behind waterfalls (Hunter and Baldwin 1962; Knorr 1961). Knorr (1961, 1993) identified six requirements of nesting habitat for this species:

- **Water:** Black swifts nest in close proximity to water varying in degree from a rushing torrent to a mere trickle, although the former seems to be preferred.Nests are placed within the spray zone or directly behind sheets of falling water (Knorr 1961:).
- **High Relief:** Nest sites have a commanding position above surrounding terrain enabling birds to automatically attain feeding altitude by flying out of nest horizontally.
- **Inaccessibility:** Nests are almost always inaccessible to terrestrial predators.
- **Darkness:** Nests are almost always placed in positions where the sun rarely shines directly upon it. Additionally, nests are typically placed in darker recesses if available.
- **Unobstructed Flyways:** Black swifts appear to choose sites, which allow them to fly to and from the nest without flying through a "maze" of branches.
- **Presence of Niches in Rock for Nests:** Apparently sites with rock that offer no pockets, crannies, ledges, or shelves for nest placement appear to be avoided.
- **Moss Availability:** Black swifts build their nest primarily from mosses that grow in the wet environments around the nesting site (Knorr 1993).

Nest sites range in elevation from sea level in California to roughly 11,000 feet in Colorado (Bailey and Niedrach 1965) and occur within a wide range of surrounding habitats. During foraging activities the black swift ranges at high elevation over most montane and adjacent lowland habitats (Andrews and Righter 1992). Foraging often occurs far from nesting areas (Boyle 1998a).

Habitat on the San Juan National Forest

The SJNF has identified 46 potential or occupied nesting sites on waterfalls across the SJNF. Within Colorado, the San Juan Mountains have been identified as having the most concentrated occurrences of black swift.

Primary Risk Factors

Limiting factors include changes to microsite characteristics of suitable breeding habitat, small colony size, small clutch size, low regional populations, reproductive success, predation, human harassment, and pesticides.

Boreal Owl

Background

The boreal owl (*Aegolius funereus*) is a small forest owl found in boreal and subalpine forest habitats. There are seven recognized subspecies of boreal owl, one of which occurs in North America (*A.f. richardsoni*) . Although it has been well studied in Scandinavia, where it is the most abundant forest owl, its biology in North America has been less thoroughly examined (Hayward and Hayward 1993). Based on the limited studies performed to date in North America it appears that the biology and ecology of this species varies geographically and is strongly related to local forest conditions. Therefore, the more extensive Scandinavian studies on this species may not be directly applicable to North American populations. Due to its secretive behavior and to a general lack of survey effort this species was considered rare to uncommon in the mountains of Colorado until relatively recently (Andrews and Righter 1992; Yanishevsky and Petring-Rupp 1998; Palmer 1986) and was not confirmed on the SJNF until 1993 (Schultz 1996a). However, recent investigations may indicate that the species is more prevalent than previously thought within the state and within this portion of the state (Holland and Schultz 1993, 1994; Palmer 1986; Shultz 1996). Prey is primarily small mammals, especially the red-backed vole, which makes up 25% to 50% of their diet (Hayward and Hayward 1989). They are opportunistic hunters, and their summer diet is varied, including insects, jumping mice, chipmunks, birds, pocket gophers, shrews, deer mice, and voles.

Status and Distribution

In North America, the boreal owl is a year-round resident through Canada's boreal forest from the Yukon to Newfoundland. Scattered populations occur in northern Minnesota, the Cascade ranges, and south in the Rocky Mountains into north-central New Mexico (Ryder 1998). In the Rocky Mountains, Blue Mountains, and Cascade ranges they are restricted to subalpine forests (Hayward and Hayward 1993).

Habitat across the Species' Range

In the Rocky Mountains the boreal owl is most closely associated with dense, mature, and late successional (>150 years) coniferous forest (Ryder 1998). This association with older forests may be at least partly due to the presence of available nest cavities. It appears to prefer mature and old growth spruce-fir forests but is also known to occasionally frequent lodgepole pine, Douglas fir, and aspen (*Populus* sp.) forests and may migrate to other lower elevational forest types during periods of nomadism (Hayward 1997; Palmer 1986; Ryder 1998). In Colorado, this species also exhibits a strong preference for mature spruce-fir forest over other forest types (Palmer 1986; Schultz 1996a). Owls in the state are generally found above 8,856 feet in elevation (Palmer 1986; Ryder et al. 1987). Breeding locations are most often found above 10,000 feet (Palmer 1986).

Habitat on the San Juan National Forest

Studies on the SJNF and Grand Mesa, Uncompahgre, and Gunnison National Forests (Holland and Schultz 1993; Schultz 1996a) suggest that mature spruce-fir forests are preferred breeding habitat for local populations of boreal owls in southwest Colorado. However, in this and other regions, younger stands and mature aspen may occasionally be used if cavities are present (Hayward and Hayward 1993; Schultz 2001). In a 6-year census study in Colorado, Palmer and Ryder (1984 in Palmer 1986) found that active territories were most often located in high elevation forests (9,100–10,800 feet) and that lower elevational mixed forest (presumably below 9,000 feet) were only used during years of owl abundance. Their study suggests that high elevational spruce-fir provides optimum habitat and that individuals radiate outward from the center of best adaptation only when more optimal habitat niches are filled (Palmer 1986). Owls do not appear to roost in cavities, but instead rest on limbs near the bole of the tree. Roost trees in Idaho and Colorado appear to be almost exclusively conifers (Hayward et al. 1993; Palmer 1986).The affinity of the boreal owl in Colorado to closed canopy mature subalpine spruce-fir forest may be a direct relationship to its preferred prey (southern red-backed vole), which also occurs at its highest density in the state within similar forest habitats (Schultz 1996a).

Primary Risk Factors

Thermal stress likely limits the elevational distribution of this species (Hayward 1997). Therefore, the availability of cool microsites, which often occur in mature forests may be a significant limiting factor in some regions (Hayward 1997). The boreal owl is vulnerable to predation by several species. American marten is probably the most important predator at the nest, preying on both owlets and nesting females (Hayward and Hayward 1993). Winter and spring are critical time periods for boreal owl survival and annual productivity. Overwinter survival is an important factor in determining population abundance, and female body condition in spring is correlated with female reproductive output the following summer (Hayward et al. 1993). Currently within the planning area, insect and disease activity is increasing due to drought and forest stand conditions that are unnaturally dense and old because of fire suppression and past management practices. However, the ongoing spruce beetle (*Dendroctonus rufipennis*) outbreak that started in 1996 has killed most of the overstory and midstory Engelmann spruce across an estimated 130,000 acres on the eastern side of the SJNF.) Spruce-fir habitat on the forest impacted by the spruce beetle epidemic may be a limiting factor to boreal owl and availability of prey as canopy cover decreases and trees die off. Studies in North America and Europe indicate that owl productivity and population demographics (clutch size, hatching rate, fledging rate, number of breeding pairs, adult survival) are directly related to prey availability (Hayward and Verner 1994). Hayward (1997:) concludes that cavity availability and prey availability likely interact to influence boreal owl population growth. Tree cavities occur non-randomly across the landscape, as do small mammal populations. The spatial arrangement of cavities and prey (relative to one another) are important in determining boreal owl abundance. The conservation status of boreal owls will be intimately tied to the interaction of these resources.

Brewer’s Sparrow

Background

Brewer’s sparrow (*Spizella breweri*) is an obligate of sagebrush (*Artemisia* sp.) communities (Braun et al. 1976; Paige and Ritter 1999). Brewer’s sparrow is a species of conservation concern across much of its western range because of declines in sagebrush habitat and breeding populations. In spring and summer Brewer’s sparrow consumes many insects (e.g., alfalfa weevils, aphids, beet leafhoppers, caterpillars, beetles). In fall and winter it feeds on seeds. Brewer’s sparrows forage mainly on the ground. They drink free water when available and will bathe in standing water, but they are adapted to arid environments and can physiologically adjust to water deprivation, obtaining water from foods (Dawson et al. 1979; Rotenberry et al. 1999).

Status and Distribution

Brewer’s sparrow is concentrated in the Great Basin from the eastern half of Washington and southern British Columbia to southwestern Saskatchewan (Smith 1996), and most of Montana, except portions of the northwest and northeast of the state. It is also found in the southern sections of Idaho through eastern Oregon, eastern California, and the northern sections of the Mojave Desert (Small 1994). This subspecies extends through all of Nevada, Utah, Wyoming, northern Arizona, northwestern New Mexico, and western, central, and eastern Colorado (Andrews and Righter 1992; Hubbard 1978).

Habitat across the Species' Range

Throughout most of the species' breeding range, it is most closely associated with landscapes dominated by big sagebrush (*Artemisia tridentata*) (Rotenberry et al. 1999; Wiens and Rotenberry 1981) with an average canopy height of less than 5 feet (Rotenberry et al. 1999). It also occurs in shrubby openings in pinyon-juniper and mountain mahogany (*Cercocarpus spp.*) woodlands (Sedgwick 1987) and large shrubby parklands within coniferous forests (Rotenberry et al. 1999). Sagebrush in Colorado occurs at elevations of approximately 4,000 to 10,000 feet and exists in a variety of climatic conditions, including low-elevation semi-desert habitats and moist, cool, mountainous areas. Perhaps 30% of Colorado's sagebrush was altered between 1900 and 1974 (Braun et al. 1976), and the ecological integrity of Colorado's sagebrush shrublands has been compromised by the invasion of exotic (e.g., cheatgrass [*Bromus tectorum*]) or native (e.g., pinyon-juniper) plant species, conversion to agricultural, residential, and other developed land types, and changes in natural fire regimes (Beidleman 2000).

Habitat on the San Juan National Forest

Brewer's sparrow is thought to occur in the suitable lower elevation sagebrush types on NFS lands of the SJNF. Indication of abundance is unknown at present.

Primary Risk Factors

The declines in Brewer's sparrow breeding populations are likely linked to extensive alteration of sagebrush shrub steppe habitats. Though widespread, this habitat constitutes one of the most endangered ecosystems in North America due to extensive, ecologically transformative influences of livestock grazing, followed by alteration of natural fire regimes and invasion by exotic plant species, especially cheatgrass. Threats and limiting factors for Brewer's sparrow are habitat loss and fragmentation, agriculture, prescribed burning in sagebrush habitat, oil and gas development, and livestock grazing.

Ferruginous Hawk

Background

The ferruginous hawk (*Buteo regalis*) is the largest of all North American buteos, typically 23 inches in length, with males weighing approximately 1,000 grams and females typically 1.3 times larger than the males (Preston 1998). As the name suggests, typical adults have reddish brown upper parts with a white patch at base of primaries (Preston 1998). This species inhabits open terrain such as grasslands and semi-desert shrublands and feeds almost exclusively on medium-sized mammals found in these habitats (Bechard and Schmutz 1995).

Status and Distribution

The breeding range of the ferruginous hawk is the smallest of any North American buteo (Preston 1998) with nesting activity identified in only 17 states and three provinces in Canada (Bechard and Schmutz 1995). The species winters primarily from the central and southern parts of breeding range south to Mexico. In Colorado it is a fairly common to common winter resident on eastern plains and uncommon to rare in western valleys and mountain parks (Andrews and Righter 1992; Preston 1998). It is an uncommon fall and winter resident in southwest Colorado (Durango Bird Club 1992). The SJNF is out of the breeding portion of the species range (NatureServe 2013). Overwintering on the SJNF occurs, but is considered uncommon to rare in this portion of the species' range.

Habitat across the Species' Range

Ferruginous hawks primarily inhabit grasslands and semi-desert shrublands, and are rare in pinyon-juniper woodlands (Andrews and Righter 1992; Preston 1998). This species nests in trees and bushes, and on ledges, large rocks, riverbanks, and hillsides (Dechant et al. 2003; Finch 1992). Ferruginous hawks forage on native grasslands where nest sites are scarce, and as a consequence, individuals reuse nest sites until the structures are sometimes over 3 feet in height. Ferruginous hawks hunt from a perch, while soaring, during low, rapid flight over open country, or while systematically searching and hovering at

40 to 60 feet (Dechant et al. 2003; Finch 1992). They feed primarily on rabbits, ground squirrels, and prairie dogs, but will also take mice, rats, gophers, birds, snakes, locusts, and crickets (Dechant et al. 2003).

Habitat on the San Juan National Forest

On the SJNF, its occurrence during the non-breeding season is limited to more open areas that are suitable for hunting, and that contain sufficient densities of small mammal prey, such as prairie dogs and ground squirrels, during snow-free seasons. Fall and spring (i.e., during snow-free periods of the non-breeding season) are the most likely time periods this hawk might occur on the SJNF.

Primary Risk Factors

Limiting factors for ferruginous hawks are nest site and prey availability (Dechant et al. 2003), habitat loss, predation, and human disturbance.

Flammulated Owl

Background

The flammulated owl (*Otus flammeolus*) is perhaps the most common raptor in montane pine forests of the western United States (McCallum 1994). It is a tiny obligate secondary cavity nester that is entirely insectivorous (McCallum et al. 1994). Flammulated owls appear to be opportunistic insectivores (McCallum et al. 1994). During cold spring and early summer nights, the owls feed almost entirely on insects, adult lepidoptera such as noctuids (Reynolds and Linkhart 1992). Noctuids are large cold-hardy moths that are abundant in spring and fall (McCallum et al. 1994). As summer progresses and other arthropods become available, lepidopteran larvae, grasshoppers, spiders, crickets, and beetles are added to their diet (McCallum et al. 1994).

Status and Distribution

The flammulated owl a western mountain species that breeds locally from southern British Columbia, southern Idaho, and northern Colorado south to southern California, southern Arizona, southern New Mexico, western Texas, and from Mexico south to Guatemala (DeGraaf et al. 1991; Hayward and Verner 1994). It is a Neotropical migrant that winters in Mexico, casually north to southern California (DeGraaf et al. 1991). In Colorado, the flammulated owl is an uncommon to common summer resident in foothills and lower mountains, and is most common in western and southern Colorado (Winn 1998).

Habitat across the Species' Range

Flammulated owl depends on tree cavities for nesting, open forests for catching insects, and brush or dense foliage for roosting (Winn 1998). They are associated with mature/old growth ponderosa pine and mixed conifer, and mature aspen (Reynolds and Linkhart 1992; Winn 1998). As an obligate secondary cavity nester, the species depends on the presence of snags and decaying trees of sufficient diameter to contain nest cavities and the presence of woodpeckers to construct suitable nest cavities. Male foraging, territorial defense, resting, and day roosting were restricted to a home range that averages 33 acres (Reynolds and Linkhart 1987). Flammulated owls forage intensively near the nest, and open vegetation is preferred for foraging (Reynolds and Linkhart 1987). In contrast to foraging habitat, which includes numerous interior edges, preferred roosting habitat appears to be dense vegetation (McCallum et al. 1994).

Habitat on the San Juan National Forest

Even though flammulated owls apparently use and breed in a variety of habitats, a review of the recent literature seems to indicate a strong preference for older ponderosa pine and warm dry mixed conifer sites containing older forest structures. Additionally, specific factors, particularly snag densities or cavity availability, would be necessary components determining suitable habitat. Flammulated owl have been found and confirmed to nest on all ranger districts on the SJNF and appear to be reasonably abundant and widespread on the SJNF during the breeding season. This species shows very high fidelity to breeding sites in Colorado (Reynolds and Linkhart 1987, 1992).

Primary Risk Factors

The flammulated owl, though widespread and locally abundant, is a habitat specialist with low and unvarying fertility (McCallum et al. 1994). Its range and abundance are functions of the range and abundance of its preferred habitat, not its own ecological amplitude or adaptability. Limited availability of suitable nest cavities and fragmentation of habitat may act as limiting factors for this species.

Lewis' Woodpecker

Background

Lewis' woodpecker (*Melanerpes lewis*) has unique characteristics that set it apart from other North American woodpeckers. It is opportunistic in its feeding habits, eating mostly insects in summer and switching in winter to acorns and other nuts, which are cached during the non-winter months (Abele et al. 2004; Bock 1970; Tobalske 1997). It is adept at capturing insects aerially through a variety of complex maneuvers, and, although it may glean from the surfaces and crevices of tree bark, it seldom excavates for wood-boring insects (Abele et al. 2004; Bock 1970; Tobalske 1997).

Status and Distribution

Lewis' woodpecker breeds from southern British Columbia to southwestern South Dakota and northwestern Nebraska south to south-central California, central Arizona, southern New Mexico, and eastern Colorado. In Colorado, the Lewis' woodpecker breeds in foothills, valleys, plains and mesas in the southern part of the state, and along the front range from Wyoming to New Mexico It winters from northern Oregon, southern Idaho, central Colorado, and south-central Nebraska south irregularly to northern Baja California, northern Mexico, southern New Mexico, and west Texas (DeGraaf et al. 1991).

Habitat across the Species' Range

Bock (1970) described the major breeding habitat of the Lewis' woodpecker as ponderosa pine throughout its range. However, they are now found in riparian habitats at a higher frequency than in upland conifer and woodland habitats (Kuenning 1998). Some researchers have suggested an elevational relationship in which ponderosa pine forests are preferred at higher elevations and open riparian forests at low elevations (Tobalske 1997). Canopy closures of 30% are considered optimal for this species and closures greater than 75% are considered unsuitable (Yanishevsky and Petring-Rupp 1998). Nest sites are associated with the presence of abundant free-living insects, open canopy forests or tree clusters, standing dead trees, and dense ground cover in the form of downed material, grasses, and shrubs (Abele et al. 2004; Tobalske 1997). Burned ponderosa pine forest may represent ideal habitat for nesting, although suitability may vary with numbers of years after fire and the intensity of the burn (Bock 1970; Linder 1994; Raphael and White 1984). Snags are important to the Lewis' woodpecker as nesting sites and as perching sites from which to hawk insect prey. Populations are positively correlated with snag density and at least one living or dead snag/acre is required to maintain fully occupied territories (Yanishevsky and Petring-Rupp 1998). A shrub crown cover of 50% is considered optimal and habitat featuring no shrub cover is considered unsuitable (Yanishevsky and Petring-Rupp 1998). The shrub component is apparently significant in providing an abundance of insect prey. However, shrubby understories appear to be of less importance in riparian areas and oak woodlands (Yanishevsky and Petring-Rupp 1998).

Habitat on the San Juan National Forest

Although Lewis' woodpecker uses a variety of habitats that are found on the SJNF, primary habitats are open, mature ponderosa pine and deciduous riparian woodland (cottonwood/box elder [*Populus/Acer negundo*]) communities during the breeding season, and mature oak woodlands during the non-breeding season (Schultz 1996b). In eastern Colorado, it inhabits cottonwood communities in close proximity to ponderosa pine or pinyon-juniper woodlands (Andrews and Righter 1992; Kuenning 1998; Yanishevsky and Petring-Rupp 1998). It seems to be especially common in the Durango area and La Plata County

(Andrews and Righter 1992). The Durango Bird Club (1992) considers this species a common year-round resident in southwest Colorado. This species occurs on all districts of the SJNF and is relatively common and locally abundant in suitable habitats across the SJNF (Schultz 1996b).

Primary Risk Factors

Lewis' woodpecker requires specific structures and characteristics in its habitat, including relatively high snag densities with well decomposed snags to provide existing cavities or in which to construct new cavities. Their restricted ability to construct cavities may be a limiting factor of nest-site availability in some populations (Abele et al. 2004). They also require low-medium crown closures, well-developed shrub cover to supply insect prey, mast and berries, and caching sites. Broad-scale population declines and reductions in distribution have been attributed to declining availability of suitable trees for nesting and mast storage (Tobalske 1997). Competition for native mast may regulate wintering populations (Abele et al. 2004). Reductions in primary habitat have occurred through the loss of mature stands of ponderosa pine and in declining stands of riparian cottonwood forests. Most of the ponderosa pine forest type on the SJNF is outside its HRV from fire suppression, grazing, logging, and snag removal or loss (Romme et al. 1997). The availability of burned forests, which appear to be important habitat for this species, has probably declined as a result of fire suppression. Cottonwood riparian habitats, which serve as both breeding and wintering habitat, have also declined through grazing, clearing for pasture and agriculture, exotic shrub invasion, and water diversion (Abele et al. 2004; Tobalske 1997). They are competitive with the European starling (*Sturnus vulgaris*) for nest sites and high rates of territorial encounters with starlings may reduce reproductive success, even if the woodpecker dominates the interaction (Tobalske 1997). The most critical time period on the SJNF is likely to be during winter for overwinter survival.

Loggerhead Shrike

Background

The loggerhead shrike (*Lanius ludovicianus*) is a small avian predator that inhabits open country with scattered or clustered shrubs or small trees. It occupies a distinctive position in avian communities by preying on reptiles, mammals, and other birds, as well as invertebrates. The shrike has adapted to the problem of eating large prey by hunting from perches and impaling its prey on sharp objects. The diet of the loggerhead shrike is composed mostly of insects (83%), with the remainder made up of small mammals, birds, and reptiles. Sometimes it hawks for aerial insects, but it takes most of its prey as it dives to the ground from elevated perches such as fence posts or utility lines (Dechant et al. 2001b). It may pursue birds in rapid, sustained flight, knocking them to the ground with a blow from the beak (DeGraaf et al. 1991). They nest earlier than most other passerines. Nests are bulky, cup-shaped, and located in trees or large shrubs 3 to 30 feet high (DeGraaf et al. 1991). Nests are well below the crown in a crotch or large branch and are typically well hidden.

Status and Distribution

The loggerhead shrike occurs across the United States, from central Washington, the Canadian prairies and Virginia in the north, to the southern states and central plains (except for heavily forested higher mountains and higher portions of the desert) (Yosef 1996). The southern range extends to Baja California and Mexico, at elevations of 4,920 to 7,880 feet. The southern states and central plains, not including eastern Colorado, support the highest densities (Carter 1998a). The northern populations are migratory, whereas the southern populations tend to be resident (Yosef 1996). They winter from Nevada and Virginia to southern Mexico. Despite its wide distribution, the loggerhead shrike is one of the few North American passerines whose populations have declined continent-wide in recent decades (Yosef 1996). In Colorado, there are distinct concentrations of loggerhead shrikes in the eastern portion of the state, and a few breeding pairs in isolated pockets in the south-central, western, and northwestern regions of the state (Carter 1998a). Populations on the Colorado's eastern plains appear to be increasing, but those on the western slope may be declining (Carter 1998a).

Habitat across the Species' Range

Loggerhead shrikes prefer open habitat characterized by grasses interspersed with bare ground and shrubs or low trees for nesting and perching (Dechant et al. 2001b). Non-breeding habitat is the more open country from prairies and agricultural lands to montane meadows. Nesting habitat includes sagebrush, desert scrub, pinyon-juniper woodlands, and woodland edges (Dechant et al. 2001b). Breeding birds are usually near isolated trees or large shrubs.

Habitat on the San Juan National Forest

No shrike nests have been documented on NFS lands of the SJNF and suitable breeding habitat appears to be rare on the SJNF. It is unlikely to winter on the SJNF due to normally deep snows and lack of prey. The nesting season (May through August) is the most critical time period on the SJNF as they are absent during late fall, winter and early spring.

Primary Risk Factors

Habitat loss is considered to be a major limiting factor of shrike populations throughout the United States (Carter 1998a; Yanishevsky and Petring-Rupp 1998). Conversions of grasslands to agricultural land, removal of trees or hedgerows, and urbanization are also limiting factors and have significantly reduced nesting and foraging habitat. Food limitation resulting in brood reduction (cannibalism) has been observed in shrikes, leading to suggestions that food limits reproductive output in some populations (Yosef 1996).

Northern Goshawk

Background

The northern goshawk (*Accipiter gentiles*) is large-bodied raptor that is holarctic in distribution, meaning it is limited to northern hemispheres. Goshawks prey primarily on medium-sized forest birds and mammals. The majority of the important prey species reside mainly on the ground and in the lower portions of the tree canopy (Reynolds et al. 1992). Frequently noted prey species include a wide variety of small mammal and bird species.

Status and Distribution

In North America, it occurs from central California, Arizona, northern New Mexico, north and northeast through New Mexico, Colorado, and South Dakota east across the southern Lake States and south into the Appalachian Mountains to North Carolina (Braun et al. 1996; Kennedy 2003). In Colorado, the northern goshawk is considered an uncommon resident in foothills and mountains within the western portion of the state (Andrews and Righter 1992; Barrett 1998a). It is considered to be a winter resident throughout its range, but some individuals winter outside their breeding areas and undertake short-distance migrations (Kennedy 2003).

Habitat across the Species' Range

Reynolds et al. (1992) consider the northern goshawk a forest generalist because it occurs in all major forest types (coniferous, deciduous, and mixed). Mature forest structures appear to be an important component in the goshawks nesting home range. It has been noted, however, that the goshawk seldom uses young dense forests. Researchers suggest that the reasons for avoidance of these areas may be due to insufficient space in and below the canopy to facilitate flight and prey capture. Additionally, due to the absence of larger trees, these areas would offer few opportunities for nesting. Goshawks exhibit high breeding territory fidelity from year to year (Kennedy 2003). All montane forest types are used for nesting (Barrett 1998a; Kennedy 2003). Nest areas have a relatively high tree canopy cover and a high density of large trees. Nests are typically located on shallow slopes with northerly exposures or in drainages or canyon bottoms protected by such slopes and are usually within close proximity to water (Barrett 1998a; Reynolds et al. 1992). Nest trees are often the largest trees in the stand and are frequently situated adjacent to breaks in the canopy such as old logging trails or openings created by fallen trees (Hennessy 1978; Kennedy 2003; Reynolds et al. 1992; Shuster 1980). Shuster (1980) also noted a relatively low level of understory vegetation in the general area of the nest site. Goshawks may select nest sites based on stand structural features, then select an appropriate nest tree (Kennedy 2003). Winter habitat use by goshawks is described as “a variety of vegetation types, such as forests, woodlands, shrub lands, and forested riparian strips” (Kennedy 2003:64)..

Habitat on the San Juan National Forest

Breeding territories have been found on all ranger districts/field offices of the SJNF and in all forested habitat types. Foraging individuals are regularly seen in a wide variety of habitat types across the SJNF.

Primary Risk Factors

There are a number of factors cited by researchers and managers as potentially detrimental to current and future goshawk viability. These include, but may not be limited to, habitat alteration, direct human disturbance, pesticides and other contaminants, and harvest for falconry. However, the primary concern throughout the range of the goshawk is habitat alteration due to timber and fire management practices. Additionally, the recent alterations of habitat due to insects and diseases in Colorado has changed goshawk habitat across the state. Prey availability and predation limit goshawk reproduction and recruitment (Kennedy 2003). Density-dependent territoriality may regulate population growth rate (Kennedy 2003). Prey availability affect populations in at least two different ways. First, low prey availability can reduce reproductive output or cause total nest failure (Boal and Mannan 1994). Low prey availability may also result in larger territories, thereby limiting the total number of territories within a given landscape of suitable habitat (Crocker-Bedford 1998; Kennedy et al. 1994). Clonal aspen stands within ponderosa pine and other conifer forest types are often used for nesting and may be important areas for foraging due to higher concentrations and diversity of prey species (Joy 1990; Shuster 1994). Aspen inclusions within pine and conifer forest types used for nesting by goshawks have been lost from the SJNF because of stand aging and lack of disturbance or subsequent regeneration due to fire suppression, and in some cases, browsing by domestic and native ungulates. During winter, prey abundance and not habitat per se may be an important factor in determining goshawk habitat use (Kennedy 2003). The nesting season (April–August) is likely to be the most critical time period and the most vulnerable to disturbance for goshawks on the SJNF.

Northern Harrier

Background

The northern harrier (*Circus cyaneus*) is a slender, medium-sized raptor with long wings and a long tail, and slender legs (MacWhirter and Bildstein 1996). The northern harrier is distinguished from other raptors by its low, coursing flight, and its distinctive, narrow wings, slim tail, and white rump patch (MacWhirter and Bildstein 1996). Voles and other small rodents, captured on the ground after a short pounce, are the primary prey of northern harriers. Harriers also prey on other mammals, small birds, reptiles, amphibians and large insects (Bildstein and Gollop 1988).

Status and Distribution

Northern harriers breed throughout North America and parts of Eurasia, but reach their highest densities in North America in the prairie-pothole region of the United States and Canada (Carter 1998b; Dechant et al. 2002; Price et al. 1995). Northern harriers reside throughout most of Colorado, but are usually more abundant during migration than during the breeding season (Andrews and Righter 1992).

Habitat across the Species’ Range

Harriers prefer open habitats with tall, dense vegetation, and abundant residual vegetation, wetlands, wet or dry grasslands, lightly grazed pastures, croplands and fallow fields, brushy areas, and dry shrublands (Dechant et al. 2002; Hamerstrom 1986). Breeding northern harriers require large tracts (greater than 100 ha) of habitat. In late summer, they forage up to alpine tundra (Carter 1998b). They breed in a variety of open habitats with tall cover from marshes to grasslands, such as cattail and reed marshes, emergent wetlands, grasslands, and tall desert shrublands (Carter 1998b; Dechant et al. 2002; Hamerstrom 1986). Whether nesting in dry upland or wetland habitats, harriers appear to be associated with large tracts of undisturbed habitat (MacWhirter and Bildstein 1996).

Habitat on the San Juan National Forest

Northern harrier are seen occasionally in summer on the NFS lands of the SJNF and may breed in some large open parks and wetlands; however, very few of these types of habitats are present on the forest.

Primary Risk Factors

Harrier populations have been difficult to monitor because of their relatively low density and shift breeding sites in response to prey availability. Nevertheless, there is substantial evidence that populations have declined, significantly in some locations, and these declines are primarily attributed to habitat loss, habitat fragmentation, and degradation of breeding and non-breeding habitat (MacWhirter and Bildstein 1996). Intensive grazing, annual burning, tilling, or mowing in harrier nesting habitat during the nesting season can significantly reduce harrier nest success and prevent successful nesting in some areas (Dechant et al. 2002). However, periodic disturbance, such as burning every 3 to 5 years, or light to moderate grazing may help maintain habitat for harrier nesting and their primary small mammal prey (Bock et al. 1993; Hands et al. 1989). Harriers declined in the 1970s due to effects of insecticides, but declines have continued, probably due to loss of wetlands and conversion of grassland breeding habitats to agricultural uses (Carter 1998b).

Olive-sided Flycatcher

Background

The olive-sided flycatcher (*Contopus cooperi*) is one of the most recognizable bird species of North America’s coniferous forests due to its distinctive song (quick, three beers) and its habit of singing from tall, prominent perches (Altman and Sallabanks 2000). Due to their foraging strategy, which involves sallying for insects from high perches, they prefer the edges of open habitats that provide both abundant prey and high visibility for detecting prey (Altman 1997). Almost all food captured are flying insects taken in aerial pursuit by sallying from and returning to the same or another prominent perch (Altman 1997). Bees, wasps, honeybees, flying ants, and dragonflies make up a high percentage of diet during the breeding season (Altman 1997; Wright 1997). Other reported prey includes flies (Diptera), beetles, grasshoppers, true bugs, and moths (Altman and Sallabanks 2000). The olive-sided flycatcher returns to its breeding habitat in the southern Rocky Mountains in May, initiates pair bonds, and begins actively building nests by late May or early June (S.L. Jones 1998). They construct open cup nests that are often placed well out on the tip of a horizontal branch most often in coniferous trees.

Status and Distribution

The olive-sided flycatcher is a neotropical migrant, with most of its breeding range in North America and its wintering grounds in Central and South America. There has been a significant population decline of about 3.5% per year since 1966 across its entire North American breeding range, amounting to a loss of about three-quarters of the population over the 30-year span (Sauer et al. 2004). Within its breeding range, which includes the western mountains of the United States, much of Canada and Alaska, and scattered populations in the eastern United States, it is primarily an inhabitant of coniferous forest (Altman and Sallabanks 2000). The western North America breeding range extends south from south-central Alaska eastward through Canada to north-central Manitoba. It extends south in the Rocky Mountains to the higher elevations of northeastern Arizona, northern New Mexico, and western Texas, and the Sierra Nevada south to northern Baja California (Altman 1997). The species is a well distributed and relatively common breeding bird throughout montane portions of western Colorado (S.L. Jones 1998).

Habitat across the Species’ Range

Olive-sided flycatcher breeding habitat has two primary components, snags for singing and foraging perches, and conifers for nesting. Flycatcher territories almost always include natural forest openings, bogs, beaver ponds, wetlands, steams, riparian areas, streams, lake shores, or old burned and logged areas (S.L. Jones 1998). Hutto (1995) and Altman (1999) suggest that flycatchers have evolved as early post-fire dependent species and that managed forest may represent an ecological sink. The nest is typically located in live conifers, although deciduous trees (i.e., aspen) may be used in some areas. Territory sizes are highly variable but generally large for a passerine bird with pairs well-spaced apart

(Altman 1997). Initial habitat groups developed for the Monitoring Colorado's Birds Program (Leukering et al. 2000) placed the olive-sided flycatcher in with other Colorado species that had their highest detection rates in aspen. Monitoring information for 2000, however, recorded the highest densities in high-elevation riparian habitat (Leukering et al. 2001). These detections coincide with natural openings and edges near riparian zones in the spruce-fir land type and indicate a habitat relationship similar to that described in the Colorado Landbird Conservation Plan (Beidleman 2000). Monitoring information for 2001 varied again and found the highest detections in ponderosa pine, mixed conifer, and spruce-fir, respectively (Leukering et al. 2002). This information suggests that the olive-sided flycatcher uses a wide variety of habitats in Colorado but is most commonly found in high to mid-elevation coniferous forests.

Habitat on the San Juan National Forest

On NFS lands of the SJNF, olive-sided flycatchers are most commonly found in spruce-fir forests and ponderosa pine forests where there is a significant remaining component of pre-settlement trees or super-canopy snags. They are found less commonly in mixed conifer and aspen forests. The nesting season (May–August) is the most critical time period for flycatchers on the SJNF because they are absent from the SJNF during fall, winter, and early spring.

Primary Risk Factors

The causes for this species range-wide decline are not well known (Altman and Sallabanks 2000). Suppression of forest fires and expansion of dense second-growth forests are likely limiting factors, along with habitat loss along migratory routes and in wintering areas of Central and South America which could contribute significantly to population declines (Nature Conservancy 2005). The extirpation and recovery of beaver populations throughout most of the western United States between the mid-nineteenth through late-twentieth centuries likely had a significant effect on flycatchers due to their strong association with beaver pond habitats. Fire suppression throughout its breeding range undoubtedly limits the acreage of available habitat (Altman 1997). Deforestation on this bird's Central and South American wintering grounds has been speculated to be a significant threat to species conservation, possibly explaining why field observers report this bird to be disappearing from apparently suitable and unchanged breeding areas with long histories of occupancy (Altman and Sallabanks 2000). Local information suggests that olive-sided flycatchers on the SJNF are most commonly associated with spruce-fir forest types, particularly near forest edges adjacent to riparian habitat. They should also be expected in past wildfire areas, particularly where an available snag component remains. As a result of the spruce beetle epidemic that has affected the forest over the last decade, ample snag habitat is available for this species in areas affected by the insect.

Purple Martin

Background

The purple martin is the largest North American swallow and one of the largest swallows worldwide (Brown 1997). There are three subspecies of purple martin. The local subspecies found on NFS lands of the SJNF is presumably *P.s. arboricola*. Eastern populations of the purple martin have recently shifted breeding to artificial nest structures and are popular and well known for their use of backyard birdhouses. However, western populations continue to nest in their traditional habitats (Brown 1997). Purple martin was first identified as breeding in Colorado in 1872 but the next confirmed breeding record did not occur until 1978 on the SJNF at Stoner Mesa (Levad 1998). Since that time breeding colonies have been identified across the Western Slope (Levad 1998). Adults arrived in breeding areas by early June and flocked in preparation for departure by late August. Nests may be found in mature aspen stands. Diet varies widely across the geographic range of the species with insect availability. Insects found in their diet common to Colorado include a variety of beetles, wasps and bees, dragonflies, caddisflies, mayflies, a variety of moths and butterflies, and winged termites (Brown 1997).

Status and Distribution

Purple marten breeds in the southern and central Rocky Mountains, including the interior highlands of Central Mexico, and may include populations found along the coastal regions of the Pacific Northwest to southern British Columbia (Brown 1997). In Colorado, Andrews and Righter (1992) consider purple martin a common summer resident in the lower mountains of northeastern Mesa and Delta, and northwestern Gunnison Counties. They consider the species rare to uncommon breeders north to Moffat and Routt Counties, east to Pitkin County and south to Montezuma, La Plata and Archuleta Counties.

Habitat across the Species' Range

Breeding habitat for the purple martin varies greatly among populations depending on geographical location. As mentioned previously, eastern populations now nest predominantly in artificial nest structures and have become highly urbanized, probably as a result of lost habitat resulting from deforestation in this portion of its range (Brown 1997). Desert populations nest in cavities of saguaro cactus (*Carnegiea gigantea*), as well as cliffs (Brown 1997; Levad 1998). However, in Colorado, breeding habitat is found almost exclusively in mature aspen stands (Levad 1998; Reynolds et.al., 2002; Svoboda et al. 1980). Breeding site elevations reported by Gillihan and Levad (2002) range between 7,900 and 9,800 feet (n = 82) and from Levad (1998) range from 8,000 to 9,000 feet. Purple martins appear to have moderately high level of site fidelity, and colony sites and specific cavities are reoccupied in successive years (Brown 1997). Although aspen forest is the typical breeding habitat for this species, it also may be found in mixed aspen/ponderosa pine or aspen/Douglas-fir forests (Andrews and Righter 1992). Nests are more frequently found in live aspen rather than in snags and in cavities excavated by northern flickers (*Colaptes auratus*) (Reynolds et al. 1991). Nests are usually within 1,000 feet of water, which includes small creeks and stock ponds. During migration, martins occur over riparian areas, open agricultural areas, and reservoirs.

Habitat on the San Juan National Forest

Inventory and monitoring for purple martins has occurred on the Mancos-Dolores Ranger District. Historically, only three purple martin sites are known from the Mancos-Dolores Ranger District, and currently there are 10 site records of recently active colonies. Martins may be found in suitable habitat on the Columbine and Pagosa Ranger Districts but limited time has been invested surveying for the species. Surveys that have occurred were conducted for specific projects to determine presence or absence, and no populations have been reported to date.

Primary Risk Factors

Due to the specific nest-site requirements, habitat is probably one of the most significant limiting factors for the purple martin in Colorado. Aspen makes up a very small percentage of the overall vegetation on the forest (approximately 13%), and mature aspen is an even small percentage of those total acres. Loss of mature aspen stands with parklands and water sources nearby could reduce the availability of suitable habitat for purple martins. Other limiting factors include disease, reproductive success, weather, parasites, competition with other species, and threats on winter grounds.

Short-eared Owl

Background

The short-eared owl (*Asio flammeus*) is a small to medium-sized owl with long wings (Cramp 1985), and light wing-loading (Clark 1975). Short-eared owls primarily eat rodents (commonly *Microtus spp.*) but also take other small mammals, birds (especially in coastal areas), and insects (Terres 1980). Short-eared owls forage primarily by flying low, typically into wind, and dropping down onto prey, sometimes after brief hover. Sibling cannibalism may occur.

Status and Distribution

The short-eared owl is a widespread breeding species in the north-temperate and arctic regions, southern and northwestern South America, and many isolated island groups (e.g., Hawaii, Galapagos, Iceland). In North America, they breed in open habitats throughout most arctic and temperate areas and south into the central portions of the United States ranging from northern Alaska to northern Labrador, south to California, Utah, Colorado, Missouri, Illinois, Ohio, and Virginia. Non-breeding habitat occurs mostly from the southern parts of most Canadian provinces south to southern Baja California, southern Mexico, Gulf Coast, Florida (American Ornithologists' Union 1983).

Habitat across the Species' Range

In North America, short-eared owls nest in open habitats including grasslands, sagebrush, marshes, and tundra. Recently published nesting records within Region 2 suggest that typical habitat is Conservation Reserve Program grasslands in Kansas (five nests) (Busby and Zimmerman 2001) and South Dakota (two nests) (Peterson 1995), and inter-mountain and prairie grasslands, as well as marshy areas in Colorado (four nests) (Boyle 1998b). No recent nesting records (e.g., Molhoff 2001) exist for Nebraska, but nesting habitat there is likely similar to that in Kansas and South Dakota. Unpublished nest records from Arapaho National Wildlife Reserve in north-central Colorado show that short-eared owls sometimes nest in sagebrush areas immediately adjacent to wet meadows and grasslands (Bilbeisi, personal communication 2003). Descriptions of nest sites in North Dakota and South Dakota suggested that short-eared owls preferred areas with 30 to 60 cm high vegetation, in fields with 2 to 8 years of residual vegetation build-up (Duebbert and Lokemoen 1977). Further east, preferred nesting habitat in Wisconsin was grasslands with maximum vegetation heights of 28 to 36 inches (Evrard et al. 1991), and in Illinois managed grasslands were 12 to 16 inches tall (Herkert et al. 1999). In general, short-eared owls breed and winter in relatively dense grasslands, especially those associated with water, but their numbers and location vary strongly from year to year.

Habitat on the San Juan National Forest

Historically in Colorado, short-eared owls were noted primarily in winter, with only a few reports of nesting. However, nesting records slowly accumulated during the mid1900s, and Bailey and Niedrach (1965) noted it as an uncommon resident, with most nesting records on the eastern plains. Recent breeding records are mostly from the northeastern quarter of the state, along with isolated breeding in North Park (Arapaho National Wildlife Reserve), the San Luis River valley (Monte Vista and Alamosa National Wildlife Reserves), and an isolated breeding record in the Southwest (Andrews and Righter 1992; Boyle 1998b). Andrews and Righter (1992) and Boyle (1998) stressed the sporadic nature of nesting at specific localities. Occurrence on NFS lands of the SJNF is considered rare to incidental. No nesting has been documented on the SJNF.

Primary Risk Factors

Habitat loss is considered the biggest limiting factor for short-eared owls. The species is declining in many parts of the range due to destruction and degradation of marshes, grasslands, and low-use pastures (Ehrlich et al. 1992). Populations have declined due to reforestation of farmlands and fragmentation and development of coastal grasslands (see Holt 1992). Loss of open grasslands to later successional stages of community development reduces available hunting and breeding habitat. Other limiting factors include predation, prey abundance, human harassment including shooting, and collision with vehicles and structures (NatureServe 2013). In winter the ground roosting habit may be abandoned for trees, possibly in response to deep snow (Banfield 1947; Bosakowski 1986).

Western Burrowing Owl

Background

The western burrowing owl is a medium-sized ground-dwelling inhabitant of western grasslands and deserts. It has several unique physical and behavioral characteristics in relation to other North American owls. It has long legs and an unusually short tail. It has tendency to nest in loose colonies in underground burrows, which is not only unusual for owls but is quite rare in any other avian species. Although it is primarily nocturnal, it is also quite active during the day, especially during the breeding season.

Status and Distribution

The burrowing owl breeds from south-central British Columbia eastward to southern Saskatchewan and south through much of the western United States, Mexico, and Central and South America to southern Chile (S.R. Jones 1998). Isolated populations are found in central Florida and on several Caribbean islands including Cuba, Hispanola, Lesser Antilles, Antigua, and the Bahamas (Haug et al. 1993). In Colorado, it is a locally uncommon to fairly common summer resident on the eastern plains, uncommon in the Grande Valley in Mesa County and rare to uncommon in other western valleys and mountain parks. It is considered a casual winter resident on the eastern plains (Andrews and Righter 1992).

Habitat across the Species' Range

The burrowing owl uses grasslands and mountain parks, usually in or near prairie dog towns (Andrews and Righter 1992). They also use well-drained steppes, deserts, prairies and agricultural lands (Haug et al. 1993). Semi-desert shrublands are rarely used (Andrews and Righter 1992). Openness, short vegetation, and burrow availability are essential components of habitat (Yanishevsky and Petring-Rupp 1998). The presence of a nest burrow seems to be a primary requirement for habitat suitability (Haug 1985). Burrows of prairie dog and ground squirrel are used most frequently, but badger burrows are also used. In Colorado, owls generally select their burrows in areas with other burrows surrounded by bare ground (S.R. Jones 1998). They often use burrows located within active prairie dog communities and in areas where prairie dog colonies have become inactive owls would discontinue their use when grass reaches 6 inches in height (S.R. Jones 1998). The family occasionally uses the surrounding burrows as alternate roosts and escape cover after the young leave the nest. They frequently choose sites close to roads (Plumpton 1992). This owl occasionally becomes urbanized and will breed or forage in vacant areas within urban zones. Little is known about the habitat preferences for migrating owls in their winter habitats (Haug et al. 1993).

Habitat on the San Juan National Forest

NFS lands of the SJNF are not considered breeding habitat for the burrowing owl although prairie dog habitat is present. There are no known occurrences on any district of the SJNF and there are no known breeding records on the SJNF (Schultz, personal communication 2012).

Primary Risk Factors

Habitat loss is considered to be a major factor limiting burrowing owl populations in the western United States (Yanishevsky and Petring-Rupp 1998). Declining populations of prairie dogs colonies, as a result of control programs and plague, have resulted in a reduction in suitable nest areas. Conversion of grasslands to intensive agriculture and urbanization has also had impacts on available burrow habitats. Other limiting factors include low recruitment of juveniles, predation, prey availability, parasites, weather, shooting, vehicle collisions, and pesticides.

Yellow-billed Cuckoo

Status and Distribution

Two subspecies of yellow-billed cuckoo (*Coccyzus americanus*) were recognized by the American Ornithologists' Union (1957), with *C.a. americanus* east of the Rocky Mountains and *C.a. occidentalis* westward. The yellow-billed cuckoo eats mainly caterpillars, as well as other insects, some fruits, sometimes small lizards and frogs, and bird eggs (Terres 1980). The species gleans food from branches or foliage, or sallies from a perch to catch prey on the wing (Ehrlich et al. 1992).

Status and Distribution

Historically, yellow-billed cuckoos bred throughout most of continental North America, including portions of eastern and western Canada, northern and central Mexico, and the Greater Antilles. The species is now extirpated in western Canada, Washington, and Oregon, and rare and patchily distributed throughout most of the historical range in the United States west of the Rocky Mountains (Wiggins 2005). The current distribution in the western United States is still difficult to delineate, as cuckoos often wander before and after breeding (Hughes 1999). In the eastern United States and in eastern Canada, yellow-billed cuckoos are still a relatively common bird, but populations are declining in many areas (see the Population status section). Yellow-billed cuckoos winter in South America, primarily east of the Andes Mountains, but with small numbers (probably of the western subspecies) west of the Andes. (Hughes 1999). It appears that this species was never common in the Rocky Mountains. There have been no recent breeding records in southwestern Colorado (Carter 1998c).

Habitat across the Species' Range

Primary cuckoo habitat consists of lowland riparian forest and urban areas with tall trees, especially with dense undergrowth and thickets. Optimum nesting habitat is closed canopy riparian forest stands of 2 to 5 acres or larger with associated dense stands of understory woody vegetation. The western yellow-billed cuckoo is a riparian ecosystem obligate species.

Habitat on the San Juan National Forest

Suitable habitat on the SJNF is unknown but may occur in limited amounts. There is no recorded occurrence on the SJNF. Due to elevation and geographic location, and lack of suitable habitat quality, occurrence of this species would be considered rare and incidental.

Primary Risk Factors

Loss, degradation, and fragmentation of riparian habitat; drought and prey scarcity (linked at least in part to pesticide use) may play a role in declines even where suitable habitat remains (Ehrlich et al. 1992). The range of the western subspecies of this bird has contracted, and populations have declined dramatically within the remaining range, due to loss of mature closed-canopy riparian forests with dense, thick, understories.

White-tailed Ptarmigan

Background

The white-tailed ptarmigan (*Lagopus leucura*) is a medium-sized grouse inhabiting alpine tundra areas. It is completely white in winter except black bill, eyes, and claws. Adult summer plumage is mottled with brown, black, and white, except for the all-white wings, tail, belly, and legs (Baily and Niedrach 1965). The white-tailed ptarmigan's winter diet consists of alder catkins, willow (*Salix* sp.) buds, and twigs (primary winter food in Colorado is willow buds), as well as buds and needles of spruces, pines, and firs. Spring and summer diet consists of leaves and flowers of herbaceous plants, willow buds, berries, seeds, and insects (NatureServe 2013).

Status and Distribution

White-tailed ptarmigan inhabit alpine areas from the southern Rocky Mountains in New Mexico north to Alaska and Northwest Territories (Braun et al. 1993). The species has also been introduced into the Sierra Nevada in California, Uinta Mountains in Utah, and the Wallowa Mountains in Oregon (Braun et al. 1993). In Colorado, white-tailed ptarmigan inhabit all mountain ranges with suitable alpine habitats, including Pikes' Peak, where it was introduced in 1975 (Braun 1971; Hoffman and Giesen 1983).

Habitat across the Species' Range

White-tailed ptarmigan primarily inhabit alpine tundra, especially in rocky areas with sparse vegetation (American Ornithologists' Union 1983). Summer habitats in the Rocky Mountains consistently include moist, low-growing alpine vegetation. In Colorado, percent canopy cover of willow was higher at winter feeding sites than at random sites (Giesen and Braun 1992). White-tailed ptarmigan nest in alpine tundra, in rocky areas or sparsely vegetated, grassy slopes. The species tends to search for vacant territory in the natal area. High fidelity to breeding territory is exhibited in successive years (NatureServe 2013). While typically found in habitats at or above the tree line, white-tailed ptarmigan also inhabit willow-dominated habitats at or below tree line in winter (Colorado Partners in Flight 2000).

Habitat on the San Juan National Forest

White-tailed ptarmigan have been observed on NFS lands of the SJNF on all three ranger districts in the Lizard Head wilderness area, Weminuche wilderness area, South San Juan wilderness area, and alpine and subalpine habitat adjacent to wilderness.

Primary Risk Factors

Excessive grazing by domestic livestock and wildlife, mining, reservoir development, winter recreation, and road building have all negatively impacted alpine habitats, especially critical wintering areas (Braun et al. 1976). Chemical contamination from mine spoils into willow habitats has been shown to affect persistence in some areas. Critical periods are during the breeding period from June through September, and disturbance of critical wintering areas during the winter months.

1.2.3 Invertebrates

Great Basin Silverspot Butterfly (Nokomis Fritillary Butterfly)

Background

The Nokomis fritillary butterfly (*Speyeria nokomis nokomis*) is a large and distinct fritillary that inhabits spring seeps and is associated with marshes with flowing water. It lives in wet meadows and seeps or sloughs at lower elevations, found only where there is permanent moisture sufficient to sustain a healthy violet crop at elevations from 5,200 to 9,000 feet. Habitats are generally described as permanent spring-fed meadows, seeps, marshes, and boggy streamside meadows associated with flowing water in arid country (Brock and Kaufman 2003; Hammond 1974; Opler and Wright 1999; Scott 1986; Tilden and Smith 1986). The Nokomis fritillary has one flight from mid-July to late September. For the species *Speyeria nokomis,* the wingspan is 2½ to 3⅛ inches. Also for the species the upper side of the male is a bright brownish orange with darkened wing bases and dark markings. Sub-marginal chevrons do not touch the very even black marginal line. The upper side of the female is black and the outer half of the wing has cream-colored spots. Both sexes have hind wing below with black-bordered silver spots. For Nokomis fritillary butterfly, the hind wing disc is light brown in males and deep olive in females. Males patrol for receptive females, who walk on the ground to lay single eggs near host plants. Unfed, first-stage caterpillars hibernate and in the spring they feed on the leaves of the host. They have one brood from late July to September (Arizona Game and Fish Department 2005).

Status and Distribution

The historic range of the Nokomis fritillary butterfly includes basin and range country from the Sierra Nevada in eastern California through Nevada and Utah to the Rocky Mountains in western Colorado, and south through eastern Arizona and New Mexico to northern Mexico (Selby 2007). It has been recorded from at least 56 counties in six states in the United States, and three states in Mexico. Some taxonomists consider this subspecies to be a narrowly endemic subspecies found only at a few locations in Colorado and eastern Utah while others consider it a more broadly distributed taxon found in Colorado, Arizona, Utah, New Mexico, and perhaps even Nevada (Arizona Game and Fish Department 2005).

Habitat across the Species' Range

The Nokomis fritillary butterfly is found in streamside meadows and open seepage areas with an abundance of violets in generally desert landscapes. Colonies are often isolated (NatureServe 2013). For the species *Speyeria nokomis* the caterpillar host plant is northern bog violet (*Viola nephrophylla*). The adults feed on flower nectar including that from thistles (Arizona Game and Fish Department 2005)

Habitat on the San Juan National Forest

Surveys for this species have not been conducted on the NFS lands of the SJNF. No species occurrence or distribution data are available for the SJNF. There are two records of species occurrence south of the SJNF boundary on state and private lands

Primary Risk Factors

Limiting factors for the species as a whole are mainly habitat loss, herbiciding, heavy grazing, and changes to hydrology (NatureServe 2013).

1.2.4 Amphibians

Boreal Toad

Background

The boreal toad, also known as the mountain or western toad (Hammerson 1999), is Colorado's only alpine species of toad. Females generally grow to 4.3 inches and males to 3.5 inches. Both sexes appear warty and usually have a light stripe along the middle of the back (most prominent on the female). Juveniles may lack the central stripe and may have red warts. This toad preys on a variety of invertebrates. It is not selective about food and any moving animal is a potential meal so long as it is smaller than the toad (Campbell 1970). Ants may comprise a large portion of its diet (Keinath and Bennett 2000). Other prey include grasshoppers, beetles, mosquitoes, crane flies, stink bugs, damsel bugs, water striders, backswimmers, alderflies, moths, caterpillars, black flies, deer flies, muscid flies, wasps, bees, mites, spiders, and snails. Larvae filter suspended plant material or feed on bottom detritus (Keinath and Bennett 2000).

Status and Distribution

Bufo boreas boreas is one of two subspecies of the western toad found in the United States (USFWS 2002). The California toad (*B.b. halophilus*) is restricted in range to California. *B.b. boreas* forms two distinctly separate populations (Southern Rocky Mountain and Northern Rocky Mountain), which appear to be genetically different and probably represent independently evolving lineages (Keinath and Bennett 2000). These populations are separated by a swath of approximately 100 miles of harsh dry habitat in central Wyoming (Keinath and Bennett 2000). The Southern Rocky Mountain population occupies extreme south-central Wyoming, most of the mountains of Colorado, and, historically, the north-central mountainous portions of New Mexico. Only the Southern Rocky Mountain population occurs in Colorado and is the subject of this assessment. Hammerson (1999) suggests that, until there is a formal change in the scientific nomenclature, the California toad should be referred to as the western toad, the Northern Rocky Mountain population as the boreal toad, and the Southern Rocky Mountain population as the mountain toad. Although once considered fairly common in southern Wyoming, Colorado, and northern New Mexico, the Southern Rocky Mountain boreal toad is now much less common and absent in portions of its range. While some historic populations have existed on the SJNF, there are currently no known populations. Surveys for presences are conducted annually.

Habitat across the Species' Range

The boreal toad (Southern Rocky Mountain population) generally occurs between 8,000 and 11,000 feet elevation in spruce-fir forests and subalpine and alpine meadows. The boreal toad typically inhabits areas with damp conditions in the vicinity of marshes, wet meadows, streams, beaver ponds, glacial kettle ponds, and lakes interspersed in subalpine forests. During the early spring and summer, boreal toads are usually found in water, at the water's edge, or on top of partially submerged logs. Later in the summer toads have been reported to disperse a considerable distance (up to 2.5 miles) from breeding areas to upland forest sites (Loeffler 2001). They still tend to favor moist sites. However, some toads, especially females, may relocate to drier montane habitats offering dense vegetation for cover. In Colorado, the largest populations are typically found in areas characterized by willows, bog birch (*Betula glandulosa*), and shrubby cinquefoil (*Pentaphylloides floribunda*) (USFWS 1994). In southern Colorado they have been reported in areas where ponderosa pine is present.

Habitat on the San Juan National Forest

Habitat for the boreal toad is found on NFS lands of all districts on the SJNF, primarily within the spruce-fir and alpine zones. Boreal toads have been reported as high as 11,860 feet in the San Juan Mountains. They have also been reported at lower elevations including an old Pagosa Springs record at 7,100 feet and another in Colbran at 6,800 feet. However, Hammerson (1999) suspects the accuracy of these low elevation records and feels that either the area of collection was incorrect or that the specimens were incorrectly identified

Primary Risk Factors

The boreal toad shows declines in population size and distribution across its range in western North America. The population in the Southern Rocky Mountains (Wyoming, Colorado, and New Mexico) is particularly vulnerable to extinction during declines, as it is geographically isolated from all other populations of boreal toads. Scientists believe the chytrid fungus *Batrachochytrium dendrobatidis* to be a contributing factor in boreal toad declines since the 1970s and currently see it as the primary threat to boreal toad populations throughout the Southern Rocky Mountains. However, the impact of *B. dendrobatidis* is compounded by other threats, the most widespread being habitat alteration from human disturbances around wetlands and human-facilitated expansion of natural and introduced predators. Habitat fragmentation further isolates breeding populations, which increases the effects of these widespread threats and the risk associated with other threats, such as local changes (Keinath and McGee 2005).

Northern Leopard Frog

Background

The northern leopard frog (*Rana pipiens*) is a medium-sized frog with an adult body length that typically ranges from 2 to 3.5 inches with a maximum of 4.3 inches (Hammerson 1999). It is usually green in color, although some may be a light brown. Its back is covered with round or oval dark spots, creating a pattern that gives this frog its name. The call is described as a "chuckling," "gabbling," or snoring sound. Larvae of the northern leopard frog are primarily vegetarian gaining sustenance by filtering free-floating algae from their surrounding waters. However, they have been observed feeding on dead animal material including conspecifics. Beetles and grasshoppers may make up a large portion of their diets. Other common prey includes flies, wasps and bees, and spiders. Studies on stomach contents have also found mollusks, crustaceans, garter snakes, hummingbirds, and yellow warbler (*Dendroica petechia*) (Smith 2003).

Status and Distribution

The range of the northern leopard frog includes much of the southern half of Canada and the northern United States south to Maryland, West Virginia, Kentucky, northern Illinois, northwestern Missouri, Nebraska, New Mexico, Arizona, and eastern California (Hammerson 1999). The northern extent of the range in Canada is poorly known (Smith 2003). Within Colorado the northern leopard frog occurs throughout much of the state, although most occurrences are in the western half of the state, including the Front Range. On the eastern plains it occurs in more spotty distribution with populations associated primarily with major drainages systems (Hammerson 1999).

Habitat across the Species' Range

The habitats used by the northern leopard frog are varied across its range. In Colorado it is reported to range in occurrence from below 3,500 feet in northeastern Colorado to above 11,000 feet in southern Colorado (Hammerson 1999). Merrell and Rodell (1968) describe three major habitat divisions: winter habitat (lakes, streams and ponds), summer habitat (post-breeding areas including upland habitats for feeding), and egg/tadpole habitat (shallow breeding ponds). Although aqueous habitats are a central feature in the frog's cycles of life, it may range a considerable distance from natal and breeding areas to a variety of other habitat types. Typical aqueous features used by the northern leopard frog include wet meadows and the banks and shallows of marshes, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches (Hammerson 1999). Streams are often used as dispersal corridors, but upland areas are also used. Suitable breeding habitat for the northern leopard frog on the SJNF would be found in streams, natural lakes and ponds, glacial kettles, stock ponds and reservoirs, marshes, and wetlands. Post-breeding habitat would be found along the edges of these features, as well as the surrounding upland habitats (generally within 2 miles). Wintering habitat would be found in streams, ponds, and lakes that do not completely freeze during winter and do not have substantial populations of predaceous fish.

Habitat on the San Juan National Forest

During the summers of 1994–1998 the SJNF conducted amphibian surveys in suitable amphibian breeding habitats across the forest, including suitable leopard frog habitat. The available district records from these surveys were incomplete. Northern leopard frogs were determined to be present on at least six sites on NFS lands of the SJNF on the Dolores District and 16 sites on the Pagosa District. No records were available for the Columbine District. These surveys apparently sampled only a portion of the available suitable habitat within different elevation zones and did not include all suitable habitats on the SJNF. Therefore, it is likely that other local populations exist on the SJNF that were not identified during the 1994–1998 surveys.

Primary Risk Factors

Loss or degradation of breeding habitat can occur through changes in hydrology or water quality. Other factors include habitat fragmentation, predation, disease, sensitivity to ultraviolet radiation, and recruitment into the population.

1.3 Effects Analysis

The purpose of this BE is to describe the direct, indirect, and cumulative effects from program activities associated with LRMP alternatives analyzed in the FEIS. The LRMP/FEIS and associated planning documents do not provide site or project-specific analysis. Instead, they provide the guidance for planning and implementing projects designed to move the land base toward meeting desired future conditions. Separate project-specific NEPA analysis would occur as projects are proposed for implementation.

The BE incorporates applicable management direction from the LRMP designed to aid in the management and conservation of sensitive species. In addition to the species-specific design criteria mentioned at the beginning of the BE, the LRMP contains over 100 components, including additional design criteria, objectives, and desired conditions that are meant to help provide for the ecological conditions in key habitat types necessary for all species. These components are outlined in Appendix M. LRMP and project-specific design criteria are intended to reduce potential impacts to species from the variety of land management activities implemented under the LRMP. The design criteria are the same under all of LRMP alternatives.

1.3.1 Direct and Indirect Effects

There are 30 terrestrial sensitive species with habitat present on the SJNF. The wide variety of sensitive species and their preferred habitats in the planning area suggests that all LRMP alternatives would have some potential to affect species or their preferred habitats. For purposes of this analysis, species are grouped into analysis groups based on the primary associations utilized on the SJNF as described in the species evaluated section. The analysis groups include grassland, shrubland, riparian/wetland, forested, and alpine.

Species in the grassland group include ferruginous hawk, Gunnison’s prairie dog, northern harrier, short-eared owl, and western burrowing owl. Species in the shrubland group include Brewer’s sparrow and loggerhead shrike. Species in the riparian/wetland group include bald eagle, American bittern, peregrine falcon, black swift, boreal toad, Nokomis fritillary butterfly, New Mexico meadow jumping mouse, northern leopard frog, river otter, and western yellow-billed cuckoo. Species in the forested group include American marten, fringed myotis, hoary bat, spotted bat, Townsend’s big-eared bat, boreal owl, flammulated owl, Lewis’ woodpecker, northern goshawk, olive-sided flycatcher, and purple martin. Species in the alpine group include Rocky Mountain bighorn sheep and white-tailed ptarmigan.

The primary management activities that have potential to affect sensitive species include fire management (prescribed fire, fires managed for resource benefits, and wildland fire suppression), habitat improvements, lands and special uses, livestock grazing (cattle, horse, and domestic sheep and goat), mechanical fuels treatments, oil and gas development, recreation (summer and winter recreation including motorized, non-motorized, developed, and dispersed), solid mineral development, and timber harvest.

There are a number of risk factors listed for each species in the species evaluated section. Some of the risk factors (biological and environmental), including low reproductive potential, parasites and disease, harvest, weather, etc., are usually not influenced by management activities; however, other risk factors such as loss or alteration of habitat or disturbance during key periods (i.e., breeding seasons) can be influenced by management activities and are primary risk factors for all species evaluated. Table T. 11 describes management activities and their potential to negatively affect habitat and species in each analysis group. A rating of low, moderate, or high is given based on the potential for management activities to negatively affect species either directly or indirectly. The overall effects would depend on the design, extent, timing, frequency, and duration of activities and associated projects. With application of design criteria in the LRMP, direct and indirect effects to species during project-level implementation are expected to be reduced. It must also be noted that management activities can result in positive effects to species and, for some, are the primary considerations for habitat enhancement. The effects (positive and negative) from management activities are discussed in detail below for each analysis group (Table T.11).

Table T.11: Potential for Management Activities to Negatively Affect Species in Each Analysis Group

Management Activity	Potential for Management Activities to Negatively Affect Species in Each Analysis Group				
	Grassland Group	Shrubland Group	Riparian/Wetland Group	Forested Group	Alpine Group
Fire management					
Prescribed burns	Low	Low	Low	Low	None
Fire for resource benefit	Moderate	Moderate	Moderate	Moderate	None
Wildfire suppression	High	High	High	High	None
Habitat improvements	Low	Low	Low	Low	Low
Lands/Special uses	High	High	Moderate	High	Moderate
Livestock grazing	High	High	High	Moderate	High
Mechanical fuels treatments	Low	High	Moderate	High	Low
Oil and gas development	High	High	High	High	Low
Recreation (summer)	High	High	High	High	High
Recreation (winter)	Low	Moderate	Low	Moderate	High
Solid mineral development	High	High	High	High	Moderate
Timber harvest	Low	Low	High	High	None

Fuels Management (Prescribed Burns, Fire for Resource Benefit, Wildfire Suppression, and Mechanical Fuels Treatments)

Prescribed fire, fire managed for resource benefits, wildland fire suppression, and mechanical fuels treatment activities would have effects (positive and negative) to sensitive wildlife species. Prior to Euro-American settlement, fire played an important role in creating and maintaining the vegetation communities in many terrestrial ecosystems, especially ponderosa pine and warm-dry mixed conifer forests. Fire suppression has contributed to the many changes seen in these ecosystems over the past 100 years. The use of prescribed fire, fire for resource benefit, and mechanical fuels treatments would help to restore the composition and structure of ecosystems, and help to maintain or restore the heterogeneous structure and pattern of the vegetation that was present on the SJNF during the reference period as described in the terrestrial ecosystems section in the FEIS. Fire and fuels management activities would affect sensitive species in the grassland, shrubland, riparian/wetland, and forested analysis groups. Direct and indirect effects from these activities for each analysis group are described below.

Prescribed Fire

The amount of area proposed for prescribed burning through ground or aerial ignitions is the same under each alternative (up to 6,000 acres per year), so the impacts to sensitive wildlife species would be the same under each alternative. Prescribed burning would occur in pinyon juniper, mixed shrublands, ponderosa pine, and warm-dry mixed conifer vegetation types. Most burning would occur during spring and fall when fire weather and behavior are conducive to meet burn plan objectives. Summer burning may also occur, particularly in areas that have prior mechanical fuels treatments.

Burning in mountain grasslands would result in an immediate, very short-term negative effect to northern harrier and short-eared owl. Effects include the temporary loss of forage habitat and cover for small mammal prey species, and cover used for breeding. As new growth occurs, there would be corresponding increases in the nutritive quality of grasses and forbs, thus returning and enhancing habitat for small mammals. In most instances small mammal prey species would see more palatable and higher quality forage. Long-term positive effects include the overall enhancement of grassland forage and breeding habitat.

Burning in sagebrush shrublands is generally limited due to its limited presence across the SJNF. Burning of sagebrush is generally approached in a cautious manner due to its slow rate of positive response and meeting desired sagebrush ecosystem resource objectives. Generally, burning in sagebrush habitat occurs only to meet very specific resource management objectives.

Burning in riparian/wetland areas may occur, but overall, minimal effects are expected to riparian/wetland sensitive species. Riparian/Wetland areas are often used as control features and/or management area boundaries. The vegetation present, along with the cool and oftentimes moist soils present, generally results in very low-intensity burns with minimal fire effects. Effects to riparian/wetland habitat used for foraging, cover, and breeding by American bittern, Nokomis fritillary butterfly, New Mexico meadow jumping mouse, northern leopard frog, and western yellow-billed cuckoo are expected to be minimal. Potential negative effects to bald eagle, bittern, leopard frog, and river otter are also expected to be minimal because of minimal impact expected to aquatic prey species and habitat. Black swift, boreal toad, and American bittern are not expected to be affected by burning, as most burns would occur in lower-elevation vegetation types rather than higher elevation vegetation types were suitable habitat for black swift and boreal toad are present. Burning that occurs in and adjacent to riparian areas would also help minimize fire effects and potential negative effects resulting from human caused wildfires or fires managed for resource benefits occurring near or in riparian/wetland habitats.

Burning in ponderosa pine and warm-dry mixed conifer forests generally results in the reduction of surface fuels (grass, needle, and leaf litter and downed woody material) and vegetation in the lower and mid-canopy layer such as shrubs and trees. In most instances prescribed burning occurs to complement mechanical fuels treatments. Burning in ponderosa pine and warm-dry mixed conifer forests would have short-term negative effects and long-term positive effects to sensitive species. Short-term effects include the removal of surface fuels as food sources and cover for small mammal prey species such as ground squirrels, which are common prey of northern goshawk. Thinning of trees, particularly within clumps, would affect goshawk nesting habitat and cover for rearing young, as well as roosting cover for hoary bat. Potential effects to key habitat components such as snags utilized as plucking and perching posts by goshawks and olive-sided flycatcher, and cavity roosts and nesting by fringed myotis, flammulated owl, and Lewis' woodpecker would be minimized with application of snag retention and recruitment design criteria.

Burning in ponderosa pine and warm-dry mixed conifer forests would have many long-term positive effects to sensitive species. All species are associated with open, park-like stand conditions. The combination of burning and mechanical vegetation fuels treatments are expected to provide more sustainable habitat for species in the long-term by improving habitat condition and enhancing resilience to insects, disease and wildfire.

Fire Managed for Resource Benefit

Under Alternative A, up to 20,000 acres of the SJNF could be affected by fires managed for resource benefit. Fires managed for resource benefit could affect sensitive wildlife species on an additional 30,000 acres of the SJNF under Alternatives B, C, and D. Fires managed for resource benefit would have similar effects to sensitive species associated with grassland, shrubland, riparian/wetlands, and ponderosa and warm-dry mixed conifer forests as those described for management ignited fire. Potential effects are expected to be slightly greater as fires are expected to occur at larger scales, and under conditions that affect vegetation, soil, and other resources slightly more than those under prescribed fire. Factors such as location of burns, time of year, weather, fuel loading, and fuel moisture can be more easily planned, managed, and monitored.

Management of fires for resource benefit in mixed vegetation and spruce-fir forests would result in positive and negative effects to forested species associated with mid- to higher-elevation forests including American marten, boreal owl, and olive-sided flycatcher. Although these fires are a primary means for restoring natural disturbance processes to high-elevation forest vegetation types, impacts to vegetation and other resources are expected. Short- and long-term effects to species would depend on fire intensity and severity to vegetation and soil resources and corresponding effects to key habitat attributes. Marten and boreal owl are associated with mature, mesic coniferous forests that contain key habitat attributes such as downed logs and snags used for foraging and security, and large trees used for denning and nesting by primary prey species (voles, snowshoe hare, and red squirrel). Low- to moderate-intensity fires would likely result in minimal to moderate negative effects to habitat utilized by marten and boreal owl in the short term and positive in the long term, while high-intensity fires would result in more adverse effects in the short and long term. Olive-sided flycatcher is a species that is highly dependent on standing dead or dying trees that contain suitable perch sites extending above the forest canopy. The species is most commonly found perching and foraging on suitable trees along forest edges, openings in the canopy, riparian/wetland areas or on ridge tops, and post-burn areas. The species is a post-fire specialist, and therefore wildfires are expected to be mostly beneficial were suitable nesting habitat remains (live conifer trees) near post-burn areas.

Wildland Fire Suppression

Wildland fire suppression is the primary management strategy for human-caused wildfires. A variety of actions are taken to suppress fires ranging in size from single tree fires (Type 5 incidents) to more complex fires (Type 4 followed by 3, 2, and 1 incidents) with Type 1 incidents being the most complex. Suppression tactics include but are not limited to construction of control lines via hand or mechanized equipment (chainsaws, dozers, etc.), establishing safety zones for crew and aerial resources, use of aerial fire retardant to slow rate of spread or reduce fire intensity, and collecting water from nearby water sources to aid in mop-up operations or reduce rate of spread and intensity. Wildfires generally result in similar effects to sensitive species and habitats as described above; however, negative effects can be greater, particularly when fires burn at much higher intensities. Resource input is collected from biologists and other resource specialists to aid in minimizing negative effects from wildfire suppression tactics and strategies, thereby reducing potential short- and long-term effects to species and habitats.

Mechanical Fuels Treatments

Mechanical fuels treatments under Alternatives A, B, and C would affect the vegetation and soils on approximately 4,500 acres per year. Mechanical fuels treatments under Alternative D would affect the vegetation and soils on approximately 5,500 acres per year. Alternatives A, B, and C would affect the vegetation and soils on fewer acres, but there would be less opportunity under these alternatives to use mechanical fuels treatments for ecosystem restoration purposes than under Alternative D.

Mechanical fuels treatments would occur in mixed shrublands, pinyon-juniper, ponderosa pine, and warm-dry mixed conifer forests. Fuels would be treated via chainsaw, hydro-axe, hydro-mower, feller-buncher, or similar equipment. Treatments would include cutting and removal of vegetation, chipping with specialized equipment on-site, and then removed, and in some instances cut material may be left on site. Treatments would affect sensitive species in the shrubland, riparian/wetland, and forested analysis groups.

Mechanical fuels treatments in shrubland habitats have potential to impact Brewer’s sparrow and loggerhead shrike, although in most instances, sagebrush shrublands are minimally affected. Mechanical fuels treatments generally avoid direct treatment of sagebrush. Treatments generally focus on other species such as pinyon, juniper, ponderosa pine, or mixed shrub species where sagebrush is present. Treatment of other tree and shrub species has potential to inadvertently affect sagebrush through mechanical operations in treatment units such as cutting, skidding, and removing cut material, or impacts caused by accessing treatment units with heavy equipment. Therefore, potential negative impacts to Brewer’s sparrow and loggerhead shrike are expected to be minimal. Treatment of encroaching trees species and other shrub species may result in positive effects to sensitive species by maintaining sagebrush habitat over the long term.

Mechanical fuels treatments in pinyon-juniper have potential to affect forested species particularly fringed myotis, hoary bat, spotted bat, and Townsend's big-eared bats that forage or roost in areas near suitable roost sites. Mechanical fuels treatments can have a positive effect on bat habitat by enhancing foraging habitat, while minimizing negative effects to roosting habitat. Sensitive bat species prefer roosting mostly in cliffs, caves and abandoned mines although some are known to roost in large-diameter standing snags with large wafers of hanging bark, cracks, and crevices (Adams 2003; Fitzgerald et al. 1994). Negative effects to cliff, cave, and mine roosting habitat are not expected, and effects to tree roosting habitat can be minimized through application of design criteria for snag protection and recruitment. Most bats prefer to forage on aerial insects in small to medium-sized forest openings or gaps, and along the vertical or horizontal edges where different habitat types or structural stages meet (Taylor 2006). The creation of small forest openings or gaps in otherwise uniform forest canopies enhances bat foraging habitat (Adams 2003).

Mechanical fuels treatments in ponderosa pine and warm-dry mixed conifer have potential to affect forested species such as sensitive bats (fringed myotis, hoary bat, and Townsend's big-eared bat) flammulated owl, Lewis' woodpecker, northern goshawk, and olive-sided flycatcher. Treatments would generally focus on thinning primarily small to mid-sized trees and shrub species such as Gambel oak (*Quercus gambelii*) to break up fuel continuity and reduce risk of high intensity wildfire. The resulting stand structure and general appearance would be more open, similar to stand conditions that were present during the reference period. Treated areas would contain small openings interspersed within clumps of mature and older trees, and stands containing a mix of age classes of desired tree species. Short-term negative effects are expected as treatments reduce suitable habitat structure and from disturbances occurring during key periods such as breeding seasons. Long-term effects are expected to be beneficial with LRMP design criteria and site-specific project design criteria applied to reduce negative effects to key habitat attributes (snags and downed woody material) and disturbance impacts to sensitive raptors from mechanized equipment operations and human activities.

Mechanical fuels treatments are not intended for riparian and wetland areas; however, direct and indirect effects may occur. The use of mechanized equipment in riparian areas is possible, but most likely limited to accessing treatment areas. Travel through riparian areas to access treatment units may result in negative effects to soils and riparian vegetation. Other negative effects may result from off-site activities that disturb upland soils, and the potential transfer of eroded material into riparian/wetlands thus affecting riparian vegetation. These negative effects are expected to be minimized with application of LRMP design criteria for watersheds and other site-specific design criteria applied during project implementation. With application of design criteria, negative effects to sensitive species in the riparian/wetland analysis group are expected to be minimal.

Habitat Improvements

Habitat improvements vary from treatment in specific vegetation types to restoration of key species-specific habitat components. These improvements are designed to have mostly positive effects, and some would have short-term negative effects and long-term benefits to others. Past management activities such as fire management, lands and special uses, livestock grazing, mechanical fuels treatments, oil and gas development, recreation, solid mineral development, and timber harvest have all had varying effects to habitats across the forest, such as riparian, warm-dry mixed conifer, ponderosa pine, cool-moist mixed conifer, spruce-fir, and aspen. Alterations and impacts to these habitats were discussed above under fuels management, discussed below for each habitat improvement type, and later in the analysis. These improvements are created to maintain, improve, and restore these habitat types that are important to wildlife species.

Species-specific habitat improvements such as butterfly and bat habitat improvement and restoration are site specific and may occur in a variety of habitat types. General terrestrial wildlife habitat improvement may occur across a variety of habitat types (mostly warm-dry mixed conifer mixed with ponderosa pine) using prescribed fire and mechanical treatments to return conditions to be more representative to the HRV (see the Terrestrial Ecosystems section of the FEIS). Winter range habitat improvement for big game may occur in mountain grassland and shrubland, to enhance and improve winter habitat available to big game such as deer, elk and potentially Rocky Mountain bighorn sheep.

Habitat improvement activities have a low probability of negatively impacting species, but may have positive effects for many species by enhancing wildlife habitat through the selected treatments. Effects, both positive and negative for the grassland, shrubland, riparian/wetland, forest and alpine group are discussed below.

Riparian Watershed Improvement

The trend in amount of riparian and wetland habitats on the SJNF is slightly downward due to persistent drought and gradually increasing demand for water uses. The trend in condition of riparian areas and wetlands is also likely to be downward for the same reasons. In Colorado, it is estimated that at least 40% of all vertebrate species are closely associated with riparian habitats (Hoover and Wills 1984). Improved management practices such as livestock grazing over the past 20 years have generally improved ecological conditions of riparian areas, wetlands, and spring and seep habitats on the SJNF; however, conditions are still far from the HRV.

Alternative C offers the most acres of riparian and watershed improvement (300 acres). Alternative B and D offer half (150 acres) with Alternative A offering the least (30 acres). Improvement to riparian and watershed habitats may include but are not limited to the continued improvement in management practices such as livestock grazing, installation of exclosures around sensitive areas and activities that encourage growth of herbaceous vegetation in wetland areas and stream corridors. These improvements would allow riparian areas to recover, which may benefit species in all analysis groups.

Nokomis Fritillary Butterfly Habitat Improvement and Restoration

Existing habitats are generally described as permanent spring-fed meadows, seeps, marshes, and boggy streamside meadows associated with flowing water in arid country. Project activities that may impact riparian areas, springs/seeps, and streamside zones are especially important. These areas provide habitat for the host plant and for the development of young butterflies and eggs. These habitat conditions are scarce in the arid Southwest and tend to occur as small, widely separated and isolated fragments within the arid landscape.

Alternatives B and C offer the same number of sites of habitat improvement and restoration (two sites) with Alternative A offering one site restored and Alternative D offering none. Improvements to butterfly habitat may include but are not limited to the construction of exclosures around steeps and springs to protect sites, and noxious weeds treatments that would help prevent the spread of invasive species, thus allowing the host plant (northern bog violet) to thrive. These improvements, in general, would benefit other riparian/wetland group species, as well at the Nokomis fritillary butterfly. Protection of seep and springs may benefit all other analysis groups as these groups utilize riparian areas to some extent.

Bat Habitat Restoration and Protection

All sensitive bats, with the exception of hoary bat, may only reproduce in unique habitat features (such as caves, rock crevices, mines, and/or specific age classes of snags) that are relatively rare across the planning area. All local bat species concentrate around riparian habitats for foraging and drinking purposes. For this reason, slow-water pools and open wetlands are especially important.

All alternatives offer the same protection via installation of structures associated with mine closures at all sites, so the positive effects from the installation of these protective structures would be the same under each alternative. Improvements to bat habitat may occur through the installation of protective structures on mines with the primary intent to protect roosting sites, particularly at mine closures. Other habitat improvements benefitting bats are the restoration efforts in ponderosa pine, riparian/wetlands, mixed conifer, and aspen. Habitat improvement treatments in other habitat types, particularly low-elevation forested areas, are expected to help improve foraging habitat. Protective structures are expected to have neutral impacts to other species. Benefits to other species groups, particularly from habitat restoration efforts in the above habitat types, are addressed in the subsequent sections.

Terrestrial Wildlife Habitat Improvement

Terrestrial wildlife habitat improvement may occur within a combination of habitat types, but mostly ponderosa pine and warm-dry mixed conifer. Conditions of ponderosa pine habitat are discussed below. Warm-dry mixed conifer forests are also rich in wildlife use. As the name implies, the vegetation mosaic of this vegetation type is generally found at lower elevations where sites are warmer and drier than that of cool-moist mixed conifer forests. Many decades of fire suppression, timber harvest, and livestock grazing have caused gradual but substantial shifts in tree species, structural stage composition, and fire frequency, resulting in many warm-dry mixed conifer stands to be outside their HRV. Currently, warm-dry mixed conifer forests have less acres in the old growth development stage, and have less diversity and distribution of native grasses compared to HRV conditions, with implications for wildlife species and populations that are most closely associated with those development stages.

The acres proposed for the above habitat restoration activities are the same for Alternatives B and C (2,000 acres) and slightly less for Alternatives A and D (1,500 acres). Improvement to terrestrial wildlife habitat may occur through management actions such as mechanical fuels treatments, timber harvest, and prescribed burning that serve to enhance forest structure and increase the extent and distribution of these stands across the SJNF. These improvements are expected to move ponderosa pine and warm-dry mixed conifer forests more towards conditions expected under HRV during the reference period, thereby improving habitat conditions and capability for wildlife species most closely associated with these ecological attributes. More open conditions created from management activities may enhance foraging habitat for members of the forested species group, particularly fringed myotis, hoary bat, flammulated owl, Lewis' woodpecker, northern goshawk, and olive-sided flycatcher. Some short-term impacts may be seen for these species if large snags or other trees used for nesting and roosting are removed during management activities; however, this effect is expected to be negligible across the landscape as the overall condition of the habitat would be more representative of conditions that historically existed.

Ponderosa Pine Restoration

Many decades of fire suppression, timber harvest, and livestock grazing have caused gradual but substantial shifts in tree species mixes, and structural stage and understory composition, resulting in many ponderosa pine stands now being considered to be outside their HRV. Currently, ponderosa pine forests have fewer acres in the old growth development stage and less diversity and distribution of native grasses compared to HRV conditions, with implications for wildlife species and populations that are most closely associated with those development stages. Ponderosa pine forests support a rich and diverse wildlife community, including some habitat specialists that reach their highest densities in this vegetation type.

Alternatives B and C offer the same acres of restoration (3,000) followed by Alternatives D and A (2,000 and 1,000 acres, respectively). Improvement to ponderosa pine habitat may occur through mechanical treatment, prescribed fire, and timber harvest. These improvements would help move conditions towards HRV in ponderosa pine, which may benefit species in the forested group, particularly fringed myotis, hoary bat, flammulated owl, Lewis's woodpecker, northern goshawk, and olive-sided flycatcher. Similar to effects from management activities outlined for terrestrial habitat improvement, some short-term impacts may be seen for these species if large snags or other trees used for nesting and roosting are removed or consumed during management activities; however, this effect is expected to be negligible across the landscape as the overall condition of the habitat would be more representative of conditions that historically existed. Other species that utilize ponderosa pine and adjacent habitats such as the shrubland and grassland groups may benefit from more open conditions created from pine restoration activities.

Cool-moist Mixed Conifer and Spruce-fir Restoration

Within the planning area, the cool-moist mixed conifer forest type is dominated by white fir and Douglas-fir trees. Some cool-moist mixed conifer forests succeeded from aspen-dominated forests that were established following stand-replacing fires. Others formed when white fir and Douglas-fir trees initially colonized a site following a disturbance event. Some may have succeeded from the warm-dry mixed conifer type, where the less shade-tolerant ponderosa pine component decreased as the more shade-tolerant Douglas-fir and white fir components increased in abundance. The selective harvesting of ponderosa pine trees from warm-dry mixed conifer stands resulted in some cool-moist mixed conifer forests. Currently, most of the cool-moist mixed conifer forest type is in the mature and old growth development stages. Spruce-fir forests are a mixture of two species, Engelmann spruce and subalpine fir. Spruce-fir forests are rich in mammal and bird species but they support relatively few reptile or amphibian species because of the higher elevations. Extensive mortality of mature trees has occurred over the last 10 years from spruce bark beetle impacts. In some areas, the majority of mature spruce trees have been killed from insects and disease.

The acres proposed for the above habitat restoration activities are the same for Alternatives B and C (2,000 acres) and slightly less for Alternatives A and D (1,000 acres). Improvements to cool-moist mixed conifer and spruce-fir may include, but are not limited to mechanical treatment, fire managed for resource benefit, and timber harvest. These improvements would help create a more diverse age structure and address issues with insect and disease, which may benefit species in the forested group, particularly American marten, boreal owl, and olive-sided flycatcher. Other species that utilize these habitats might be the riparian/wetland group, particularly the boreal toad, which has historic occurrence within the planning area but is not known to currently occur. Short-term impacts to these species may occur through the loss of canopy cover, removal of snags that may be utilized for nesting, denning or resting, or from ground disturbance associated with treatments to ground-dwelling species such as boreal toad; however, long-term stand conditions are expected be more healthy and resilient with a more diverse age structure.

Winter Range Habitat Improvement

These areas primarily occur on the SJNF in pinyon-juniper, ponderosa pine, mountain shrubland, and sagebrush shrubland habitats below about 8,000 feet, although the upper elevation limit fluctuates, depending on seasonal snow depth, and may be higher for bighorn sheep. Winter range extends across the southern and western portions of the SJNF and onto a variety of adjacent land ownerships, including BLM, state, tribal, and private lands. While winter range is extensive across all ownerships, it is not equal to the quality and extent of summer range on the SJNF, and it is believed that winter range amount and habitat effectiveness could become a limiting factor to big game populations in the future.

Alternative B offers the most acres of habitat restoration (5,000) with Alternative C offering half the acres (2,500), followed by Alternatives D and A, which both offer 1,000 acres of habitat restoration. Improvement to winter range may occur through mechanical treatment and prescribed burning in mountain shrublands and grasslands, pinyon-juniper, and ponderosa pine. These improvements would help increase the health and vigor of the above habitats, not just for big game species but members of the grassland group (ferruginous hawk and northern harrier), shrubland group (Brewer's sparrow, and loggerhead shrike), and forested group (fringed myotis, Townsend's big-eared bat, hoary bat, and spotted bat). Short-term effects from prescribed burning to the above species are outlined in the fuels management section above. In general, immediate short-term effects to the above species may occur, followed by new growth of grasses and forbs, thus returning and enhancing habitat for small mammals and producing higher-quality forage for big game. Long-term positive effects include overall enhancement of grassland forage and breeding habitat.

Aspen Habitat Restoration

Aspen forests range from occurring as pure stands to a mixed overstory of aspen trees and conifer trees with the most abundant tree species being aspen. Where aspen trees intermix with conifer trees, the resulting aspen-dominated forests usually supports a wider variety of wildlife species than conifer-dominated forests nearby. The trend in amount of aspen on the SJNF is stable, but there is a declining trend in the amount of aspen in early successional stages and a trend of increasing conifer succession in the understory of many aspen stands.

The acres proposed for the above habitat restoration activities are the same for Alternatives B and C (3,000 acres) and slightly less for Alternatives A and D (1,000 acres). Improvement to aspen habitat may occur through timber harvest. These improvements would increase the amount of suckering to recruit future nesting habitat for species like flammulated owl, northern goshawk, and Lewis' woodpecker. Aspen-dominated forests are extremely rich habitats for many wildlife species; therefore, the clearing of downed and decadent aspen would increase forage for many species such as bats. These activities may benefit species in the forested group (fringed myotis, hoary bat, flammulated owl, Lewis' woodpecker, northern goshawk, olive-sided flycatcher, and purple martin), as well as in the riparian group (northern leopard frog and boreal toad). Short-term negative effects from ground disturbance associated with treatments may negatively impact ground-dwelling species such as boreal toad and northern leopard frog. Some large snags or decadent trees that may provide nesting habitats for some of the forested group may be lost during activities; however, the effects from restoration efforts are expected to increase the health and vigor of the stand, enhancing wildlife habitat in the long-term. Further impacts to species are addressed in the timber harvest section below.

Lands and Special Uses

The SJNF administers approximately 700 non-recreational land use authorizations consisting of special use permits, rights-of-way (ROW) grants, easements, and leases that authorize the occupancy and use of public lands by government agencies, private individuals, or companies for a variety of activities (including roads, dams, pipelines, and other private or commercial uses). The SJNF special uses program also authorizes the occupancy of public lands for pipelines, communication lines, power transmission lines, and communication sites.

For the purposes of this analysis, future special use authorizations cannot be predicted as to specific location, scale, and timing; therefore, there is no clear way to estimate the impacts of a special uses program under the requirements under various alternatives. Ultimately, the degree of the impacts of any project would depend on approved conservation strategies, critical habitat designations, and biological opinions that mandate specific management requirements for land uses. These requirements would not be known until specific project proposals are submitted and assessed.

All species groups may be affected by lands and special uses activities. In general, effects to wildlife from lands/special uses programs are generally similar to other land management activities. Effects to habitat include loss of habitat important components through removal of vegetation and structural attributes such as snags and downed woody debris. Other potential effects to habitat include habitat modification (modification of vegetation, soil, or water) and pollution (habitats contaminated with foreign materials). The most influential impact to wildlife from lands/special uses programs is activities that reduce habitat effectiveness through the indirect effects of human disturbance, causing individual animals to be displaced from preferred habitats to areas of lesser habitat capability or reduced security. The degree to which human disturbance affects wildlife species is dependent on type of human use/activity, the intensity of human activity, the timing of human activity in relation to important animal life functions, and the location of human activity in relation to key habitat attributes.

In general, application of LRMP design criteria and referenced guidance and best management practices (BMPs) is expected to ensure that impacts to wildlife from activities conducted by this program areas would be minor to moderate, limited in scale in relation to requisite habitats, and limited in duration to minimize impacts during times of important life functions.

Livestock Grazing

Livestock grazing has been occurring across the SJNF since prior to the establishment of the San Juan Forest Reserve in 1905. Following 1905, many changes in management were implemented in an effort to properly manage the rangeland resource. Some of the noteworthy changes included dividing domestic livestock ranges into distinct grazing districts (allotments) and assigning these areas to specific permittees with designated numbers and seasons of use, including the designation of specific trailing areas to be used to access the allotments.

Past livestock grazing has had a significant impact on the current conditions seen in many of the terrestrial ecosystems on the SJNF, particularly mountain grasslands, semi-desert shrublands, semi-desert grasslands, sagebrush shrublands, and pinyon-juniper woodlands. Since the early 1900s, there has been a significant reduction in the numbers of cattle and sheep that graze on the SJNF. For example, in the 1930s, approximately 216,684 sheep and 41,968 cattle were permitted on the SJNF. In 2012, approximately 14,330 sheep and 23,412 cattle were permitted. Currently, a little over half of the SJNF is considered suitable for livestock grazing, and although impacts from livestock and impacted areas are still present, impacts have been reduced with more effective rangeland management techniques and adaptive management approaches.

Proposed stocking rates and the amount of area available for permitted livestock grazing varies between alternatives. Alternative D has the potential to affect the highest number of acres and proposes the highest cattle stocking rates, and therefore has the most potential to affect sensitive wildlife species. Alternative B has the next highest potential to affect sensitive wildlife species, followed by Alternatives A then C due to incrementally lower numbers of permitted cattle and fewer acres considered suitable for grazing. Alternatives A, B, and D have the same number of acres suitable for domestic sheep and goat grazing, and Alternative C has the least number of acres suitable for grazing. Alternative D proposes the highest domestic sheep and goat stocking rates and therefore has the most potential to affect sensitive wildlife species. Alternatives A and B have the next highest potential to affect sensitive wildlife species given the same stocking rates, followed by Alternative C with the least amount of animals proposed for stocking.

Livestock grazing on NFS lands occurs under the authorization of grazing permits.

Grazing permits authorize a permittee to graze livestock and are generally issued for a 10-year period on specific portions in designated allotments. The permittee is required by the permit to graze under specified terms and conditions designed for resource protection and enhancement, as described in an allotment management plan, which is incorporated as part of the permit. Permits are administered annually through issuance of annual operating instructions. Grazing permits by themselves do not authorize the permit holder to develop water, construct fences, build roads or trails, manipulate vegetation, or conduct other ground-disturbing activities. The authorization of these or similar ground-disturbing activities is based on the outcome of project-specific NEPA analysis.

Livestock grazing activities would affect sensitive wildlife species in all analysis groups. Effects to species are similar among groups and are primarily influenced by the areas grazed, permitted livestock numbers and class, timing and duration of grazing, and the type of grazing system used and operations to manage livestock distribution as described below.

Cattle are grazed in permitted range allotments across the forest at the lower, mid, and upper elevations (below tree line). Grazing by domestic sheep and goats occurs mostly in the higher elevations (alpine habitat) compared to low elevations where only a few sheep allotments are present. Livestock grazing occurs in areas classified as primary and secondary range. Primary rangelands are preferred by livestock and are associated with gentle slopes and contain abundant forage production. Primary rangelands include grasslands, shrublands, riparian areas, alpine, and open forested stands. Secondary rangelands are less preferred by livestock, as they contain less forage production when compared to primary rangelands. Secondary rangelands are generally present in dense shrublands and forested areas on moderately steep slopes. Forested areas that contain high canopy closures, extensive dead and down material, steep slopes, or soils types that are less conducive for grass-forb production are areas less preferred by domestic livestock.

Grazing is authorized on permitted allotments during specific time frames. Currently, there are 97 cattle allotments on the SJNF, which include 27 on the Columbine District, 34 on the Dolores District, and 36 on the Pagosa District. Most cattle grazing (yearling, cow-calf pairs, or mixed age classes and sexes) occurs from early June to early October. Currently there is a total of 28 domestic sheep grazing allotments on the SJNF, which include 19 on the Columbine District, seven on the Dolores District, and two on the Pagosa District. The domestic sheep grazing season varies by location, but generally runs from mid-June (low elevations) or early July (high elevations) to mid-September or early October.

The most common types of grazing systems used across the SJNF are rotation, deferred rotation, and rest-rotation. The type of system used is dependent on site-specific conditions and forage capability and suitability. The rotation system involves the movement of livestock from one pasture to another on a scheduled basis. Deferred rotation involves delaying grazing until seed maturity of important forage species. Under a rest rotation system, generally one pasture is rested or receives non-use while the other pastures are grazed. There is no year-round grazing on designated allotments across the SJNF.

There are a variety of operational strategies used in managing livestock across the SJNF. Some livestock are trailed to designated allotments, while others are transported by vehicle. In some instances, range improvement projects are initiated to manage livestock distribution such as the construction of fencing (brush, wire, and pole) and water developments (spring development, stock ponds, and reservoirs) and associated maintenance, salting, and range riding.

In general, effects to sensitive species may result from the direct competition between livestock and wildlife for food or cover. Other effects may result from the short- or long-term reduction in habitat quality or reduced habitat effectiveness, potentially affecting breeding and foraging habitat, and habitat used by prey species such as insects and small mammals. Operational activities such as fence construction and water developments, and managing herd distribution can also affect species. Poor fence design or lack of maintenance can result in hazards such as entanglement resulting in injury or death, an impact most likely affecting sensitive birds and bats. In most cases, construction of fences and water developments requires the removal of grassland, shrub, or forested vegetation at small scales, and therefore no appreciable negative effects to habitat are expected. Although vegetation removal can result in loss of habitat, these projects can also benefit wildlife species by mitigating negative effects from grazing such as reducing the timing and extent livestock graze in primary rangelands. Moving livestock from pasture to pasture or across allotments may cause minor disturbance temporarily displacing wildlife. Repetitive use of certain routes by livestock can reduce habitat at small scales, and create non-system trails that may encourage public use causing disturbance. Invasive species such as noxious weeds may be introduced during any of the management activities and may expand into previously disturbed and undisturbed areas negatively affecting forage quantity and quality.

Based on the considerations described above, sensitive species in the grassland, shrubland and riparian/wetland groups, and forested species that prefer more open stand conditions (fringed myotis, hoary bat, Townsend’s big eared, flammulated owl, Lewis’ woodpecker, northern goshawk, olive-sided flycatcher, and purple martin) are expected to be most affected by livestock grazing. Many of these species nest/roost, breed, and forage in or in close proximity to primary rangelands during the time cattle are turned on to the allotments. The reduction or alteration of grassland, shrubland, or riparian/wetland vegetation have potential to negatively affect habitat for the species and their prey, especially those that nest on the ground (American bittern, northern harrier, short-eared owl, western burrowing owl, and Nokomis fritillary butterfly), den below the surface (Gunnison’s prairie dog and New Mexico meadow jumping mouse), or nest in shrubs (Brewer’s sparrow). The extent and duration of grazing generally coincides with potential effects to species and habitats; therefore, species area expected to be less affected by rest rotation, followed by deferred rotation, and more traditional rotation system. Species in the forested group, particularly those associated with dense mixed conifer and spruce-fir forests (marten and boreal owl) are less likely to be affected by grazing due to the lack of grazing and associated activities, and minimal overlap with habitat used by the species.

Domestic sheep and goat grazing in alpine habitat has potential to affect white-tailed ptarmigan and Rocky Mountain bighorn sheep. For ptarmigan, the primary effect of sheep grazing is a reduction in food availability. Domestic sheep are generally turned on to allotments in early July, during or shortly after the peak of ptarmigan hatch. Although newly hatched chicks are mainly consuming insects, they quickly shift their diet to plant matter similar to adult ptarmigan. Some of the most important foods identified in the diet of domestic sheep on alpine ranges are clovers and bistorts, the same forbs that comprise a substantial percentage of the summer and fall diets of ptarmigan. Another potential negative effect of sheep grazing on ptarmigan habitat is browsing impacts to upland willows of moderate to low stature, reducing food availability and hiding cover in brood rearing areas and summer/fall foraging areas. Any activity, including sheep grazing, that negatively affects willows or reduces the abundance of species diversity of the forb community in areas used by ptarmigan during the summer and fall can negatively affect ptarmigan.

Projects or activities associated with LRMP implementation that have potential to influence habitat quality, quantity, and effectiveness for bighorn sheep include recreation management, fire/fuels management, and livestock grazing management. Although habitat degradation from fire suppression, highways, livestock grazing, and human disturbance is of concern to bighorn sheep, the susceptibility of bighorn herds to extirpation as a result of diseases that may be transmitted by domestic sheep or goats appears to be the greatest threat to bighorns.

There are five Rocky Mountain bighorn sheep populations present on the SJNF, most of which are present in or utilize alpine habitat. Current national direction requires a risk assessment be prepared for bighorn sheep as part of a plan revision and is part of the planning record (USFS 2011b). The assessment addressed risk of contact between domestic sheep and goats and bighorn sheep. The results from the risk assessment show that physical contact between bighorn sheep and domestic sheep and goats is high for 24 allotments, moderate for three allotments, and low for one allotment. The risk assessment also prioritized grazing allotments for future analysis and management. Project-level analyses would review the findings of the SJNF-wide risk assessment, follow LRMP direction to avoid risk of contact between domestic sheep and bighorns, and apply BMPs at the project-level. Site-specific conditions would dictate the best management solutions to avoid risk of contact. The risk assessment is part of the project record (USFS, 2013).

LRMP guidance for bighorn sheep and domestic sheep is the same for the alternatives and may require differing levels of management design in order to meet LRMP standards during site specific implementation. With respect to findings from the risk assessment, Alternative B could maintain the same permitted numbers and area of domestic sheep grazing as Alternative A. For this reason, there would be little difference between Alternative A and B in potential for physical contact between bighorn and domestic sheep. Under Alternative C, livestock grazing could be managed to enhance other resources including wildlife, cultural, and soils values, which could result in lower livestock stocking rates. Under Alternative C, domestic sheep numbers and suitable acres could be reduced compared to all other alternatives. Alternative C could therefore reduce the potential for physical contact between domestic and bighorn sheep, thereby also reducing the complexity of project design needed to reduce the potential for a bighorn sheep mortality event during LRMP implementation, compared to Alternatives A, B, or D. Under Alternative D, livestock grazing could be managed to increase grazing opportunities and therefore could increase domestic sheep numbers. For this reason, Alternative D could result in greater complexity of project design to address the potential for physical contact between domestic and bighorn sheep, therefore reducing a greater potential for a bighorn sheep mortality event, as compared to Alternatives A, B, or C.

The combination of fewer numbers of livestock, fewer acres available for grazing, and the application of LRMP and site-specific design criteria would help minimize negative effects to sensitive species from domestic livestock grazing.

Oil and Gas Development

Much of the anticipated oil and gas development on the SJNF is expected to be in lower-elevation habitat types including pinyon-juniper, ponderosa pine, and warm-dry mixed conifer forests, as well as in sagebrush and mountain shrublands and in desert grasslands. Lesser amounts of oil and gas development are expected in higher-elevation habitats such as cool-moist mixed conifer, aspen, and spruce-fir forests. The potential for oil and gas development in alpine habitat is low due to geological formations, which are not known to have any oil or gas reserves.

For these reasons, sensitive species more closely associated with low to mid elevation habitat types (bald eagle, American bittern, peregrine falcon, Brewers' sparrow, ferruginous hawk, flammulated owl, fringed myotis, Nokomis fritillary butterfly, Gunnison's prairie dog, hoary bat, Lewis' woodpecker, loggerhead shrike, New Mexico meadow jumping mouse, northern goshawk, northern harrier, northern leopard frog, river otter, short-eared owl, spotted bat, Townsend's big-eared bat, western burrowing owl, and yellow-billed cuckoo) are more likely to be negatively affected by oil and gas development than sensitive species associated with higher elevation habitats (American marten, boreal owl, black swift, boreal toad, Rocky Mountain bighorn sheep, and white-tailed ptarmigan). The development of oil and gas resources on the SJNF would affect sensitive wildlife species primarily in the grassland, shrubland, riparian/wetlands, and forested analysis groups.

Impacts from oil and gas leasing and development on the SJNF are likely to occur within reproduction, migration, and movement corridors, and wintering habitats (or some combination of all three) depending on the species and season of occurrence. For every action carried out under any LRMP alternative, some sensitive species could benefit from habitat changes, some sensitive species may not be impacted at all, and some sensitive species may be negatively impacted. The degree of impact to sensitive species would differ depending on factors such as primary habitat association, effect to key habitat components, habitat generalist or specialist, and season of species occurrence.

Potential impacts to sensitive species may occur in areas where existing oil and gas leases are present and in new lease areas. Potential impacts are expected to be greatest in areas with high potential for oil and gas development, including the Northern San Juan Basin, San Juan Sag, and the Paradox Basin/ Gothic Shale Gas Play (GSGP) area. Alternative D has the largest amount of acreage available for leasing, followed by Alternatives A, B, and C.

The degree of impact and range of effects would depend on the sensitive species affected, the scope and scale of the project, and many other factors. The degree and direction of impact would likely vary, depending on factors such as project type, the time of year projects are implemented, general habitat type, and application of project design criteria and lease stipulations.

Lease stipulations guide how potential development could occur across areas leased. Lease stipulations are applied to protect various resources (soils, watersheds, terrestrial and aquatic wildlife and habitat, cultural resources, etc.) from adverse effects from development activities. Roadless areas have a No Surface Occupancy (NSO) stipulation applied, and for lands outside CRAs, a full range of leasing stipulations are assigned, including NSO, Timing Limitation (TL), Controlled Surface Use (CSU), and standard lease terms to protect various resources. Designated wilderness areas and the Piedra Area are areas withdrawn from leasing by law. Additionally, approximately 67,700 acres are recommended for wilderness and WSR designation, and administratively not available for lease.

Alternative B contains the most acreage where NSO stipulations would be applied followed by Alternatives A, D, and C. Alternative A contains the most acreage where TL stipulations apply, and no TL stipulations would be applied across Alternatives B, C, or D.

Alternative D contains the most acreage where CSU stipulations apply, followed by Alternatives B, A, and C. Alternative D contains the most acreage where standard lease terms apply, followed by Alternatives A, B, and C.

Sensitive species that are expected to be most impacted by oil and gas activities are those with relatively narrow tolerances to disturbance (bats, raptors, and amphibians), species with restricted year-round or seasonal habitats (hibernacula/roosting sites such as caves for sensitive bats), and/or species with habitats that are limited across the planning area (sagebrush habitat for Brewer's sparrow and loggerhead shrike). One oil and gas lease stipulation applies specifically to bat habitats, but a variety of lease stipulations designed to protect other resources would also provide substantive protections to habitats for bats, loggerhead shrike, Brewer's sparrow, amphibians, and raptors) (see Appendix H).

In general, the amount of habitat likely to be affected by oil and gas leasing and development during LRMP implementation under any of the alternatives is expected to be relatively small when compared to the total amount of habitat currently available across the SJNF. For this reason, and for most sensitive species, the impacts of direct habitat loss would be relatively small and likely not sufficient to result in population-level impacts or in changes to species distributions across the SJNF. However, for some sensitive species that are associated with relatively rare riparian areas and wetlands (New Mexico meadow jumping mouse, northern leopard frog, Nokomis fritillary butterfly) or unusual habitats such as mature cottonwood gallery forest (yellow-billed cuckoo), it is possible that LRMP implementation activities that affect that particular rare or unusual habitat or important structural attribute could have locally more substantial impacts to a specific sensitive species. For all these reasons, impacts to species would vary under all of the alternatives.

The No Leasing Alternative would provide the greatest protection for sensitive species on the SJNF, but some loss of key habitat components is likely under the alternative due to development of lands that have already been leased. Of the action alternatives, Alternative C would have the least potential for impacts to sensitive species habitats, followed by Alternatives B, D, and A, respectively. This is based on the projected total combined acres of disturbance on leased and unleased lands for conventional and GSGP within the Paradox Basin, and therefore the relative potential for oil and gas activities to reduce the abundance or affect the distribution of key habitat components for sensitive species. It is also based on relative expected levels of disturbance associated with oil and gas operation activities in and adjacent to production areas.

Total projected disturbance acres are very similar for Alternatives A and D, with somewhat less disturbance projected for Alternative B, followed by substantially less disturbance for Alternative C, respectively. There is only about a 19% difference in total combined acres of projected disturbance between the most impactive alternative, Alternative A, and the least impactive alternative, Alternative C. The No Leasing Alternative would have the least amount of projected total disturbance acres, but still projects about 35% of the development in the Paradox Basin that is projected to occur under the most impactive alternative, Alternative A. Projected acres of development in areas already leased do not vary by alternative and would be about 38% of total projected development. Conversely, about 62% of projected development within the Paradox Basin would be on unleased lands and thus represents new potential impacts to habitats for sensitive species.

A variety of leasing stipulations (see Appendix H) and LRMP standards and guidelines and other referenced guidance are expected to reduce potential negative effects of oil and gas leasing and development on sensitive species, and provide habitat conditions necessary to conserve sensitive species on the SJNF. Nine oil and gas lease stipulations apply specifically to sensitive species habitats and conservation measures, but a variety of lease stipulations designed to protect other resources would also provide substantive protections to sensitive species and the habitats on which they depend (see Appendix H). Some of this LRMP direction, such as leasing stipulations, is applied at the leasing stage, whereas other LRMP direction, such as standards and guidelines, is applied at the project development stage during LRMP implementation. LRMP direction is expected to provide the ecological conditions necessary to support sensitive species populations widely distributed across the SJNF.

Recreation

The population changes in Archuleta, Dolores, La Plata, and Montezuma Counties is indicative of the growth rate around the SJNF. From 1991 through 2000, these four counties grew by approximately 43%. The growth projection for the year 2025 is 63% (U.S. Census Bureau 2000). This population growth has been fueling a recreation boom that utilizes expanding technological advances in motorized recreation devices, as well as a growing array of non-motorized recreational pursuits that are expanding their influence across the landscape. Increased demand for recreational opportunities is expected to continue for the foreseeable future. The growing human population, technological advances in recreational equipment, and development of new forms of recreation has expanded human activity into a variety of wildlife habitats and into previously secure habitat areas, including areas where direct human influences were previously minor or absent. This trend during the past 30 years of increased overall human presence and activity is expected to continue and likely increase for the foreseeable future. As a consequence, the amount, condition, and effectiveness of some key wildlife habitats are expected to decline for the foreseeable future.

The planning area offers a variety of dispersed outdoor settings and opportunities, often defined by a semi-primitive and predominantly natural environment. A combination of features offers suitable terrain for camping, picnicking, mountain biking, off-highway vehicle driving, snowmobiling, backcountry skiing, hunting, and other dispersed uses.

Summer

An inventory of dispersed campsites shows camps often clustered along streams in valley bottoms. Concerns have been raised regarding wildlife impacts associated with heavily used, and easily accessed, dispersed recreation areas. Locations close to communities such as Cortez, Durango, and Pagosa Springs also show the impacts of constant and intensive dispersed day use.

Summer recreation impacts to sensitive wildlife species are possible from activities such as camping, hiking, mountain biking, horseback riding, and motorized recreation. Recreation use is widespread, and would occur to some extent in all habitats on the SJNF, but impacts are typically confined to localized areas such as designated trails, frequently used dispersed areas, or developed recreation facilities such as campsites or trailheads. All species groups are expected at some point to be impacted by summer recreation. In general, the application of LRMP design criteria, referenced guidance, and BMPs is expected to ensure that impacts to wildlife from recreation program activities would be minimized during times of important life functions. Use of these design criteria during project-level planning would help minimize impacts to sensitive species, but impacts from dispersed recreation are still possible.

While the actual direct impacts from different types of recreation use are similar for all alternatives, the amount of area potentially impacted varies by alternative, primarily because of differences in the number of acres that would be designated as suitable for motorized use. Alternative A has the most amount of area designated as suitable for motorized recreation, and is the only alternative that allows motorized travel off of designated routes, and therefore has the potential have a greater impact to species from negative impacts to habitat and disturbance. Alternative D has the second highest amount of area designated as suitable for motorized recreation, followed by Alternative B. Alternative C has the fewest number of acres designated as suitable for motorized recreation, and therefore has the potential to impact sensitive wildlife species on the fewest number of acres.

General effects to species groups from recreation vary, but the greatest impact from recreation is disturbance to those species sensitive to human intrusion, particularly during breeding season, which overlaps the summer recreation period. As mentioned above, all species groups are likely to be impacted at some point by recreation activities, but species in the forested group (fringed myotis, Townsend's big-eared bat, and northern goshawk), riparian/wetland group (peregrine falcon), and alpine group (Rocky Mountain bighorn sheep and white-tailed ptarmigan) are the species most negatively affected by disturbance from recreation activities at roost sites, nesting sites, or lambing areas during breeding season. Habitat loss and alteration from newly developed recreation areas or projects may occur but these would vary and would be analyzed at the project level.

Winter

Effects from winter recreation correspond to the increasing human population in southwest Colorado and other parts of the country attracted to the area's winter recreation opportunities. This has resulted in an increased demand for access to recreational opportunities on snow. In addition, snowmobiles have increased in power and reliability, allowing them to access more terrain. Backcountry skiers now also have better equipment, and there has been an overall surge in adventure skiing. Another emerging sport is hybrid skiing, which is where a snowmobile tows or carries a skier or snowboarder up hills.

Although winter recreation opportunities are fewer than summer and restricted to a smaller area, impacts to sensitive wildlife species are possible from activities such as skiing, ski area development, and snowmobiling. Species groups that may be affected by winter recreation are the forested group (American marten, boreal owl, and northern goshawk), the grassland group (ferruginous hawk), the riparian/wetland group (bald eagle and river otter), and the alpine group (Rocky Mountain bighorn sheep and white-tailed ptarmigan). In general, the application of LRMP design criteria, referenced guidance, and BMPs is expected to ensure that impacts to wildlife from program activities would be minimized during times of important life functions. Use of these design criteria during project-level planning would help minimize impacts to sensitive species, but impacts from existing recreation (skiing and snowmobile use) are still possible.

While the actual direct impacts from different types of recreation use are similar for all alternatives, the amount of area potentially impacted varies by alternative, primarily because of differences in the number of acres that would be designated as suitable for motorized use. Alternative A has the most area designated as suitable for motorized travel over snow and would provide the most suitable motorized acres on the mountain passes. Alternative D has the second highest amount of area designated as suitable for motorized recreation, followed by Alternative B. Alternative C has the fewest number of acres designated as suitable for motorized recreation, and therefore has the potential to impact sensitive wildlife species on the fewest number of acres.

Those species listed above are likely to be the most impacted from human disturbance associated with winter recreation, as they are more sensitive to human disturbance and remain active during the winter. Habitat loss and alteration from newly developed ski areas or newly designated recreation areas may occur; however, effects for these activities vary and would be analyzed at the project level.

Solid Mineral Development

Currently on the SJNF, some small-scale solid mineral development is possible in alpine habitat around Silverton and in a variety of terrestrial ecosystems around the Rico and La Plata areas. Small-scale rock collecting is also possible in many areas across the SJNF. Solid mineral development may have negative effects to sensitive wildlife species that occur in the project areas where mining or rock collecting are most likely to occur. Potential negative effects are expected to be associated mostly with small-scale habitat loss or alteration, and for most species, temporary displacement resulting from human disturbance and development activities.

The number of acres available for solid minerals development varies by approximately 10,000 acres between alternatives. Alternative C has the fewest number of acres open to locatable mineral development and the highest number of acres proposed for withdrawal, and thus would have the least amount of potential impact on sensitive wildlife species. Alternative B has more acres available for mineral development and fewer acres proposed for withdrawal as compared to Alternative C. Alternatives A and D have the most acres available for locatable mineral development and do not propose the withdrawal of any additional areas from mineral development, and would therefore have the most potential to impact sensitive wildlife species. The number of acres currently withdrawn from possible solid mineral development is the same for each alternative. Solid mineral development may have impacts to sensitive species in all analysis groups.

There are several design criteria requiring that projects or activities occurring in habitat for sensitive species be designed to reduce negative effects to habitat or minimize disturbance effects to species. Design criteria applicable to solid mineral development include those listed for sensitive butterflies, bats, bighorn sheep, and sensitive raptors. Additional design may be included during project-level analysis and implementation. In addition, federal authority over mining activities allows for the setting of terms and conditions in operating plans in order to minimize impacts to public lands. There are also areas that have been withdrawn from leasing or are administratively unavailable for leasing that would not be affected by solid mineral development. Currently, there are 424,428 acres on the SJNF that have been withdrawn from leasing. In addition, the opportunity for new solid mineral development within the roughly 566,000 acres of CRAs is somewhat limited because new road construction is prohibited, unless there is a prior existing right. The design criteria in the LRMP, the withdrawal of areas from leasing, and the limited opportunity for solid mineral development in CRAs all combine to minimize negative effects of solid mineral development on sensitive wildlife species.

Timber Harvest

Timber management and harvesting is an important tool for managing ecosystem diversity, forest insect and disease populations, tree growth and yields, recreation settings, wildlife habitat, wildfire hazard mitigation. The timber and fuels programs would be integrated to meet overlapping common goals. The timber program would focus treatments in following areas:

- landscapes in the wildland urban interface that have altered fire regimes and/or have areas with high fuel loadings;
- landscapes at high risk for developing epidemic levels of insect and/or disease infestation;
- landscapes where disturbance (such as fire, or insects/disease) has resulted in dead or dying trees;

- areas where vegetation management could most effectively move age classes, size classes, density, and species closer to desired conditions;
- areas treated previously in order to maintain sustainable conditions and to improve scenic integrity; and
- areas where wood processing facilities can effectively and economically use products resulting from vegetation management.

Timber harvest treatments would occur in ponderosa pine, warm-dry mixed conifer, cool-moist mixed conifer, aspen, and spruce-fir forests. Treatment in ponderosa pine and warm-dry mixed conifer would be via restoration treatments (a form of partial cut where post-harvest residual density is partially or closely tied to HRV) and partial cutting (includes single-tree and group selection, improvement cuts, shelterwood, and other partial-cut harvesting methods, generally removing 30% or less of the existing overstory). Treatment in cool-moist mixed conifer and spruce-fir include partial cutting. Treatment in aspen would include clear cutting and coppice. Coppice is a method of regenerating a stand in which the majority of regeneration is from stump sprouts, or in the case of aspen, root suckers. Vegetation would be treated via traditional timber harvest methods such as chainsaw, feller-buncher, or similar equipment via land based systems. Treatments would occur when ground conditions are conducive for operating heavy equipment and other motor vehicles, generally summer through winter.

Timber harvest treatments under Alternative D would affect the vegetation and soils on approximately 3,400 acres per year, followed by Alternative A at 2,150 acres and Alternative B at 2,100 acres. Alternative C would affect the vegetation and soils on the fewest acres per year at 1,580 acres. While Alternatives A, B, and C would affect the vegetation and soils on fewer acres, there would also be less opportunity under these alternatives to use timber harvest treatments for ecosystem restoration purposes than under Alternative D. As noted in the Table T.11 harvest treatments would occur over a relatively small amount of each vegetation type over the life of the LRMP, and therefore potential effects (positive and negative) to sensitive species would occur at a relatively small scale. Treatments would affect sensitive species in the forested and riparian/wetland analysis groups. Direct and indirect effects from timber harvest treatments are discussed by treatment in each vegetation type.

Disturbance impacts resulting from use of mechanized equipment and construction and/or reconstruction of roads to access treatment units are common effects associated with all sensitive species. Disturbance impacts would vary by species as some species are less affected, while others such as northern goshawk are likely to be most affected given their general intolerance to human disturbances. The construction and/or reconstruction of roads would occur to access treatment units, directly impacting additional habitat for species. Roads also serve as a means of public transportation (permitted and non-permitted) thereby indirectly impacting species by causing disturbance, and in some areas of high usage, reduced habitat effectiveness. LRMP and project-specific design criteria would be applied to minimize disturbance impacts to goshawk and other species sensitive to human disturbance.

Ponderosa Pine

Timber harvest treatments in ponderosa pine would focus on restoration treatments and affect habitat for forested sensitive species including fringed myotis, hoary bat, Townsend’s big-eared bat, flammulated owl, Lewis’ woodpecker, northern goshawk, and olive-sided flycatcher. Treatment would include primarily thinning of ponderosa pine to decrease stand densities, with the primary objective of enhancing forest health. The health and vigor of residual trees would increase after treatment due to the increased uptake of soil and moisture nutrients. Treatments would also increase resiliency of ponderosa pine forests to insects, disease, and high-intensity wildfire.

Restoration treatments would have short-term negative effects and long-term positive effects. For all species, short-term effects include temporary displacement due to disturbance. Where thinning of trees particularly within clumps occurs, roosting habitat for species such flammulated owl and hoary bat, and potential nesting habitat for goshawk would be negatively affected. Negative effects to key habitat components such as snags used by olive-sided flycatcher for perching posts, northern goshawk for plucking posts, and flammulated owl and Lewis’ woodpecker for nesting would be minimized with application of LRMP design criteria for snag retention and recruitment.

Restoration treatments are expected to have many positive effects to sensitive species in the long-term through the enhancement of structural characteristics preferred by the species. All species are associated with more open, park-like stand conditions with clumps and groups of mostly even-aged trees (of varying size classes) and small openings dispersed throughout treatment areas. These structural characteristics provide foraging, nesting/roosting, and security habitat for all species. Clumps provides roosting and security for hoary bat, flammulated owl, and northern goshawk. Small grass-forb openings interspersed among clumps and groups of trees provide foraging habitat for fringed myotis, hoary bat, Townsend’s big eared bat, flammulated owl, Lewis’ woodpecker, and northern goshawk. The combination of treatment and the likelihood of prescribed burning post-treatment would reduce the risk of high-intensity wildfire, thereby maintaining more sustainable ponderosa pine habitat in the long-term.

Treatment in ponderosa pine via partial cutting methods utilizing individual tree and group selection would have similar effects to species as restoration treatments. Partial cutting methods utilizing even-aged cutting methods such as shelterwood treatments would be more impacting to sensitive species as negative effects to structural characteristics preferred by the species are expected to be greater.

Warm-dry Mixed Conifer

Timber harvest treatments in warm-dry mixed conifer forests would have similar effects to species as those described for ponderosa pine harvest treatments.

Aspen

Timber harvest treatments in aspen would focus on partial cutting treatments and affect habitat for forested sensitive species including fringed myotis, hoary bat, flammulated owl, Lewis’ woodpecker, northern goshawk, olive-sided flycatcher, and purple martin. Treatment would focus on aspen regeneration in combination with aspen release. Where aspen is intermixed with conifer, white fir, and other conifer species encroaching into mature aspen stands would be targeted for removal to help reduce competition and release existing aspen regeneration. Pure stands of live and decadent aspen may also be harvested to promote suckering of aspen regeneration.

Treatment in aspen/conifer forests would reduce a minor amount of potential nesting habitat for flammulated owl and northern goshawk until trees of sufficient size are present to provide cavity-nesting opportunities (flammulated owl) or stick nest placement (northern goshawk). At the same time, treated areas would provide foraging habitat for both species residing in adjacent stands, as well as other species that forage in the newly created openings. Treatment in aspen with conifer areas would result in significant aspen sprouting and regeneration. Maintaining aspens presence in treated areas would maintain prey diversity for goshawks and other forest dwelling raptors, and provide breeding (flammulated owl, Lewis’ woodpecker, purple martin, and fringed myotis) and foraging habitat (all species) as stands develop and reach maturity.

Treatment in aspen-dominated stands would have similar effects to sensitive species as those described above.

Cool-moist Mixed Conifer

Timber harvest treatments in cool-moist mixed conifer would focus on partial cutting treatments and affect habitat for forested sensitive species including American marten, flammulated owl, northern goshawk, and olive-sided flycatcher. All species are associated with mature and late successional cool-moist mixed conifer forests due to the structural characteristics and habitat attributes present (large trees, multi-story stands, moderate to high canopy closures of 40% and greater, snags, and downed woody material) that provide suitable habitat for nesting/denning, foraging, and security. Harvest treatments that negatively affect structural characteristics and key habitat attributes can negatively affect sensitive species.

Many of the cool-moist mixed conifer stands across the SJNF are in mature or older stages of development, and many are being affected by insects and disease. Uneven- and even-aged silvicultural treatments would be used to treat areas affected by insects and disease, and areas that are high risk of developing epidemic levels of insects and disease. In general, uneven-aged silvicultural treatments (individual tree and group selection) tend to result in fewer short- and long-term negative effects to structural characteristics when compared to even-aged treatments (shelterwood cuts). Structural characteristics are not expected to be appreciably affected in the short or long term by either silvicultural treatment, as both treatments would target trees reflecting poor health, and, to a lesser extent, healthy trees. Healthy trees would be removed in some locations to reduce stand densities and multi-story structure preferred by insects such as western spruce budworm (*Choristoneura* sp.), and disease such as *Armillaria* and other root rot diseases. Insects and disease are common disturbance agents of cool-moist mixed conifer forests. Trees that are weakened or killed by insects and disease provide habitat for wildlife; however, their habitat value is far greater when they exist in forests containing an abundance of healthy trees, as healthy trees provide other requirements. Because treatments would be designed to improve forest health, long-term effects to species are expected to be mostly positive, and more sustainable habitat is expected in the long-term.

Either silvicultural treatment can have negative effects to habitat attributes such as snags used for cavity nesting (flammulated owl), foraging (olive-sided flycatcher), and perching (northern goshawk). Snags are also used by bird and small prey species of northern goshawk and American marten such as woodpeckers, jays, and ground squirrels. Treatments can also affect small mammal prey such as voles, red squirrels, and snowshoe hare for American marten and northern goshawk that utilize downed material for forage and cover. Negative effects to downed woody material may occur during felling operations and during use of mechanized equipment for skidding logs to landings, or during the construction or reconstruction of roads in treatment units.

Treatment in areas affected by insects and disease are not expected to appreciably impact forested sensitive species as endemic populations of insects and disease would remain following treatment, continuing their role as natural disturbance agents and continue influencing structural characteristics and maintaining habitat attributes utilized by sensitive species. Negative effects to snags and downed woody material would be minimized with application of LRMP and project-specific design criteria that retain sufficient number of snags and course woody debris in treated areas.

In areas where insects and disease have fewer impacts to cool-moist mixed conifer forests, treatment would occur to move age classes, size classes, density, and species closer to desired conditions. Short- and long-term effects to structural characteristics and habitat attributes are expected to be similar to those described above.

Spruce-fir

Timber harvest treatments in spruce-fir would focus on partial cutting and affect habitat for forested sensitive species including American marten, boreal owl, northern goshawk, and olive-sided flycatcher. All species are associated with mature and late successional spruce-fir forests due to the structural characteristics and habitat attributes described previously for cool-moist mixed conifer. Harvest treatments that negatively impact structural characteristics and key habitat attributes can negatively affect sensitive species.

Many of the spruce-fir stands across the SJNF are in mature or older stages of development, and many of them are being affected by insects and disease, especially spruce bark beetle. Uneven- and even-aged silvicultural treatments would be used to treat areas affected by insects and disease, and areas that are high risk of developing epidemic levels of insects and disease. In areas where insects and disease are having fewer impacts to spruce-fir forests, treatment would occur to move age classes, size classes, density, and species closer to desired conditions.

Short- and long-term effects to American marten, northern goshawk, and olive-sided flycatcher are expected to be similar to those described for cool-moist mixed conifer. Effects to boreal owl are expected to be similar to marten, goshawk, and olive-sided flycatcher, as they all utilize and are associated with the same structural characteristics and habitat attributes described under cool-moist mixed conifer.

Riparian/Wetlands

Timber harvest treatments are not intended for riparian and wetland areas; however, direct and indirect effects may occur. The use of mechanized equipment in riparian areas is possible, but most likely limited to accessing treatment areas. Travel through riparian areas to access treatment units may result in negative effects to soils and riparian vegetation. Other negative effects may result from off-site activities that disturb upland soils, and the potential transfer of eroded material into riparian/wetlands, thus affecting riparian vegetation. These negative effects are expected to be minimized with application of LRMP and project-specific design criteria for watersheds. With application of design criteria, negative effects to sensitive species in the riparian/wetland analysis group are expected to be minimal.

1.3.2 Summary of Direct and Indirect Effects

The wide variety of sensitive species and their preferred habitats suggests that all LRMP alternatives have potential for some affect to sensitive species or their preferred habitats. Effects could be positive, negative, or neutral depending on the species and habitats affected. LRMP alternatives that emphasize more ground-disturbing activity in or near primary habitat areas for sensitive species (such as nesting sites, roosting sites, production areas, and wintering areas) would have a greater potential for impact to some sensitive species or increase the intensity of impacts to some sensitive species.

The potential for influential impacts and disturbances would vary widely among sensitive species and between the alternatives. LRMP implementation activities that occur in close proximity to active breeding and young-rearing areas and other important habitats, such as roosting or wintering areas, would be more likely to have impacts of greater intensity and on a wider variety of sensitive species.

The potential for impact, as well as the potential need for adjustment and monitoring of project effects to some sensitive species and their key habitat components, is likely to be greatest under Alternative D. The potential for impacts to sensitive species is likely to be least under Alternative C and is likely to be similar between Alternatives A and B. The differences between alternatives would be due to the greater projected outputs under Alternative D and acres available for timber harvest, the available livestock animal unit months (AUMs), fluid minerals development scenarios, and greater acres suitable for summer motorized travel. Alternative D would also have a larger amount of land area available for active management activities that may, in turn, impact habitats for sensitive species, movements of individuals, and the potential for human disturbance to species or their key habitats or use areas.

For recreation and associated travel management, Alternatives B, C, and D would eliminate cross-country motorized use. Eliminating cross-country motorized travel and limiting motorized travel to a system of designated routes would substantially reduce the potential for disturbance to sensitive species, compared to the potential for disturbance in areas of unrestricted cross-country travel that would remain available under Alternative A.

For livestock grazing, impacts to species associated with riparian areas, wetlands, and spring and seep habitats would be greatest under Alternative D because it proposes the most acres as suitable for livestock grazing, followed by Alternatives A and B, which propose relatively similar acres as suitable for grazing, then Alternative C, which proposes the least acres as suitable for livestock grazing.

For timber harvest in lower elevation forests such as ponderosa pine and warm-dry mixed conifer where some sensitive species are most abundant on the SJNF, Alternative C proposes the fewest acres of timber harvest, followed by Alternatives A and B, which project the same acres of timber harvest, then Alternative D, which projects the most timber harvest. Timber harvest activities may cause some temporary impacts to individuals in harvest activity areas, but restoration treatments are expected to be beneficial in the mid- to long-term (5–10 years or more).

For fuels treatments (mechanical and prescribed fire), there is little difference between the LRMP alternatives in projected activity outputs in ponderosa pine and mixed conifer forests. Some temporary impacts to individuals may occur during project implementation, but long-term effects (10 years or more) on habitats for sensitive species are expected to be primarily beneficial through movement of ecological conditions closer to those expected under HRV.

Application of LRMP design criteria and management recommendations from referenced documents and manuals during project design and implementation should ensure that the scale of impact is minimized and the intensity of effects is reduced to the extent possible. In general, the distribution of habitat components and habitat diversity across the planning area would be guided by land capability and HRV. The habitats affected by LRMP implementation would vary somewhat in distribution, depending on the alternative selected. LRMP components relating to management of landscape connectivity areas, forest structural stage and canopy cover objectives, retention of snags and downed woody debris, and maintenance of wetlands and water-dependent features would maintain habitat capability for some sensitive species.

1.3.3 Cumulative Effects

Human populations near the SJNF have increased over the last 100 years and are projected to continue growing in the foreseeable future. This trend, and the associated increased demand for a wide variety of forest products and recreational opportunities across the SJNF, may be one of the largest wildlife management challenges facing LRMP implementation.

Actions taken to implement any of the alternatives, along with past, present, and reasonably foreseeable future activities undertaken by the SJNF or other ownerships, may result in cumulative impacts to sensitive species. However, all alternatives would be limited by LRMP components designed, in part, to account for potential cumulative impacts of activities occurring on adjacent ownerships, or from the combined effects of all program activities on lands managed by the SJNF. LRMP components are expected to provide the ecological conditions necessary to maintain populations of all species well distributed across the SJNF. LRMP components that address species and wildlife diversity are also founded in law, federal regulation, and policy that allows for periodic reviews and adjustments of the LRMP, as needed and as new information becomes available.

No LRMP alternative is expected to result in any appreciable cumulative impacts to detect changes in population or habitat trends. Plan monitoring requirements and adaptive management principles are expected to help identify changes in sensitive species populations and habitat trends on the SJNF and guide decisions about the potential need for management changes to address unanticipated cumulative impacts over the life of the LRMP.

1.3.4 Determination

In consideration of the direct, indirect, and cumulative effects analysis, and management direction in the LRMP for alternatives, implementation of the LRMP for the SJNF **may impact individual sensitive species but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing or loss of species viability range wide**. The BE incorporates applicable management direction from the LRMP designed to aid in the management and conservation of sensitive species. In addition to the species-specific design criteria mentioned at the beginning of the BE, the LRMP contains over 100 components, including additional design criteria, objectives, and desired conditions, that are meant to help provide for the ecological conditions in key habitat types necessary for all species.

Two species, the New Mexico meadow jumping mouse and the Western yellow-billed cuckoo are involved in litigation settlement with USFWS. These species are in review with the USFWS and could become Federally listed as proposed species with proposed critical habitat prior to a FS Plan decision notice and FS Agency approval in meeting the scheduling process outlined in the settlement. There is no currently known suitable habitat or species occupation for the yellow-billed cuckoo on SJNF. There is also no known occupation by the jumping mouse. The only known possibly suitable jumping mouse habitat is isolated on the SJNF and not within distances to known populations where natural dispersal and colonization could result. Without confirmed breeding, known populations, or individuals on SJNF, management actions under the preferred alternative are not likely to jeopardize the continued existence of either species and conferencing is not required. If proposed critical habitat is designated on SJNF for either species, conferencing will be triggered if further review indicates that management actions proposed under the LRMP would destroy of adversely modify proposed critical habitat.

2 BUREAU OF LAND MANAGEMENT SENSITIVE WILDLIFE SPECIES ANALYSIS

2.1 Introduction

This appendix contains the sensitive species analysis for BLM sensitive species—plants, fish, and terrestrial wildlife. BLM policy states that actions authorized by the BLM shall further the conservation and/or recovery of federally listed species and conservation of BLM sensitive species. BLM sensitive species would be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under ESA (BLM 6840 Manual).

2.2 Sensitive Species Considered and Evaluated

Table T.12: Bureau of Land Management Sensitive Species and Habitat Associations for the Tres Rios Field Office

Sensitive Species	Habitat Association or Vegetation Type
Birds	
American bald eagle *Haliaeetus americanus*	Forested stands around aquatic settings
American bittern *Botaurus lentiginosus*	Marsh, swamp, or bog with cattails, rushes, grasses, and sedges
American peregrine falcon *Falco peregrinus anatum*	Breeds on cliffs, often in association with riparian areas; regular breeder on theTRFO
Black swift *Cypseloides niger*	Vertical rock faces near waterfalls or in dripping caves
Brewer's sparrow *Spizella breweri*	Primarily sagebrush but also in mixed shrublands (rabbitbrush, greasewood, etc.)
Columbian sharp-tailed grouse *Pediocetes phasianellus columbianus*	Oak/Serviceberry shrublands, often interspersed with sagebrush; aspen forests; irrigated pasture; recently reintroduced near Dolores, not expected for other units
Ferruginous hawk *Buteo regalis*	Grasslands and semi-desert shrub; not known to breed but a regular winter resident on the TRFO
Gunnison sage-grouse *Centrocercus minimus*	Sagebrush grasslands
Northern goshawk *Accipiter gentiles*	Ponderosa pine, aspen, mixed conifer, and spruce-fir forests
Western burrowing owl *Athene cunicularia*	Prairie dog colonies with vacant burrows; grasslands, shrublands, deserts
Western yellow-billed cuckoo *Coccyzus americanus*	Riparian; gallery cottonwoods with dense understory
White-faced ibis *Plegadis chihi*	Freshwater marshes, pond edges, irrigated land
Insects	
Great Basin silverspot butterfly (Nokomis fritillary butterfly) *Speyeria nokomis nokomis*	Riparian; mostly tied to springs

Sensitive Species	Habitat Association or Vegetation Type
Mammals	
Allen's big-eared bat *Idionycteris phyllotis*	Mountain areas, canyons, forested habitats, limited in arid areas
Big free-tailed bat *Nyctinomops macrotis*	Rocky landscapes, high cliff faces
Desert bighorn sheep *Ovis canadensis nelsoni*	Rocky canyons, grass, low shrub, open habitat with adjacent steep rocky areas for escape and safety
Fringed myotis *Myotis thysanodes pahasapensis*	Pinyon-juniper and other coniferous woodlands
Gunnison's prairie dog *Cynomys gunnisoni*	Grasslands and semi-desert and montane shrublands
New Mexico meadow jumping mouse *Zapus hudsonius luteus*	Mesic grass/forb/sedge riparian habitat
North American wolverine *Gulo gulo*	Rare; boreal spruce-fir forest and tundra
Spotted bat *Euderma maculatum*	Pinyon-juniper, shrub desert, possibly riparian
Townsend's big-eared bat *Corynorhinus townsendii*	Abandoned mines and caves
AMPHIBIANS	
Boreal toad *Bufo boreas boreas*	Damp conditions; marshes, wet meadows, streams, ponds, lakes
Canyon tree frog *Hyla arenicolor*	Intermittent or permanent streams and pools in deep rocky canyons
Northern leopard frog *Rana pipiens*	Water's edge; wet meadows, banks of marshes and ponds
REPTILES	
Desert spiny lizard *Sceloporus magister*	Shrub-covered dirt banks and sparsely vegetated rocky areas near flowing streams or arroyos
Longnose leopard lizard *Gambelia wislizenii*	Flat or gently sloping shrublands with a large percentage of open ground and includes mesa tops above canyons

2.3 Sensitive Species Evaluations

All sensitive species known to occur or suspected to have habitat on the Tres Rios Field Office (TRFO) are evaluated below. They are grouped by mammals, birds, insects, amphibians, reptiles, fish, and plants. This information is based on the most current scientific information available, including species assessments, monitoring plans, conservation assessments and plans, and recovery plans.

2.3.1 Mammals

Allen's Big-eared Bat

Natural History and Background

Allen's big-eared bat (*Idionycteris phyllotis*) occurs in southwestern United States to central Mexico (Adams 2003). This species can be expected in extreme southwestern Colorado (Fitzgerald et al. 1994). The species has been reported on BLM lands near Dolores where it has been detected using canyon habitat along the Dolores River. The biology of this species is poorly known. The species inhabits mountainous areas and is commonly found in pine-oak forested canyons and in coniferous forests. It has been found in low elevation ponderosa pine forests, pinyon-juniper woodlands, occasionally in high-elevation white fir forests, and areas with narrow leaf cottonwood (Adams 2003). The species forms day roosts in rock crevices, caves, and mines, and therefore typically prefers areas associated with cliffs, outcrops, or boulder piles. The species has been found roosting under loose tree bark of ponderosa pine. It is not known how this species uses tree roosts. It is thought there is a strong correlation to the use of caves, mines, and crevices. For the purpose of this analysis, the BLM assumes use of snags, caves, mines, and crevices for roosting.

The greatest threat to this bat is thought to be human disturbance of roost sites and especially hibernacula and maternity colonies (Arizona Game and Fish Department 1993; Western Bat Working Group 1998). The impacts of White Nose Syndrome on this species are not currently known at this time. Other threats include closure of abandoned mines, renewed mining at historic sites, toxic material impoundments, pesticide spraying, vegetation conversion, fuels treatments, timber harvest, and destruction of buildings and bridges used as roosts (Western Bat Working Group 1998).

Past management activities that may influence the habitat for this species have not changed significantly over the life of the LRMP. Abandoned mine reclamation has focused efforts on identifying resources used by bats and modifying design criteria to keep mines open to bat use. Fuels and timber activities most likely have removed roosting habitat for Allen’s big-eared bat, however the scale of activity compared to available habitat has not raised any habitat conservation concerns in the planning area. This species may make significant use of natural crevices within rock faces for various life cycles across the planning area. Planning activities have not impacted these habitats due to the inaccessibility of the sites. The majority of oil and gas activities throughout the planning area have been localized to known developing fields. Minimal loss of roosting habitat may have occurred through the clearing of snags for drilling activities.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the Allen’s big-eared bat involve fluid minerals development, wildlife management (i.e., abandoned mine closures), and possibly fuels treatment and timber management activities. Fuels and timber treatments may impact this species through the direct removal of roosting habitat and modification of habitat across the landscape.

Oil and gas development has the potential for direct and indirect impacts through loss of habitat and direct loss of individuals. If roosting snags are within a proposed development the loss of the roost may temporarily displace individuals. The most apparent threat is loss of individuals through entrapment in drilling, production pits, and production equipment. In an unpublished study by the USFWS in Indiana, “hundreds of dead birds and bats were found in oil pits in counties with Indiana bat summer habitat” (USFWS, Bloomington Field Office, unpublished data, 1993–1994). Krutzsch (1948) found the pooling oil from oiling roads attracted volant desert animals. Three bats were among the animals removed from small pools of oil. Finley et al. (1983) documented mortalities in a sludge pit near Rifle, Colorado. A total of 27 bats was found in one sludge pit.

Timber and fuels management would continue across all alternatives, only at varying levels. The impacts from timber and fuels management may result in the direct loss of individuals if a roost tree is removed during a project. Because the Allen’s big-eared bat is known to day roost in ponderosa pine, impacts to the species could occur if the planned activities result in reductions in these components. Conversely, restoration activities that include thinning of small dense trees might benefit the foraging patterns of many bat species. The scale of treatments across all alternatives makes any impacts miniscule when compared the amount of available habitat.

Alternative A: No Action

<u>Direct/Indirect Effects:</u>
The species is extremely rare in Colorado, with no breeding sites or important habitat elements found. Impacts to these areas are therefore unlikely and cannot be predicted or measured at this time.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area. Alternative A offers similar timber management treatments across all alternatives. Lands suitable for timber production vary by 2% to 5% across all alternatives. Several LRMP components also focus on snag management and retention, and although impacts would occur they are anticipated to be minor.

Alternative A offers similar fuels treatments throughout all alternatives. Acres of fuels treatments vary by no more that 6% across all alternatives. Prescribed fire activity projections are also similar across all alternatives and vary by only 100 to 200 acres. As with mastication, prescribed fire could negatively influence potential roost structures if snags are fire hardened, removed, or burned.

Alternative A provides the same wildlife management actions in regards to mine closures with bat gates as opportunities arise. Thus, all alternatives install the same quantity and quality of mine closure bat gates over the life of the LRMP.

In general, Alternative A offers a slightly higher risk of negative influences on some potential habitat components for the Allen's big-eared bat, such as snags, because it allocates a greater amount of area to active management scenarios. Impacts are expected to be minimal because abandoned mines and cave habitat have standards and guidelines across all alternatives that target important underground roost sites for closure and protection. The ability of this species to use multiple roosts increases the likelihood that adequate habitat would be available throughout the planning area. LRMP components are also expected to reduce impacts to snags and other vegetation where active management occurs.

Action Alternatives: Alternatives B–D

Direct/Indirect Effects:
Effects from Alternatives B, C, and D are similar to the impacts in Alternative A. Standards and Guidelines that protect the habitats of Allen's big-eared bat do not vary throughout alternatives. Acres allocated for development may be altered by alternative, with Alterative C designating more lands for natural or unique landscapes or processes. Under Alternative C more habitats would be managed for less development and habitat fragmentation across the planning area may be slightly lower.

Closed loop drilling systems would eliminate the potential for bats to be entrapped in pits. Screening required for production equipment would greatly reduce the potential for bats to be trapped in equipment that bats may identify as potential roost sites.

Surveys for bats prior to mine closures would continue to ensure that abandoned mines beneficial to bats remain open for hibernacula and closed for human safety.

Cumulative Effects:
Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent or the impacts of fragmentation on Allen's big-eared bat are not known at this time. Alternatives A through D include both current and projected new leases, the "no new lease" scenario only includes current leases under each of the alternatives. Under the No Leasing Alternative development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the Reasonable Foreseeable Development (RFD) scenario.

In regards to past, current, or reasonably foreseeable vegetative changes that may have influenced the Allen's big-eared bat, its primary habitat types have most likely been altered from historic conditions. Fire suppression and timber harvest activities have resulted in structural changes in ponderosa pine forests as compared to historic conditions. It is therefore likely that potential snag roosts have also been reduced. It is not likely that snag roosts are a limiting factor for Allen's big-eared bat due to the ability of this species to use multiple roost throughout its life history.

Although some management trends on private lands have recently changed, it is likely that the majority of mature stands and habitat values for bats and other wildlife species would remain and occur primarily on public lands. The focus of these lands under all alternatives involves restoration activities such as thinning, fuel reductions, and prescribed fire intended to help return these cover types to a more historic condition.

Big Free-tailed Bat

Natural History and Background

Big free-tailed bat (*Nyctinomops macrotis*) occurs from the southwestern United States to south-central Mexico (Adams 2003). Individuals and roost sites are present in the western canyon country of Colorado, in particular along the Dolores River in Montrose County (Adams 2003).

The species has been reported on BLM lands near Dolores where it has been detected using canyon habitat along the Dolores River. This species prefers rocky landscapes, roosting high on cliff faces (Adams 2003). It also uses buildings for day roosts and occasionally roosts in tree cavities. Maternity roosts have been documented in rock crevices, with long-term use of the crevice reported (Navo 2003). As with other bats human disturbance to roost sites appear to be an important factor. Disturbance to maternity roosts from June through August may be detrimental. For the purpose of this analysis the BLM assumes the use of snags, caves, mines, and crevices for roosting.

The greatest threat to this bat is thought to be human disturbance of roost sites, especially hibernacula and maternity colonies, through recreational caving and mine exploration (Arizona Game and Fish Department 1993; Western Bat Working Group 1998). The impacts of White Nose Syndrome on this species are not currently known at this time. Other threats include closure of abandoned mines, renewed mining at historic sites, toxic material impoundments, pesticide spraying, vegetation conversion, fuels treatments, timber harvest, and destruction of buildings and bridges used as roosts (Western Bat Working Group 1998).

Past management activities that may influence the habitat for this species have not changed significantly over the life of the LRMP. Abandoned mine reclamation has focused efforts on identifying resources used by bats and modifying design criteria to keep mines open to bat use. Fuels and timber activities most likely have removed roosting habitat for big free-tailed bat; however, the scale of activity compared to available habitat has not raised any habitat conservation concerns in the planning area. This species may make significant use of natural crevices within rock faces for various life cycles across the planning area. Planning activities have not impacted these habitats due to the inaccessibility of the sites. The majority of oil and gas activities throughout the planning area have been localized to known developing fields. Minimal loss of roosting habitat may have occurred through the clearing of snags for drilling activities.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the big free-tailed bat involve fluid minerals development, wildlife management (i.e., abandoned mine closures), and possibly fuels treatment and timber management activities. Fuels and timber treatments may impact this species through the direct removal of roosting habitat and modification of habitat across the landscape.

Oil and gas development has the potential for direct and indirect impacts through loss of habitat and direct loss of individuals. If roosting snags are within a proposed development, the loss of the roost may temporarily displace individuals. The most apparent threat is loss of individuals through entrapment in drilling and production pits. In an unpublished study by the USFS in Indiana, "hundreds of dead birds and bats were found in oil pits in counties with Indiana bat summer habitat" (USFWS, Bloomington Field Office, unpublished data, 1993–1994). Krutzsch (1948) found the pooling oil from oiling roads attracted volant desert animals. Three bats were among the animals removed from small pools of oil. Finley et al. (1983) documented mortalities in a sludge pit near Rifle, Colorado. A total of 27 bats was found in one sludge pit.

Timber and fuels management would continue across all alternatives, only at varying levels. The impacts from timber and fuels management may result in the direct loss of individuals if a roost tree is removed during a project. Because the big free-tailed bat is known to day roost in ponderosa pine, impacts to the species could occur if the planned activities result in reductions in these components. Conversely, restoration activities that include thinning of small dense trees might benefit the foraging patterns of many bat species. The scale of treatments across all alternatives makes any impacts miniscule when compared the amount of available habitat.

Alternative A: No Action

Direct/Indirect Effects:
The big free-tailed bat is currently known to occur sporadically on the far western portion of the TRFO. Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area. Alternative A offers similar timber management treatments across all alternatives. Lands suitable for timber production vary by 2% to 5% across all alternatives. Several LRMP components also focus on snag management and retention, although impacts are anticipated to be minor.

Alternative A offers similar fuels treatments throughout all alternatives. Acres of fuels treatments vary by no more that 6% across all alternatives. Prescribed fire activity projections are also similar across all alternatives and vary by only 100 to 200 acres. As with mastication, prescribed fire could negatively influence potential roost structures if snags are fire-hardened, removed, or burned.

Alternative A provides the same wildlife management actions in regards to mine closures with bat gates as opportunities arise. Thus, all alternatives install the same quantity and quality of mine closure bat gates over the life of the LRMP.

In general, Alternative A offers a slightly higher risk of negative influences on some potential habitat components for the big free-tailed bat, such as snags, because it allocates a greater amount of area to active management scenarios. Impacts are expected to be minimal because abandoned mines and cave habitat have standards and guidelines across all alternatives that target important underground roost sites for closure and protection. The ability of this species to use multiple roosts increases the likelihood that adequate habitat would be available throughout the planning area. LRMP components are also expected to reduce impacts to snags and other vegetation where active management occurs.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Effects from Alternatives B, C, and D are similar to the impacts in Alternative A. Standards and guidelines that protect the habitats of big free-tailed bat do not vary throughout alternatives. Acres allocated for development may be altered by alternative with Alterative C designating more lands for natural or unique landscapes or processes. Under Alternative C, more habitats would be managed for less development and habitat fragmentation across the planning area may be slightly lower.

Closed loop drilling systems would eliminate the potential for bats to be entrapped in pits. Screening required for production equipment would greatly reduce the potential for bats to be trapped in equipment that bats may identify as potential roost sites.

Surveys for bats prior to mine closures would continue to ensure that abandoned mines beneficial to bats remain open for hibernacula and closed for human safety.

Cumulative Effects:
Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent or the impacts of fragmentation on the big free-tailed bat are not known at this time. Alternatives A through D include both current and projected new leases, the “no new lease” scenario only includes current leases under each of the alternatives. Under the No Leasing Alternative, development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

In regards to past, current, or reasonably foreseeable vegetative changes that may have influenced the big free-tailed bat, its primary habitat types have most likely been altered from historic conditions. Fire suppression and timber harvest activities have resulted in structural changes in ponderosa pine forests as compared to historic conditions. It is therefore likely that potential snag roosts have also been reduced. It is not likely that snag roosts are a limiting factor for big free-tailed bats due to the ability of this species to use multiple roosts throughout its life history.

Although some management trends on private lands have recently changed, it is likely that the majority of mature stands and habitat values for bats and other wildlife species would remain and occur primarily on public lands. The focus of these lands under all alternatives involves restoration activities such as thinning, fuel reductions, and prescribed fire intended to help return these cover types to a more historic condition.

Desert Bighorn Sheep

Natural History and Background

The historic range of the desert bighorn is thought to include southwest Colorado (Monson 1980) and large areas of suitable habitat within the TRFO are present. Important habitat requirements for desert bighorn sheep include topographical diversity of vertical cliffs and sandstone rims, escape terrain with areas of high visibility with good forage and water sources nearby. Terrain is typically rough, rocky, and broken by canyons and washes, with steep slopes used for lambing and predator avoidance. Bighorns are social animals, using grouping as a predator defense mechanism (Bleich et al. 1997) and preferring open habitats for feeding to enhance predator detection and avoidance. Escape terrain is particularly critical to ewes and ewe-lamb groups, to the extent that those groups would sacrifice forage quality to obtain higher security from predators (Bleich et al. 1997; Shackleton et al. 1999). Desert bighorn utilize a variety of vegetation ranging from grass and shrub communities to pinyon-juniper woodlands, generally avoiding areas of dense vegetation and poor visibility. Water availability can influence distribution patterns for individuals and some herds.

There are two desert bighorn sheep populations currently present in the TRFO, the middle Dolores River population and the upper Dolores River population. Both populations in the planning area are the result of reintroductions by CPW in the 1980s, and the populations are closely managed. CPW has monitored these populations in recent years with global positioning system (GPS) radio collars and has collected more precise habitat use and survival data for these populations. There has also been evidence that individuals from the two populations would travel down or up the river corridor to the other population.

The upper Dolores population is located on BLM lands primarily between Mountain Sheep Point and Burro Canyon near Slickrock Bridge on Highway 141. However, there have been observations reported both below and above this general geographic area. This section of the Dolores River is composed of steep vertical cliffs with a mix of pinyon-juniper and mixed shrub vegetation. This area receives considerable recreational river traffic during high flow years and from public using this area via all-terrain vehicle, horseback, bicycle, and foot travel throughout the other warm weather months. A section of the Dolores River in the core of this population is seasonally closed to vehicular traffic between February 1 and June 30 to protect critical habitat during the lambing period for the desert bighorn sheep.

The middle Dolores population is located in the geographic area between gypsum gap and paradox valley and is typically defined as the area encompassed by the Dolores River wilderness study area (WSA). This population has also been documented to travel widely outside of the protected WSA throughout the year.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the desert bighorn sheep involve fluid minerals development, motorized and non-motorized recreation, and potentially livestock grazing. In particular, the potential conflict with domestic sheep if they were ever proposed for grazing in desert bighorn sheep habitat.

Though there is the potential for competition of forage between desert bighorn sheep and livestock, the limited timing and placement of the livestock would have little impact to the overall habitat for the bighorn sheep. These populations would continue to be annually monitored to ensure conflicts that could be detrimental to this species are not occurring as a result of the Proposed Action. Currently there are no active domestic sheep allotments located within, or near, the desert bighorn populations in the TRFO. Bighorn sheep species are especially vulnerable to the influence of infectious diseases that have been documented in domestic sheep, and the effects these diseases could have to population performance and species abundance is considerable.

Oil and gas development has the potential for direct and indirect impacts through loss of habitat and fragmentation of habitat near both of these populations. The middle and upper Dolores populations are almost entirely located in a WSA and within a protected river corridor, which is unavailable for surface occupancy by oil and gas development. However, these populations are not exclusive to habitat within these protected areas and there is the potential for oil and gas expansion near these populations. Some of the potential direct effects from development near these populations include disruption of movement corridors and other critical use areas.

Timber and fuels management would continue across all alternatives, only at varying levels. The impacts from timber and fuels management would be minimal to the desert bighorn populations within the TRFO. Fuels management and the removal of timber in occupied habitat would likely benefit the desert bighorn sheep due to the removal of predator cover and the increase in visibility for the desert bighorn.

Recreation would likely continue to present in occupied desert bighorn habitat in all alternatives. Both populations are located in areas that receive considerable river recreation traffic during the spring runoff. These impacts are thought to have minimal overall impacts to desert bighorn sheep. Motorized traffic has been limited in the upper Dolores River population during critical lambing periods. The Dolores River corridor is being proposed as a Special Recreation Management Area (SRMA) under the proposed alternative, which could prioritize recreational activities in desert bighorn sheep habitat in the future.

Alternative A: No Action

Direct/Indirect Effects:
Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area. The slight increase in available leased lands could negatively impact desert bighorn sheep over time.

Alternative A offers similar fuels treatments throughout all alternatives. Acres of fuels treatments vary by no more that 6% across all alternatives. Prescribed fire activity projections are also similar across all alternatives and vary by only 100 to 200 acres. As with mastication, prescribed fire could have an overall beneficial impact to desert bighorn sheep in that an increase of forage and a reduction in predator cover would result.

Alternative A provides the same wildlife management actions in regards recreational impacts in bighorn sheep habitat.

In general, Alternative A offers similar management to what is currently in place and has allowed these populations to be successful.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Effects from Alternatives B, C, and D are similar to the impacts in Alternative A. Standards and guidelines that protect the habitats of bighorn sheep do not vary throughout alternatives. Acres allocated for development may be altered by alternative with Alternative C designating more lands for natural or unique landscapes or processes. Under Alternative C more habitats would be managed for less development, and habitat fragmentation across the planning area may be slightly lower. Increased development in bighorn sheep habitat under any of the action alternatives could have an overall negative impact to this species. Site-specific analysis of potential impacts would be analyzed and mitigated at the project level.

Cumulative Effects:
Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent or the impacts of fragmentation and the disturbance from oil and gas development on bighorn sheep are not well known other than the direct loss of suitable habitat. Alternatives A through D include both current and projected new leases; the “no new lease” scenario only includes current leases under each of the Alternatives. Under the No Leasing Alternative, development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

The specific LRMP components that have been developed for bighorn sheep and existing regulations are expected to alleviate any potential cumulative effects and contribute to favorable habitat conditions for any individual desert bighorn sheep that occur within the TRFO.

Fringed Myotis

Natural History and Background

The fringed myotis ranges throughout western North America, from British Columbia southward into Mexico (Adams 2003). Fringed myotis roost in crevices, buildings, underground mines, rocks, cliff faces, and bridges. Roosting in decadent trees and snags, particularly large ones, is common throughout its range in western United States and Canada. Fringed myotis roosts have been documented in a large variety of tree species and it is likely that structural characteristics (e.g., height, decay stage), rather than tree species, play a greater role in selection of a snag or tree as a roost.

The species is particularly susceptible to human disturbances, especially near maternity colonies (O’Farrell and Studier 1980, cited in Adams 2003). Hibernation has only been documented in buildings and underground mines (Bradley and Ports 2003). The species is known to migrate, but to what extent is unclear.

The greatest threat to this bat is thought to be human disturbance of roost sites, especially hibernacula and maternity colonies, through recreational caving and mine exploration (Arizona Game and Fish Department 1993; Western Bat Working Group 1998). The impacts of White Nose Syndrome on this species are not currently known at this time. It is likely that if White Nose Syndrome were found in Colorado, this species may not be as impacted as cave-obligate species. Other threats include closure of abandoned mines, renewed mining at historic sites, toxic material impoundments, pesticide spraying, vegetation conversion, fuels treatments, timber harvest, and destruction of buildings and bridges used as roosts (Western Bat Working Group 1998). Disturbance or destruction of water sources and riparian habitat may also influence fringed myotis habitat use (NatureServe 2013).

Past management activities that may influence the habitat for this species have not changed significantly over the life of the LRMP. Abandoned mine reclamation has focused efforts on identifying resources used by bats and modifying design criteria to keep mines open to bat use. Fuels and timber activities most likely have removed roosting habitat for fringed myotis; however, the scale of activity compared to available habitat has not raised any habitat conservation concerns in the planning area. This species may make significant use of natural crevices within rock faces for various life cycles across the planning area. Planning activities have not impacted these habitats due to the inaccessibility of the sites. The majority of oil and gas activities throughout the planning area have been localized to known developing fields. Minimal loss of roosting habitat may have occurred through the clearing of snags for drilling activities.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the fringed myotis involve fluid minerals development, wildlife management (i.e., abandoned mine closures), and possibly fuels treatment and timber management activities. Influences from fuels and timber treatments would be limited to the lower-elevation habitat types where the fringed myotis may potentially occur. Fuels and timber treatments may impact this species through the direct removal of roosting habitat and modification of habitat across the landscape.

Oil and gas development has the potential for direct and indirect impacts through loss of habitat and direct loss of individuals. If roosting snags are within a proposed development the loss of the roost may temporarily displace individuals. The most apparent threat is loss of individuals through entrapment in drilling and production pits. In an unpublished study by the USFWS in Indiana, “hundreds of dead birds and bats were found in oil pits in counties with Indiana bat summer habitat” (USFWS, Bloomington Field Office, unpublished data, 1993–1994). Krutzsch (1948) found the pooling oil from oiling roads attracted volant desert animals. Three bats were among the animals removed from small pools of oil. Finley et al. (1983) documented mortalities in a sludge pit near Rifle, Colorado. A total of 27 bats was found in one sludge pit.

Alternative A: No Action

<u>Direct/Indirect Effects:</u>
Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

Alternative A offers similar timber management treatments across all alternatives. Lands suitable for timber production vary by 2% to 5% across all alternatives. Several LRMP components also focus on snag management and retention, but impacts are anticipated to be minor.

Alternative A offers similar fuels treatments throughout all alternatives. Acres of fuels treatments vary by no more that 6% across all alternatives. Prescribed fire activity projections are also similar across all alternatives and vary by only 100 to 200 acres. As with mastication, prescribed fire could negatively influence potential roost structures if snags are fire-hardened, removed, or burned.

Alternative A provides the same wildlife management actions in regards to mine closures with bat gates as opportunities arise. Thus, all alternatives install the same quantity and quality of mine closure bat gates over the life of the LRMP. This action could be quite beneficial to the fringed myotis because it readily roosts in abandoned mines.

In general, Alternative A offers a slightly higher risk of negative influences on some potential habitat components for the fringed myotis, such as snags, because it allocates a greater amount of area to active management scenarios. Impacts are expected to be minimal because abandoned mines and cave habitat have standards and guidelines across all alternatives that target important underground roost sites for closure and protection. The ability of this species to use multiple roosts increases the likelihood that adequate habitat would be available throughout the planning area. LRMP components are also expected to reduce impacts to snags and other vegetation where active management occurs.

Action Alternatives: Alternative B–D

<u>Direct/Indirect Effects:</u>
Effects from Alternatives B, C, and D are similar to the impacts in alternative A. Standards and guidelines that protect the habitats of fringed myotis do not vary throughout alternatives. Acres allocated for development may be altered by alternative with Alterative C designating more lands for natural or unique landscapes or processes. Under Alternative C, more habitats would be managed for less development and habitat fragmentation across the planning area may be slightly lower.

Closed loop drilling systems would eliminate the potential for bats to be entrapped in pits. Screening required for production equipment would greatly reduce the potential for bats to be trapped in equipment that bats may identify as potential roost sites.

Surveys for bats prior to mine closures would continue to ensure that abandoned mines beneficial to bats remain open for hibernacula and closed for human safety.

<u>Cumulative Effects:</u>
Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent or the impacts of fragmentation on fringed myotis are not known at this time. Alternatives A through D include both current and projected new leases, the “no new lease” scenario only includes current leases under each of the alternatives. Under the No Leasing Alternative, development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

In regards to past, current, or reasonably foreseeable vegetative changes that may have influenced the fringed myotis, its primary habitat types have most likely been greatly altered from historic conditions. Fire suppression and timber harvest activities have resulted in structural changes in ponderosa pine forests as compared to historic conditions. It is therefore likely that potential snag roosts have also been reduced. It is not likely that snag roosts are a limiting factor for fringed myotis due to the ability of this species to use multiple roost throughout its life history.

Although some management trends on private lands have recently changed, it is likely that the majority of mature stands and habitat values for bats and other wildlife species would remain and occur primarily on public lands. The focus of these lands under all alternatives involves restoration activities such as thinning, fuel reductions, and prescribed fire intended to help return these cover types to a more historic condition.

Gunnison’s Prairie Dog

Natural History and Background

Gunnison’s prairie dogs are distributed from central Colorado to central Arizona, including southeast Utah and much of the northwestern half of New Mexico (NatureServe 2013). In Colorado, the species is restricted to the southwest and south-central portions of the state. They range in elevation from 6,000 to 12,000 feet. They are well distributed across the TRFO at lower elevations.

Gunnison's prairie dogs inhabit grasslands and semi-desert and montane shrublands (Fitzgerald et al. 1994). Habitat use by Gunnison's prairie dogs differs somewhat from the black-tailed prairie dog primarily due to the strikingly different geographical settings within the range distribution of these species. The black-tailed prairie dog is primarily a prairie species, while the Gunnison's prairie dog is associated with intermountain valleys, benches, and plateaus that offer prairie-like topography and vegetation. These intermountain valleys, benches, and plateaus can range from very arid to mesic sites. Gunnison prairie dogs can occupy mesic plateaus and higher mountain valleys, as well as arid lowlands (Knowles 2002). The species is generally found in groups of several individuals, oftentimes forming colonies. They dig burrows that are used for raising young and providing cover from predators.

Gunnison's prairie dogs hibernate. In central Colorado around 10,000 feet, individuals enter burrows by October and emerge in mid-April. Hibernation periods at lower elevations are shorter and some individuals may even appear above ground in winter months (Fitzgerald et al. 1994).

Predators include badgers, golden eagles, coyotes, bobcats, and red-tailed hawks. Plague and poisoning have caused considerable retraction of the species in parts of Colorado and New Mexico (Fitzgerald et al. 1994). In Colorado, prairie dogs are considered small game species and are provided no protection from harvest. The primary activities that have influenced Gunnison's prairie dogs in Colorado involve intentional poisoning and plague (Fitzgerald et al. 1994). Recreational shooting may also influence local prairie dog populations in some locations. Recreational shooting of prairie dogs is controlled and managed by CPW and not influenced by the LRMP alternatives.

Past management activities that may have impacted Gunnison's prairie dog include mineral development, ROW authorizations, and road construction.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence Gunnison's prairie dog primarily involve fluid minerals development, seismic exploration, road construction/reconstruction, ROWs, summer motorized recreation, and range management activities (i.e., livestock grazing and associated activities). Outbreaks of plague are density-dependent occurrences that are not influenced by any of the LRMP revision alternatives, and poisoning is not permitted without additional analysis. Surface-disturbing activities such as seismic activity and ROW authorizations (pipelines, power lines, roads, etc.) may disturb habitat and temporarily displace individuals during construction. Burrows adjacent to proposed activities may collapse as a result of construction equipment within the ROW.

Alternative A: No Action

Direct/Indirect Effects:
The exact locations of fluid minerals development are not known at this time. However, potential development areas do overlap the range of Gunnison's prairie dog, so some influences or impacts could be possible.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. NSO stipulations do not apply specifically for Gunnison's prairie dog; however, the species may benefit from stipulations applied for the management of other species (i.e., burrowing owl). Under the No Leasing Alternative, development would be limited to existing leases within the planning area.

It is likely that winter travel is not a major influence on prairie dogs because the species hibernates while that activity is occurring. In regards to summer motorized travel, Alternative A offers more suitable acres for this activity than in any of the action alternatives. Although summer travel probably causes no direct impacts to prairie dog colonies, motorized travel near the colonies may disturb the species or disrupt their foraging habits.

Under Alternative A, no standards or guidelines exist to limit activity outside the breeding season. Young too small to escape construction equipment may be killed. Impacts during hibernation may be similar to impacts during breeding and rearing of young. Arousal during hibernation may result in the loss of fat reserves needed for individuals to make it through winter months. Individuals not displaced during hibernation may be killed by equipment or suffocate if burrows were to collapse.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
As with Alternative A, the action alternatives would have no influence over the control of plague outbreaks and no additional authority over state actions involving recreational shooting. Poisoning of prairie dogs is not allowed under any alternative without additional analysis.

As noted in effects common to all alternative, there is slight variation in acres of leasing and stipulations across Alternatives B, C, and D. There is only a 2% difference in leased acres in Alternatives B and C. Alternative C opens the fewest acres to leasing and has the highest percentage of leased acres with NSO stipulations. Lease stipulations limit timing of activity such that no surface-disturbing activity may occur from March 1 to July 15 on occupied Gunnison's prairie dog colonies. Lease stipulations also require that special modifications be made to minimize disturbance of active burrows. There are no restrictions on construction during hibernation. Historic and foreseeable development levels are such that any loss of individual prairie dogs during construction would not have any impact on the overall population of Gunnison's prairie dogs.

Impacts from seismic, ROWs, and other surface-disturbing activities do not differ across Alternatives B, C, and D.

The action alternatives offer fewer suitable acres for summer motorized travel. Consistent with the theme of minimizing human influences, Alternative C is the most restrictive. All action alternatives provide potential benefits because of greater controls on off-road travel. Greater indirect benefits to prairie dogs may therefore be associated with the action alternatives.

Changes in permitted livestock in the action alternatives are not expected to have much influence on Gunnison's prairie dog because of generally neutral interactions between the two. However, if cattle are providing indirect benefits to prairie dogs because of grazing influences, this might be reduced in Alternative C. Overall, however, no detectable differences are expected.

Cumulative Effects:
Gunnison prairie dog colonies have been greatly reduced from historic numbers because of influences such as intentional poisoning and introduced plague. Recreational shooting has probably impacted localized populations in some areas. Intentional poisoning has been greatly reduced over time but still may continue on private lands. On public lands, however, this activity is strictly controlled. Plague outbreaks remain a primary factor influencing Gunnison's prairie dogs in Colorado.

Some planned activities on the TRFO may influence existing prairie dog colonies. While Alternatives A through D include both current and projected new leases, the "no new lease" scenario only includes current leases under each of the Alternatives. Overall, however, the TRFO remains a refuge for the prairie dog and planned activities are expected to have little influence on their persistence. Planned activities are not expected to contribute to any negative cumulative effects on the species habitat or populations.

New Mexico Meadow Jumping Mouse

Natural History and Background

The New Mexico meadow jumping mouse is one of three species of *Zapus* found in North America. This subspecies, *luteus*, is endemic to the American Southwest where it is known as disjunct Pleistocene relic populations (Frey 2008). This mouse is recognized as a federal candidate species by the USFWS. The USFWS identified the following counties as areas where the species is known or believed to occur: Archuleta, Conejos, Costilla, La Plata, Las Animas, and Montezuma.

The subspecies is known to occur from sites in eastern Arizona, New Mexico, and extreme southern Colorado. The meadow jumping mouse is not currently known to occur on BLM lands. It has been found on private lands at lower elevations in general proximity to TRFO.

This species is found in moist grasslands and meadows, often along the edges of marshes and near free-flowing water (Morrison 1990). In habitat studies by Frey in New Mexico, the species is restricted to complex riparian habitats. Very good habitat was deemed those areas with very dense vegetation cover over 3 feet high, with grasses and forbs dominating the areas where the species was found (Frey 2005). The jumping mouse appears to only utilize two riparian community types: 1) persistent emergent herbaceous wetlands (i.e., beaked sedge [*Carex utriculata*] and reed canarygrass [*Phalaris arundinacea*] alliances) and 2) scrub-shrub wetlands (i.e., riparian areas along perennial streams that are composed of willows and alders) (Frey 2005:53).

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the New Mexico meadow jumping mouse primarily involve road construction/reconstruction, summer motorized recreation, and range management activities (i.e., livestock grazing and associated activities). Oil and gas development should not have any impacts on this species or it habitat since under land use planning standards and guidelines no surface-disturbing activities are allowed in riparian areas. Road construction could potentially remove habitat; however, this is a remote possibility since most riparian stream crossings have been established for decades.

Livestock grazing in riparian areas could modify habitat for the New Mexico meadow jumping mouse. Habitat on BLM lands for this species is located mostly along the Dolores River. There is limited habitat for this species in the proposed Snaggle Tooth lands with wilderness characteristics. Currently no active allotments are permitted within the proposed Snaggle Tooth lands with wilderness characteristics and grazing should have no impact on this species. The New Mexico meadow jumping mouse currently is not known to occur on BLM lands in the planning area.

Alternative A: No Action

<u>Direct/Indirect Effects:</u>
Grazing impacts under the No Action Alternative would be the same as described in effects common to all alternatives. Under the No Action Alternative, habitat along the Dolores River would not receive any protection under lands with wilderness characteristics. New development would be allowed under this alternative. It is not very likely that any new development would occur along the Dolores River corridor due to the location of the area and limited potential for development.

Action Alternatives: Alternative B–D

<u>Direct/Indirect Effects:</u>
Grazing impacts under the No Action Alternative would be the same as described in effects common to all alternatives. Under Alternatives B and C habitat for this species would be restricted from development due to the potential for being classified as lands with wilderness characteristics. Under Alternative D habitat along the Dolores River would not receive any protection under lands with wilderness characteristics or any other special designations. New development would be allowed under Alternative

D. It is not very likely that any new development would occur along the Dolores River corridor, regardless of designation, due to the location of the area and limited potential for development.

Cumulative Effects:
Impacts to this species and its habitat would continue on private surface regardless of alternatives chosen in the LRMP. Cumulative impacts to this species or habitat is not likely to change among any of the alternatives due to the low potential for development of the habitat. Grazing has the highest potential of any resource to influence habitat conditions for this species. Currently there are no active grazing permits for any allotments that may contain habitat for this species.

North American Wolverine

Natural History and Background

The wolverine is the largest member of the family *Mustelidae*, which also includes weasel, fisher, marten, badger, and mink. Wolverines are found in small numbers throughout their range and appear to require large expanses of wilderness or remote areas.

Historically, its North America range included Alaska, most of Canada, the Great Lakes region (in small numbers), with peninsular extensions into the northern Midwest (North and South Dakota and Nebraska), the Rocky Mountains as far south as northern New Mexico, and the Pacific coastal ranges through central California. The status of the wolverine in Colorado is undetermined, with 22 records representing 25 animals between 1871 and 1919 (Seidel et al. 1998). Since 1979, 12 investigations have been conducted in Colorado with the goal of trying to document wolverine presence in the state (Seidel et al. 1998). After intensive efforts using snow tracking, hair snags, remote cameras, and snares, only 10 sets of tracks were found that appeared to have a high probability of being wolverine (Seidel et al. 1998). One of those investigations occurred on NFS lands of the planning area but no evidence of wolverine was found.

Wolverines are a wide-ranging species, and thus use a wide variety of habitats. Habitats fragmented by high road densities, heavy timber management, urbanization, etc., appear to be avoided (Banci 1994).

A significant body of evidence suggests that large remote tracts of higher elevation lands are necessary for wolverine populations (Banci 1994; Hornocker and Hash 1981; Seidel et al. 1998). Any activities that increase human presence or result in significant alteration of habitats in and adjacent to these limited areas may degrade their overall ability to support wolverine populations. In addition, linkages between these areas must be maintained if self-sustaining populations of wolverines can persist (Banci 1994). Other limiting factors include low reproductive potential, low-density populations, availability of natal and maternal dens, prey availability, predation, trapping, and parasites. Disturbance at any time of year can cause displacement. However, disturbance in proximity to natal sites or disrupting natal activities (January–March) can lead to abandonment of the den (Heinemeyer and Copeland 1999).

Habitat for wolverine on BLM lands in the TRFO is limited to the Silverton area. The Silverton area is heavily developed and experiences substantial recreation use. Given the remote possibility that a population of wolverines inhabits the San Juan Mountains, and due to the secretive nature of this species, it is highly unlikely wolverines would inhabit BLM lands in this area.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the wolverine primarily involve road construction/reconstruction, motorized and non-motorized recreation, and ski area development. The Silverton area has the only habitat on the BLM with any potential for the occurrence of wolverine. It is extremely unlikely that a wolverine would be found in the Silverton area due their avoidance of disturbance and people. Silverton experiences high levels of recreation during the summer, with approximately 300,000 visitors annually.

Alternative A: No Action

Direct/Indirect Effects:
Management of recreation does not change through Alternatives B, C, and D. Effects to wolverine are the same as in the effects common to all alternatives.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Management of recreation does not change through Alternatives B, C, and D. Effects to wolverine are the same as in the effects common to all alternatives.

Cumulative Effects:
Cumulative impacts across all alternatives would have the same cumulative effects. A considerable amount of wilderness and unfragmented habitat remains in the San Juan Mountains, and recreational use on BLM lands has increased to a point that previously undisturbed areas are now supporting various types of extreme sports and other recreational pursuits. These activities, as well as ski areas associated with some alternatives, have the potential to reduce the amount of solitude habitat available for species such as the wolverine.

Timber harvest and fuels reduction activities would continue on NFS and private lands within habitat for wolverine. BLM and USFS wildlife programs in coordination with CPW would continue to monitor for the presence of wolverines.

Spotted Bat

Natural History and Background

The spotted bat occurs from south-central British Columbia to southern Mexico. In Colorado, spotted bats occur in the western semi-desert canyonlands (Armstrong et al. 1994). Spotted bats have been found in a variety of habitats; however, rocky cliffs are necessary to provide suitable cracks and crevices for roosting, as is access to water (Fitzgerald et al. 1994). The species roosts by day in rock crevices located on high cliffs (Adams 2003). The dependency of rock-faced cliff roosting habitat limits the spotted bat to very small geographic areas with specific geologic features (Luce 2004). Foraging has been observed in forest openings, pinyon-juniper woodlands, large riverine/riparian habitats, riparian habitat associated with small to mid-sized streams in narrow canyons, wetlands, meadows, and agricultural fields (Western Bat Working Group 1998).

Historically, the spotted bat has endured little impact from human disturbance because its roosts are remote. Recreational rock climbing may disturb bats in local situations (Luce 2004). Large-scale pesticide programs to control Mormon crickets (*Anabrus simplex*) and grasshoppers could affect this species by reducing the availability of prey (Luce 2004). Disturbance to hibernacula in the winter months during temperature extremes could be limiting.

Past management activities that may influence the habitat for this species have not changed significantly over the life of the LRMP. Abandoned mine reclamation has focused efforts on identifying resources used by bats and modifying design criteria to keep mines open to bat use. This species is thought to be an obligate of natural crevices within rock faces and planning activities have not impacted these habitats due to the inaccessibility of the sites. The majority of oil and gas activities throughout the planning area have been localized to known developing fields.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the spotted bat primarily involve minerals development and recreational rock climbing. Rock climbing could disturb the species if climbing activities happened to disturb roosting individuals within rock crevices. However, there is no information that rock climbing is a risk to the species and assessing that activity would be purely speculative at this time.

Oil and gas development has the potential for direct impacts through loss of individuals foraging near oil and gas development. The most apparent threat is loss of individuals through entrapment in drilling and production pits. In an unpublished study by the USFWS in Indiana, "hundreds of dead birds and bats were found in oil pits in counties with Indiana bat summer habitat" (USFWS, Bloomington Field Office, unpublished data, 1993–1994). Krutzsch (1948) found the pooling oil from oiling roads attracted volant desert animals. Three bats were among the animals removed from small pools of oil. Finley et al. (1983) documented mortalities in a sludge pit near Rifle, Colorado. A total of 27 bats was found in one sludge pit.

Alternative A: No Action

Direct/Indirect Effects:
The spotted bat is a desert species that is currently known to occur sporadically on the far western portion of the planning area. Its range could therefore overlap planned activities such as oil and gas development in the Paradox Basin. This overlap would primarily involve activities planned within the Paradox Basin.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

Because the spotted bat primarily roosts in rock crevices in high cliff faces, it is unlikely that impacts to primary reproductive or roosting habitat would occur. If overlaps did occur, however, there may be a greater risk of impact to this species because it appears to reuse tradition rock crevice roost sites regularly (Wai-Ping and Fenton 1989). The species also does not appear to utilize mines or caves.

Benefits to this species could occur from water pond developments associated with livestock grazing. This activity has the potential to create valuable drinking water sites important to many bat species. Potential benefits are expected to be similar in all alternatives.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Effects from Alternatives B, C, and D are similar to the impacts in Alternative A. Standards and guidelines that protect the habitats of spotted bats do not vary throughout alternatives. Acres allocated for development may be altered by alternative with Alterative C designating more lands for natural or unique landscapes or processes. Under Alternative C, more habitats would be managed for less development and habitat fragmentation across the planning area may be slightly lower.

Closed loop drilling systems would eliminate the potential for bats to be entrapped in pits. Screening required for production equipment would greatly reduce the potential for bats to be trapped in equipment that bats may identify as potential roost sites.

Cumulative Effects:
Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent or the impacts of fragmentation on spotted bats are not known at this time. Alternatives A through D include both current and projected new leases, the "no new lease" scenario only includes current leases under each of the alternatives. Under the No Leasing Alternative, development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

Recreational climbing would continue throughout the life of the LRMP. Recreational climbing is not expected to result in any measureable impacts to spotted bat populations or their habitat since spotted bats are relatively solitary.

Townsend’s big-eared bat

Natural History and Background

Townsend’s big-eared bat occurs throughout much of western North America, with some isolated populations in the eastern United States (Adams 2003). One of the largest winter roost sites in Colorado was found in the early 1990s at a patented mine on the Mancos-Dolores District of the SJNF. CPW biologists currently monitor the site. Elsewhere, CPW volunteers conducted exit counts and trapped bats at various abandoned mines in La Plata Canyon during the early 1990s. No Townsend’s big-eared bats were recorded during these surveys, nor have there been any other confirmed reports of this species elsewhere on the planning area.

Physical habitat, especially the presence of caves or mines suitable for day and night roosting and for hibernation, is probably more important than the vegetative characteristics (Armstrong et al. 1994). Roosting habitats consist most frequently of caves and abandoned mines, but also include buildings, bridges, rock crevices, and hollow trees. They do not move long distances from hibernacula to summer roosts nor do they move or forage far from their day roosts. During the summer, single individuals may be encountered hanging in cracks of cliffs.

The primary threat from LRMP decisions are disturbance or destruction of roost sites caused by recreational caving, mine reclamation, and renewed mining in historical districts. This species is sensitive to disturbance and has been documented to abandon roost sites after human visitation. Disturbance to hibernacula in the winter months during temperature extremes may be critical. Both roosting and foraging habitats may be affected by timber harvest practices. In addition, pesticide spraying in forested and agricultural areas may affect the prey base (Western Bat Working Group 1998). The impacts of White Nose Syndrome on this species are not currently known at this time. Townsend’s big-eared bats are cave-obligate species and introduction of White Nose Syndrome into their environment would most certainly be detrimental to populations in Colorado.

Past management activities that may influence the habitat for this species have not changed significantly over the life of the LRMP. Abandoned mine reclamation has focused efforts on identifying resources used by bats and modifying design criteria to keep mines open to bat use. Fuels and timber activities most likely have not influenced foraging habitat characteristics for Townsend’s big-eared bats in any measurable levels. The majority of oil and gas activities throughout the planning area have been localized to known developing fields.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence Townsend’s big-eared bat primarily involve fluid minerals development and wildlife management (i.e., abandoned mine closures). Although big-eared bats may occasionally utilize some trees as day roosts, it is primarily a cave-dwelling bat and this analysis would focus on that important habitat component.

Oil and gas development has the potential for direct and indirect impacts through loss of habitat and direct loss of individuals. If roosting snags are within a proposed development the loss of the roost may temporarily displace individuals. The most apparent threat is loss of individuals through entrapment in drilling and production pits. In an unpublished study by the USFWS in Indiana, “hundreds of dead birds and bats were found in oil pits in counties with Indiana bat summer habitat” (USFWS, Bloomington Field Office, unpublished data, 1993–1994). Krutzsch (1948) found the pooling oil from oiling roads attracted volant desert animals. Three bats were among the animals removed from small pools of oil. Finley et al. (1983) documented mortalities in a sludge pit near Rifle, Colorado. A total of 27 bats was found in one sludge pit.

Abandon mine closures would continue at the same level across all alternatives. All closures are surveyed for bat activity prior to mine closure. Any mines with bat activity are closed to human access and constructed to be bat friendly and maintain ventilation.

Recreational caving in the planning area is not substantial due to the paucity of known caves.

Alternative A: No Action

Direct/Indirect Effects:
Townsend's big-eared is uncommon on the TRFO but occurs sporadically at lower elevations. Undisturbed cave and mine habitat is the primary limiting factor for this species. Because natural caves could occur in rock formations, it is possible that potential habitat could overlap planned activities such as oil and gas development.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

All alternatives provide the same wildlife management actions in regards to mine closure gates for bats. Thus, all alternatives install the same quantity and quality of mine closure bat gates over the life of the LRMP. These closures are coordinated with CPW and the Colorado Division of Reclamation Mining and Safety and provide undisturbed habitat for mine-associated bat species while also addressing human safety and health issues.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
There is no difference among the LRMP revision alternatives in regards to implementation of wildlife management activities that may provide bat gates on abandoned mines used by bat species. This activity is expected to provide the highest benefit to Townsend's big-eared bats because they commonly reuse traditional roost and hibernacula. Comparison of impacts from oil and gas development is described above in Alternative A.

Cumulative Effects:
Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent or the impacts of fragmentation on Townsends' big-eared bat are not known at this time. Alternatives A through D include both current and projected new leases, the "no new lease" scenario only includes current leases under each of the alternatives. Under the No Leasing Alternative development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

Mine closures would continue for health and human safety. Surveys for bat activity, particularly hibernacula, would provide valuable monitoring for the introduction of White Nose Syndrome in Colorado. White nose syndrome has not been identified in Colorado but continues to move west as the disease spreads. Whether Colorado caves and mines provide the habitat necessary for *Geomyces destructans* (the fungus responsible for White Nose Syndrome) is not known at this time.

2.3.2 Birds

American Bald Eagle

Natural History and Background

The bald eagle is a large bird of prey with a wingspan of approximately 6 to 7 feet. It is brown in color except for the white head and tail. The species is found throughout the United States and Canada primarily near large bodies of water or larger streams and rivers. The winter range of the bald eagle includes most of its breeding range; however, most eagles winter from southern Alaska south to Arizona, New Mexico, and Colorado (USFWS 1998).

Bald eagles feed primarily on fish they catch or take from other fish eating birds. They will feed on waterfowl and other birds, carrion, small to medium-sized mammals, and turtles. They are opportunistic feeders (USFWS 1998). Bald eagles will feed on big game animals that have died on their winter ranges. This carrion provides an important source of food during the winter. Waterfowl, particularly dead or crippled individuals, are an important source of food when fish are not readily available (USFWS 1998).

Loss of habitat and prey sources could reduce populations. The bald eagle is also susceptible to poaching and human disturbance during nesting. The species is recovering from habitat degradation and pesticide related problems. Bald eagles, like the peregrine falcon, are very sensitive to disturbance from the initiation of courtship to young fledging. This time period is roughly from mid-December to mid or late June. During this time period it is extremely sensitive to human disturbance activities and nest abandonment and desertion of long established territories may occur.

Past management activities that may influence this species have not changed significantly over the life of the LRMP. Throughout the majority of the planning time frame bald eagles were managed under the ESA. Once delisted the species was managed with the same conservation measures for 5 years. Mineral development throughout the planning area has been managed in order to avoid nest locations and winter roost sites. All program areas were managed in order to decrease the potential for disturbance at nest and winter roost locations.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence bald eagles include mineral development, recreation, fuels treatments, and timber management. Oil and gas development has the potential for disturbance at the nest location and winter roost sites. Fuels treatments could potentially impact nesting or wintering bald eagles if the disturbance was to occur during timing restrictions within recommend buffers.

To some degree, there are numerous activities and programs that might influence the bald eagle if they occur in nesting areas or within important winter concentration habitat. Most bald eagle nest trees occur near water bodies and are protected and “buffered” from disturbances associated with land use planning decisions.

Alternative A: No Action

Direct/Indirect Effects:
Fluid minerals management under the No Action Alternative stipulates a 0.25-mile NSO stipulation for active nests and winter roost locations. A 0.25-mile NSO stipulation for nest locations covers 125.6 acres compared to 502.4 acres for a 0.5-mile NSO restriction. The nest and winter roost buffer in Alternative A is 4 times smaller than Alternatives B, C, and D. Based off best available science a 0.25-mile NSO stipulation around active nest and roost locations is not sufficient to protect bald eagles during critical life stages. Development closer than the USFWS recommend 0.5-mile stipulation may lead to nest or roost abandonment.

In regards to activities that could potentially influence the bald eagle, Alternative A offers more acres of active management than Alternative B and C. Because the bald eagle is such an opportunistic forager whose prey species can be influenced by several factors, it is probable that Alternative A has a higher possibility of influencing some aspect of the natural history needs of bald eagles more so than Alternative B or C. Alternative D slightly exceeds Alternative A in active management area acres.

Disturbance from motorized and non-motorized recreation can impact bald eagles at nest sites and in winter concentration areas. Alternative A offers more high-use recreation areas than any of the action alternatives. This difference could potentially allow greater disturbances to bald eagles depending on the type, timing, and scope of the activity. Greater winter travel via snowmobiles could theoretically disturb eagles in winter concentration areas and/or while they are roosting or foraging. Uncontrolled summer motorized activities could add to disturbances around nest sites or summer foraging sites where fish are the primary prey species.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative, development would be limited to existing leases within the planning area.

There are no standards and guidelines in existing planning to limit impacts of fuels around nest locations or winter roost sites. However, management actions are still required to comply with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. It is not likely that fuels treatments under Alternative A would have any impacts different than other alternatives.

Alternative A could offer a greater risk of impacting the bald eagles than Alternative B and C because it is associated with greater development and fewer strict protective measures. Although direct overlap is unlikely, minimal impacts to individuals cannot be completely discounted because the species may roost or forage near development areas.

Action Alternatives: Alternative B–D

<u>Direct/Indirect Effects:</u>
Fluid minerals management under Alternatives B, C, and D stipulates a 0.5-mile NSO stipulation for active nests and winter roost locations. The 0.5-mile NSO stipulation is four times larger than the buffer in Alternative A. Development closer than the USFWS recommend 0.5-mile NSO stipulation may lead to nest or roost abandonment.

All action alternatives offer fewer potential disturbances than the No Action Alternative in winter motorized recreation areas because of decreased acres available for motorized use. For summer motorized use, all action alternatives offer more acres available for motorized use than the No Action Alternative and are consistent with their themes in that Alternative C offers the fewest motorized use acres, while Alternative D offers the most acres. Alternative B offers a balance between action Alternatives C and D. Reductions in open motorized areas during winter should decrease the potential for displacement or disturbances to bald eagles during the wintering periods. The increase of acres for motorized use during the summer is mitigated by guidelines set forth in the LRMP that states human encroachment should not occur with 0.5-mile radius of active nests from November 15 through July 15 to reduce disturbance during the nesting season and prevent reproductive failure.

Alternative C offers the fewest acres available for leasing followed by Alternative B. Alternatives A and D are fairly similar and offer the most acres available for leasing. Alternatives B, C, and D offer the most protective lease stipulations with fairly similar acres with NSO, all having significantly more acres than the No Action Alternative. Under the “no new lease” scenario only the existing lease areas have potential for development under these alternatives resulting in fewer acres of potential influence to the species.

<u>Cumulative Effects:</u>
Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent of the impacts of fragmentation on bald eagles is not known. Under the No Leasing Alternative development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

Private surface and development would continue regardless of land use planning decisions. Impacts to bald eagles may continue on private surface. Most resource actions on federal and state surface would have beneficial impacts due to management direction in all alternatives incorporating management standards and guidelines to protect various species and habitats. Even without standards and guidelines for bald eagles cumulative impacts under Alternative A may only differ slightly from Alternatives B, C, and

D due to the requirements for federal agencies to comply with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

The national mid-winter bald eagle counts confirm other findings that bald eagle populations are increasing across the United States (Steenhof et al. 2002). These increases are highest in the East, Northeast, and upper Midwest, and least in the Southwest. This geographic variation could be due to several factors, including increasingly warmer winters, past insecticide exposure levels by geographic area, and more rapid human population growth in the West and Southwest. The fact that that mid-winter counts of adults increased at almost twice the rate of immatures suggests that the overall trend may reflect past increases in recruitment and that recruitment may be stabilizing (Steenhof et al. 2002). Although minor disturbances to individual bald eagles on the TRFO may occur, no cumulative effects have been identified and the population may be stabilizing to the available habitat and food supply.

American Peregrine Falcon

Natural History and Background

In the western United States, breeding grounds for the peregrine falcon most commonly occur in mountainous areas near water sources (USFWS 1977). Peregrines prefer sites within 1,300 to 2,300 feet of perennial or ephemeral water (Pagel 1995). The preference for water features in proximity to nest sites is probably associated with the peregrine’s prey base (Johnsgard 1990). Cliff structures are most often chosen for nest sites and cliffs are the only sites known in Colorado. On the TRFO and throughout Colorado, breeding territories are found almost exclusively on high walls of tall cliffs in river gorges and along mountainsides (Craig 1986).

Peregrine falcons are primarily aerial hunters of a wide variety of avian species (USFWS 1977). Although small to medium-sized passerines make up the primary diet of peregrines, they may also occasionally take larger prey such as waterfowl (NatureServe 2013). In addition to avian prey, peregrines may rarely take small mammals, such as bats and small rodents, and even lizards (NatureServe 2013).

Limiting factors include limited suitable nesting habitat, prey availability, fragmentation of hunting territories, limited recruitment of young into the population, weather, predation, competition, sensitivity to pesticides, parasites and disease, and sensitivity to human disturbance. Breeding sites on the TRFO are usually occupied March through August.

Past management activities most likely have not influenced this species. The inaccessibility of nest locations removes this species from almost all impacts of management decisions. Guidance has not been developed in previous plans to address the impacts of recreational rock climbing. Most climbing is popular throughout the planning area, however monitoring of peregrine falcon nests has not identified a need to manage this activity.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the peregrine falcon primarily involve motorized and non-motorized recreation (e.g., rock climbing). Riparian management activities could potentially improve prey habitat for the falcon.

Alternative A: No Action

Direct/Indirect Effects:
Recurring occupancy of cliff structures as nest sites on the TRFO suggests that local populations of peregrine falcon could be considered secure. Although nest sites are generally inaccessible to humans, potential disturbance at nest sites are possible.

The peregrine falcon was removed from the endangered species list in 1999. Existing conditions have recovered the peregrine falcon to the point that it has been able to be delisted. Alternative A is expected to continue this trend because most nest sites are inaccessible to human impacts. However, it is possible that Alternative A provides a higher risk of disturbance to individuals because there is more suitable opportunity land for motorized travel. A higher amount of travel and human activity area could potentially disturb peregrine falcons while they are nesting.

Rock climbing activities also have the potential to disturb falcons if the activity occurs near nest sites. Although rock climbing is a popular sport in the planning area, there is no evidence to suggest that it is currently influencing nest productivity or causing disturbances.

Both Alternative A and B offer the same amount of riparian habitat improvement over the life of the LRMP. These activities may benefit prey species if it occurs in areas where falcons forage. Alternative A does not provide as many acres of watershed improvement as Alternatives C and D.

Alternative A offers a 0.25-mile NSO stipulation for disturbance near nest sites. The disturbance buffer under Alternative A is 0.25 mile and covers 125.6 acres. Should structures be placed outside the 0.25-mile buffer then depending on the nature of the disturbance abandonment of the nest site may occur.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
All action alternatives reduce potential impacts from motorized travel in a similar manner, with most road access restricted to current routes and trails. Although travel impacts to individual falcons may still occur, it is likely that these travel management actions would reduce potential disturbances to nesting falcons.

Potential influences from rock climbing are not expected to be different under the action alternatives. Site-specific management and protection of nest sites would occur.

Alternative C and D offer slightly more acres of watershed and riparian improvement activities than Alternative B. This could potentially have a slightly greater benefit to prey species if the actions occur near falcon nest sites.

Alternative B, C, and D have a 0.5-mile NSO stipulation that covers 502.4 acres. This buffer is four times larger than the buffer in alternative A.

Cumulative Effects:
At least 31 peregrine eyries were known to occur historically in Colorado.By 1998, however, peregrines in Colorado occupied 90 of 107 known nesting sites. Seventy-six of the sites were occupied by breeding pairs that produced 157 young (USFWS 2003).

The peregrine falcon was delisted on August 25, 1999, as a result of reintroduction efforts and a comeback after the banning of DDT, an insecticide (USFWS 2003). From 1999 through 2001, peregrine falcons were known to occupy 134 territories in Colorado at least once (USFWS 2003). A post-delisting monitoring plan has been developed that would monitor at least 72 of these territories every three years to determine occupancy, nest success, and, if feasible, productivity (USFWS 2003). Some of these sites occur on the TRFO. Recovery of the peregrine falcon is expected to continue with no cumulative effects identified from activities planned on the TRFO.

Cumulative effects under Alternative A would generally have the greatest cumulative impacts because it provides more opportunity for disturbance around nest locations.

Black Swift

Natural History and Background

Within the state, the San Juan Mountains have been identified as having the most concentrated occurrences of black swift. This species has the unique characteristic of nesting in colonies on cliffs in close association with mountain waterfalls, often within the spray zone of rushing water. Within the state, the San Juan Mountains have been identified as having the most concentrated occurrences of black swift.

In its mountainous habitats it forages over a range of habitats but is highly specific in its breeding site preference. Nest sites are almost always located on precipitous cliffs near or behind waterfalls (Hunter and Baldwin 1962; Knorr 1961).

Nest sites range in elevation from sea level in California to roughly 11,000 feet in Colorado (Bailey and Niedrach 1965) and occur within a wide range of surrounding habitats. The USFS has identified nine nesting sites across the SJNF and a number of potential sites have been identified but have not been adequately surveyed. No sites have been identified on the TRFO.The black swift is an aerial forager and apparently consumes a wide variety of small flying insectivorous prey. They appear to be attracted to swarms or “blooms” of some insect species.

Limiting factors include changes to microsite characteristics of suitable breeding habitat, small colony size, small clutch size, low regional populations, reproductive success, predation, human harassment, and pesticides. Breeding occurs June through mid-September.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the black swift primarily involve non-motorized recreation (e.g., rock climbing and ice climbing).

Alternative A: No Action

Direct/Indirect Effects:
Black swift nesting habitat occurs behind perennial waterfalls, often in remote locations. Although rock and/or ice climbing within the spray zone of the waterfall could potentially influence the microsite conditions important to nesting, there is no information that is occurring at any locations. Most nest sites remain highly inaccessible to human alterations. Therefore, no measurable effect is anticipated from the No Action Alternative.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:

None of the action alternatives provide additional access to black swift nest sites. The protection offered by their unique nesting habits are expected to continue to discourage any measurable impacts from LRMP revision activities. No effect from any of the action alternatives is anticipated.

Cumulative Effects:
The unique nesting habits of the black swift make them practically invulnerable to predators or human disturbance. The young remain protected behind the waterfalls during the day while the adults spend most of the daylight hours on-the-wing foraging high above the forest canopies. Measurable cumulative effects from human activities are therefore unlikely.

Brewer’s Sparrow

Natural History and Background

Brewer’s sparrow is an obligate of sagebrush communities (Braun et al. 1976; Paige and Ritter 1999). Throughout most of the Brewer’s sparrow’s breeding range it is most closely associated with landscapes dominated by big sagebrush (Rotenberry et al. 1999; Wiens and Rotenberry 1981) with an average canopy height of less than 5 feet (Rotenberry et al. 1999). It also occurs in shrubby openings in pinyon-juniper and mountain mahogany woodlands (Sedgwick 1987) and large shrubby parklands within coniferous forests (Rotenberry et al. 1999). Sagebrush in Colorado occurs at elevations of approximately 4,000 to 10,000 feet and exists in a variety of climatic conditions, including low-elevation semi-desert habitats and moist, cool, mountainous areas. Perhaps 30% of Colorado’s sagebrush was altered between 1900 and 1974 (Braun et al. 1976), and the ecological integrity of Colorado’s sagebrush shrublands has been compromised by the invasion of exotic (e.g., cheatgrass) or native (e.g., pinyon-juniper) plant species, conversion to agricultural, residential, and other developed land types, and changes in natural fire regimes (Biedleman 2000).

The declines in Brewer's sparrow breeding populations are likely linked in part to extensive alteration of sagebrush shrub steppe habitats and impacts on winter habitat. Threats and limiting factors for Brewer's sparrow are habitat loss and fragmentation, agriculture, prescribed burning in sagebrush habitat, oil and gas development, and livestock grazing.

Past management activities that may have influenced this species include sagebrush treatments, fuels reductions, oil and gas development, seismic exploration, and livestock grazing.

Under the current land use plan (Alternative A), the BLM has treated over 2,000 acres of sagebrush habitat in Dry Creek Basin. Sagebrush treatments included mowing, burning, brush beating, and spike treatments. Treatment impacts have ranged from complete loss of sagebrush habitat to short-term reduction in canopy cover.

Historic livestock grazing may have altered sagebrush understory components, and current management is focused on sustainable livestock management.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence Brewer's sparrow primarily involve fuels treatment activities, mineral development, and livestock grazing. Brewer's sparrow occurs most commonly where sagebrush densities are high and contiguous. Even minor declines in sagebrush cover have been shown to result in a similar reduction in breeding pair densities (Holmes 2007). Activities that influence the quality and quantity of sagebrush cover on the TRFO may also have negative influences on this species. Fuels treatments primarily involve hydro-mowing and crushing of mixed shrublands to reduce fuels hazards associated with mature, high-density shrublands. These shrublands are dominated by Gambel oak. Sagebrush may also be affected on a site-specific basis when it coexists with Gambel oak; however, it is not a target species for fuels reduction on BLM lands. Potential impacts to Brewer's sparrow from fuels reduction activities on the TRFO are expected to be minor but cannot be completely discounted.

Oil and gas development has the potential to fragment habitat for Brewer's sparrow. Densities of sagebrush obligates can be expected to decrease due to the loss of habitat and decrease in habitat effectiveness. Ingelfinger and Anderson (2004:392) studied the impacts of oil and gas development on the densities of nesting sagebrush obligates and noted that "[e]ven along roads with light traffic volume (<12 cars per day), density of sagebrush obligates was reduced within 100-m of the road zone." Decreases in density of sagebrush obligates cannot be attributed to traffic alone. Sage sparrows may select against edged created by road and pipeline construction (Ingelfinger and Anderson 2004). Although not statistically significant "[a]long the natural gas pipeline where traffic was absent, Sage Sparrow density was reduced by 64% within a 100-m buffer of the surface disturbance" (Ingelfinger and Anderson 2004:392).

Alternative A: No Action

Direct/Indirect Effects:
Brewer's sparrow is a species of conservation concern across much of its western range because of declines in sagebrush habitat and breeding populations. Most suitable habitat on the planning area occurs on lower-elevation BLM lands.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

Fuels treatment acres for Alternative A are the same for Alternatives B and C.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
All action alternatives provide for a similar amount of fuels treatment in mixed-shrubland, with a slight increase in Alternative D. Because sagebrush is not a target species for fuels reduction, potential influences on Brewer's sparrow and other sage-associated species are expected to be similar to Alternative A.

Alternative B provides for the same amount of livestock grazing as Alternative A. There is a slight reduction in AUMs and area in Alternative C and a slight increase in Alternative D. The decrease in grazing area and stocking rates in Alternative C may provide some secondary benefits to species such as Brewer's sparrow, while the increase in Alternative D may be associated with a higher degree of habitat impacts to the species. Overall, however, potential impacts are expected to be similar and based on site-specific areas where conservation measures are available to alleviate identified problems. The conservation measures are similar across all alternatives.

Fuels treatments impacts would be the same for Alternatives A, B, and C. Alternative D proposes to treat more acres for fuels. However, the difference between acres treated and available habitat are so minor there is virtually no difference between the alternatives.

Cumulative Effects:
Some data (Rotenberry and Knick 1999) suggest that Brewer's sparrow populations may be limited by processes occurring on winter range. Brewer's sparrows winter in the extreme southwest United States, but mostly in Mexico. Land use practices, invasion by exotic plants, disrupted ecosystem processes, and altered disturbance regimes have impacted and continue to impact sagebrush ecosystems across the western United States (Knick et al. 2003).

Fuels management may occur in areas, which include small stands of sagebrush but otherwise are dominated by other vegetation types.

Oil and gas development is expected to continue throughout all alternatives. Development levels are projected for each alternative in the RFD scenario. Only under the No Leasing Alternative would oil and gas development be limited to private surface/private minerals.

Columbian Sharp-tailed grouse

Natural History and Background

The native range of the Columbian sharp-tailed grouse is western Colorado, northeastern Utah, western Wyoming, extreme western Montana, northern Nevada, northwestern California, eastern Oregon, eastern Washington, Idaho, and southeastern British Columbia (Spomer 1987). This grouse does not currently occur on the TRFO and has not been documented on the planning area for more than 30 years (Giesen and Braun 1993). Some suitable habitat may still exist on the SJNF, all on the western part of the forest on the Dolores Ranger District.

In 2004, the Colorado Division of Wildlife (now CPW) reintroduced 40 male sharp-tailed grouse onto private land in southwest Colorado. The reintroduction area involves former agricultural land that is now part of the Conservation Reserve Program. In April 2005, 40 females were also brought from northwest Colorado and released at lek sites that the males had established.

The reintroduced grouse successfully reproduced during the 2005 breeding season, with 14 successful nests out of 17 attempts documented. All of the nests were located in residual grasses on private Conservation Reserve Program lands. As of January 2006, eight females and males (16 birds total) were still being tracked via the transmitters. An additional supplement of mostly females was planned for the spring of 2006. The goal of CPW's Columbian sharp-tailed grouse conservation plan is to establish a breeding population in southwestern Colorado and an additional population on the Uncompahgre Plateau. All populations will be tracked by CPW to provide trend information gathered at the leks. It is unknown whether a population will establish from these efforts. Currently, no occurrence has been recorded on BLM lands.

Habitat requirements appear narrower in winter than in summer, and winter distribution is usually in close proximity to mountain shrub and riparian habitats (Giesen and Connelly 1993).

Populations of Columbian sharp-tailed grouse have declined drastically throughout their range since the early 1900s. Increased agricultural development and grazing by domestic livestock are factors influencing abundance and distribution (Hoffman 2001; Meints et al. 1992). Winter dependence on deciduous trees and shrubs for food and cover may limit grouse within sagebrush-steppe habitat (Giesen and Connelly 1993).

Leks are a focal point in management of grouse because disturbances may result in regional population declines (Giesen and Connelly 1993; Rogers 1969). Winter is a critical time period because habitats sufficient for overwintering grouse populations are thought to be limited (Meints et al. 1992).

The Columbian sharp-tailed grouse has been reintroduced to private lands near the TRFO. Although the species is not believed to occur on BLM lands, habitat for the species is available on adjacent BLM-administered lands. As populations recover, it is expected that the grouse would re-occupy some habitats on BLM-administered lands.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the Columbian sharp-tailed grouse primarily involve mineral development, fuels treatment activities, and livestock grazing.

Mineral development may temporarily displace individuals or could cause abandonment of lek sites if development were to occur near lek areas. Development is projected for all alternatives in the RFD scenario. Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

Fuels treatments may result in a temporary loss of habitat. These activities are expected to be beneficial to the Columbian sharp-tailed grouse due to a reduction in shrub cover that promotes forage plants such as forbs and grasses that support high insect densities for broods. It should be noted that removal of shrubs in winter habitat may be detrimental to sharp-tailed grouse.

Grazing in sharp-tailed grouse habitat has the potential to reduce nesting cover. Winter habitat may be a potential limiting factor and would be more influenced by big game use than domestic livestock. Heavy use of deciduous trees and shrubs by big game may remove important winter forage for sharp-tailed grouse.

No LRMP activities would have any influence on introduced population of sharp-tailed grouse unless grouse start using BLM lands for breeding or winter habitat.

Alternative A: No Action

<u>Direct/Indirect Effects:</u>
In regards to activities that may influence sharp-tailed grouse, Alternative A provides similar fuels treatments in mixed-shrublands and ponderosa pine forest as the action alternatives.

Permitted livestock grazing in Alternative A is 36% of available AUMs. These activities may influence potential grouse habitat because of influences on forage species, insect densities, and other factors.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
All action alternatives provide for a similar amount of potential benefits from fuels treatment activities on potential grouse habitat. Benefits are therefore expected to be similar to Alternative A.

Alternative B provides the same amount of livestock grazing as Alternative A at 36% of available AUMs being permitted. There is a slight reduction in AUMs in Alternative C, where 22% of available AUMs being authorized for grazing, and a slight increase in Alternative D with 40% being permitted. Conservation measures do not change across Alternatives B, C, and D.

Cumulative Effects:
Introduce sharp-tailed grouse primarily use private Conservation Reserve Program lands but adjacent habitats on the SJNF may become more important to the success of the reintroduction program as the species becomes reestablished. Adjacent BLM lands may be used should populations of sharp-tailed grouse continue to expand.

Oil and gas development would continue on private surface/private minerals regards of LRMP alternative. Development of split estate (private surface/federal minerals) would continue in Alternatives B, C, and D with the same conservation measures across all alternatives. Regardless of overall NSO acres sharp-tailed grouse lease stipulations do not vary throughout alternatives. In the No Leasing Alternative oil and gas development would be limited to federal minerals with existing leases and private surface/private mineral estate.

Fuels treatments and grazing would continue on federal lands adjacent to sharp-tailed grouse habitat. No cumulative impacts from the effects identified above are anticipated unless sharp-tailed grouse expand into those areas. Current population growth is probably not limited by habitat available to the species but predation, recruitment, and other factors that may be impacting this species population growth rates.

Ferruginous Hawk

Natural History and Background

The ferruginous hawk breeds from eastern Washington, southern Alberta, and southern Saskatchewan south to eastern Oregon, Nevada, northern and southeastern Arizona, northern New Mexico, north-central Texas, western Oklahoma, and Kansas (DeGraaf et al. 1991). The species winters primarily from the central and southern parts of breeding range south to Mexico. In Colorado it is a fairly common to common winter resident on eastern plains and uncommon to rare in western valleys and mountain parks (Andrews and Righter 1992; Preston 1998). It is an uncommon fall and winter resident in southwest Colorado (Durango Bird Club 1992). The TRFO is out of the breeding portion of the species range (NatureServe 2013). Overwintering on the TRFO occurs but is considered uncommon to rare in this portion of the species' range.

Ferruginous hawks primarily inhabit grasslands and semi-desert shrublands, and are rare in pinyon-juniper woodlands (Andrews and Righter 1992; Preston 1998). This species nests in trees and bushes, and on ledges, large rocks, riverbanks, and hillsides (Dechant et al. 2003; Finch 1992). Ferruginous hawks forage on native grasslands where nest sites are scarce, and as a consequence, individuals reuse nest sites until the structures are sometimes over 3 feet in height. Ferruginous hawks hunt from a perch, while soaring, during low, rapid flight over open country, or while systematically searching and hovering at 40 to 60 feet (Dechant et al. 2003; Finch 1992). They feed primarily on rabbits, ground squirrels, and prairie dogs, but would also take mice, rats, gophers, birds, snakes, locusts, and crickets (Dechant et al. 2003).

Limiting factors for ferruginous hawks are nest site and prey availability (Dechant et al. 2003), habitat loss, predation, and human disturbance. On the planning area, its occurrence during the non-breeding season is limited to more open areas that are suitable for hunting and that contain sufficient densities of small mammal prey, such as prairie dogs and ground squirrels, during snow-free seasons. Fall and spring (i.e., during snow-free periods of the non-breeding season) are the most likely time periods this hawk might occur on the TRFO.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the ferruginous hawk primarily involve motorized and non-motorized recreation and mineral development.

Alternative A: No Action

Direct/Indirect Effects:
The ferruginous hawk is a migratory species with individuals that occur sporadically during the winter period. No breeding or nesting pairs are known to occur. Potential affects to this species are therefore most likely limited to possible disturbances from motorized vehicles or recreational activities.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Potential effects from the action alternatives are expected to be similar to the no action. Potential affects to this species are expected to be limited to possible disturbances from motorized vehicles or recreational activities on migratory non-breeding individuals.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

Cumulative Effects:
The ferruginous hawk has suffered habitat loss and negative effects throughout much of its range in the western United States. However, all of the alternatives associated with the LRMP revision are expected to have no cumulative effects on this species because the planning area does not measurably contribute to the conservation of the species. All individuals are migratory with no important breeding habitats known.

Gunnison Sage-grouse

Gunnison sage-grouse (*Centrocercus minimus*) is addressed in the Biological Assessment (see Appendix J).

Northern Goshawk

Natural History and Background

The northern goshawk is large-bodied raptor that is holarctic in distribution, meaning it is limited to northern hemispheres. In Colorado, the northern goshawk is considered an uncommon resident in foothills and mountains within the western portion of the state (Andrews and Righter 1992; Barrett 1998a). It is considered to be a winter resident throughout its range, but some individuals winter outside their breeding areas and undertake short-distance migrations (Kennedy 2003). Breeding territories have been found on all Ranger Districts/Field Offices of the planning area and in all forested habitat types. Foraging individuals are regularly seen in a wide variety of habitat types across the planning area.

Goshawks exhibit high breeding territory fidelity from year to year (Kennedy 2003). All montane forest types are used for nesting (Barrett 1998a; Kennedy 2003). Nest areas have a relatively high tree canopy cover and a high density of large trees. Nests are typically located on shallow slopes with northerly exposures or in drainages or canyon bottoms protected by such slopes and are usually within close proximity to water (Barrett 1998a; Reynolds et al. 1992). Nest trees are often the largest trees in the stand and are frequently situated adjacent to breaks in the canopy such as old logging trails or openings created by fallen trees (Hennessy 1978; Kennedy 2003; Reynolds et al. 1992; Shuster 1980). Shuster (1980) also noted a relatively low level of understory vegetation in the general area of the nest site.

Goshawks may select nest sites based on stand structural features, then select an appropriate nest tree (Kennedy 2003). Winter habitat use by goshawks is described as forests, woodlands, shrub lands, and forested riparian strips (Kennedy 2003:).

There are a number of factors cited by researchers and managers as potentially detrimental to current and future goshawk viability. These include, but may not be limited to, habitat alteration, direct human disturbance, pesticides and other contaminants, and harvest for falconry. However, the primary concern throughout the range of the goshawk is habitat alteration due to timber and fire management practices. Additionally, the recent alterations of habitat due to insects and diseases in Colorado has changed goshawk habitat across the state. Prey availability and predation limit goshawk reproduction and recruitment (Kennedy 2003). Density-dependent territoriality may regulate population growth rate (Kennedy 2003). Prey availability affect populations in at least two different ways. First, low prey availability can reduce reproductive output or cause total nest failure (Boal and Mannan 1994). Low prey availability may also result in larger territories, thereby limiting the total number of territories within a given landscape of suitable habitat (Crocker-Bedford 1998; Kennedy et al. 1994). Clonal aspen stands within ponderosa pine and other conifer forest types are often used for nesting and may be important areas for foraging due to higher concentrations and diversity of prey species (Joy 1990; Shuster 1994). Aspen inclusions within pine and conifer forest types used for nesting by goshawks have been lost from the TRFO because of stand aging and lack of disturbance or subsequent regeneration due to fire suppression, and in some cases, browsing by domestic and native ungulates. During winter, prey abundance and not habitat per se may be an important factor in determining goshawk habitat use (Kennedy 2003). The nesting season (April–August) is likely to be the most critical time period and the most vulnerable to disturbance for goshawks on the planning area.

Effects Analysis

LRMP revision activities that could potentially influence the northern goshawk primarily involve timber harvest, fuels treatments, oil and gas development, and wildlife management activities. Motorized and non-motorized recreation and the development of roads could possibly influence nesting in some locations.

Alternative A: No Action

<u>Direct/Indirect Effects:</u>
Restoration treatments intended to restore the ponderosa pine cover type closer to historic conditions is the primary treatment in Alternative A. These treatments are similar in all alternatives and are intended to help maintain and restore the large tree component required for goshawk nesting substrate over time. These treatments would target small-diameter stands and closed canopy mature stands where density reduction should benefit goshawk foraging patterns. Unless carefully planned, however, density reduction may have negative influences on individual nesting territories. Any treatments that occur during critical nesting periods could potentially displace breeding adults and could impair successful breeding by goshawks.

Treatments in warm-dry mixed conifer stands are also expected to have variable effects on northern goshawks. Where restoration treatments occur, benefits should be similar to those described for ponderosa pine. Where partial cuts occur, variable effects may occur depending on existing stand conditions and the amount of overstory removed. Nesting habitat and/or trees could be reduced in some cases. As discussed above, management activities could impact the breeding success of individual northern goshawks. However, the differences between all alternatives represent a minimal change in this habitat and are not likely to affect the goshawk populations as a whole.

Alternative A offers similar fuels treatments throughout all alternatives. Acres of fuels treatments vary by no more than 6% across all alternatives. Prescribed fire activity projections are also similar across all alternatives and vary by only 100 to 200 acres. As with mastication, prescribed fire could have a negative impact to the northern goshawk, depending on the time of year the treatment is occurring. The use of prescribed fire could help restore habitat conditions for the northern goshawk due to a reduction in small-diameter trees that could inhibit effective foraging. The use of prescribed fire is also expected to provide benefits by reducing fuel loads that could result in a high-intensity wildfire that could render habitat unsuitable. Benefits to prey species is also anticipated as small mammals and birds respond to the burn areas. However, the reduction of course woody debris from fire could temporarily limit habitat for some prey species. Some impacts, such as displacement or nest failure, may occur to individual goshawks if nesting occurs within a prescribed fire area. The use of prescribed fire is projected to occur on approximately 4,000 acres and does not vary across alternatives. Wildland fire use may be used as a management tool on 1 to 30,000 acres of spruce-fir in all action alternatives. This could impact individual goshawks if fire occurs in nesting areas.

Alternative A offers more high-use recreation areas than any of the action alternatives. This difference could potentially allow greater disturbances to nesting goshawks than the action alternatives. As described above, goshawks are especially sensitive to disturbance during critical nesting periods. Nesting success may be affected by the increase in recreation through this alternative.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area. Under all alternatives, there are stipulations and mitigation measures in place that would protect critical goshawk habitat and nest territories during critical breeding periods.

Wildlife management activities in ponderosa pine systems in Alternative A do not vary from the action alternatives. These activities are also intended to help restore ponderosa pine closer to historic conditions by understory thinning and other activities that should be beneficial to the northern goshawk. As with timber and fuels treatments, wildlife management activities that occur during critical breeding periods could negatively impact breeding northern goshawks.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Overall, the effects from Alternatives B, C, and D are similar to the impacts in Alternative A. Standards and guidelines that protect the habitats of the northern goshawks do not vary throughout alternatives. Acres allocated for development may be altered by alternative with Alterative C designating more lands for natural or unique landscapes or processes. Under Alternative C more habitats would be managed for less development and habitat fragmentation across the planning area may be slightly lower. Increased development in northern goshawk habitat under any of the action alternatives could have an overall negative impact to this species. Site-specific analysis of potential impacts would be analyzed and mitigated at the project level.

There is little difference between the No Action Alternative and Alternatives B, C, and D in regards to predicted outputs and restoration activities in ponderosa pine. As is consistent with the active management theme, Alternative D offers the greatest amount of projected activities in all cover types that may be utilized by the northern goshawk. The slight reduction in harvest outputs in Alternative C and slight increase in Alternative D suggest that potential impacts and disturbances may therefore also vary. Overall, however, all action alternatives are similar and expected to have similar influences on the northern goshawk. Site-specific impacts may occur to individual goshawks in the short term, with long-term benefits anticipated in primary ponderosa pine habitat.

All action alternatives offer fewer potential disturbances than the No Action Alternative from summer motorized recreation because of decreases in the amount of motorized use area. Consistent with their themes, Alternative C offers the fewest motorized acres while Alternative D offers the highest amount of acreage. Alternative B offers a balance between the two other action alternatives, but also provides more undisturbed habitat than Alternative A. Reductions in open motorized areas should decrease the potential for displacement or disturbances to northern goshawks while nesting.

The use of prescribed fire and wildlife management for restoration in ponderosa pine does not vary from the No Action Alternative. Similar benefits and influences are therefore expected. As with Alternative A, it is estimated that wildland fire use may be used as a management tool on 1 to 30,000 acres in all action alternatives. Depending on fire severity and scale, these outputs could have both positive and negative influences on the northern goshawk, depending on the timing of the activity and the proximity to active nests.

Wildlife management activities proposed in the action alternatives to aid in the restoration of ponderosa pine stands do not vary from the No Action Alternative. Similar benefits and influences are expected. However, as stated with Alternative A, wildlife management activities that occur during critical breeding periods could negatively impact breeding northern goshawks.

Cumulative Effects:
Since the beginning of the last century, the planning area has experienced changes in forest structure caused by timber management, fire prevention, domestic livestock grazing, and other factors. Extensive logging, particularly in the ponderosa pine and mixed conifer types, has created much younger, and often much denser, forests than existed in the pre-settlement era (Romme 1997). The opening of the canopy that results from timber harvest, in combination with fire suppression, has allowed dense shrub layers to develop. These conditions are less suitable for goshawks because of a lower diversity or unavailability of prey species.

The fuels reduction program on the TRFO is using various techniques to restore ponderosa pine to more suitable habitat conditions. These include forest thinnings, mechanical treatments, and controlled burns. All of these techniques reduce understory trees and shrubs and therefore change habitat capability for goshawks. These changes are expected to improve long-term habitat conditions for prey species and make them more accessible to goshawks. As a result, it is expected that cumulative effects would be minimized and long-term benefits for goshawks and their primary prey species would occur while the risks of a high-intensity stand replacement fire are reduced.

Oil and gas development would continue throughout known formations and nesting and foraging may be fragmented. The extent or the impacts of fragmentation and the disturbance from oil and gas development on raptors has been well documented and similar impacts to the northern goshawks in suitable habitat can be anticipated. Alternatives A through D include both current and projected new leases; the “no new lease” scenario only includes current leases under each of the alternatives. Under the No Leasing Alternative development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

The specific LRMP components that have been developed for sensitive species and specifically for the northern goshawk are expected to alleviate any potential cumulative effects and contribute to favorable habitat conditions for any individual northern goshawk that occurs within the planning area.

Western Burrowing owl

Natural History

The western burrowing owl is a medium-sized ground-dwelling inhabitant of western grasslands and deserts. It has tendency to nest in loose colonies in underground burrows, which is not only unusual for owls but is quite rare in any other avian species. Although it is primarily nocturnal, it is also quite active during the day, especially during the breeding season.

In Colorado, it is a locally uncommon to fairly common summer resident on the eastern plains, uncommon in the Grande Valley in Mesa County and rare to uncommon in other western valleys and mountain parks. It is considered a casual winter resident on the eastern plains (Andrews and Righter 1992). The species is rare on BLM-administered lands of the planning area. Burrowing owls are known to occur on Gunnison prairie dog colonies in the TRFO.

The burrowing owl uses grasslands and mountain parks, usually in or near prairie dog towns (Andrews and Righter 1992). In Colorado, owls generally select their burrows in areas with other burrows surrounded by bare ground (S.R. Jones 1998). They would often use burrows located within active prairie dog communities and in areas where prairie dog colonies have become inactive owls would discontinue their use when grass reaches 6 inches in height (S.R. Jones 1998). They frequently choose sites close to roads (Plumpton 1992). This owl occasionally becomes urbanized and would breed or forage in vacant areas within urban zones. Little is known about the habitat preferences for migrating owls in their winter habitats (Haug et al. 1993).

Habitat loss is considered to be a major factor limiting burrowing owl populations in the western United States (Yanishevsky and Petring-Rupp 1998). Declining populations of prairie dogs colonies, as a result of control programs and plague, have resulted in a reduction in suitable nest areas. Conversion of grasslands to intensive agriculture and urbanization has also had impacts on available burrow habitats. Other limiting factors include low recruitment of juveniles, predation, prey availability, parasites, weather shooting, vehicle collisions, and pesticides.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the western burrowing owl primarily involve recreational shooting of prairie dogs, habitat fragmentation, seismic exploration, and oil and gas development.

Alternative A: No Action

Direct/Indirect Effects:
Under the No Action Alternative, no protective buffers would be provided for burrowing owls. Romin and Muck (2002) suggest a 0.25-mile buffer to avoid disturbance to owls during the nesting season. Drilling and construction activities may disturb nesting owls and lead to nest abandonment. Burrowing owls have demonstrated some level of tolerance to human activity in urban areas; however, no studies have investigated the impacts of oil and gas development. Seismic activities may lead to burrow collapse and abandonment or even loss of individuals. Increased habitat fragmentation may lead to a higher potential for vehicle collisions. Under Alternative A, a 0.125-mile (660 feet) NSO stipulation is applied for nest locations. This would impact approximately 31.4 acres for each active nest location.

Recreational shooting of prairie dogs could disturb owls during the nesting season. There is low potential for owls to be shot by recreation shooters of prairie dogs.

Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
The management of burrowing owls or their habitats does not change throughout Alternatives B, C, and D. For Alternative B, C, and D, a 0.25-mile NSO stipulation would be applied to surface-disturbing activities. Each active nest would receive a 125.6 acre buffer. This buffer is four times larger than the buffer in Alternative A. Seismic activities would continue at the same level and impact across all alternatives. Impacts from recreational shooting would be the same as in Alternative A.

Cumulative Effects:
Management of burrowing owls and their habitat is not expected to change throughout the planning area. No substantial development is expected to occur in known areas occupied by burrowing owls. These areas are associated with Gunnison prairie dog colonies. Prairie dog populations are expected to continually cycle and experience periodic plague outbreaks. Burrows would collapse due to lack of maintenance by active prairie dogs. Recreational shooting of prairie dogs is expected to continue across all alternatives

Oil and gas activity is expected to continue at the same levels as identified in the reasonable foreseeable development scenario. Disturbance to burrowing owl habitat would be limited to existing leases in the no new lease scenario.

Western Yellow-billed Cuckoo

Natural History and Background

The western yellow-billed cuckoo was designated federal candidate species in October 2001. This species is rare to uncommon spring and fall migrant and summer resident throughout much of the Rocky Mountain region. Numbers of this species fluctuate widely from year to year. North American populations of this species are declining significantly and it is on the National Audubon Society Blue List. The range of the western subspecies of this bird has contracted, and populations have declined dramatically within the remaining range, due to loss of mature closed-canopy riparian forests with dense, thick, understories. It appears that this species was never common in the Rocky Mountains. There have been no recent breeding records in southwest Colorado (Carter 1998c). Suitable habitat on the TRFO is unknown but may occur in limited amounts. There is no recorded occurrence on the TRFO. Due to elevation and geographic location, and lack of suitable habitat quality, occurrence of this species would be considered rare and incidental.

Loss, degradation, and fragmentation of riparian habitat, drought, and prey scarcity (linked at least in part to pesticide use) may play a role in declines even where suitable habitat remains (Ehrlich et al. 1992).

Past management activities probably had little impact on habitat for western yellow-billed cuckoo. Habitat for the species is limited in the planning area.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the western yellow-billed cuckoo primarily involve livestock grazing and wildlife management activities (e.g., watershed, riparian, and aquatic habitat improvements).

Alternative A: No Action

Direct/Indirect Effects:
No direct or indirect effects on the yellow billed cuckoo are expected from the No Action Alternative because occurrence of the species is considered incidental to rare on the TRFO. Suitable habitat for this species on BLM and NFS lands is limited, with no breeding or local populations confirmed on public lands within the planning area.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
No direct or indirect effects on the yellow-billed cuckoo are expected from implementation of any of the action alternatives because occurrence of this species is considered incidental to rare on the TRFO. Suitable habitat on BLM and NFS lands is limited, with no breeding or local populations confirmed on public lands within the planning area.

Cumulative Effects:
No cumulative effects are expected because of lack of suitable nesting habitat.

White-faced Ibis

Natural History and Background

The white-faced ibis (*Plegadis chihi*) is a long-legged wader that inhabits wetlands and marshes and feeds in agricultural fields and flooded hay meadows. This species nests in marshes across the western United States (Great Basin) and winters in large flocks in Mexico, western Louisiana, and eastern Texas (Ryder and Manry 1994). They are nomadic breeders in response to drought and rains, represented by their wide distribution within their breeding colonies.

There is no known breeding habitat on the TRFO. Occurrence on BLM-administered lands are considered incidental during migration. There is one record of nesting at the Narraquinnep state wildlife area, but this appears to have been a chance occurrence (Levad, personal communication).

In Colorado, nesting ibises favor islands of tall emergents, such as bulrushes and cattails, surrounded by water greater than 18 inches in depth. The white-faced ibis feeds in agricultural fields, flooded hay meadows and shallowly flooded wetlands of short, emergent plants (Ryder and Manry 1994). Wetland plant communities such as sedges, spikerushes, glassworts, saltgrass (*Distichlis spicata*), and greasewood (*Sarcobatus vermiculatus*) are often utilized. In Nevada, Colorado, Utah, Idaho, and Oregon, agricultural fields of alfalfa, barley and native hay meadows are important feeding sites.

The white-faced ibis feeds on aquatic and moist-soil invertebrates, crustaceans, and earthworms (Ryder and Manry 1994). Earthworms are considered their principal food source (Yanishevsky and Petring-Rupp 1998). Other prey includes larval insects, leeches, snails, crayfish, small fish, and frogs.

Water level fluctuations, both natural and human-caused, may be the main cause of habitat deterioration for the white-faced ibis. Loss of feeding and nesting habitat due to drought, wetlands destruction, water diversion, or competition over water rights can lead to drastic decreases in population size. In addition to drought, flooding of nest sites may also cause temporary or permanent abandonment of traditional colony sites and possible abandonment of young (Ryder and Manry 1994). In addition, other limiting factors include weather productivity, predation, pesticides, toxicants, brood parasitism, and fire.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the white-faced ibis primarily involve water management and wildlife management activities (e.g., watershed, riparian, and aquatic habitat improvements).

Alternative A: No Action

<u>Direct/Indirect Effects:</u>
No direct or indirect effects on the white-faced ibis are expected from the No Action Alternative because occurrence of the species is considered incidental to rare. Individuals occur only during migration. Suitable habitat for this species on BLM lands is limited, with no breeding or local populations confirmed on BLM-administered lands within the planning area.

Action Alternatives: Alternative B–D

<u>Direct/Indirect Effects:</u>
No direct or indirect effects on the white-faced ibis are expected from implementation of any of the action alternatives because occurrence of this species is considered incidental to rare. Individuals occur only during migration. Suitable habitat for this species on BLM lands is limited, with no breeding or local populations confirmed on BLM-administered lands within the planning area.

<u>Cumulative Effects:</u>
No specific LRMP components have been developed for the white-faced ibis because it is considered incidental during migration on BLM-administered lands. LRMP components and regulations specific to the management of wetlands for other species are expected to alleviate any potential cumulative effects and contribute to favorable habitat conditions for any ibis that may happen on the TRFO.

2.3.3 Insects

Great Basin Silverspot Butterfly

Natural History and Background

The Great Basin Silverspot or nokomis fritillary butterfly is a large and distinct fritillary that inhabits spring seeps and is associated with marshes with flowing water. It lives in wet meadows and seeps or sloughs at lower elevations, found only where there is permanent moisture sufficient to sustain a healthy violet crop at elevations from 5,200 to 9,000 feet. The Nokomis fritillary has one flight from mid-July to late September. Males patrol for receptive females, who walk on the ground to lay single eggs near host plants. Unfed, first-stage caterpillars hibernate and in the spring they feed on the leaves of the host. They have one brood from late July to September (Arizona Game and Fish Department 2005).

The Nokomis fritillary butterfly is found in streamside meadows and open seepage areas with an abundance of violets in generally desert landscapes. Colonies are often isolated (NatureServe 2013). For the species *Speyeria nokomis* the caterpillar host plant is northern bog violet. The adults feed on flower nectar including that from thistles (Arizona Game and Fish Department 2005). Limiting factors for the species as a whole are mainly habitat loss, herbiciding, heavy grazing, and changes to hydrology (NatureServe 2013).

There are two records of species occurrence south of the planning area boundary on state and private lands. There are no records of this species on BLM-administered lands in the planning area. Habitat for this species on BLM lands may exist along the Dolores River and an isolated BLM parcel on the Mancos River. Habitat may exist on split estate lands in the planning area.

Past management activities that may influence the habitat for this species have not changed over the life of the LRMP. Management activities that may alter habitat include livestock grazing.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the nokomis fritillary butterfly primarily involve livestock grazing. Grazing during critical times of the year may remove host plants for the Great Basin silverspot caterpillars. Impacts to seeps and springs that support *Viola* spp., the host plant, could influence potential habitat for the Nokomis fritillary butterfly. Livestock grazing is a dominant land use practice in many of the areas that could potentially support the species. Light grazing is not expected to influence the habitat components or riparian features that support the host plant. However, livestock grazing can damage seeps and springs if grazing is heavy or trampling occurs.

Alternative A: No Action

Direct/Indirect Effects:
The Nokomis fritillary butterfly is not known to occur on BLM lands in the planning area. However, surveys are limited and the species could potentially occur around seeps and springs in low-elevation habitat types. The current plan identified 64,200 AUMs available on BLM-administered lands in the planning area. Permitted livestock grazing in alternative A is 36% of available AUMs.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Total AUMs available does not vary across any alternative, at 64,200. Permitted AUMs vary slightly across all alternatives. Alternative B provides the same amount of livestock grazing as Alternative A at 36% of available AUMs being permitted. There is a slight reduction in AUMs in Alternative C where 22% of available AUMs being authorized for grazing, and a slight increase in Alternative D with 40% being permitted. Conservation measures do not change across Alternatives B, C, and D that would protect seeps and springs.

Cumulative Effects:
Cumulative effects are similar across all alternatives. Since the signing of the current LRMP, permitted livestock grazing has been reduced by 64% of available AUMs. Drought and other factors influence permitted AUMs. Management activities would continue to monitor rangeland health, which includes monitoring of riparian areas. Habitat is expected to continue maintain or improve across all alternatives in as much as management has the potential to influence the habitat for this species. Droughts may continue and would influence habitat and distribution of this species.

2.3.4 Amphibians

Boreal Toad

Natural History and Background

The boreal toad, also known as the mountain or western toad (Hammerson 1999), is Colorado's only alpine species of toad.

Bufo boreas boreas is one of two subspecies of the western toad found in the United States (USFWS 2002). While some historic populations have existed on the SJNF, there are currently no known populations. Surveys for presences are conducted annually. The boreal toad (Southern Rocky Mountain population) primarily generally occurs between 8,000 and 11,000 feet elevation in spruce-fir forests and subalpine and alpine meadows. They have been reported as high as 11,860 feet in the San Juan Mountains.

The boreal toad typically inhabits areas with damp conditions in the vicinity of marshes, wet meadows, streams, beaver ponds, glacial kettle ponds and lakes interspersed in subalpine forests. In Colorado, the largest populations are typically found in areas characterized by willows, bog birch, and shrubby cinquefoil (USFWS 1994). In southern Colorado they have been reported in areas where ponderosa pine is present.

During the early spring and summer boreal toads are usually found in water, at the water's edge, or on top of partially submerged logs. Later in the summer toads have been reported to disperse a considerable distance (up to 2.5 miles) from breeding areas to upland forest sites (Loeffler 2001). They still tend to favor moist sites. However, some toads, especially females may relocate to drier montane habitats offering dense vegetation for cover.

Habitat for the boreal toad is found on NFS lands of all districts on SJNF, primarily within the spruce-fir and alpine zones. Because suitable elevations have been reported to as low as 8,000 feet, cool, moist mixed conifer forests and aspen with appropriate site characteristics may also provide additional suitable habitat. Ponds, wet meadows, wet stands of willow, small lakes, marshes, beaver impoundments, and glacial kettle ponds would offer suitable breeding habitat for this species. Suitable late summer non-breeding habitat would be found within 2.5 miles of suitable breeding areas (Loeffler 2001).

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the boreal toad primarily involve livestock grazing (sheep only), road construction/reconstruction, and motorized/non-motorized recreation.

The primary direct effect of roads on boreal toads involves the crushing of individuals from vehicle use. Roads can also create barriers to water flow and to the movement of toads across the landscape. The indirect effects of roads on landscape hydrology can influence wetlands and riparian vegetation (Loeffler et al. 2001). Roads within riparian zones can also lead to conflicts with beaver, which if removed can disrupt key habitat processes related to beaver ponds (Loeffler et al. 2001). Alternative A offers more high-use recreation areas than any of the action alternatives, including areas suitable for motorized recreation. This difference could potentially allow greater impacts to high-elevation upland sites that could be considered potential habitat. Because all historic breeding sites are now absent of toads, no impacts are expected from the small amount of roads to be constructed/reconstructed in Alternative A.

Primary influences from recreational activities can include direct trampling (eggs and toadlets). Many indirect effects can also occur that influence riparian vegetation and water quality. Potential activities that could influence boreal toad populations and/or habitat include off-road vehicle use, trail construction and use, camping in riparian areas, and activities related to fisheries management such as in-stream channel work, poisoning, and stocking of fish in areas that historically did not support them (Loeffler et al. 2001). Alternative A offers more high-use recreation areas than any of the action alternatives, including areas suitable for motorized recreation. This difference could potentially allow greater impacts to high-elevation upland sites that could be considered potential habitat.

Livestock grazing is not considered much of threat to boreal toads even when the activity overlaps species occurrence (Loeffler et al. 2001). Cattle generally do not overlap with most boreal toad sites because their grazing occurs primarily at lower-elevations. However, domestic sheep are grazed at higher elevations and can frequently overlap with potential boreal toad habitat. Potential direct effects from grazing can include trampling. Potential indirect effects can include reduced egg and tadpole survival from changes in water chemistry and/or riparian vegetation related to grazing. Overall grazing influences can lead to changes in riparian vegetation and hydrology (Loeffler et al. 2001).

Alternative A: No Action

Direct/Indirect Effects:
Recreation use and impacts in boreal toad habitat across the TRFO does not vary across alternatives. Travel is limited to existing roads and trails. No new roads are anticipated in boreal toad habitat due to the wetland characteristics of the habitat.

Alternative A and all action alternatives continue to allocate allotments to domestic sheep grazing. Alternative A maintains the same permitted numbers and area as Alternative B, currently set at 2,073 AUMs.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
As noted in Alternative A, impacts from recreation and roads does not vary across alternatives. Grazing levels are the same in Alternative B. Alternative C authorizes 16 AUMs, which would essentially remove domestic sheep grazing in boreal toad habitat. Alternative D would authorize 2,281 AUMs, 208 AUMs more that Alternatives A and B.

Permitted grazing across the planning area is substantially reduced from available AUMs. Alternatives A and B authorize cattle and sheep grazing at 36% of available AUMs. Alternative C authorizes cattle and sheep grazing at 22% of available AUMs and Alternative D authorizes grazing at 40% of available AUMs.

Cumulative Effects:
The boreal toad has significantly declined through portions of its range in Colorado, Utah, and Wyoming. These declines are not thought to be strongly associated with habitat conditions, but rather to a larger issue that may be an early indicator of other types of environmental degradation at a global scale (Jones 2003). For example, the recent discovery of chytrid fungus in some boreal toad populations in Colorado may be contributing to their decline. Samples taken from 43 sites in Colorado during 2000 to 2001 indicated that approximately 9% of 213 boreal toads tested chytrid positive (Livo 2002). This fungus has now been identified in boreal toads from over a dozen Colorado populations and evidence suggests that this pathogen was responsible for the declines documented in the late 1970s and early 1980s.

Interagency efforts are currently underway to learn more about chytrid fungus and halt its spread. A captive-breeding program has also been established that can be used to reintroduce boreal toads back into suitable former habitat areas. The habitat condition on the TRFO remains in excellent condition to reintroduce the species as appropriate. The state recovery plan and the interagency conservation plan and agreement are both expected to minimize any potential cumulative effects on the boreal toad.

Domestic sheep grazing is expected to continue at moderate levels. Recreation is expected to continue within boreal toad habitat. All boreal toad habitats on BLM-administered lands are located in the Silverton area. Silverton receives approximately 300,000 visitor use days annually.

Canyon Tree Frog

Natural History and Background

The canyon tree frog occurs in western Colorado along the southern edge of the Colorado River valley, east to Grand Junction and along the Dolores River and its tributaries from near the Utah border, and south to San Miguel County (Hammerson 1999). Colorado is on the fringe of the species territory that extends into southern Utah, western New Mexico, southwest Texas, eastern Arizona, and northern Mexico. The frog is small growing up to 2.2 inches. It is gray, tan, or olive in color typically with green or gray blotches or spots, although sometimes lacking (International Union for Conservation of Nature and NatureServe, 2004, range data developed as part of the Global Amphibian Assessment and provided by International Union for Conservation of Nature World Conservation Union, Conservation International, and NatureServe).

The canyon tree frog is found in western Colorado at elevations of about 4,500 to 6,300 feet. The canyon tree frog occurs mainly in intermittent or permanent streams and pools in deep rocky canyons. Sparse cottonwood galleries often grow along inhabited stream courses. Except on warm rainy nights, canyon tree frogs do not range far from the permanent canyon–bottom pools (Hammerson 1999). During the cold season or periods of drought, frogs retreat to rock crevices not far from their breeding sites. Most activity takes place at night from May to September. These frogs often perch in the sun on dry steeply sloped rocks and rock crevasses. At dusk they climb down from their day perches and move toward water to breed or forage (Brennan 2010).

The canyon tree frog breeding seems to peak between May and June, but may take place as late as July if spring conditions are exceptionally dry (Hammerson 1999). Tadpoles may grow to 1.5 inches prior to metamorphosis. Tadpoles typically have dark spots and patches, and become speckled with golden or bronze coloration as they mature. Tadpoles feed mainly on minute organic materials, which include bottom detritus and plant material. Adults feed mainly on small invertebrates such as caterpillars, beetles, ants, and caddisflies.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the canyon tree frog primarily involve livestock grazing, motorized and non-motorized recreation, water management, oil and gas development, and wildlife management activities (e.g., watershed, riparian, and aquatic habitat improvements).

Alternative A: No Action

<u>Direct/Indirect Effects:</u>
Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area. Though there is no literature that specifically points out impacts of oil and gas development to this species, the slight increase in available leased lands could negatively impact the canyon tree frog over time.

Alternative A offers similar fuels treatments throughout all alternatives. Acres of fuels treatments vary by no more that 6% across all alternatives. Prescribed fire activity projections are also similar across all alternatives. Mastication and prescribed fire would have minimal impacts to the canyon tree frog due to its specific habitat requirements that would not likely be treated by these management actions.

In general, Alternative A offers similar management to what is currently in place, which has not likely had negative affects to the canyon tree frog. The effect of livestock grazing on riparian areas, water quality, and upland habitats is well documented (Belskey and Uselmann 1999; Buckhouse and Gifford 1976; Kauffman and Krueger 1984; Krueper 1992). These effects include sedimentation, degradation of water quality, direct trampling, and changes in vegetation and/or moisture retention capacity and may affect breeding habitat, migration habitat, and/or over-wintering habitat (Smith 2003). Because the canyon tree frog occurs primarily at lower elevations, its range would primarily overlap areas used for cattle grazing.

Alternative A continues the current range management practices under the current management plans for both the USFS and BLM. Cattle grazing in riparian zones in the planning area have the potential to have negative influences on potential habitat for the canyon tree frog. The LRMP revision components developed for amphibians and other riparian associated species are intended to minimize impacts to riparian areas. Although improvements continue to be made, there is a potential that impacts to individual habitats and/or frogs could occur in some areas.

Alternative A offers more high-use recreation areas than any of the action alternatives, including areas suitable for motorized recreation. This difference could potentially allow greater impacts to riparian areas that offer potential habitat for the canyon tree frog.

Riparian and watershed improvements may benefit potential habitat for the canyon tree frog if the activity occurs in or near occupied or potential habitat. Examples of this activity could include fencing or correcting erosion problems that have occurred from past activities. The outputs for this activity are similar across all alternatives.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Effects from Alternatives B, C, and D are similar to the impacts in Alternative A. Standards and guidelines that protect the habitats of sensitive species, and in particular riparian areas, do not vary throughout alternatives. Acres allocated for development may be altered by alternative with Alternative C designating more lands for natural or unique landscapes or processes. Under Alternative C more habitats would be managed for less development and habitat fragmentation across the planning area may be slightly lower. Development in canyon tree frog habitat under any of the action alternatives would be minimal due to its strict habitat requirements that are limited to rocky riparian areas. However, if development were to occur in canyon tree frog habitat, it could have an overall negative impact to this species. Site-specific analysis of potential impacts would be analyzed and mitigated at the project level.

Alternatives B, C and D offer fewer potential impacts from oil and gas development identified in Alternative A, because they offer fewer acres of potential lease area. Though there is no literature that specifically points out impacts of oil and gas development to this species, the slight increase in available leased lands could negatively impact the canyon tree frog over time.

The fewer amounts of available lease acres and greater amount of protective lease stipulations suggest that fewer potential impacts to riparian habitats, amphibians, and other associated species may be associated with the action alternatives. Still, some potential impacts may still occur and influence habitat components or impact individual tree frogs. Under the “no new lease” scenario, only the existing lease areas have potential for development under these alternatives resulting in fewer acres of potential influence to the species.

Alternative B maintains the same permitted numbers and area for domestic livestock grazing as Alternative A. No difference in risk or protective measures for the tree frog is expected under this alternative. Alternative C reduces livestock numbers and allotment area and has the potential to reduce potential impacts to canyon tree frogs if the differences involves occupied or potential habitat. Alternative

D allows more livestock grazing than any other alternative and increases livestock numbers and allotment areas. Alternative D may therefore require more management attention to assure that domestic livestock are not impacting riparian habitat attributes that are important to the canyon tree frog and other associated species.

All action alternatives offer fewer potential disturbances than the No Action Alternative from summer motorized recreation because of decrease in the amount of permitted motorized use area. Consistent with their themes, Alternative C offers the fewest motorized acres while Alternative D offers the highest amount of acreage. Alternative B offers a balance between the two other action alternatives, but also provides less potential disturbance than Alternative A. Potential benefits to the northern leopard frog are expected to be associated with Alternatives B and C, with perhaps a higher risk of impact in Alternative D.

Riparian and watershed improvements may benefit potential habitat for the canyon tree frog if the activity occurs in or near occupied or potential habitat. Examples of this activity could include fencing or correcting erosion problems that have occurred from past activities. The outputs for this activity are similar across all alternatives.

Cumulative Effects:
Management actions associated with any of the alternatives are not likely to greatly impact this species over the life of the LRMP. Grazing may continue to occur in the specific habitat required by this species. Impacts from grazing in riparian areas are monitored and any long-term impact to potential canyon tree frog habitat would be mitigated through grazing management.

Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent or the impacts of fragmentation and the disturbance from oil and gas development on canyon tree frogs are not well known other than the direct loss of suitable habitat. Alternatives A through D include both current and projected new leases; the “no new lease” scenario only includes current leases under each of the alternatives. Under the No Leasing Alternative, development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

The specific components and conservation measures included in the LRMP revision that have been developed for sensitive species are expected to adequately alleviate any potential cumulative effects and protect most of the habitat elements required by the canyon tree frog. Special management attention may be warranted in areas that are known to have existing and high-potential breeding habitat.

Northern Leopard Frog

Natural History and Background

The northern leopard frog is a medium-sized frog with an adult body length that typically ranges from 2 to 3.5 inches with a maximum of 4.3 inches (Hammerson 1999).

Within Colorado the northern leopard frog occurs throughout much of the state, although most occurrences are in the western half of the state including the Front Range. On the eastern plains it occurs in more spotty distribution with populations associated primarily with major drainages systems (Hammerson 1999).

The habitats used by the northern leopard frog are varied across its range. In Colorado it is reported to range in occurrence from below 3,500 feet in northeast Colorado to above 11,000 feet in southern Colorado (Hammerson 1999). Merrell and Rodell (1968) describe three major habitat divisions: winter habitat (lakes, streams and ponds), summer habitat (post-breeding areas including upland habitats for feeding), and egg/tadpole habitat (shallow breeding ponds). Although aqueous habitats are a central feature in the frog’s cycles of life, it may range a considerable distance from natal and breeding areas to a variety of other habitat types. Typical aqueous features used by the northern leopard frog include wet meadows and the banks and shallows of marshes, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches (Hammerson 1999). Streams are often used as dispersal corridors, but upland areas are also used.

Suitable breeding habitat for the northern leopard frog on BLM-administered lands would be found in streams, natural lakes and ponds, glacial kettles, stock ponds and reservoirs, marshes, and wetlands. Post-breeding habitat would be found along the edges of these features, as well as the surrounding upland habitats (generally within 2 miles). Wintering habitat would be found in streams, ponds, and lakes that do not completely freeze during winter and do not have substantial populations of predaceous fish.

Larvae of the northern leopard frog are primarily vegetarian gaining sustenance by filtering free-floating algae from their surrounding waters. However, they have been observed feeding on dead animal material including conspecifics. Adults and sub-adults are carnivorous and primarily insectivorous, although they have been described as generalists that can consume anything that is small enough to swallow. Beetles and grasshoppers may make up a large portion of their diets. Other common prey includes flies, wasps and bees, and spiders. Studies on stomach contents have also found mollusks, crustaceans, garter snakes, hummingbirds, and a yellow warbler (Smith 2003).

Loss or degradation of breeding habitat can occur through changes in hydrology or water quality. Other factors include habitat fragmentation, predation, disease, sensitivity to ultraviolet radiation, and recruitment into the population.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the northern leopard frog primarily involve fluid minerals development, livestock grazing, motorized recreation, water management, and wildlife management activities (e.g., watershed, riparian, and aquatic habitat improvements).

Impacts from oil and gas development primarily involve the fragmentation of habitat that northern leopard frog may disperse into. Breeding habitat is protected through a variety of stipulations within the LRMP. Riparian areas are protected from disturbance under leasing stipulations.

The effect of livestock grazing on riparian areas, water quality, and upland habitats is well documented (Belskey and Uselmann 1999; Buckhouse and Gifford 1976; Kauffman and Krueger 1984; Krueper 1992). These effects include sedimentation, degradation of water quality, direct trampling, and changes in vegetation and/or moisture retention capacity and may affect breeding habitat, migration habitat, and/or over-wintering habitat for northern leopard frogs (Smith 2003). Because the leopard frog occurs primarily at lower elevations, its range would primarily overlap areas used for cattle grazing.

Road-related mortality of juvenile northern leopard frogs is well documented (numerous authors in Smith 2003). Significant road mortality of emergent adults migrating to their breeding ponds has also been noted (Nussbaum et al. 1983). Roads may also be associated with factors such as sedimentation and the runoff of toxic compounds that can also affect aquatic communities (Trombulak and Frissell 2000; Welsh and Oliver 1998). Alternative A offers more high-use recreation areas than any of the action alternatives, including areas suitable for motorized recreation. This difference could potentially allow greater impacts to riparian areas that offer potential habitat for the northern leopard frog.

Alternative A: No Action

Direct/Indirect Effects:
Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

Alternative A and all action alternatives continue to allocate allotments to domestic grazing. Alternative A permits fewer AUMs that Alternatives B and D and more than Alternative C.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
The fewer amounts of available lease acres and greater amount of protective lease stipulations suggest that fewer potential impacts to riparian habitats, amphibians, and other associated species may be associated with the action alternatives. Still, some potential impacts may still occur and influence habitat components or impact individual leopard frogs. Under the "no new lease" scenario only the existing lease areas have potential for development under these alternatives, resulting in fewer acres of potential influence to the species.

Permitted grazing across the planning area is substantially reduced from available AUMs. Alternatives A and B authorize cattle and sheep grazing at 36% of available AUMs. Alternative C authorizes cattle and sheep grazing at 22% of available AUMs, and Alternative D authorizes grazing at 40% of available AUMs

All action alternatives offer fewer potential disturbances than the No Action Alternative from summer motorized recreation because of decrease in the amount of permitted motorized use area. Consistent with their themes, Alternative C offers the fewest motorized acres while Alternative D offers the highest amount of acreage. Alternative B offers a balance between the two other action alternatives, but also provides less potential disturbance than Alternative A. Potential benefits to the northern leopard frog are expected to be associated with Alternatives B and C, with perhaps a higher risk of impact in Alternative D.

Cumulative Effects:
The northern leopard frog has significantly declined throughout most portions of its range, with populations in the western United States apparently declining at a quicker rate than those in the east (Smith 2003). The northern leopard frog has also experienced significant declines in Colorado (Hammerson 1999). Introduced predators and habitat have been indicated as causes in some areas. However, as with all amphibians, the causes are complex and may involve several factors. Currently, it is believed that anthropogenic stressors may be related to the declines and causing some amphibian species to be more susceptible to infectious diseases (Carey et al. 1999; Smith 2003).

The conservation measures included in the LRMP revision are expected to be adequate for protecting most of the habitat elements required by the northern leopard frog. Given the decline in their populations, however, special management attention has been identified in the LRMP in areas that still retain existing and high-potential breeding habitat.

2.3.5 Reptiles

Desert Spiny Lizard

Natural History and Background

The desert spiny lizard (*Sceloporus magister*) is one of two BLM sensitive reptile species that may occur in the planning area. The desert spiny lizard has only been documented in the extreme southwest part of Colorado, but it could occur within the TRFO based on its habitat attributes, which include shrub-covered dirt banks and sparsely vegetated rocky areas near flowing streams or arroyos. They also prefer soft soils beneath greasewood, rabbitbrush, saltcedar (*Tamarix* sp.), and other shrubs and also frequently perch on large rocks or in large shrubs or trees (Hammerson 1999).

The primary period of activity for the desert spiny lizard is from May to September with some activity in April and October during warm weather (Hammerson 1999). Courtship takes place in May and hatchlings first appear in early August. Adults stay within a small home range (1.6–6 acres) from year to year and adult males are extremely territorial to other individuals (Hammerson 1999). The adults relatively small home range does not change much from year to year, where juvenile desert spiny lizards may move several hundred meters before establishing a territory of their own (Tanner and Krogh 1973). Desert spiny lizards feed opportunistically on available arthropods, occasional small lizards and some plant material. According to Hammerson, Johnson (1966) found that ants and beetles are major food items for the desert spiny lizard in Montezuma County. This species is dormant during the winter and would not likely be affected by management activities that are limited to the surface during the winter months.

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the desert spiny lizard primarily involve fuels treatments, oil and gas development, and motorized recreation. Because this species is known to inhabit the same territory from year to year, management activities within these territories could displace individuals and disrupt critical life functions.

Livestock grazing impacts to wildlife under all alternatives may include loss of forage and/or impacts to riparian habitats favored by many species of wildlife. Livestock grazing may lead to conversion of native vegetation to invasive weeds, such as cheatgrass. This may have the potential to impact special status species, especially the desert spiny lizard.

The expansion of motorized transportation and the use of roads from motorized recreationists could impact this species. Roads can result in direct habitat loss and habitat fragmentation, can encourage the spread of noxious weeds, is a source of disturbance, interfere with movement patterns, and can cause direct mortality. There are two measures of transportation that can be evaluated: 1) road length and its associated area of ground disturbance and 2) road density involving the number of miles of roads per square mile. Although there are numerous variables to consider when determining impacts, the comparison of road length and density under the different alternatives may be used as a comparison for this potential impact.

Because this species is not thought to have a wide-spread distribution in the TRFO, the proposed alternatives and the actions associated with these alternatives would have minimal impact to this species.

Alternative A: No Action

Direct/Indirect Effects:
Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area. Though there is no literature that specifically points out impacts of oil and gas development to this species, the slight increase in available leased lands could negatively impact the desert spiny lizard over time.

Alternative A offers similar fuels treatments throughout all alternatives. Acres of fuels treatments vary by no more that 6% across all alternatives. Prescribed fire activity projections are also similar across all alternatives and vary by only 100 to 200 acres. As with mastication, prescribed fire could have a negative impact to desert spiny lizards in that it could reduce forage and displace individuals.

In general, Alternative A offers similar management to what is currently in place, which has not likely had negative effects to the desert spiny lizard.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Effects from Alternatives B, C, and D are similar to the impacts in Alternative A. Standards and guidelines that protect the habitats of sensitive species do not vary throughout alternatives. Acres allocated for development may be altered by alternative with Alternative C designating more lands for natural or unique landscapes or processes. Under Alternative C, more habitats would be managed for less development and habitat fragmentation across the planning area may be slightly lower. Increased development in desert spiny lizard habitat under any of the action alternatives could have an overall negative impact to this species. Site-specific analysis of potential impacts would be analyzed and mitigated at the project level.

Cumulative Effects:
Oil and gas development would continue throughout known formations and foraging habitat would continue to be fragmented. The extent or the impacts of fragmentation and the disturbance from oil and gas development on desert spiny lizards are not well known other than the direct loss of suitable habitat. Alternatives A through D include both current and projected new leases; the "no new lease" scenario only includes current leases under each of the alternatives. Under the No Leasing Alternative development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

The specific LRMP components that have been developed for sensitive species and existing regulations are expected to alleviate any potential cumulative effects and contribute to favorable habitat conditions for any individual desert spiny lizard that occurs within the TRFO.

Longnose Leopard Lizard

Natural History and Background

The long-nosed leopard lizard (*Gambelia wislizenii*) is a larger-bodied lizard that is one of two BLM reptiles on the sensitive species list. Habitat for the long-nosed leopard lizard is flat or gently sloping shrublands with a large percentage of open ground and includes mesa tops above canyons. Specific habitat for this lizard includes lowland desert and semi-desert areas with scattered shrubs or other low plants, such as sagebrush, especially in areas with abundant rodent burrows (Hammerson 1999). Hammerson (1999) describes other habitat associations in southwest Colorado, including areas along the Dolores River where leopard lizards inhabit areas with sandy-rocky soils and scattered sagebrush, junipers, and skunk brush in canyon bottoms. The leopard lizard's distribution in Colorado is not well known, and the species could exist in lower elevations in the western part of the planning area.

Like the desert spiny lizard, the long-nosed leopard lizard has a small home range from 1.6 to 6 acres in size (Hammerson 1999). It is slightly more limited in its activity period (from May to early August) and they have an unwary behavior, which makes them vulnerable to human exploitation (Hammerson 1999). Adults in Colorado are active through June and July, then disappear underground by early August. Hatchlings may remain active through early September.

The known diet in Colorado includes grasshoppers, beetles, spiders, wasps, ant lions caterpillars, and a variety of smaller lizards (Hammerson 1999). This lizard is an active diurnal predator that, while omnivorous, is known for being able to eat lizards its own size, including members of its own species (Jones 2009).

Effects Common to All Alternatives

LRMP revision activities that could potentially influence the long-nosed leopard lizard primarily involve fuels and treatments, oil and gas development, and motorized recreation. Because this species is known to inhabit the same territory from year to year, management activities within these territories could displace individuals and disrupt critical life functions.

Livestock grazing impacts to wildlife under all alternatives may include loss of forage and/or impacts to riparian habitats favored by many species of wildlife. Livestock grazing may lead to conversion of native vegetation to invasive weeds, such as cheatgrass. Because the long-nosed leopard lizard are most common where the ground surface between shrubs is bare or sparsely vegetated, cheatgrass infestation could alter the habitat in a way that is unusable to this lizard. Moderate livestock grazing could be beneficial to this species. Removal of grazing from its habitat could render the habitat unusable to longnose leopard lizards.

The expansion of motorized transportation and the use of roads from motorized recreationists could impact this species. Roads can result in direct habitat loss and habitat fragmentation, can encourage the spread of noxious weeds, is a source of disturbance, interfere with movement patterns, and can cause direct mortality. There are two measures of transportation that can be evaluated: 1) road length and its associated area of ground disturbance and 2) road density involving the number of miles of roads per square mile. Although there are numerous variables to consider when determining impacts, the comparison of road length and density under the different alternatives may be used as a comparison for this potential impact.

Because this species is not thought to have a widespread distribution in the planning area, the proposed alternatives and the actions associated with these alternatives would have minimal impact to this species.

Alternative A: No Action

Direct/Indirect Effects:
Acres of federal minerals available for leasing are fairly similar across Alternatives A, B, and C. Alternatives A, B, and D open the largest percentages of federal minerals to leasing with 92%, 92%, and 93% of federal minerals available for leasing, respectively. Alternative C opens the fewest acres to leasing with 74% federal minerals available for leasing. No acres are available for leasing under the No Leasing Alternative.

Under Alternative A, 13% of leased acres would have NSO stipulations, whereas Alternatives B, C, and D would have 29%, 35%, and 18% of leased acres with NSO stipulations, respectively. Under the No Leasing Alternative development would be limited to existing leases within the planning area.

Alternative A offers similar fuels treatments throughout all alternatives. Acres of fuels treatments vary by no more that 6% across all alternatives. Prescribed fire activity projections are also similar across all alternatives, and vary by only 100 to 200 acres. As with mastication, prescribed fire could have an overall negative impact to long-nosed leopard lizards in that a decrease in cover in suitable habitat could occur.

Alternative A provides the same wildlife management actions in regards recreational impacts in long-nosed leopard lizard habitat.

In general, Alternative A offers similar management to what is currently in place and has allowed these populations to be successful.

Action Alternatives: Alternative B–D

Direct/Indirect Effects:
Effects from Alternatives B, C, and D are similar to the impacts in Alternative A. Standards and guidelines that protect the habitats of the sensitive species do not vary throughout alternatives. Acres allocated for development may be altered by alternative with Alternative C designating more lands for natural or unique landscapes or processes. Under Alternative C, more habitats would be managed for less development and habitat fragmentation across the planning area may be slightly lower. Increased development in long-nose leopard lizard habitat under any of the action alternatives could have an overall negative impact to this species. Site-specific analysis of potential impacts would be analyzed and mitigated at the project level.

Cumulative Effects:
Oil and gas development would continue throughout known formations and lizard habitat could continue to be fragmented. The extent or the impacts of fragmentation and the disturbance from oil and gas development on long-nosed leopard lizards are not well known other than the direct loss of suitable habitat. Alternatives A through D include both current and projected new leases; the “no new lease” scenario only includes current leases under each of the Alternatives. Under the No Leasing Alternative, development would most likely slow to lower than historic rates due to the lack of available leases for exploration and development. Development levels are identified in the RFD scenario.

The specific LRMP components that have been developed for sensitive species and existing regulations are expected to alleviate any potential cumulative effects and contribute to favorable habitat conditions for any individual long-nosed leopard lizard that occurs within the planning area.

3 U.S. FOREST SERVICE SENSITIVE PLANTS BIOLOGICAL EVALUATION

3.1 Sensitive Species Considered and Evaluated

Table T.13 lists the sensitive plant species evaluated by the USFS for the SJNF portion of the planning area.

Table T.13: U.S. Forest Service Sensitive Plants Evaluated for the San Juan National Forest

Sensitive Plant Species	Habitat Association or Vegetation Type
Stonecrop gilia *Aliciella sedifolia*	Alpine (dry, rocky, gravelly talus of tuffaceous sandstone)
Missouri milkvetch *Astragalus missouriensis* var. *humistratus*	Pinyon-juniper woodlands, ponderosa pine forests, Gambel oak shrublands (underlain by Mancos Shale)
Aztec milkvetch *Astragalus proximus*	Ponderosa pine, pinyon-juniper, mountain shrubland
Lesser panicled sedge *Carex diandra*	Riparian/wetland (fens)
Lesser yellow lady's slipper orchid *Cypripedium parviflorum*	Aspen, ponderosa pine (restricted to calcareous derived soils in montane aspen and ponderosa pine forest)
Smith's draba *Draba smithii*	Mixed conifer (montane seeps, rock cracks and crevices in shaded protected sites)
English sundew *Drosera anglica*	Riparian/wetland (fens)
Stream orchid *Epipactis gigantea*	Riparian/wetland (seeps on sandstone cliffs and hillsides)
Whitebristle cottongrass *Eriophorum altaicum* var. *neogaeum*	Riparian/wetland (fens)
Chamisso's cottongrass *Eriophorum chamissonis*	Riparian/wetland (fens)
Slender cottongrass *Eriophorum gracile*	Riparian/wetland (fens, wet meadows)
Lone Mesa snakeweed *Gutierrezia elegans*	Pinyon-juniper, semi-desert shrubland, sagebrush (barren Mancos Shale outcrops)
Frosty bladderpod *Lesquerella pruinosa*	Mountain grasslands and mountain shrublands (soils derived from Mancos Shale)
Colorado tansyaster *Machaeranthera coloradoensis*	Alpine, spruce-fir (gravelly areas on slopes and in parks, on soils of sedimentary or volcanic origin)
Kotzebue's grass-of-Parnassus *Parnassia kotzebuei*	Sub-alpine and alpine (wet areas along streamlets and in moss mats)
Cushion bladderpod *Physaria pulvinata*	Pinyon-juniper, semi-desert shrubland, sagebrush (barren shale outcrops)
West silver bladderpod *Physaria scrotiformis*	Alpine (barren exposure of Leadville limestone)
Arizona willow *Salix arizonica*	Riparian/wetland (high elevation wet meadows, stream sides, and cienegas)
Sageleaf willow *Salix candida*	Riparian/wetland (fens)
Autumn willow *Salix serissima*	Riparian/wetland (fens and possibly stream banks)
Sphagnum moss *Sphagnum angustifolium*	Riparian/wetland (fens)

Sensitive Plant Species	Habitat Association or Vegetation Type
Baltic bog moss *Sphagnum balticum*	Riparian/wetland (fens)
Largeflower triteleia *Triteleia grandiflora*	Ponderosa pine
Lesser bladderwort *Utricularia minor*	Aquatic (submerged in shallow water, inundated mudflats, or areas with emergent vegetation)

3.2 Sensitive Species Evaluations

3.2.1 Stonecrop Gilia (Aliciella sedifolia)

Stonecrop gilia (referred to in some sources as *Gilia sedifolia*) is a member of the phlox family. It appears to be biennial or possibly a short-lived monocarpic perennial (Anderson 2004). It is an extremely rare, narrow endemic species whose entire know global distribution is confined to two occurrences in the San Juan Mountains of southwest Colorado at approximately 11,800 to 13,400 feet in elevation. Both known occurrences are on lands managed by the USFS. The Sheep Mountain occurrence (thought to be on the SJNF) was last seen in 1892. The Half Peak occurrence (on the Gunnison National Forest) consists of two stands and approximately 1,100 individuals and was last seen in 2003. This species is apparently restricted to dry, rocky, or gravelly talus of tuffaceous sandstone. Alpine areas on ash-flow tuff parent material may also be suitable habitat. The population found in 2003 was found in large bare gravel patches that contained no other plants except some lichens and a few very scattered other species (Anderson 2004; Komarek 2003). Stonecrop gilia is ranked globally critically imperiled (G1) by NatureServe, and it is considered critically imperiled (S1) in Colorado. The activity that may occur on the SJNF with the most potential to impact stonecrop gilia is recreation.

3.2.2 Missouri Milkvetch (Astragalus missouriensis var. humistratus)

Missouri milkvetch is a low-growing perennial in the pea family. It has greenish gray foliage with noticeable aboveground prostrate stems and pinkish purple flowers with white-tipped petals. The reduced stature, apparent unpalatability and long lifespan of Missouri milkvetch indicates that it is a stress tolerator, which is a trait shared by many other Astragalus species. Missouri milkvetch is a local endemic species whose global distribution is limited to three known locations in northwest New Mexico and 12 in southwest Colorado. There are four known locations on the SJNF on the Pagosa and Columbine Ranger Districts (Decker 2006a). Occurrences of this species in Colorado are associated with pinyon-juniper woodlands, ponderosa pine forests, and Gambel oak mountain shrublands. Within these types, it is typically found in openings or on sparsely vegetated soils at elevations ranging from about 7,100 to 8,600 feet. Missouri milkvetch appears to favor shaley substrates, as the majority of known populations are on sites underlain by Mancos Shale or Lewis Shale, with a few on shales of the Mesa Verde Formation (Decker 2006a). The species is ranked as a critically imperiled variety of an otherwise widespread and common species (G5T1) by NatureServe. It is considered critically imperiled (S1) in Colorado. Activities that may occur on the SJNF with the most potential to impact Missouri milkvetch include livestock grazing, solid mineral development, oil and gas development, fire management, timber harvest, and mechanical fuel treatment.

3.2.3 Aztec Milkvetch (Astragalus proximus)

Aztec milkvetch is a perennial in the pea family, with slender pale green-gray stems growing from 6 to 20 inches tall. When flowering, it typically holds 12 to 40 flowers with white or lavender-tinged petals. The reduced stature, apparent unpalatability, and long lifespan of Aztec milkvetch indicate that it is a stress tolerator, which is a trait shared by many other *Astragalus* species and is common among species of sparsely vegetated habitats (Decker 2005). Aztec milkvetch is a local endemic species whose global distribution is limited to the San Juan Basin in southwest Colorado and northwest New Mexico. It is fairly common within the New Mexico part of the basin, but is much rarer in the Colorado portion of its range. Documented locations include five sites on the Pagosa and Columbine Ranger Districts of the SJNF ranging from 6,650 to 7,350 feet in elevation. Aztec milkvetch occurrences in Colorado are associated with pinyon-juniper woodlands (with or without sagebrush) and ponderosa pine/Gambel oak forests. Soils are sandy or clayey and contain shale rock fragments. Aztec milkvetch is ranked globally apparently secure (G4) by NatureServe and imperiled (S2) in Colorado. Activities that may occur on the SJNF with the most potential to impact Aztec milkvetch include livestock grazing, recreation, solid mineral development, oil and gas development, fire management, timber harvest, and mechanical fuel treatment.

3.2.4 Lesser Panicled Sedge (Carex diandra)

Lesser panicled sedge is a perennial, tussock forming species in the sedge family widely distributed globally. It is found throughout Europe and Asia, the Canary Islands, and New Zealand. In North America, it is found in all Canadian provinces and is discontinuously distributed in 30 U.S. states. It is documented from 14 locations on NFS lands in USFS Region 2. It is not known to occur on the SJNF, but there is a known population on BLM land in the Silverton area, and there is habitat for this species on the SJNF (Colorado Natural Heritage Program 2012). The populations in Wyoming and Colorado are primarily in fens at elevations between 6,100 and 9,600 feet (Gage and Cooper 2006). Lesser panicled sedge is ranked globally secure (G5) by NatureServe and critically imperiled (S1) in Colorado. Activities that may occur on the SJNF with the most potential to impact lesser panicled sedge include livestock grazing, recreation, and solid mineral development.

3.2.5 Lesser Yellow Lady's Slipper Orchid (Cypripedium parviflorum)

Lesser yellow lady's slipper orchid is a yellow-flowered orchid found in boreal regions of the Northern Hemisphere. There are 224 known occurrences of lesser yellow lady's slipper orchid in USFS Region 2. Eleven of these are known to occur on NFS land in Colorado, two of which are found on the SJNF. The species can be found in a variety of habitats, including dry ponderosa pine habitat where soil moisture can be very low late in the growing season, as well as riparian areas, north slopes, and cool drainages that have moist to near saturated soil moisture throughout the growing season. Lesser yellow lady's slipper orchid is often found on soils and stony soils that have developed over a calcareous substrate, limestone scree and the base of limestone cliffs or in peaty soils. On the SJNF, lesser yellow lady's slipper orchid has been found at 8,000 feet elevation in an area dominated by cottonwood and aspen stands and at 8,000 feet in an area dominated by ponderosa pine, Gambel oak, and snowberry (Mergen 2006). Lesser yellow lady's slipper orchid is ranked globally secure (G5) by NatureServe and imperiled (S2) in Colorado. Activities that may occur on the SJNF with the most potential to impact the species include recreation, fire management, and timber harvest.

3.2.6 Smith's Draba (Draba smithii)

Smith's draba is a slender perennial in the mustard family only known to occur in Alamosa, Archuleta, Custer, Las Animas, Mineral, and Saguache Counties in southern Colorado. There are 27 known occurrences of Smith's draba in Colorado, 25 of which are found on lands managed by the USFS. There is one known location of the SJNF. Smith's draba is found on rock outcrops and on talus slopes with little closely associated vascular vegetation, although lichen and mosses can be abundant. The species occurs on quartz porphyry and volcanic-derived soils. On the SJNF, Smith's draba has been found at 7,760 feet in elevation on cliff and talus slopes in both seep areas and in more xeric areas (Ladyman 2004a). Smith's draba is ranked globally imperiled (G2) by NatureServe and imperiled (S2) in Colorado. Activities that may occur on the SJNF with the most potential to impact Smith's draba include recreation, road maintenance, and noxious weed management

3.2.7 English Sundew (Drosera anglica)

English sundew is a member of the sundew family found in nutrient-poor fens. It is a carnivorous plant that derives a significant proportion of its nutrients from the absorption of animal tissues. English sundew has a circumboreal distribution and is widespread and abundant in many regions. The only known occurrences of this obligate wetland species in Region 2 are on the Shoshone National Forest in Wyoming and the SJNF in Colorado. The population on the SJNF is a geographically isolated population near the southern extent of the species' range in La Plata County on the Columbine Ranger District. On the SJNF, it is found in a basin fen at 8,500 feet in elevation (Wolf et al. 2006). English sundew is ranked globally secure (G5) by

NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact English sundew include any activities that alter the hydrologic functioning or nutrient budgets of fens where the species occurs. Activities that may occur on the SJNF with the most potential to alter the hydrologic functioning or nutrient budgets of fens include livestock grazing and recreation.

3.2.8 Stream Orchid (Epipactis gigantea)

Stream orchid is a pink-flowered orchid found from southern British Columbia through the western United States as far inland as Texas. There are 41 known occurrences of stream orchid in USFS Region 2. Most of these are on lands managed by the BLM or the National Park Service. Only two are on NFS lands: one on the Black Hills National Forest and one on the SJNF. Stream orchid occurs in desert, montane, and boreal climates, but is always restricted to nutrient-rich habitats that have a constant supply of moisture from sources such as thermal and non-thermal springs, seeps, and streams. On the SJNF, the known location of stream orchid is found in a hillside seep in a ponderosa pine/Douglas-fir forest at approximately 6,600 feet in elevation (Rocchio et al. 2006). Stream orchid is ranked globally apparently globally secure (G4) by NatureServe and imperiled to vulnerable (S2/S3) in Colorado. Activities that may occur on the SJNF with the most potential to impact stream orchid include livestock grazing, utility line maintenance, road maintenance, and noxious weed management.

3.2.9 Whitebristle Cottongrass (Eriophorum altaicum var. neogaeum)

Whitebristle cottongrass is a perennial in the sedge family. In bloom, it has a solitary flowering head whose fluffy bristles resemble a cotton ball. Whitebristle cottongrass is known from Asia and North America, but the variety *neogaeum* is restricted to Colorado. There are 29 known occurrences in Colorado, 25 of which are found on lands managed by the USFS. Eighteen of these known locations are on the SJNF, where it is always associated with water-saturated soils in bogs, fens, and wetlands at elevations between approximately 11,000 and 12,400 feet (Ladyman 2004b). The NatureServe global rank for whitebristle cottongrass is apparently secure (with some uncertainty) for the species *E. altaicum* and between vulnerable and apparently secure for the variety *neogaeum* (G4?T3T4). It is ranked vulnerable (S3) in Colorado. Activities on the SJNF with the most potential to impact whitebristle cottongrass include any that may impact the hydrology of areas where the species occurs. This could include livestock grazing, recreation, and solid mineral development.

3.2.10 Chamisso’s Cottongrass (Eriophorum chamissonis)

Chamisso’s cottongrass is a perennial in the Sedge family which appears very similar to whitebristle cottongrass in having a solitary flowering head that resembles a cotton ball. It is a circumpolar species that occurs in most of the northern tier of the U.S. states west of the Great Lakes, as well as all Canadian provinces and northern Eurasia. At the southern extent of its range in Region 2, it occurs in small, disjunct populations in subalpine wet meadows and fens with saturated peat soils, where graminoids and forbs dominate the vegetation. There are 12 known occurrences in Colorado and Wyoming, all of which are on NFS lands. Two of these known locations are on the SJNF, where it is found in high-elevation fens at elevations between approximately 11,560 and 11,820 feet (Decker et al. 2006a). Chamisso’s cottongrass is ranked globally secure (G5) by NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact Chamisso’s cottongrass include any that may impact the hydrology of areas where the species occurs. This could include livestock grazing, recreation, and solid mineral development.

3.2.11 Slender Cottongrass (Eriophorum gracile)

Slender cottongrass is a perennial in the sedge family with two to five flowering heads resembling cotton balls. It is a circumpolar species that occurs in the northern tier of U.S. states north of approximately 40 degrees latitude, as well as in all of the Canadian provinces and northern Eurasia. At the southern extent of its range in Region 2, it occurs in small, disjunct populations in fens and subalpine wet meadows with saturated soils from 7,000 to 11,140 feet in elevation. Of the 36 documented occurrences in Region 2, 15 are on NFS lands in Colorado and Wyoming, including nine in Colorado. Although slender cottongrass has not been documented to occur on the SJNF, there is suitable habitat for this species on the SJNF

(Decker et al. 2006b). Slender cottongrass is ranked globally secure (G5) by NatureServe and imperiled (S2) in Colorado. Activities on the SJNF with the most potential to impact slender cottongrass include any that may impact the hydrology of areas where the species occurs. This could include livestock grazing, recreation, and solid mineral development.

3.2.12 Lone Mesa Snakeweed (Gutierrezia elegans)

Lone Mesa snakeweed is a yellow-flowered, shrubby member of the aster family first described in 2008. It is currently known from five occurrences in and around Lone Mesa State Park in southwest Colorado. One of these locations is on the Dolores Ranger District of the SJNF. Lone Mesa snakeweed is found on barren Mancos Shale outcrops, side slopes of shallow washes, and in sites with deeper soil over the shale at approximately 7,575 feet in elevation (Schneider et al. 2008). Lone Mesa snakeweed is ranked globally critically imperiled (G1) by NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact Lone Mesa snakeweed include potential water development of Plateau Creek, livestock grazing, recreation, oil and gas development, road maintenance, and noxious weed management.

3.2.13 Frosty Bladderpod (Lesquerella pruinosa)

Frosty bladderpod is a low-growing species in the mustard family. It is known from 21 occurrences in Archuleta and Hinsdale Counties in southwest Colorado and from one occurrence in northern Rio Arriba County, New Mexico. There are seven main populations of frosty bladderpod found on the Pagosa District of the SJNF. The largest population on the SJNF is found within the boundaries of the O'Neal Hill Special Botanical Area, which was designated to protect and preserve this species. Frosty bladderpod is limited to soils derived from the Upper Cretaceous Mancos Shale Formation between 6,890 and 8,800 feet in elevation (Anderson 2006). Frosty bladderpod is ranked globally imperiled (G2) by NatureServe and imperiled (S2) in Colorado. Activities on the SJNF with the most potential to impact frosty bladderpod include livestock grazing, solid mineral development, oil and gas development, road maintenance, and noxious weed management.

3.2.14 Colorado Tansyaster (Machaeranthera coloradoensis)

Colorado tansyaster is a perennial forb in the aster family endemic to central, west-central, and southwest Colorado and south-central Wyoming. Of the 33 known occurrences, 21 are on NFS lands in Colorado and Wyoming. Five of these are on the SJNF on the Columbine and Dolores Ranger Districts in alpine meadows at 11,400 to 12,600 feet. It is generally found in sparsely vegetated areas on rocky, exposed soils of sedimentary or volcanic origin (Hartman 1976) and is consistently found in areas with open exposure. However, the slope, aspect, and moisture vary from site to site (Beatty et al. 2004). Colorado tansyaster is ranked globally vulnerable (G3) by NatureServe and vulnerable (S3) in Colorado. Activities on the SJNF with the most potential to impact Colorado tansyaster include livestock grazing, recreation, or solid mineral development.

3.2.15 Kotzebue's Grass-of-Parnassus (Parnassia kotzebuei)

Kotzebue's grass-of-Parnassus is a small and inconspicuous member of the saxifrage family. It is a circumpolar species that grows in mesic to wet arctic and alpine habitats in the Northern Hemisphere and is found in scattered locations at high elevations in Washington, Nevada, Idaho, Montana, Wyoming, and Colorado. It is known from 27 locations in Region 2, covering approximately 27 acres and containing an estimated 1,135 plants. Kotzebue's grass-of-Parnassus is found primarily above the tree line and also in subalpine forest openings, on rocky coniferous slopes, and in deep spruce forests. In these areas, it is found growing in wet areas along streamlets and in moss mats. There is one documented location on the Columbine Ranger District of the SJNF at approximately 12,000 feet (Panjabi and Anderson 2007). Kotzebue's grass-of-Parnassus is ranked globally secure (G5) by NatureServe and imperiled (S2) in Colorado. Activities on the SJNF with the most potential to impact Kotzebue's grass-of-Parnassus include any that may impact the hydrology of areas where the species occurs. This could include livestock grazing, recreation, or solid mineral development.

3.2.16 Cushion Bladderpod (Physaria pulvinata)

Cushion bladderpod is a member of the mustard family first described in 2006. It is currently known from two occurrences in San Miguel and Dolores Counties, Colorado, at approximately 7,500 feet in elevation (O'Kane and Reveal 2006). A portion of one of these populations is on the Dolores Ranger District of the SJNF. It is found on scattered outcrops of grayish, argillaceous shale (Anderson and Panjabi 2006), often in association with Lone Mesa snakeweed, another sensitive plant species on the Dolores Ranger District (Gildar 2013). Cushion bladderpod is ranked globally critically imperiled (G1) by NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact cushion bladderpod include potential water development of Plateau Creek, livestock grazing, recreation, oil and gas development, road maintenance, and noxious weed management.

3.2.17 West Silver Bladderpod (Physaria scrotiformis)

West silver bladderpod is a long-lived perennial forb of the mustard family first described in 2006. The entire known population of this low-growing species is found in one location on the SJNF on a windswept, nearly barren exposure of Leadville limestone in the Weminuche wilderness on the Columbine Ranger District at approximately 11,680 feet in elevation (O'Kane 2007). West silver bladderpod is ranked globally critically imperiled (G1) by NatureServe and critically imperiled (S1) in Colorado. The activity on the SJNF with the most potential to impact west silver bladderpod is recreation.

3.2.18 Arizona Willow (Salix arizonica)

Arizona willow is a willow species known to occur near the margins of the Colorado Plateau in Utah, Arizona, New Mexico, and Colorado. This subalpine species is typically found in high-elevation wet meadows, streamsides, and cienegas. According to Decker (2006b), known occurrences are confined to three primary centers of distribution in the White Mountains of east-central Arizona, the High Plateaus of south-central Utah, and the Southern Rocky Mountains of northern New Mexico and southern Colorado. In USFS Region 2, the only known occurrence is found on the Rio Grande National Forest along a stream at approximately 10,300 feet in elevation. There is potential habitat for Arizona willow on the SJNF. Arizona willow is frequently associated with substrates of volcanic origin, and it appears to favor coarse-textured and well-watered soils, including those associated with alluvial deposits (Decker 2006b). Arizona willow is ranked globally imperiled to vulnerable (G2/G3) by NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact Arizona willow include activities that can cause hydrologic alterations such as livestock grazing and recreation.

3.2.19 Sageleaf Willow (Salix candida)

Sageleaf willow is a willow species with a boreal distribution, concentrated in Canada and the northern tier of the United States, including Alaska. Sageleaf willow is typically found in fens, bogs, marshes, and other areas of permanently saturated soils where peat is present, especially those characterized as "rich" or "extreme rich" fens. It is known from 32 locations within USFS Region 2, 16 of which are located on NFS lands. Survey work from 1985 indicated that this species was present on the SJNF, but since no specimens were collected to document these occurrences and botanists have been unable to relocate the occurrences, there is some question regarding the accuracy of these reports (Decker 2006c). Regardless, there is suitable habitat for this species on the SJNF. Within Colorado, this species occurs at elevations between 8,900 and 10,040 feet. Sageleaf willow is ranked globally secure (G5) by NatureServe and imperiled (S2) in Colorado. Activities on the SJNF with the most potential to impact sageleaf willow include activities that can cause hydrologic alterations to the fens where this species is located such as livestock grazing and recreation.

3.2.20 Autumn Willow (Salix serissima)

Autumn willow is a boreal willow with known populations concentrated in the northeastern United States and in Canada from Newfoundland to British Columbia. Autumn willow is typically found in areas with permanently saturated soils where peat is present, such as fens. However, given the lack of habitat information included with some specimens, it cannot be ruled out that this species may also occur in other moist habitats such as stream banks. It is known from five locations on NFS lands within USFS Region 2, one of which is potentially on the SJNF at approximately 8,300 feet in elevation (Decker 2006d). Autumn willow is ranked globally apparently secure (G4) by NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact autumn willow include impacts from activities that might cause hydrologic alterations to the fens were this species is located such as livestock grazing and recreation.

3.2.21 Sphagnum Moss (Sphagnum angustifolium)

Sphagnum moss is a moss species found in Europe, across Canada, and in the northern tier of the United States, including Alaska. It is known from both Wyoming and Colorado within USFS Region 2 (Austin 2007). As of 2012, there were nine known occurrences of sphagnum moss on the Columbine Ranger District of the SJNF (Colorado Natural Heritage Program 2012). This species is typically found in iron fens and poor fens (Austin 2007) between approximately 9,500 and 11,600 feet in elevation (Colorado Natural Heritage Program 2012). Sphagnum moss is ranked globally secure (G5) by NatureServe and imperiled (S2) in Colorado. Activities on the SJNF with the most potential to sphagnum moss include impacts from activities that might cause hydrologic alterations to the fens were this species is located such as livestock grazing, recreation, or solid mineral development.

3.2.22 Baltic Bog Moss (Sphagnum balticum)

Baltic bog moss is a moss species found in Wales, Northern England, Scotland, and Canada. There are only two known populations of this species in the United States, both of which are in Colorado on the Columbine Ranger District on the SJNF, where it occurs in the wet portions of iron fens (Austin 2009) at approximately 9,620 to 10,280 feet in elevation (Colorado Natural Heritage Program 2012). Baltic bog moss is ranked globally imperiled to globally apparently secure (G2/G4) by NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact Baltic bog moss include impacts from activities that might cause hydrologic alterations to the fens where this species is located such as livestock grazing, recreation, or solid mineral development.

3.2.23 Largeflower Triteleia (Triteleia grandiflora)

Largeflower triteleia is a perennial plant in the onion family that has been reported from Washington, Oregon, northern California, Idaho, Wyoming, Utah, and southwest Colorado. The only known location of this species on NFS lands in USFS Region 2 is on the Dolores Ranger District on the SJNF. At this site, it is found in open to partially shaded patches in a ponderosa pine/Gambel oak community at approximately 7,900 to 7,960 feet in elevation (Ladyman 2007). Largeflower triteleia is ranked globally apparently secure to secure (G4/G5) by NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact largeflower triteleia include livestock grazing, recreation, oil and gas development, fire management, timber harvest, and mechanical fuels treatments.

3.2.24 Lesser Bladderwort (Utricularia minor)

Lesser bladderwort is a small, perennial, yellow-flowered, aquatic species in the bladderwort family that grows affixed to substrate (as opposed to being free-floating). It grows in a variety of low-energy aquatic environments such as shallow water, inundated mudflats, or areas with emergent vegetation. It is a circumboreal species found primarily in North America, Europe, and Asia. In USFS Region 2, it is found on the SJNF and Grand Mesa and Routt National Forests (Neid 2006). On the SJNF, lesser bladderwort occurs in a small creek that is the outflow from a lake on the Dolores Ranger District. Lesser bladderwort is ranked globally secure (G5) by NatureServe and imperiled (S2) in Colorado. Activities on the SJNF with the most potential to impact lesser bladderwort include any activities that alter the hydrologic functioning or degrade water quality of areas where this species occurs. Activities on the SJNF with the most potential to impact lesser bladderwort include livestock grazing and recreation.

3.3 Effects Analysis

Implementing a sustainable ecosystems strategy that maintains sustainable ecosystems and existing habitats for sensitive plant species on SJNF would protect and sustain those ecosystems and the diversity and viability of the majority of plant species within them (including sensitive plant species). Of the 24 sensitive plant species known to occur or with habitat on the SJNF, 16 occur within areas well represented in protected areas (including fens, high-elevation wetlands, and alpine habitat). The remaining eight species are found at lower elevations in habitats poorly represented or entirely absent from protected areas. This includes but is not limited to hanging gardens, low-elevation riparian areas and wetlands, and specific soil types such as gypsum and Mancos Shale soils.

Management activities that could have impacts on sensitive plant species on the SJNF include livestock grazing, recreation, solid mineral development (mining), oil and gas development, fire management, timber harvest, and mechanical fuels treatments. Other actions such as road maintenance or noxious weed management may also have an impact on sensitive plant species. Impacts would depend on many factors, including the extent, timing, frequency, and duration of activities. Impacts to sensitive plant species from management activities would be reduced, minimized, or prevented by the implementation of standards, guidelines, and stipulations in the LRMP, the implementation of project-specific mitigation measures, and by following direction in the Watershed Conservation Practices Handbook (Forest Service Handbook [FSH] 2509.25), the ESA, FSM 2622, and FSM 2070. Impacts from the activities listed above are discussed in more detail below.

3.3.1 Livestock Grazing

Livestock grazing may have impacts to USFS sensitive plant species that occur in the habitats where grazing may occur. Past livestock grazing has had a significant impact on the current conditions seen in the many of the terrestrial ecosystems on the SJNF, particularly mountain grasslands, semi-desert shrublands, semi-desert grasslands, sagebrush shrublands, and pinyon-juniper woodlands. The sensitive plant species that occur in these lower-elevation terrestrial ecosystems are the most likely to be impacted by livestock grazing. This includes Missouri milkvetch, Aztec milkvetch, Lone Mesa snakeweed, frosty bladderpod, Colorado tansyaster, cushion bladderpod, and largeflower triteleia. For these species, there is a standard in the LRMP requiring that projects or activities occurring on shale and gypsum soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species. Many wetlands and riparian areas have also been impacted by past and current livestock grazing and water development. The sensitive plant species present in these areas and most likely to be impacted by livestock grazing include lesser panicled sedge, English sundew, stream orchid, whitebristle cottongrass, Chamisso's cottongrass, slender cottongrass, Kotzebue's grass-of-Parnassus, Arizona willow, sageleaf willow, autumn willow, sphagnum moss, Baltic bog moss, and less bladderwort. There is a standard in the LRMP requiring that projects or activities occurring in fens, wetlands, or hanging gardens occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species.

There has also been a significant reduction in the numbers of cattle and sheep that graze on the SJNF since the early 1900s. For example, in the 1930s, approximately 216,684 sheep and 41,968 cattle were permitted on the SJNF. In 2012, approximately 14,330 sheep and 23,412 cattle were permitted. In addition, there are also fewer acres available for livestock grazing than there were in the past. Currently, a little over half of the SJNF is considered suitable for livestock grazing. The combination of fewer numbers of livestock, fewer acres available for grazing, the use of the guidelines mentioned above, and other project-specific design criteria and mitigation measures during project-level planning would help minimize impacts to sensitive species at the project level.

Proposed stocking rates and the amount of area available for permitted livestock grazing varies between alternatives. Alternative D has the potential to impact the highest number of acres and proposes the highest cattle stocking rates, and therefore has the most potential to impact sensitive plant species. Alternative B has the next highest potential to impact sensitive plant species, followed by Alternatives A then C due to incrementally lower numbers of permitted cattle and fewer acres considered suitable for grazing.

3.3.2 Recreation

Recreation impacts to USFS sensitive plant species are possible from activities such as camping, hiking, mountain biking, horseback riding, and motorized recreation. Recreation use is widespread and would occur to some extent in all of the terrestrial ecosystems on the SJNF, but impacts are typically confined to localized areas such as designated trails, frequently used campsites, or developed recreation facilities such as campsites or trailheads. The species most likely to be impacted by recreation activities include those with known populations near frequently used areas, such as trails, near popular lakes or wetland areas and in or near developed recreation sites. The potential for dispersed recreation in many areas also makes the potential for impacts to sensitive plant species more likely. The species most likely to be impacted by recreation activities include stonecrop gilia, Aztec milkvetch, lesser panicled sedge, lesser yellow lady's slipper orchid, Smith's draba, English sundew, whitebristle cottongrass, Chamisso's cottongrass, slender cottongrass, Lone Mesa snakeweed, Colorado tansyaster, Kotzebue's grass-of-Parnassus, cushion bladderpod, Arizona willow, sageleaf willow, autumn willow, sphagnum moss, Baltic bog moss, largeflower triteleia, and lesser bladderwort. There are standards in the LRMP requiring that projects or activities occurring in fens, wetlands, and hanging gardens occupied by sensitive plant species, and on shale and gypsum soils occupied by sensitive plant species, be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species. Use of these design criteria during project-level planning would help minimize impacts to sensitive species, but impacts from dispersed recreation are still possible.

While the actual direct impacts from different types of recreation use are similar for all alternatives, the amount of area potentially impacted varies by alternative, primarily because of differences in the number acres that would be designated as suitable for motorized use. Alternative A has the most amount of area designated as suitable for motorized recreation and is the only alternative that allows motorized travel off of designated routes, and therefore has the potential to impact sensitive plant species that may be present in these areas. Alternative D has the second highest amount of area designated as suitable for motorized recreation, followed by Alternative B. Alternative C has the fewest number of acres designated as suitable for motorized recreation and therefore has the potential to impact sensitive plant species on the fewest number of acres.

3.3.3 Solid Minerals Development

Currently on the SJNF, some small-scale solid mineral development is possible in the alpine terrestrial ecosystems around Silverton and in a variety of terrestrial ecosystems around the Rico and La Plata areas. Small-scale rock collecting is also possible in many areas across the SJNF. Solid mineral development may have impacts to USFS sensitive plant species that occur in the project areas where mining or rock collecting are most likely to occur. The sensitive plant species most likely to be impacted by solid mineral development are those that are near the areas most likely to experience solid mineral development and include *Missouri milkvetch*, *Aztec milkvetch*, *lesser panicled sedge*, *whitebristle cottongrass*, *Chamisso's cottongrass, slender cottongrass, Colorado tansyaster*, *Kotzebue's grass-of-Parnassus*, *sphagnum moss*, and *Baltic bog moss*. For USFS sensitive plant species, there are standards requiring that projects or activities occurring in fens, wetlands, and hanging gardens occupied by sensitive plant species, and on shale and gypsum soils occupied by sensitive plant species, be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species. These design criteria can be used in operating plans to help minimize potential impacts to sensitive plant species from solid mineral development. In addition, federal authority over mining activities allows for the setting of terms and conditions in operating plans in order to minimize impacts to public lands. There are also areas that have been withdrawn from leasing or are administratively unavailable for leasing that would not be impacted by solid mineral development. Currently, there are 424,428 acres on the SJNF which have been withdrawn from leasing. In addition, the opportunity for new solid mineral development within the roughly 566,000 acres of CRAs is somewhat limited because new road construction is prohibited, unless there is a prior existing right. The standards in the LRMP, the withdrawal of areas from leasing, and the limited opportunity for solid mineral development in CRAs all combine to minimize the impact of solid mineral development on sensitive plant species.

The number of acres available for solid minerals development varies by approximately 10,000 acres between alternatives. Alternative C has the fewest number of acres open to locatable mineral development, and the highest number of acres proposed for withdrawal, and thus would have the least amount of potential impact on sensitive plant species. Alternative B has more acres available for mineral development and fewer acres proposed for withdrawal as compared to Alternative C. Alternatives A and D have the most acres available for locatable mineral development and do not propose the withdrawal of any additional areas from mineral development, and would therefore have the most potential to impact sensitive plant species. The number of acres currently withdrawn from possible solid mineral development is the same for each alternative.

3.3.4 Oil and Gas Development

Impacts to USFS sensitive plant species and suitable habitat for these species are possible during oil and gas development. The sensitive plant species most likely to be impacted by oil and gas development are those that occur at lower elevations of the SJNF and include Missouri milkvetch, Aztec milkvetch, Lone Mesa snakeweed, frosty bladderpod, cushion bladderpod, and largeflower triteleia. Many known populations of USFS sensitive plant species and suitable habitat for these species occur in areas that are currently under lease. In areas **already under lease**, but not yet developed, standard lease terms can be used to move the location of a well or access road prior to development to help prevent or minimize impacts to USFS sensitive plant species and their suitable habitat. The standard in the LRMP requiring that activities in shale and gypsum soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species can also be used to condition the approval of development on existing leases. In **new lease** areas, impacts to USFS sensitive plant species and suitable habitat for these species would be minimized by the application of standard lease terms, or prevented by the application of special lease stipulations, depending on alternative. Alternative C offers the highest level of protection to sensitive plant species because it is the only alternative that allows the application of an NSO stipulation on lands occupied by sensitive species and within a 325-foot buffer around those lands. Alternative B allows for a CSU stipulation to be applied to new leases. Under Alternatives A and D, only standard lease terms can be applied.

Overall, oil and gas development under the No Leasing Alternative would have the least amount of impact on sensitive plant species since impacts would only occur in areas that are already under lease. Areas not currently under lease would not be impacted under the No Leasing Alternative. In regards to Alternatives A through D, Alternative C would have the least amount of impact on sensitive plant species. Alternative C has the highest number of acres that are withdrawn from leasing or are administratively unavailable for leasing (Table T.14), and the special leasing stipulations available under this alternative offer the highest level of resource protection available to sensitive plant species (Table T.15). Alternative B offers the second highest number of acres withdrawn or unavailable for leasing and the second highest level of protection to sensitive plant species from special leasing stipulations. Alternative A offers the third. Alternative D has the fewest number of acres that are withdrawn from leasing or are administratively unavailable for leasing, and the lowest level of protection offered by special leasing stipulations.

Table T.14: Acres Withdrawn from Leasing or Administratively Not Available for Leasing by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	No Leasing Alternative
USFS					
Federal mineral acres	1,863,402	1,863,402	1,863,402	1,863,402	1,863,402
Acres withdrawn from leasing	509,954	509,954	509,954	509,954	509,954
Acres administratively not available for leasing	16,357	73,636	644,113	14,896	1,353,448
Acres available for leasing	1,337,090	1,279,811	709,335	1,338,551	0

Table T.15: Special Leasing Stipulations Related to Sensitive Plant Species

Stipulation	Alternative A	Alternative B	Alternative C	Alternative D
Region 2 Regional Forester's sensitive species	SLT	CSU	NSO	SLT
Special botanical areas	CSU	NSO	NSO	CSU
Lands with slopes of 25 to 35% and shale soils	SLT	CSU	NSO	SLT
Lands with gypsum soils	SLT	CSU	NSO	SLT
NSO = No Surface Occupancy; CSU = Controlled Surface Use; SLT = Standard Lease Terms				

3.3.5 Fire Management

Management-ignited fires, wildfires, and fire suppression would have impacts to terrestrial ecosystems, sensitive plant species, and soils on the SJNF. Prior to Euro-American settlement, fire played an important role in creating and maintaining the vegetation communities in many terrestrial ecosystems, especially ponderosa pine and warm-dry mixed conifer forests. Fire suppression has contributed to the many changes seen in these ecosystems over the past 100 years. The use of management-ignited fires and the appropriate management of naturally ignited wildfires would help to restore the composition and structure of ecosystems and maintain or restore the heterogeneous structure and pattern of the vegetation that was present on the SJNF during the reference period, including sensitive plant species. Fire management has the potential to impact all of the sensitive plant species on the SJNF, but those species found in ponderosa pine and warm-dry mixed conifer forests (Missouri milkvetch, Aztec milkvetch, lesser yellow lady's slipper orchid, and largeflower triteleia) have the most potential to be impacted. Project-specific design criteria can be used during project-level planning to help minimize impacts to sensitive plant species. In addition, there is a standard in the LRMP requiring that projects or activities occurring on shale soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species.

The amount of area proposed for management-ignited fire is the same under each alternative (between 3,000 and 7,000 acres per year), so the impacts to sensitive plant species would be the same under each alternative. Up to 20,000 acres of the SJNF could be impacted by fires managed for resource benefit under Alternative A. Fires managed for resource benefit could impact the sensitive plant species on an additional 30,000 acres of the SJNF under Alternatives B, C, and D.

3.3.6 Timber Harvest and Mechanical Fuels Treatments

Impacts from timber harvest would occur in spruce-fir, aspen, cool-moist mixed conifer, warm-dry mixed conifer, and ponderosa pine forests. Impacts from mechanical fuels treatment are most likely to occur in warm-dry mixed conifer forests, ponderosa pine forests, pinyon-juniper woodlands, and mountain shrublands. These activities may have impacts to sensitive plant species that occur in the habitats where treatments may occur, including Missouri milkvetch, Aztec milkvetch, lesser yellow lady's slipper orchid, and largeflower triteleia. Project-specific design criteria can be used during project-level planning to help minimize impacts to sensitive plant species at the project level. In addition, there is a standard in the LRMP requiring that projects or activities occurring on shale soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species.

Timber harvest under Alternative D would impact the vegetation and soils on approximately 3,750 acres of per year, followed by Alternatives B at 2,675 acres, and Alternative A at 2,650 acres. Alternative C would impact the vegetation and soils on the fewest acres per year (2,165 acres). While Alternatives A, B, and C would impact the vegetation and soils on fewer acres, there would also be less opportunity under these alternatives to use mechanical fuels treatments for ecosystem restoration purposes than under Alternative D.

Mechanical fuels treatments under Alternative D would impact the vegetation and soils on approximately 7,700 acres per year, while Alternatives A, B, and C would each impact approximately 6,700 acres per year. Alternatives A, B, and C would impact the vegetation and soils on fewer acres, but there would be less opportunity under these alternatives to use mechanical fuels treatments for ecosystem restoration purposes than under Alternative D.

3.3.7 Cumulative Impacts

Past management activities (including fire management, timber harvest, mechanical fuels treatments, livestock grazing, oil and gas development, solid minerals development, and recreation) on federal and non-federal lands within the planning area caused impacts to sensitive plant species as described above. Many of the impacts associated with those activities (soils disturbances) have recovered due to restoration efforts and natural processes. Many other adverse impacts (particularly those associated with fire management and livestock grazing) are still evident on the SJNF and would remain evident over the next 15 years. Project designs and the proper implementation of mitigation measures, conditions of approval, stipulations, standards, and guidelines served to protect the composition, structure, and function of sensitive plant species on most past projects.

Additional impacts to sensitive plant species (as described above) on federal and non-federal lands within the planning area would occur from the implementation of management activities in the LRMP and from foreseeable future management activities beyond the 15-year life of the LRMP. Those impacts are anticipated to be localized and would not adversely affect the ecological integrity of most areas or the diversity or viability of sensitive plant species.

The cumulative impact of past, present, and foreseeable future management activities on federal and non-federal lands within the planning area could cause impacts to sensitive plant species, as described above, on a small percent of the planning area. Those impacts would not adversely affect the diversity or viability of sensitive plant species. Project design, the implementation of standards, guidelines, and stipulations in the LRMP, project level analysis, and the implementation of mitigation measures at the project level would minimize adverse cumulative impacts to sensitive plant species on federal lands.

3.3.8 Determination Statement

It is the USFS's determination that implementation of any of the alternatives and activities associated with this FEIS **may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing** for the Region 2 Regional Forester's sensitive plant species known to occur or likely to occur on the SJNF. This includes stonecrop gilia, Missouri milkvetch, Aztec milkvetch, lesser panicled sedge, lesser yellow lady's slipper orchid, Smith's draba, English sundew, stream orchid, whitebristle cottongrass, Chamisso's cottongrass, slender cottongrass, Lone Mesa snakeweed, frosty bladderpod, Colorado tansyaster, Kotzebue's grass-of-Parnassus, cushion bladderpod, west silver bladderpod, Arizona willow, sageleaf willow, autumn willow, sphagnum moss, Baltic bog moss, largeflower triteleia, and lesser bladderwort.

This determination is based on the fact that project-specific design criteria can be used during project-level planning to help prevent or minimize impacts to sensitive plant species at the project level. In addition, the application of standards and guidelines in the LRMP related to sensitive plant species and their habitat, the application of standard lease stipulations and special lease stipulations such as NSO and CSU, withdrawal of certain areas from leasing for oil and gas development and/or solid mineral development, and the setting of terms and conditions in operating plans for solid mineral development would all help prevent or minimize impacts to sensitive plant species. Effects to sensitive plant species from management activities could occur under all of the alternatives. Since Alternative D proposes the most active management, it has the greatest potential to affect sensitive plant species as described above, compared to the other alternatives. Alternative A has the next highest potential to affect sensitive plant species since it proposes the second most active management, followed by Alternative B. Alternative C has the least potential to affect sensitive plant species as described above, since it proposes the least active management.

4 BUREAU OF LAND MANAGEMENT SENSITIVE PLANT SPECIES ANALYSIS

4.1 Plant Species Considered and Evaluated

Table T.16 lists the sensitive plant species evaluated by the BLM for the TRFO portion of the planning area.

Table T.16: Bureau of Land Management Sensitive Plant Species Considered and Evaluated for the Tres Rios Field Office

Sensitive Plant Species	Habitat Association or Vegetation Type
Jones' bluestar *Amsonia jonesii*	Pinyon-juniper woodlands and desert shrub in runoff-fed draws on sandstone
Naturita milkvetch *Astragalus naturitensis*	Pinyon-juniper woodlands (grows in the cracks of sandstone bedrock, associated with biological soil crusts)
Schmoll's milkvetch *Astragalus schmolliae*[*]	Mature pinyon-juniper woodlands on mesa tops in the Mesa Verde area
Gypsum Valley cateye *Cryptantha gypsophila*	Pinyon-juniper, desert grasslands and desert shrublands on gypsum soils
Fragile rockbrake *Cryptogramma stelleri*	Riparian/wetlands (cliff crevices and seeps in calcareous soils)
Kachina daisy *Erigeron kachinensis*	Riparian/wetlands (saline soils in alcoves and seeps in desert canyon walls)
Comb Wash buckwheat *Eriogonum clavellatum*	Semi-desert shrublands with shadscale saltbush, on shale soils
Lone Mesa snakeweed *Gutierrezia elegans*	Pinyon-juniper, semi-desert shrubland, sagebrush (barren Mancos Shale outcrops)
Frosty bladderpod *Lesquerella pruinosa*	Mountain grasslands and mountain shrublands (soils derived from Mancos Shale)
Dolores River skeletonplant *Lygodesmia doloresensis*	Pinyon-juniper, semi-desert shrublands with shadscale, and sagebrush communities on reddish, purple, sandy alluvium and colluvium of the Cutler Formation between the canyon walls and the Dolores river
Eastwood's monkeyflower *Mimulus eastwoodiae*	Riparian/wetland (shallow caves and seeps on canyon walls, hanging gardens)
Aromatic Indian breadroot *Pediomelum aromaticum*	Semi-desert shrublands and sagebrush shrublands
Cushion bladderpod *Physaria pulvinata*	Pinyon-juniper, semi-desert shrubland, sagebrush (barren shale outcrops)
[*]Candidate Species	

4.2 Species Evaluations

4.2.1 Jones' Bluestar (Amsonia jonesii)

Jones' bluestar is a member of the dogbane family. It is a tap-rooted perennial with powder-blue, tubular flowers. It is found in northeast Arizona, Utah, northwest New Mexico, and southwest Colorado (in Mesa and Montezuma Counties) (Spackman and Anderson 2002). There are six known occurrences of this species in Colorado (Colorado Natural Heritage Program 2013). There are no known occurrences of this species on the TRFO outside the Canyons of the Ancients National Monument (Colorado Natural Heritage Program 2013), but there is suitable habitat. This species grows in dry, open areas with clay, sandy or gravelly soils in desert-steppe, rocky gorges, and canyons between 4,500 and 5,000 feet (Spackman and Anderson 2002). Jones' bluestar is ranked globally apparently secure (G4) by

NatureServe, and it is considered critically imperiled (S1) in Colorado. Activities that may occur on the TRFO with the most potential to impact Jones' bluestar habitat include livestock grazing, recreation, and mineral and energy development.

4.2.2 Naturita Milkvetch (*Astragalus naturitensis*)

Naturita milkvetch is a small, low-growing perennial in the pea family. It has greenish gray foliage with white and purple flowers on ascending stems. It occurs in southeast Utah, northwest Arizona, and southwest Colorado (Mesa, Montezuma, Montrose, and San Miguel Counties) (Spackman and Anderson, 2002). There are 44 known locations in Colorado, 14 are on the TRFO (Colorado Natural Heritage Program 2013). Occurrences of this species are associated with sandstone mesa, ledges, crevices, and slopes in pinyon-juniper woodlands from 5,000 to 7,000 feet (Spackman and Anderson 2002). Naturita milkvetch is ranked as imperiled or vulnerable (G2G3) by NatureServe. It is considered imperiled or vulnerable (S2S3) in Colorado. Activities that may occur on the TRFO with the most potential to impact Naturita milkvetch include recreation, mineral and energy development, and vegetation management.

4.2.3 Schmoll's Milkvetch (*Astragalus schmolliae*)

Schmoll's milkvetch is an upright perennial plant with stems branching from an underground root crown. Its leaves and stems are covered in short hairs, making it appear ash-colored. It has creamy white flowers. Known populations of Schmoll's milkvetch are limited to 4,000 acres in Mesa Verde National Park and the adjacent Ute Mountain Ute Tribal Park on mesa tops on deep, reddish loess soils. There are no known populations on the TRFO, but there is suitable habitat. Schmoll's milkvetch is a federal candidate species, which the BLM treats as a sensitive species. It is ranked as globally critically imperiled (G1) by Natureserve and critically imperiled (G1) in Colorado. The activities with the most potential to impact Schmoll's milkvetch habitat include recreation, livestock grazing, mineral and energy development, and vegetation management.

4.2.4 Gypsum Valley Cateye (*Cryptantha gypsophila*)

Gypsum Valley cateye is a perennial forb in the forget-me-not family. It is a low-growing, tufted plant with leaves that are hairy on the front and smooth on the back. It can be distinguished from a very similar species, *C. paradoxa,* because *C. paradoxa* is hairy on both the front and back of the leaf and because Gypsum Valley cateye is restricted to gypsum soils (Reveal and Broom 2006). It has white tube-shaped flowers with yellow centers. Gypsum Valley cateye is a newly discovered, local endemic species whose global distribution is limited to 16 occurrences in San Miguel, Montrose, and Mesa Counties of Colorado (Reveal and Broom 2006). On the TRFO, there are 14 occurrences (Colorado Natural Heritage Program 2013), five of which are found within the proposed Gypsum Valley Area of Critical Environmental Concern, which was proposed in part to protect this species and its habitat. It is only found in pinyon-juniper, desert grasslands and desert shrublands on gypsum soils on the Paradox Member of the Hermosa Formation at approximately 6,300 feet (Reveal and Broom 2006). Gypsum Valley cateye is ranked globally imperiled (G2) by NatureServe and imperiled (S2) in Colorado. Activities that may occur on the TRFO with the most potential to impact Gypsum Valley cateye include mineral and energy development and motorized recreation.

4.2.5 Fragile Rockbrake (*Cryptogramma stelleri*)

Fragile rockbrake is a delicate, slender fern with a creeping rhizome. It is found in boreal habitats in North America, northeastern Europe, and Asia (Morin 1994). Fragile rockbrake grows on moist, shaded cliffs and ledges in coniferous forest on calcareous soils (Morin 1994). There are 17 occurrences in Colorado, 16 of which are on public lands (Colorado Natural Heritage Program 2013). There are no occurrences on the TRFO, but there are occurrences on adjacent SJNF lands (Colorado Natural Heritage Program 2013). The TRFO does contain suitable habitat for the species. Fragile rockbrake is ranked globally secure (G5) by NatureServe and imperiled (S2) in Colorado. Generally, there are no active management activities that have likelihood to affect fragile rockbrake because it grows in areas where active management is uncommon.

4.2.6 Kachina Daisy (Erigeron kachinensis)

Kachina daisy is a small perennial forb in the aster family. Its global range is restricted to San Juan County in Utah and in Montrose County in Colorado (Allphin and Harper 1997). There is one known location of the TRFO (Colorado Natural Heritage Program 2013). Kachina daisy is found on saline soils in alcoves and seeps on canyon walls (Spackman and Anderson 2002) and forms hanging gardens. Kachina daisy is ranked globally imperiled (G2) by NatureServe and critically imperiled (S1) in Colorado. Activities that may occur on the TRFO with the most potential to impact Kachina daisy include any activities that alter the hydrologic functioning of hanging gardens. Activities that may occur on the TRFO with the most potential to alter hydrologic function of hanging gardens include mineral and energy development and water developments.

4.2.7 Comb Wash Buckwheat (Eriogonum clavellatum)

Comb Wash buckwheat is a subshrub in the buckwheat family with spreading stems and white flowers. Its global distribution is limited to a few sites in the Four Corners area of San Juan County, Utah, Montezuma County, Colorado, and San Juan County, New Mexico (Reveal 2005). There are eight occurrences in Colorado, all on Ute Mountain Ute Reservation (Colorado Natural Heritage Program 2013). There are no known occurrences on the TRFO, but there is suitable habitat. Comb Wash buckwheat is ranked globally imperiled (G2) by NatureServe and critically imperiled (S1) in Colorado. Activities that may occur on the SJNF with the most potential to impact Comb Wash buckwheat include mineral and energy development, motorized recreation, road maintenance, and livestock grazing.

4.2.8 Lone Mesa Snakeweed (Gutierrezia elegans)

Lone Mesa snakeweed is a yellow-flowered, shrubby member of the aster family first described in 2008. It is currently known from five occurrences in and around Lone Mesa State Park in southwest Colorado. One of these locations is on the TRFO and the adjacent Dolores Ranger District of the SJNF (Colorado Natural Heritage Program 2013). Lone Mesa Snakeweed is found on barren Mancos Shale outcrops, side slopes of shallow washes, and in sites with deeper soil over the shale at approximately 7,575 feet in elevation (Schneider et al. 2008). Lone Mesa Snakeweed is ranked globally critically imperiled (G1) by NatureServe and critically imperiled (S1) in Colorado. Activities on the TRFO with the most potential to impact Lone Mesa Snakeweed include potential water development of Plateau Creek, livestock grazing, and road maintenance.

4.2.9 Frosty Bladderpod (Lesquerella pruinosa)

Frosty bladderpod is a low growing species in the mustard family. It is known from 21 occurrences in Archuleta and Hinsdale Counties in southwest Colorado and from one occurrence in northern Rio Arriba County, New Mexico. There are no known populations on the TRFO (Colorado Natural Heritage Program 2013); however, there is suitable habitat. There are seven main populations of *frosty bladderpod* found on the Pagosa District of the SJNF, some in adjacent parcels to the TRFO (Colorado Natural Heritage Program 2013). The largest population on the SJNF is found within the boundaries of the O'Neal Hill Special Botanical Area on the SJNF, which was designated to protect and preserve this species. *Frosty bladderpod* is limited to soils derived from the Upper Cretaceous Mancos Shale Formation between 6,890 and 8,800 feet (Anderson 2006). *Frosty bladderpod* is ranked globally imperiled (G2) by NatureServe and imperiled (S2) in Colorado. Activities on the TRFO with the most potential to impact *frosty bladderpod* habitat include livestock grazing and vegetation management activities such as mechanical fuels treatments and prescribed fire.

4.2.10 Dolores River Skeletonplant (Lygodesmia doloresensis)

Dolores River skeletonplant is a perennial forb in the aster family with rose-colored flowers surrounded by wispy leaves. This species is known from a 10-mile stretch of the Dolores River Canyon in Mesa County, Colorado, and a 5-mile stretch of the Colorado River Canyon in Grand County, Utah (NatureServe 2013). However, the Dolores Canyon, where most of the known plants occur, is heavily grazed by cattle. Dolores River skeletonplant is thus found only in sites that are physically inaccessible to cattle (NatureServe

2013). There are no known populations on the TRFO (Colorado Natural Heritage Program 2013), but there is suitable habitat. This species is found in mixed juniper-desert shrub and juniper-grassland communities on alluvial soils at elevations of 4,400 to 4,800 feet (O'Kane 1988). Soils are derived from sandstone outcrops associated with the undivided lower portion of the Cutler Group (NatureServe 2013). Dolores River skeletonplant is ranked globally critically imperiled or imperiled (G1G2) by NatureServe and critically imperiled (S1) in Colorado. Activities on the SJNF with the most potential to impact Dolores River skeletonplant habitat include livestock grazing.

4.2.11 Eastwood's Monkeyflower (Mimulus eastwoodiae)

Eastwood's monkeyflower is a small, perennial forb in the snapdragon family. It is endemic to the canyon lands of southeastern Utah and adjacent Colorado, Arizona, and New Mexico (Cronquist et al. 1984; Heil et al. 2002). It is known from 11 locations in Colorado, all of which are on public lands and four of which are on the TRFO (Colorado Natural Heritage Program 2013). Eastwood's monkeyflower is found in moist seeps and hanging garden communities in sandstone cliffs. Eastwood's monkeyflower is ranked globally vulnerable or apparently secure but rare in some parts of its range (G3G4) by NatureServe and critically imperiled (S1) in Colorado. Activities that may occur on the TRFO with the most potential to impact Eastwood's monkeyflower include any activities that alter the hydrologic functioning of hanging gardens. Activities that may occur on the TRFO with the most potential to alter hydrologic function of hanging gardens include mineral and energy development and water developments.

4.2.12 Aromatic Indian Breadroot (Pediomelum aromaticum)

Aromatic Indian breadroot is a taprooted perennial forb of the pea family. This species is known from Mesa and Montrose Counties in Colorado (Weber and Wittmann 2001); Mohave County, Arizona; and San Juan, Washington, Emery and Grand Counties, Utah (Welsh et al. 1993). There are 12 occurrences in Colorado. All occur on public lands with one occurrence (possibly historical) on TRFO lands (Colorado Natural Heritage Program 2013). Aromatic Indian breadroot is ranked globally vulnerable (G3) by NatureServe and imperiled (S2) in Colorado. Activities on the SJNF with the most potential to impact aromatic Indian breadroot include livestock grazing, mineral and energy development, and recreation.

4.2.13 Cushion Bladderpod (Physaria pulvinata)

Cushion bladderpod is a member of the mustard family first described in 2006. It is currently known from two occurrences in San Miguel and Dolores Counties, Colorado, at approximately 7,500 feet in elevation (Colorado Natural Heritage Program 2013). A portion of one of these populations is on the TRFO and also on the adjacent Dolores Ranger District of the SJNF (Colorado Natural Heritage Program 2013). It is found on scattered outcrops of grayish, argillaceous shale (Anderson and Panjabi 2006), often in association with Lone Mesa snakeweed, another sensitive plant species on the TRFO (Gildar 2013). Cushion bladderpod is ranked globally critically imperiled (G1) by NatureServe and critically imperiled (S1) in Colorado. Activities on TRFO with the most potential to impact cushion bladderpod include potential water development of Plateau Creek, livestock grazing, and road maintenance.

4.3 Effects Analysis

Implementing a sustainable ecosystems strategy that maintains sustainable ecosystems and existing habitats for sensitive plant species on the TRFO would protect and sustain those ecosystems and the diversity and viability of the majority of plant species within them (including sensitive plant species). Of the 12 sensitive plant species known to occur or with habitat on the TRFO, one occurs within areas well represented in protected areas (including fens, high-elevation wetlands, and alpine habitat). The remaining 11 species are found at lower elevations in habitats poorly represented or entirely absent from protected areas. This includes but is not limited to hanging gardens, low-elevation riparian areas and wetlands, and specific soil types such as gypsum and Mancos Shale soils.

Management activities that could have impacts on sensitive plant species on the SJNF include livestock grazing, recreation, solid mineral development (mining), oil and gas development, fire management, timber harvest, and mechanical fuels treatments. Other actions such as road maintenance or noxious weed management may also have an impact on sensitive plant species. Impacts would depend on many factors, including the extent, timing, frequency, and duration of activities. Impacts to sensitive plant species from management activities would be reduced, minimized, or prevented by the implementation of standards, guidelines, and stipulations in the LRMP, the implementation of project-specific mitigation measures, and following direction in the ESA, BLM Colorado's Standards for Public Land Health (Standards 2, 3 and 4), BLM Colorado's Guidelines for Livestock Grazing Management, BLM Manual 6840 (Special Status Species Management), and BLM Manual 6840.06, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development "The Gold Book" (2007), Integrated Weed Management Plan (BLM 2011). Impacts from the activities listed above are discussed in more detail below.

4.3.1 Livestock Grazing

Livestock grazing may have impacts to BLM sensitive plant species that occur in the habitats where grazing may occur. Past livestock grazing has had a significant impact on the current conditions seen in the many of the terrestrial ecosystems on the TRFO, particularly mountain grasslands, semi-desert shrublands, semi-desert grasslands, sagebrush shrublands, and pinyon-juniper woodlands. The sensitive plant species that occur in these lower elevation terrestrial ecosystems are the most likely to be impacted by livestock grazing. This includes Jones' bluestar, Naturita milkvetch, Schmoll's milkvetch, Comb Wash buckwheat, Lone Mesa snakeweed, frosty bladderpod, Dolores River skeletonplant, aromatic Indian breadroot, and cushion bladderpod. For these species, there is a standard in the LRMP requiring that projects or activities occurring on shale and gypsum soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species.

There has also been a significant reduction in the numbers of cattle and sheep that graze on the TRFO since the early 1900s. In addition, there are also fewer acres available for livestock grazing than there were in the past. The combination of fewer numbers of livestock, fewer acres available for grazing, the use of the guidelines mentioned above, as well as other project-specific design criteria and mitigation measures during project-level planning would help minimize impacts to sensitive species at the project level.

Proposed stocking rates and the amount of area available for permitted livestock grazing varies between alternatives. Alternative D has the potential to impact the highest number of acres and proposes the highest cattle stocking rates, and therefore has the most potential to impact sensitive plant species. Alternative B has the next highest potential to impact sensitive plant species, followed by Alternatives A then C due to incrementally lower numbers of permitted cattle and fewer acres considered suitable for grazing.

4.3.2 Recreation

Recreation impacts to BLM sensitive plant species are possible from activities such as camping, hiking, mountain biking, horseback riding, and motorized recreation. Recreation use is widespread and would occur to some extent in all of the terrestrial ecosystems on the TRFO. The species most likely to be impacted by recreation activities include those with known populations near frequently used areas, such as trails, near popular lakes or wetland areas, in areas where cross-country travel is common, and in or near developed recreation sites. The potential for dispersed recreation in many areas makes the potential for impacts to sensitive plant species more likely. The species most likely to be impacted by recreation activities include Jones' bluestar, Naturita milkvetch, Schmoll's milkvetch, Gypsum Valley cateye, Comb Wash buckwheat, and aromatic Indian breadroot. There are standards in the LRMP requiring that projects or activities occurring in fens, wetlands, and hanging gardens occupied by sensitive plant species and on shale and gypsum soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species. Use of these standards, guidelines, and additional referenced guidance during project-level planning would help minimize impacts to sensitive species, but impacts from dispersed recreation are still possible.

While the actual direct impacts from different types of recreation use are similar for all alternatives, the amount of area potentially impacted varies by alternative, primarily because of differences in the number acres that would be designated as suitable for motorized use. Alternative A has the most amount of area designated as suitable for motorized recreation and is the only alternative that allows motorized travel off of designated routes, and therefore has the potential to impact sensitive plant species that may be present in these areas. Alternative D has the second highest amount of area designated as suitable for motorized recreation, followed by Alternative B. Alternative C has the fewest number of acres designated as suitable for motorized recreation and therefore has the potential to impact sensitive plant species on the fewest number of acres.

4.3.3 Solid Minerals Development

The most common types of solid mineral development within the planning area include gravel operations, landscape rock, hard rock mining, and uranium mining. Currently on the TRFO, most major solid mineral development activity is restricted to lower-elevation terrestrial ecosystems in the Slick Rock area near Dove Creek. Solid mineral development may have impacts to BLM sensitive plant species that occur in the project areas where mining or rock collecting are most likely to occur. The sensitive plant species most likely to be impacted by solid mineral development are those that are near the areas most likely to experience solid mineral development and include Jones' bluestar, Naturita milkvetch, and aromatic Indian breadroot. For BLM sensitive plant species, there are standards requiring that projects or activities occurring in fens, wetlands, and hanging gardens occupied by sensitive plant species and on shale and gypsum soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species. These design criteria can be used in operating plans to help minimize potential impacts to sensitive plant species from solid mineral development. In addition, federal authority over mining activities allows for the setting of terms and conditions in operating plans in order to minimize impacts to public lands. There are also areas that have been withdrawn from leasing or are administratively unavailable for leasing that would not be impacted by solid mineral development. Currently, there are 57,058 acres on the TRFO that have been withdrawn from leasing. The standards in the LRMP and the withdrawal of areas from leasing minimize the impact of solid mineral development on sensitive plant species.

The number of acres available for solid minerals development varies by approximately 10,000 acres between alternatives. Alternative C has the fewest number of acres open to locatable mineral development and the highest number of acres proposed for withdrawal, and thus would have the least amount of potential impact on sensitive plant species. Alternative B has more acres available for mineral development, and fewer acres proposed for withdrawal as compared to Alternative C. Alternatives A and D have the most acres available for locatable mineral development and do not propose the withdrawal of any additional areas from mineral development, and would therefore have the most potential to impact sensitive plant species. The number of acres currently withdrawn from possible solid mineral development is the same for each alternative.

4.3.4 Oil and Gas Development

Impacts to BLM sensitive plant species and suitable habitat for these species are possible during oil and gas development. The sensitive plant species most likely to be impacted by oil and gas development are those that occur at lower elevations of the TRFO and include Jones' bluestar, Naturita milkvetch, Schmoll's milkvetch, Gypsum Valley cateye, Kachina daisy, Comb Wash buckwheat, Eastwood's monkeyflower, and aromatic Indian breadroot. In areas **already under lease**, but not yet developed, standard lease terms can be used to move the location of a well or access road prior to development to help prevent or minimize impacts to BLM sensitive plant species and their suitable habitat. The standard in the LRMP requiring that activities in shale and gypsum soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species can also be used to condition the approval of development on existing leases. In **new lease** areas, impacts to BLM sensitive plant species and suitable habitat for these species would be minimized by the application of standard lease terms or prevented by the application of special lease stipulations, depending on alternative. Alternative C offers the highest level of protection to sensitive plant species because it is the only alternative that allows the application of an NSO stipulation on lands occupied by sensitive species and within a 325-foot buffer around those lands. Alternative B allows for a CSU stipulation to be applied to new leases. Under Alternatives A and D, only standard lease terms can be applied.

Overall, oil and gas development under the No Leasing Alternative would have the least amount of impact on sensitive plant species since impacts would only occur in areas that are already under lease. Areas not currently under lease would not be impacted under the No Leasing Alternative. In regards to Alternatives A through D, Alternative C would have the least amount of impact on sensitive plant species. Alternative C has the highest number of acres that are withdrawn from leasing or are administratively unavailable for leasing (Table T-17), and the special leasing stipulations available under this alternative offer the highest level of resource protection available to sensitive plant species (Table T-18). Alternative B offers the second highest number of acres withdrawn or unavailable for leasing and the second highest level of protection to sensitive plant species from special leasing stipulations. Alternative A offers the third. Alternative D has the fewest number of acres that are withdrawn from leasing or are administratively unavailable for leasing and the lowest level of protection offered by special leasing stipulations.

Table T.17 Acres Available and Administratively Not Available for Leasing by Alternative (BLM Surface and Subsurface Mineral Estate)

	Alternative A	Alternative B	Alternative C	Alternative D	No Leasing Alternative
Federal mineral acres	823,423	823,423	823,423	823,423	823,423
Acres administratively not available for leasing	62,437	62,570	161,637	56,916	823,423
Acres available for leasing	760,987	760,853	661,786	766,507	0

Table T.18: Special Leasing Stipulations Related to Sensitive Plant Species

Stipulation	Alternative A	Alternative B	Alternative C	Alternative D
Colorado BLM State Director's Sensitive Species	SLT	CSU	NSO	SLT
Special botanical areas	CSU	NSO	NSO	CSU
Lands with slopes of 25 to 35% and shale soils	SLT	CSU	NSO	SLT
Lands with gypsum soils	SLT	CSU	NSO	SLT
NSO = No Surface Occupancy; CSU = Controlled Surface Use; SLT = Standard Lease Terms				

4.3.5 Fire Management

Management-ignited fires, wildfires, and fire suppression would have impacts to terrestrial ecosystems, sensitive plant species, and soils on the TRFO. Prior to Euro-American settlement, fire played an important role in creating and maintaining the vegetation communities in many terrestrial ecosystems, especially ponderosa pine and warm-dry mixed conifer forests. Fire suppression has contributed to the many changes seen in these ecosystems over the past 100 years. The use of management-ignited fires and the appropriate management of naturally ignited wildfires would help to restore the composition and structure of ecosystems and help to maintain or restore the heterogeneous structure and pattern of the vegetation that was present on the TRFO during the reference period, including sensitive plant species. Fire management has the potential to impact all of the sensitive plant species on the TRFO, but none of the habitats in which TRFO sensitive species occur tend to have much active fire management. Project-specific design criteria can be used during project level-planning to help minimize impacts to sensitive plant species at the project level. In addition, there is a standard in the LRMP requiring that projects or activities occurring on shale soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species.

Up to 10,000 acres of the TRFO could be impacts by fires managed for resource benefit under all alternatives (1,000–2,000 acres per year), so the impacts to sensitive plant species would be the same under each alternative.

4.3.6 Timber Harvest and Mechanical Fuels Treatments

Impacts from timber harvest would occur in spruce-fir, aspen, cool-moist mixed conifer, warm-dry mixed conifer, and ponderosa pine forests. Impacts from mechanical fuels treatment are most likely to occur in warm-dry mixed conifer forests, ponderosa pine forests, pinyon-juniper woodlands, and mountain shrublands. These activities may have impacts to sensitive plant species that occur in the habitats where treatments may occur, including Naturita milkvetch, Schmoll's milkvetch, and frosty bladderpod. Project-specific design criteria can be used during project level planning to help minimize impacts to sensitive plant species at the project level. In addition, there is a standard in the LRMP requiring that projects or activities occurring on shale soils occupied by sensitive plant species be designed to maintain the soil characteristics necessary to support and sustain those sensitive plant species.

Timber harvest under Alternative D would impact the vegetation and soils on approximately 3,750 acres of per year, followed by Alternative B at 2,675 acres and Alternative A at 2,650 acres. Alternative C would impact the vegetation and soils on the fewest acres per year (2,165 acres). While Alternatives A, B, and C would impact the vegetation and soils on fewer acres, there would also be less opportunity under these alternatives to use mechanical fuels treatments for ecosystem restoration purposes than under Alternative D.

Mechanical fuels treatments under Alternative D would impact the vegetation and soils on approximately 7,700 acres per year, while Alternatives A, B, and C would each impact approximately 6,700 acres per year. Alternatives A, B, and C would impact the vegetation and soils on fewer acres, but there would be less opportunity under these alternatives to use mechanical fuels treatments for ecosystem restoration purposes than under Alternative D.

4.3.7 Cumulative Impacts

Past management activities (including fire management, timber harvest, mechanical fuels treatments, livestock grazing, oil and gas development, solid minerals development, and recreation) on federal and non-federal lands within the planning area caused impacts to sensitive plant species as described above. Many of the impacts associated with those activities (soils disturbances) have recovered due to restoration efforts and natural processes. Many other adverse impacts (particularly those associated with fire management and livestock grazing) are still evident on the TRFO and would remain evident over the next 15 years. Project designs and the proper implementation of mitigation measures, conditions of approval, stipulations, standards, and guidelines served to protect the composition, structure, and function of sensitive plant species on most past projects.

Additional impacts to sensitive plant species (as described above) on federal and non-federal lands within the planning area would occur from the implementation of management activities in the LRMP and from foreseeable future management activities beyond the 15-year life of the LRMP. Those impacts are anticipated to be localized and would not adversely affect the ecological integrity of most areas and would not adversely affect the diversity or viability of sensitive plant species.

The cumulative impact of past, present, and foreseeable future management activities on federal and non-federal lands within the planning area could cause impacts to sensitive plant species, as described above, on a small percent of the planning area. Those impacts would not adversely affect the diversity or viability of sensitive plant species. Project design, the implementation of standards, guidelines, and stipulations in the LRMP, project-level analysis, and the implementation of mitigation measures at the project level would minimize adverse cumulative impacts to sensitive plant species on federal lands.

4.3.8 Determination Statement

It is the BLM's determination that implementation of any of the alternatives and activities associated with this FEIS **may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing** for the BLM Colorado State Director's sensitive plant species known to occur or likely to occur on the TRFO. This includes *Jones' bluestar, Naturita milkvetch, Schmoll's milkvetch, Gypsum Valley cateye, Kachina daisy, Comb Wash buckwheat, Lone*

Mesa snakeweed, frosty bladderpod, Dolores River skeletonplant, Eastwood's monkeyflower, aromatic Indian breadroot, and *Physaria pulvinata.*

This determination is based on the fact that project-specific standards, guidelines, and additional referenced guidance can be used during project-level planning to help prevent or minimize impacts to sensitive plant species at the project level. In addition, the application of standards and guidelines in the LRMP related to sensitive plant species and their habitat, the application of standard lease stipulations and special lease stipulations such as NSO and CSU, withdrawal of certain areas from leasing for oil and gas development and/or solid mineral development, and the setting of terms and conditions in operating plans for solid mineral development would all help prevent or minimize impacts to sensitive plant species. Effects to sensitive plant species from management activities could occur under all of the alternatives. Since Alternative D proposes the most active management, it has the greatest potential to affect sensitive plant species as described above, compared to the other alternatives. Alternative A has the next highest potential to affect sensitive plant species since it proposes the second most active management, followed by Alternative B. Alternative C has the least potential to affect sensitive plant species as described above, since it proposes the least active management.

5 U.S. FOREST SERVICE FISH BIOLOGICAL EVALUATION AND BUREAU OF LAND MANAGEMENT SENSITIVE FISH SPECIES ANALYSIS

5.1 Habitat Associations

Table T.19 lists the USFS and BLM sensitive fish species evaluated for the SJNF and TRFO.

Table T.19: U.S. Forest Service and Bureau of Land Management Sensitive Species and Habitat Associations for the San Juan National Forest and Tres Rios Field Office

Sensitive Species	Habitat Association or Vegetation Type
Roundtail chub *Gila robusta*	Tributaries of the Colorado and San Juan rivers
Bluehead sucker *Catostomus disobolus*	Tributaries of the Colorado and San Juan rivers
Flannelmouth sucker *Catostomus latipinnis*	Tributaries of the Colorado and San Juan rivers
Colorado River cutthroat trout *Oncorhynchus clarki pleuriticus*	Tributaries of the Colorado and San Juan rivers

5.2 Species Evaluation and Effects

5.2.1 Roundtail Chub (BLM and USFS Sensitive)

Natural History and Background

Distribution

The roundtail chub (*Gila robusta)* is an endemic species to the Colorado River Basin in Colorado and Wyoming (Rees, Ptacek, and Miller 2005). Historically, roundtail chubs were known to commonly occur in most medium-sized to large tributaries of the Upper Colorado River Basin (Holden and Stalnaker 1975; Joseph et al. 1977; Vanicek 1967). Roundtail chubs historically occur in lower-elevation streams, including the Colorado, Dolores, Duchesne, Escalante, Green, Gunnison, Price, San Juan, San Rafael, White, and Yampa Rivers (Bezzerides and Bestgen 2002).

The roundtail chub is not restricted to large rivers within the Colorado River Basin. Populations currently exist in western Colorado and south-central Wyoming. Miller and Rees (2000) described historical and recent accounts of roundtail chub in the mainstream of the San Juan River and various tributaries in the southwestern portion of Colorado and in New Mexico. These tributaries include the Animas, Florida, La Plata, and Mancos Rivers, as well as Navajo Wash (tributary of the Mancos River).

The current distribution of roundtail chub on federal lands in Colorado appears to be very limited. However, the planning area contains a documented population of roundtail chubs in the Dolores River, downstream from McPhee Reservoir. Several roundtail chub populations exist in tributary streams immediately downstream of federal lands in Colorado. These tributary streams include Divide and Rifle Creeks (tributaries to the Colorado River), Elkhead Creek (tributary to the Yampa River), and the Florida, La Plata, and Los Pinos Rivers (San Juan River drainage).

Reason for Concern

Roundtail chubs have been extirpated from 45% of their total historical habitat, especially portions of the Price, San Juan, Gunnison, and Green Rivers (Bezzerides and Bestgen 2002). A decline in populations has been observed in the Animas, Green, Gunnison, Salt, San Juan, White, and Yampa Rivers (Bestgen and Crist 2000; Lentsch et al. 1998; Miller and Rees 2000; Minckley 1973; Platania 1990; Propst and Hobbes 1999; Wheeler 1997).

The decline in roundtail chub populations can be attributed with the construction of dams and reservoirs between the 1930s and 1960s, introduction of non-native fishes, and removal of water from the Colorado River system (Rees, Ptacek, and Miller 2005). Dams, impoundments, and water use practices (e.g., diversion ditches) are probably the major reasons for modified natural river flows and channel characteristics in the both mainstem rivers and tributary streams. Dams on the mainstem rivers have segmented the river system, blocking spawning migrations and changing flows and temperatures (e.g., conversion of warm water habitat to cold water habitat). Other water use and development projects have reduced or eliminated suitable habitat due to water depletions and reduced stream flows. Major changes in species composition have occurred with the introduction of non-native species. The decline of roundtail chub seems related to predation, competition, or other behavioral interactions with non-native fishes. Alterations in the natural fluvial environment from land management activity has exacerbated this problem (USFWS 1995). To minimize land management effects and proactively assist roundtail chub populations, the BLM and USFS have signed the Range-wide Conservation Agreement and Strategy for Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker (Utah Department of Natural Resources 2006).

Life History

Roundtail chubs evolved in the Colorado River Basin below an elevation of approximately 7,500 feet. Most reaches of this system receive heavy sediment loads and high annual peak flows that contrast with low base flows. Little is known about the specific influence of these annual events, but healthy roundtail chub populations have persisted in habitats with a wide range of annual flows, sediment transport, and even sediment deposition, providing that these physical events are associated with a natural flow regime (Rees, Ptacek, and Miller 2005).

Roundtail chubs live in big rivers and tend to occupy slow-moving waters (Woodling 1985). Murky, rather than clear, water is sought (Sigler and Sigler 1996). Roundtail chubs are often found in stream reaches that have a complexity of pool and riffle habitats (Bezzerides and Bestgen 2000). Juveniles and adults are typically found in relatively deep, low-velocity habitats that are often associated with woody debris or other types of cover (Beyers et al. 2001; Bezzerides and Bestgen 2002; McAda et al. 1980; Miller et al. 1995; Vanicek and Kramer 1969). Sigler and Sigler (1996) reported that substrate in roundtail chub habitat may range from rock and gravel to silt and sand. Temperature tolerance of roundtail chub has been reported up to 39 degrees Celsius, but temperature preference ranges between 22 and 24 degrees Celsius (Weitzel 2002).

The life history phases that appear to be most critical for the roundtail chub include spawning, larvae development, and feeding of the young through the first year of life. In most Colorado River tributaries, natural spawning is initiated on the descending limb of the annual hydrograph as water temperatures approach 18 to 20 degrees Celsius (Bezzerides and Bestgen 2002). Spawning occurs from July 1 to September 1, although high-flow water years may suppress temperatures and extend spawning into September. Conversely, during low-flow years when water warms earlier, spawning may occur in late June (USFWS 1995). Depending on water temperature, eggs usually hatch within 4 to 15 days after spawning.

There is a downstream drift of larvae following hatching (Haines and Tyus 1990). Drifting occurs primarily after mid-July and appears to become more frequent as water temperatures initially increase. From late summer through fall, young of the year roundtail chub prefer natural backwater areas of zero to low velocity.

Very little information is available on the influence of turbidity on the sensitive Colorado River fishes. It is assumed that turbidity is important particularly as it affects the interaction between introduced fishes and the endemic Colorado River fishes. Because these endemic fishes have evolved under natural conditions of high turbidity, it is probable high turbidity is important. Reduction of turbidity may enable introduced species to gain a competitive edge, which could further contribute to the decline of roundtail chub (USFWS 1995).

Effects Analysis

Direct/Indirect Effects

LRMP revision activities that could potentially influence the roundtail chub include water use and development projects, livestock grazing, road management and construction, oil and gas leasing and development, mining and mine reclamation, and vegetation management projects.

As previously stated, water diversions and depletions have had the greatest effect on roundtail chubs and other warm water sensitive fish species. Water diversions and depletions occur as a result of municipal and domestic uses, water storage, irrigation, stock ponds, transbasin diversions, snowmaking, and numerous other reasons. The effects from water use and development projects (including diversion ditches, storage reservoirs, pipelines, wells, etc.) are reduced or eliminated stream flows, and reduced or eliminated fishery habitat that is not available for use. Water depletions reduce peak flow and durations. This causes losses of backwater pools for spawning and rearing. It also reduces suspended sediments, which may confer a competitive advantage on non-native species. Additional impacts include increased stream temperatures and reduced dissolved oxygen levels. These effects could be more pronounced during periods of natural cyclic flow reductions (in fall and winter) or during summer months in a drought.

The effects from water use and development projects would likely be adverse to roundtail chubs immediately downstream from these projects found in the Dolores, Mancos, La Plata, Animas, Florida, Los Pinos, and San Juan Rivers or their major tributaries (Navajo Wash for the Mancos River) at the lower elevations of the planning area under all alternatives. The impacts of reduced or eliminated fishery habitat would result from water depletions and reduced stream flows. The impacts are not expected to vary between alternatives since the demand for water use authorizations are driven by proponents rather than by the USFS's and BLM's programs or budgets. Because the effects of water use and development projects are speculative, more precise effects cannot be determined until the location, timing, size, and exact design of the projects are known.

Livestock grazing can degrade in-stream habitat and water quality. Effects generally are increased sedimentation, increased stream temperatures, and fecal/bacteria contamination caused by stream bank trampling, stream widening, and vegetation removal in riparian areas. Use of LRMP standards, guidelines, and additional referenced guidance and referenced documents and manuals should ensure proper rangeland management and minimal effects to fisheries. The effects from livestock grazing and big game use under all alternatives may adversely affect specific individuals but would overall be minor for the populations of the roundtail chub. Because of the lag time to influence existing conditions, Alternative C with its reductions in suitable and available livestock grazing areas may reduce grazing effects on fisheries from the present conditions in the long term but not in the short term. For Alternative D, with its increases in suitable and available livestock grazing areas, grazing may increase effects on these fisheries from the present in the long term but not in the short term. Although there would be localized improvements in grazing management and implementation of rangeland health improvement projects, the impacts of sediment and increased water temperatures on fishery habitat quality should continue.

The effects of roads are primarily through sediment production. Eroded material may be delivered to streams as fine sediment and deposited in channels or transported downstream. The actual amount of sediment from these land-disturbing activities that reaches stream channels or still water bodies would be a result of numerous factors including the location of roads, number of road/stream crossings, slope steepness and length, amount of exposed soil, type of vegetation in the area, frequency and intensity of rainfall, soil type, and the implementation and effectiveness of BMPs. Heavy sediment loads can reduce pool depths, bury stream substrates and spawning gravels, adhere to aquatic insects and the gills of fish, alter channel form and function, and result in other forms of habitat degradation. Improperly placed, shaped, and sized culverts can act as fish barriers on key streams or exacerbate erosion and cause head-cutting. Where sediment production is high in areas of exposed marine shales, elevated salinity levels, over extended periods of time, may become toxic for aquatic ecosystems and fish species.

Small amounts of water are used in road construction and reconstruction, road maintenance, and dust abatement. This water would be obtained from federal and/or private sources. Since this water is connected to a federal action, it is considered a depletion from a major river basin and would require coordination and consultation with the USFWS for threatened and endangered species, under Section 7 of the ESA. Because of miles of roads, these activities are almost entirely confined to NFS lands. For all alternatives, about 9 acre-feet of water in the San Juan River Basin and 6 acre-feet of water in the Dolores River Basin are used on forest lands over a 15-year period for road construction and reconstruction, road maintenance, and dust abatement, excluding road-related activities with gas well drilling and completion.

Generally, the effects from roads may adversely affect specific individuals but overall would be minor for the populations of roundtail chubs found in the Dolores, Mancos, La Plata, Animas, Florida, Los Pinos, and San Juan Rivers and their tributaries at the lower elevations of the SJNF and TRFO under all alternatives. Projects that implement the LRMP requiring new road construction in the Dolores or Mancos River drainages (including the Navajo Wash drainage) could likely result in adverse effects to the roundtail chub because of the salinity issues and higher sediment production from these sensitive watersheds. Again, since the exact details for these projects are unknown presently, the impacts continue to be speculative.

There are indications that oil and gas resource potential may result in leasing and exploration east of Pagosa Springs (in the San Juan Sag area) on national forest lands, and on the BLM portion (especially in the Disappointment Valley, Big Gypsum Valley, and Dry Creek Basin, and along the Dolores River Canyon) and on the national forest portion (especially in the Glade and McPhee Reservoir areas, and along the Dolores River Canyon) of the Paradox Basin. There are two types of possible gas development (i.e., conventional gas and GSGP gas) within the Paradox Basin. Exploration could include 1-2 wildcat wells per year in the San Juan Sag area. For conventional development in the Paradox Basin, 4-7 exploratory gas wells per year may be developed on BLM lands for the 15 year period, and 5-8 wildcat gas wells per year may be developed on national forest lands for the same period. For the GSGP development within the Paradox Basin, exploratory wells are slowly developed for the first 7 years, then accelerated development occurs. For BLM-administered lands, two to three exploratory gas wells per year are constructed for the first 7 years, then nine to 24 gas wells per year are developed for the next 8 years. For NFS lands, six to eight wildcat wells are constructed for the first 7 years, then 37 to 68 gas wells per year are developed for the next 8 years.

In total, approximately 8 to 12 acres per year may be disturbed from well pads and roads on BLM public lands from oil and gas development activity for the first 7 years. For the next 8 years, about 36 to 96 acres per year may be disturbed. For all oil and gas development on NFS lands, approximately 24 to 32 acres per year may be disturbed from well pads and roads for the first 7 years. For the following eight years, about 148 to 272 acres per year may be disturbed. If paying quantities of gas are discovered in the San Juan Sag and Paradox Basin (for both conventional and GSGP gas development), as many as 263 and 611 production wells are projected for BLM lands and NFS lands, respectively.

The potential impacts to roundtail chubs from oil and gas leasing and development would be mainly related to water depletions and some reduced stream flows. This would, subsequently, reduce fishery habitat available for use, increase sediment production, and result in degraded fishery habitat. Other potential effects include salinity and water contamination from petroleum products, drilling mud, and other contaminants. For the San Juan Sag (within the San Juan River Basin), 35 acre-feet of water is projected to be used in well drilling, fracturing, and completion process for unleased mineral estate over the next 15 years for all alternatives.

Substantial quantities of water are projected to be used in the drilling, fracturing, and completion process for both the GSGP and Paradox conventional development (Table T.20). The major river basins affected by the projected development in the Paradox Leasing Analysis Area are the Dolores and San Juan River Basins. GSGP gas wells in the Paradox Basin would use approximately 7.9 to 13.1 acre-feet of water per well in the drilling and completion process. This level of water consumption is six to 11 times the amount of water used to drill and complete a conventional gas well and 11 to 18 times the amount of water used to drill and complete a coalbed methane (CBM) gas well. Paradox conventional gas wells would use 3.3

acre-feet of water per well in the drilling and completion process. This level of water use is 2.5 times the amount of water used to drill and complete other conventional wells and five times the amount of water used to drill and complete a CBM well.

Table T.20: Projected Water Used in Well Drilling, Fracturing, and Completion (acre-feet) for Leased and Unleased GSGP and Paradox Conventional Gas Wells over a Period of 15 Years for National Forest System and Bureau of Land Management Lands by Alternative

Jurisdiction	Alternative A	Alternative B	Alternative C	Alternative D	No Leasing Alternative
USFS - leased and unleased GSGP and Paradox conventional	5,311	5,032	4,556	5,300	832
BLM - leased and unleased GSGP and Paradox conventional	4,265	3,726	3,593	4,107	2,480
Total	**9,576**	**8,758**	**8,149**	**9,407**	**3,312**

It is assumed that all water associated with GSGP and Paradox conventional gas development and production would be purchased and trucked into the project area, as the water would not be obtained from water sources on public land. The sources of this private water are unknown, but would occur within the San Juan and Dolores River Basins. Since this water is connected to a federal action, it is considered a depletion from a major river basin and would require preparation of a biological assessment and coordination and consultation with the USFWS for threatened and endangered species, under Section 7 of the ESA (Tables T.21and T.22; and see Appendix J).

Water can also be depleted during gas field production. For the GSGP and Paradox conventional wells, small quantities of water are produced or pumped from the gas producing formation(s) in order to release the pressure on the gas tied-up in the seam and allow it to flow. In some cases, as wells are drilled and the formation(s) fractured, groundwater may be connected to surface water streams. With the large number of gas wells proposed in the GSGP and Paradox conventional development (see Table T.21 and Table T.22), the amount of produced water removed may reduce some stream flows in stream systems with warm water sensitive fisheries or tributary to downstream sensitive fishery streams. Because of difficulties in quantifying effects on stream flow, water depleted due to gas field production was not estimated for the GSGP and Paradox conventional wells.

Table T.21: Projected Number of Gas Wells and Water Used in Well Drilling, Fracturing, and Completion (acre-feet) for Leased and Unleased Gothic Shale Gas Play and Paradox Conventional Gas Wells over a Period of 15 Years by Major River Basin for National Forest System and Bureau of Land Management Lands under Alternative A

	Future Leases		Existing Leases	
	Dolores River Basin	**San Juan River Basin**	**Dolores River Basin**	**San Juan River Basin**
USFS				
Number of wells	562	24	101	not applicable
Water used (acre-feet)	4,262	216	832	not applicable
BLM				
Number of wells	229	34	326	25
Water Used (acre-feet)	1,490	296	2,256	224
Grand Total of Water Used (acre-feet)	**5,752**	**512**	**3,088**	**224**

Table T.22: Projected Number of Gas Wells and Water Used in Well Drilling, Fracturing, and Completion (acre-feet) for Leased and Unleased Gothic Shale Gas Play and Paradox Conventional Gas Wells over a Period of 15 Years by Major River Basin for National Forest System and Bureau of Land Management Lands under Alternative C

	Future Leases		Existing Leases	
	Dolores River Basin	San Juan River Basin	Dolores River Basin	San Juan River Basin
USFS				
Number of wells	460	20	101	not applicable
Water used (acre-feet)	3,539	185	832	not applicable
BLM				
Number of wells	147	20	326	25
Water Used (acre-feet)	928	185	2,256	224
Grand Total of Water Used (acre-feet)	**4,467**	**370**	**3,088**	**224**

Decreased stream flows may impact roundtail chub populations by reducing or eliminating both the extent and quality of suitable habitat by increasing stream temperatures and, subsequently, reducing dissolved oxygen levels. Such impacts may be more pronounced during periods of natural cyclic flow reductions during fall and winter or during summer months during periods of drought. A loss of stream flow can also reduce a stream's ability to transport sediment downstream and result in increased deposition which, in turn, can impact the numbers and diversity of benthic macro invertebrates and ultimately, aquatic habitat.

Clearing of drill pads and roads and their continued use can expose soil to both wind and water erosion. Given the number of well pads and roads projected in the Paradox Leasing Analysis Area, consequential sedimentation of streams and still water bodies has the potential to impact fishery and aquatic resources (Table T.23). These impacts may be more pronounced in the Paradox Basin because of the number of sensitive watersheds with sediment and salinity concerns that may be upstream of roundtail chubs. Eroded material may be delivered to streams as fine sediment and deposited in channels or transported downstream. The actual amount of sediment from these land-disturbing activities that reaches stream channels or still water bodies would be a result of numerous factors including the location of roads, number of road/stream crossings, slope steepness and length, amount of exposed soil, type of vegetation in the area, frequency and intensity of rainfall, soil type, and the implementation and effectiveness of BMPs. A typical concern with sedimentation is that sediment loads, above background levels, can reduce pool depths, bury stream substrates and spawning gravels, adhere to aquatic insects and the gills of fish, alter channel form and function, and result in other forms of habitat degradation. Where sediment production is high in areas of exposed marine shales, elevated salinity levels, over extended periods of time, may become toxic for aquatic ecosystems and fish species.

Table T.23: Projected Surface Disturbance (acres) for Leased and Unleased Gothic Shale Gas Play and Paradox Conventional Gas Well Development over a Period of 15 Years for National Forest System and Bureau of Land Management Lands by Alternative

Jurisdiction	Alternative A	Alternative B	Alternative C	Alternative D	No Leasing Alternative
USFS - leased and unleased GSGP and Paradox conventional	3,570	3,395	2,770	3,555	530
BLM - leased and unleased GSGP and Paradox conventional	3,070	2,688	2,590	2,920	1,780
Total	**6,640**	**6,083**	**5,360**	**6,475**	**2,310**

LRMP direction addresses potential aquatic impacts from surface disturbance. Where gas facilities are developed within the Paradox Basin, soil erosion and sediment deposition, and corresponding potential to impact aquatic and riparian habitat would be limited by implementing lease stipulations that require avoidance of sensitive, erosion prone areas, and riparian areas, secondly by using standards and guidelines in the LRMP, and thirdly by the application of BMPs. Some of these BMPs may include, for example, graveling road surfaces to avoid dust and loss of soil to wind erosion, revegetating or covering any soil stockpiles that would remain for extended periods to avoid significant wind and water erosion, installing slope breaks and silt fences on slopes to slow and filter storm water runoff that might carry exposed soils to surface water drainages, timely reclaiming disturbed areas to minimize erosion after construction of facilities, and avoiding locations having highly erosive soils where possible. Non-productive wells would also be immediately reclaimed. The applicable lease stipulations to protect aquatic ecosystems and fish species are listed in Table T.24.

Table T.24: Lease Stipulations that pertain to the Aquatic Ecosystem and Fish Species as Applied by Alternative (See Appendix H Leasing Stipulation for full description of stipulations and where they apply.)

Fisheries	Alt A	Alt B	Alt C	Alt D
Perennial streams, water bodies, riparian areas, and fens: Prohibit surface occupancy and surface-disturbing activities within a minimum buffer distance of 325 horizontal feet for all perennial waters.	NSO	NSO	NSO	CSU
Perennial streams, water bodies, riparian areas, and fens: From 325 to 500 horizontal feet from the perennial water body, CSU restrictions would apply.	CSU	CSU	CSU	SLT
Reservoirs and lakes: For reservoirs and lakes 1 acre or larger as measured by the high water mark, no surface occupancy would be allowed within 0.25 mile of the high water shoreline.	NSO	NSO	NSO	CSU
Colorado River cutthroat trout (sensitive species): Within 0.25 mile of streams occupied by conservation populations of Colorado River cutthroat trout or streams that have been identified as reintroduction sites for Colorado River cutthroat trout.	NSO	NSO	NSO	CSU
Greenback cutthroat trout (threatened species): Within 0.5 mile of streams occupied by existing populations of greenback cutthroat trout.	NSO	NSO	NSO	NSO
NSO = No Surface Occupancy; CSU = Controlled Surface Use; SLT = Standard Lease Terms				

Another potential impact to fisheries from the projected gas development and production would be the potential for various chemical leaks and spills. This is mitigated through the use of BMPs that apply to well drilling operation maintenance and material handling.

In regard to air quality, the effects on roundtail chubs would be negligible over the life of the LRMP. The air analysis was focused on the entire planning area, not just the Paradox Leasing Analysis Area. It is a modeling effort with many assumptions, including a gas development scenario as depicted in the RFD scenario. The potential impacts of nitrogen loading or sulfur dioxide deposition to lakes, streams, and the aquatic ecosystems and fish species would be a very slow and prolonged process. It would be very difficult to detect any measureable effects on aquatic ecosystems well beyond the life of the LRMP.

The effects of oil and gas leasing and development would range from highest in Alternative A, to Alternatives D, B, and C, in descending order, and could likely be adverse to the roundtail chub downstream from this activity found in the Dolores, Mancos, La Plata, Animas, Florida, Los Pinos, and San Juan Rivers or their tributaries (Navajo Wash for the Mancos River) at the lower elevations of the SJNF and TRFO. The impacts are mainly due to water depletion and reduced stream flows over time and subsequently reduced fishery habitat available for use. Since the effects from oil and gas development are speculative, more precise effects cannot be determined until the location, timing, size, and exact design of the projects are known. There would be concerns for new oil and gas development in the Dolores or Mancos River watersheds (including the Navajo Wash drainage) with salinity issues, high road densities, or sensitive to disturbance (e.g., degraded fishery habitat). If no new leases were made available, the impacts on the roundtail chub would be as a result of existing leases only.

Mining activities on the SJNF and TRFO may include suction dredging, gravel mining operations, hard rock mining, uranium and vanadium mining, and recreational gold panning. LRMP Chapter 2 displays the potential acreage of disturbance per year from these activities. The impacts to roundtail chubs from mining or mining reclamation would be mainly due to erosion and sediment impacts (e.g., degraded fishery habitat), saline runoff or heavy metal loading of streams (e.g., toxic levels for aquatic species), and/or altered stream channels and associated fishery habitat.

Generally, the effects related to mining and mining reclamation would be similar under all alternatives and may adversely affect specific individuals but would overall be minor for the populations of roundtail chub found in the La Plata, Animas, Florida, Los Pinos, and San Juan Rivers at the lower elevations of the SJNF and TRFO. Specific uranium and vanadium mining projects in the Dolores or Mancos River drainages (including the Navajo Wash drainage) under all alternatives with salinity issues, high road densities, or sensitive to disturbance would likely result in minor adverse effects to the roundtail chub because of populations in other unaffected drainages. Again, since the exact details for these projects are unknown presently, the impacts continue to be speculative.

The effects from vegetation management (timber harvesting, mechanical fuels reduction, rangeland treatments, prescribed burns, etc.) may adversely affect specific individuals but would overall be minor for the population of roundtail chubs. Since all alternatives have generally the same levels of timber harvest, hazardous fuels treatment, etc. (only 1,800 acres separate Alternative D with the greatest levels of harvest and Alternative C with the least amount of vegetation treatment), the effects would be nearly the same for all alternatives. Again, the impacts are driven by sediment and stream temperature influences on fishery habitat quality.

Cumulative Impacts

Roundtail chubs are BLM and USFS sensitive species as a result of past cumulative effects, locally and regionally, including introduction of non-native species. For all alternatives, the primary adverse cumulative effects on this warm water species, found in the Dolores, Mancos, La Plata, Animas, Florida, Los Pinos, and San Juan Rivers and their tributaries (Navajo Wash for the Mancos River) at the lower elevations of the SJNF and TRFO, presently, would occur from activities that lead to additional water depletions and reduced stream flows (i.e., reduced or eliminated fishery habitat that is available for use). Again, these activities would mainly be water use and development projects on or off the SJNF and TRFO, or oil and gas development from current leases and projected new leases on or off the SJNF and TRFO. The demands for water use and development projects are difficult to analysis because they are driven by proponents rather than by USFS's and BLM's programs or budgets. Because of heightened concerns about sediment and salinity inputs and downstream effects on fishery habitat quality, ground-disturbing activities (new road construction, uranium and vanadium mining, etc.) in the Dolores or Mancos river watersheds (including the Navajo Wash drainage) may also adversely affect the roundtail chub. However, since the exact details for these projects and activities in the Dolores or Mancos River watersheds are unknown presently, the impacts continue to be speculative.

Gas development on private and state mineral estate development may add an additional 810 wells to those projected for development on federal mineral estate in the Paradox Leasing Analysis Area. These private and state well numbers equate to 6,540 acre-feet and 166 acre-feet of water used for drilling, fracturing, and completion for the GSGP gas development and Paradox conventional gas development, respectively. For the San Juan Sag (within the San Juan River Basin), existing leases on NFS lands are estimated to have used 7 acre-feet for well drilling and completion. Existing leases for the San Juan Basin CBM and conventional gas wells are estimated to have used 160 and 14 acre-feet of water, respectively, for BLM lands, and 487 and 42 acre-feet of water, respectively, for NFS lands. Private and state mineral estate development may use an additional 722 acre-feet of water for CBM gas wells in the San Juan Basin. The water usage estimates for the above San Juan Basin CBM gas wells (all ownerships) also includes gas production-induced depletions of river and stream flow.

Water is produced in conjunction with the production of CBM gas in the Northern San Juan Basin. Within the Basin in Colorado, there are concerns that the removal of water from the tributary Fruitland – Pictured Cliffs aquifer may result in stream depletions that impact downstream water users and fisheries. These concerns have prompted four studies spanning 2000 to 2009 which quantify groundwater/surface water impacts and their interactions.

Our RFD scenario for CBM in the Northern San Juan Basin includes 450 wells to be developed at 80-acre spacing on existing leases. On BLM lands for infill CBM development and production, about 103 acre-feet of water would be needed for well drilling and completion and water depletion from intercepted groundwater potentially bound for streams and river over the next 15 years. On NFS lands, approximately 241 acre-feet of water would be needed for well drilling and completion and water depletion from intercepted groundwater potentially bound for streams and rivers over the next 15 years, due to infill CBM development and production. Private and state mineral estate development may use an additional 516 acre-feet of water over the next 15 years for infill CBM development and production.

Future development in the Northern San Juan Basin would occur on existing oil and gas leases, most of which have already been developed. The decision as to whether the existing lease can be developed is a function of project-level decision-making and subject to the rights granted by the associated leases. Consequently, federal lease development in the Northern San Juan Basin is not considered a direct effect of the LRMP decisions, but is considered in cumulative effects analysis.

It is likely there would be cumulative effects from as many as 3,900 new gas wells drilled on or adjacent to the SJNF and TRFO over the next planning period. In addition to an estimated 875 new wells that may be drilled on new leases on federal lands (discussed under Direct/Indirect Effects), there could be as many as 450 new infill gas wells drilled in the Northern San Juan Basin, 800 to 1,000 new wells drilled on the Southern Ute Indian Tribal lands adjacent to the planning area, and 1,600 new wells on previously leased land in the Paradox Basin and Northern San Juan Basin. The RFD projected wells would require new roads, pipelines, and associated disturbance for gas well construction. Consequently, oil and gas development may have large potential to have substantial cumulative effects when compared to all other activities that affect the SJNF and TRFO. The magnitude of new road/pipeline construction and other disturbances would vary only slightly by alternative.

Determination

All LRMP revision alternatives, including Alternative A, may adversely impact individuals (roundtail chubs), but would not likely result in a loss of population viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide. The rationale for this determination is as follows:

- Within the planning area, roundtail chubs are found only in the lower Dolores River downstream of McPhee Reservoir. Flows in the lower Dolores River are dictated by McPhee Reservoir releases per U.S. Bureau of Reclamation operations. While water depleting activities occurring upstream of the reservoir on NFS lands may have a minor effect on reservoir storage, they would not be significant relative to the major consumptive uses related to McPhee Reservoir operations.
- Although the roundtail chub distribution and abundance have diminished, they still occupy a wide geographic area and range of locations outside the planning area.
- Through the desired conditions, objectives, standards, and guidelines, leasing stipulations, BLM and USFS manuals and handbooks, and BMPs, the effects of BLM and USFS actions to the roundtail chub would be minimized.
- The SJNF and TRFO would continue to work cooperatively with CPW to develop proactive management programs to reduce adverse effects to the roundtail chub and other warm water sensitive fish species.

5.2.2 Flannelmouth Sucker (BLM and USFS Sensitive)

Natural History and Background

Distribution

The flannelmouth sucker (*Catostomus latipinnis*) is endemic to the Colorado River Basin (Rees, Ptacek, Carr, and Miller 2005). Historically, the flannelmouth sucker was commonly found in most, if not all, medium-sized to large lower-elevation rivers of the Upper Colorado River drainage (upstream of Glen Canyon Dam). It was found in similar habitats of the Lower Colorado River drainage (downstream of Glen Canyon Dam), but in lesser numbers (Joseph et al. 1977). Although this species is typically associated with large rivers, it also occurs in smaller tributaries and occasionally in lakes and reservoirs (Bezzerides and Bestgen 2002).

The flannelmouth sucker is still widely distributed in medium-sized to large streams in the Upper Colorado River Basin, which includes the mainstream of the Colorado River, numerous tributaries that drain a large portion of Colorado, Wyoming, and Utah, and the San Juan River drainage in New Mexico (Holden and Stalnaker 1975). However, in many areas of the upper basin, populations are thought to be decreasing (Sigler and Sigler 1996).

Within Colorado, flannelmouth suckers are currently present in streams and rivers that are not heavily impacted by impoundments or habitat degradation. Flannelmouth suckers have been reported from the San Juan River and the following tributaries that occur in the southern portion of Colorado: Animas, Florida, La Plata, Los Pinos, Mancos, Navajo, and Piedra Rivers, as well as McElmo Creek (Miller and Rees 2000; Miller et al. 1995; Whiteman 2000). Some of these tributaries are located on the SJNF and TRFO. The distribution parallels that of the bluehead suckers and they are often found together; however the flannelmouth sucker is not as common as the bluehead sucker (*Catostomus discobolus*) on NFS and BLM lands. Available data provided by Miller and Rees (2000) suggested that the range of flannelmouth suckers in the Piedra and San Juan Rivers (and possibly other tributaries) included lower reaches in the planning area. The flannelmouth sucker is known to occur on the SJNF and TRFO of the upper San Juan River, Piedra River, Animas River, Dolores River, Disappointment Creek, McElmo Creek, and Yellowjacket Canyon (Japhet, CPW, Senior Aquatic Biologist for the Southwest District, personal communication with Dave Gerhardt, 2006, Nickell, BLM, Wildlife Biologist for TRFO, personal communication with Mike Johnson, 2008). Occurrence on NFS lands of the Piedra River is unlikely, but it is known to occur in the Piedra River downstream of NFS lands.

Reason for Concern

Flannelmouth sucker populations have declined in abundance and distribution throughout their historic range (Bezzerides and Bestgen 2002; Weitzel 2002). Most of the decline has been attributed to construction of dams and reservoirs, activities that have diverted water or changed the natural regime in both tributary and mainstem streams and rivers, and introduction of non-native fish species (Rees, Ptacek, Carr, and Miller 2005). Dams on the mainstem Colorado River and its main tributaries have segmented the river system, blocking spawning migrations, altered channel geomorphology, and changed flows and temperatures (e.g., conversion of warm water habitat to cold water habitat from hypolimnetic releases below dams). Other water use and development projects (e.g., diversion ditches, etc.) have reduced or eliminated suitable habitat due to water depletions and reduced stream flows. Major changes in species composition have occurred with the introduction of non-native species, especially the flannelmouth sucker. The decline of flannelmouth sucker seems related to predation, competition, hybridization, or other behavioral interactions with non-native fishes.

At present, there is concern regarding the status of flannelmouth sucker in the Colorado River drainage (Rees, Ptacek, Carr, and Miller 2005). Although the specific mechanisms of most threats to this species are poorly understood, the flannelmouth sucker appears to be vulnerable throughout its range in the Upper Colorado River Basin due to the combined impacts of habitat loss, habitat degradation, habitat fragmentation, and interactions with non-native species. Of the three warm water sensitive species found on the SJNF and TRFO, the flannelmouth sucker appears at as great of risk as the bluehead sucker from present water developments, water diversions, or drought effects. To minimize land management effects and proactively assist flannelmouth sucker populations, the BLM and USFS have signed the Range-wide Conservation Agreement and Strategy for Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker (Utah Department of Natural Resources 2006).

Life History

The flannelmouth sucker is considered a "big river" fish, preferring deeper, high-gradient riffles and clean substrates. Flannelmouth suckers are typically found in slower, warmer rivers of the Colorado River drainage (Deacon and Mize 1997). They usually inhabit the mainstem of moderate to large rivers but are occasionally found in small streams (Rees, Ptacek, Carr, and Miller 2005). This species frequents pools and deep runs but can also be found in the mouths of tributaries, riffles, and backwaters. Flannelmouth suckers are occasionally found in lakes or reservoirs, but they generally react poorly to impounded habitats or habitats influenced by impoundments (Chart and Bergersen 1992; Minckley 1973).

Juvenile and adult flannelmouth suckers utilize most habitats and can be considered a habitat generalist. Juveniles and adults are most often found using run, pool, and eddy habitats (Joseph et al. 1977; McAda 1977; Tyus et al. 1982). This species appears to prefer temperatures around 25 degrees Celsius (Sublette et al. 1990).

Flannelmouth sucker typically spawn in the Upper Colorado River Basin between April and June (McAda 1977; McAda and Wydoski 1985; Snyder and Muth 1990; Tyus and Karp 1990). Otis (1994) reports that spawning occurs at water temperatures ranging from 12 to 15 degrees Celsius and that flannelmouth suckers in the Lower Colorado River Basin spawn 6 to 8 weeks earlier than those in the upper basin. Flannelmouth spawning aggregations have been observed in tributaries of the Lower Colorado River in glides or slow riffles, over medium-coarse gravel substrate (Otis 1994; Weiss 1993).

There is downstream drift of larvae following hatching (Bezzerides and Bestgen 2002). Carter et al. (1986) and Robinson et al. (1998) suggest that larvae have the ability to actively enter and escape the draft. The draft mechanism likely accomplishes population dispersal and location of suitable larval habitat.

Hybridization between flannelmouth suckers and other species is a common occurrence throughout the range of the species. Flannelmouth sucker are known to hybridize with the following species of suckers: mountain (*C. platyrhynchus*), bluehead, desert (*C. clarki*), razorback (*Xyrauchen texanus*), and the introduced white suckers (*C. commersonii*) (Bezzerides and Bestgen 2002). The most common, and perhaps the most detrimental, instance of hybridization occurs with the non-native white sucker. Also introduced white suckers compete with flannelmouth suckers for food resources.

Very little information is available on the influence of turbidity on the sensitive Colorado River fishes. It is assumed that turbidity is important particularly as it affects the interaction between introduced fishes and the endemic Colorado River fishes. Because these endemic fishes have evolved under natural conditions of high turbidity, it is probable high turbidity is important. Reduction of turbidity may enable introduced species to gain a competitive edge, which could further contribute to the decline of flannelmouth sucker (USFWS 1995).

Effects Analysis

Direct/Indirect Effects

LRMP revision activities that could potentially influence the flannelmouth sucker include water use and development projects, livestock grazing, road management and construction, oil and gas leasing and development, mining and mine reclamation, and vegetation management projects.

As previously stated, water diversions and depletions have had the greatest effect on flannelmouth suckers and other warm water sensitive fish species. Water diversions and depletions occur as a result of municipal and domestic uses, water storage, irrigation, stock ponds, transbasin diversions, snowmaking, and numerous other reasons. The effects from water use and development projects (including diversion ditches, storage reservoirs, pipelines, wells, etc.) are reduced or eliminated stream flows, and reduced or eliminated fishery habitat that is not available for use. Water depletions reduce peak flow and durations.

This causes losses of backwater pools for spawning and rearing. It also reduces suspended sediments which may confer a competitive advantage on non-native species. Additional impacts include increased stream temperatures and reduced dissolved oxygen levels. These effects could be more pronounced during periods of natural cyclic flow reductions (in fall and winter) or during summer months in a drought.

The effects from water use and development projects would likely be adverse to flannelmouth suckers immediately downstream from these projects found in the Dolores, Mancos, La Plata, Animas, Florida, Los Pinos, Piedra, San Juan, and Navajo Rivers or their major tributaries, as well as McElmo Canyon, Disappointment Creek, and Yellowjacket Canyon at the lower elevations of the SJNF and TRFO under all alternatives. The impacts of reduced or eliminated fishery habitat would result from water depletions and reduced stream flows. The impacts are not expected to vary between alternatives since the demand for water use authorizations are driven by proponents rather than by the USFS's and BLM's programs or budgets. Because the effects of water use and development projects are speculative, more precise effects cannot be determined until the location, timing, size, and exact design of the projects are known.

Livestock grazing can degrade in-stream habitat and water quality. Effects generally are increased sedimentation, increased stream temperatures, and fecal/bacteria contamination caused by stream bank trampling, stream widening, and vegetation removal in riparian areas. Use of LRMP standards, guidelines, additional referenced guidance, and manuals should ensure proper rangeland management and minimal effects to fisheries. The effects from livestock grazing and big game use under all alternatives may adversely affect specific individuals but would overall be minor for the populations of the flannelmouth sucker. Because of the lag time to influence existing conditions, Alternative C with its reductions in suitable and available livestock grazing areas may reduce grazing effects on fisheries from the present conditions in the long term but not in the short term. For Alternative D with its increases in suitable and available livestock grazing areas, grazing may increase effects on these fisheries from the present in the long term but not in the short term. Although there would be localized improvements in grazing management and implementation of rangeland health improvement projects, the impacts of sediment and increased water temperatures on fishery habitat quality should continue.

The effects of roads are primarily through sediment production. Eroded material may be delivered to streams as fine sediment and deposited in channels or transported downstream. The actual amount of sediment from these land-disturbing activities that reaches stream channels or still water bodies would be a result of numerous factors, including the location of roads, number of road/stream crossings, slope steepness and length, amount of exposed soil, type of vegetation in the area, frequency and intensity of rainfall, soil type, and the implementation and effectiveness of BMPs. Heavy sediment loads can reduce pool depths, bury stream substrates and spawning gravels, adhere to aquatic insects and the gills of fish, alter channel form and function, and result in other forms of habitat degradation. Improperly placed, shaped, and sized culverts can act as fish barriers on key streams or exacerbate erosion and cause head-cutting. Where sediment production is high in areas of exposed marine shales, elevated salinity levels, over extended periods of time, may become toxic for aquatic ecosystems and fish species.

Small amounts of water are used in road construction and reconstruction, road maintenance, and dust abatement. This water would be obtained from federal and/or private sources. Since this water is connected to a federal action, it is considered a depletion from a major river basin, and would require preparation of a biological assessment and coordination and consultation with the USFWS for threatened and endangered species, under Section 7 of the ESA. Because of miles of roads, these activities are almost entirely confined to NFS lands. For all alternatives, about 9 acre-feet of water in the San Juan River Basin and 6 acre-feet of water in the Dolores River Basin are used on NFS lands over a 15-year period for road construction and reconstruction, road maintenance, and dust abatement, excluding road-related activities with gas well drilling and completion.

Generally, the effects from roads may adversely affect specific individuals but overall would be minor for the populations of flannelmouth suckers found in the La Plata, Animas, Florida, Los Pinos, Piedra, San Juan, and Navajo Rivers and their tributaries at the lower elevations of the SJNF and TRFO under all alternatives. Projects that implement the LRMP requiring new road construction in the Dolores or Mancos river drainages, or within the McElmo Creek or Disappointment Creek watersheds could likely result in adverse effects to the flannelmouth sucker because of the salinity issues and higher sediment production from these sensitive watersheds. Again, since the exact details for these projects are unknown presently, the impacts continue to be speculative.

There are indications that oil and gas resource potential may result in leasing and exploration east of Pagosa Springs (in the San Juan Sag area) on NFS lands, and on the BLM portion (especially in the Disappointment Valley, Big Gypsum Valley, and Dry Creek Basin, and along the Dolores River Canyon) and the NFS portion (especially in the Glade and McPhee Reservoir areas, and along the Dolores River Canyon) of the Paradox Basin. There are two types of possible gas development (i.e., conventional and GSGP gas) within the Paradox Basin. Exploration could include one to two wildcat wells per year in the San Juan Sag area. For conventional development in the Paradox Basin, four to seven exploratory gas wells per year may be developed on BLM lands for the 15-year period, and five to eight wildcat gas wells per year may be developed on NFS lands for the same period. For the GSGP development within the Paradox Basin, exploratory wells are slowly developed for the first 7 years, then accelerated development occurs. For BLM lands, two to three exploratory gas wells per year are constructed for the first 7 years, then nine to 24 gas wells per year are developed for the next 8 years. For NFS lands, six to eight wildcat wells are constructed for the first 7 years, then 37 to 68 gas wells per year are developed for the next 8 years.

In total, approximately 8 to 12 acres per year may be disturbed from well pads and roads on BLM public lands from oil and gas development activity for the first 7 years. For the next 8 years, about 36 to 96 acres per year may be disturbed. For all oil and gas development on NFS lands, approximately 24 to 32 acres per year may be disturbed from well pads and roads for the first 7 years. For the following 8 years, about 148 to 272 acres per year may be disturbed. If paying quantities of gas are discovered in the San Juan Sag and Paradox Basin (for both conventional and GSGP gas development), as many as 263 and 611 production wells are projected for BLM lands and NFS lands, respectively.

The potential impacts to flannelmouth suckers from oil and gas leasing and development would be mainly related to water depletions and some reduced stream flows. This would, subsequently, reduce fishery habitat available for use, increase sediment production, and result in degraded fishery habitat. Other potential effects include salinity and water contamination from petroleum products, drilling mud, and other contaminants. For the San Juan Sag (within the San Juan River Basin), 35 acre-feet of water is projected to be used in well drilling, fracturing, and completion process for unleased mineral estate over the next 15 years for all alternatives.

Substantial quantities of water are projected to be used in the drilling, fracturing, and completion process for both the GSGP and Paradox conventional development (see Table T.20 above). The major river basins affected by the projected development in the Paradox Leasing Analysis Area are the Dolores and San Juan River Basins. GSGP gas wells in the Paradox Basin would use approximately 7.9 to 13.1 acre-feet of water per well in the drilling and completion process. This level of water consumption is six to 11 times the amount of water used to drill and complete a conventional gas well and 11 to 18 times the amount of water used to drill and complete a CBM gas well. Paradox conventional gas wells would use 3.3 acre-feet of water per well in the drilling and completion process. This level of water use is 2.5 times the amount of water used to drill and complete other conventional wells and five times the amount of water used to drill and complete a CBM well.

It is assumed that all water associated with GSGP and Paradox conventional gas development and production would be purchased and trucked into the project area, as the water would not be obtained from water sources on public land. The sources of this private water are unknown, but would occur within the San Juan River Basin and Dolores River Basin. Since this water is connected to a federal action, it is considered a depletion from a major river basin, and would require preparation of a biological assessment and coordination and consultation with the USFWS for threatened and endangered species, under Section 7 of the ESA (see Tables T.21 and T.22 above; and see Appendix J).

Water can also be depleted during gas field production. For the GSGP and Paradox conventional, small quantities of water are produced or pumped from the gas producing formation(s) in order to release the pressure on the gas tied-up in the seam and allow it to flow. In some cases as wells are drilled and the formation(s) fractured, groundwater may be connected to surface water streams. With the large number of gas wells proposed in the GSGP and Paradox conventional development (see Tables T.21 and T.22

above), the amount of produced water removed may reduce some stream flows in stream systems with warm water sensitive fisheries or tributary to downstream sensitive fishery streams. Because of difficulties in quantifying effects on stream flow, water depleted due to gas field production was not estimated for GSGP and Paradox conventional wells.

Decreased stream flows may impact flannelmouth sucker populations by reducing or eliminating both the extent and quality of suitable habitat by increasing stream temperatures and, subsequently, reducing dissolved oxygen levels. Such impacts may be more pronounced during periods of natural cyclic flow reductions during fall and winter or during summer months during periods of drought. A loss of stream flow can also reduce a stream's ability to transport sediment downstream and result in increased deposition which, in turn, can impact the numbers and diversity of benthic macro invertebrates and ultimately, aquatic habitat.

Clearing of drill pads and roads and their continued use can expose soil to both wind and water erosion. Given the number of well pads and roads projected in the Paradox Leasing Analysis Area, consequential sedimentation of streams and still water bodies has the potential to impact fishery and aquatic resources (see Table T.23 above). These impacts may be more pronounced in the Paradox Basin because of the number of sensitive watersheds with sediment and salinity concerns that may be upstream of flannelmouth suckers. Eroded material may be delivered to streams as fine sediment and deposited in channels or transported downstream. The actual amount of sediment from these land-disturbing activities that reaches stream channels or still water bodies would be a result of numerous factors including the location of roads, number of road/stream crossings, slope steepness and length, amount of exposed soil, type of vegetation in the area, frequency and intensity of rainfall, soil type, and the implementation and effectiveness of BMPs. A typical concern with sedimentation is that sediment loads, above background levels, can reduce pool depths, bury stream substrates and spawning gravels, adhere to aquatic insects and the gills of fish, alter channel form and function, and result in other forms of habitat degradation. Where sediment production is high in areas of exposed marine shales, elevated salinity levels, over extended periods of time, may become toxic for aquatic ecosystems and fish species.

LRMP direction addresses potential aquatic impacts from surface disturbance. Where gas facilities are developed within the Paradox Basin, soil erosion and sediment deposition, and corresponding potential to impact aquatic and riparian habitat, would be limited by implementing lease stipulations that require avoidance of sensitive, erosion-prone areas and riparian areas, secondly by using standards and guidelines (see the LRMP), and thirdly by the application of BMPs. Some of these BMPs may include, for example, graveling road surfaces to avoid dust and loss of soil to wind erosion, revegetating or covering any soil stockpiles that would remain for extended periods to avoid significant wind and water erosion, installing slope breaks and silt fences on slopes to slow and filter storm water runoff that might carry exposed soils to surface water drainages, timely reclaiming disturbed areas to minimize erosion after construction of facilities, and avoiding locations having highly erosive soils where possible. Non-productive wells would also be immediately reclaimed. The applicable lease stipulations to protect aquatic ecosystems and fish species are listed in Table T.24.

Another potential impact to fisheries from the projected gas development and production would be the potential for various chemical leaks and spills. This impact is mitigated through the use of BMPs that apply to well drilling operation maintenance and material handling.

In regard to air quality, the effects on flannelmouth suckers would be negligible over the life of the LRMP. The air analysis was focused on the entire planning area, not just the Paradox Leasing Analysis Area. It is a modeling effort with many assumptions, including a gas development scenario as depicted in the RFD scenario. The potential impacts of nitrogen loading or sulfur dioxide deposition to lakes, streams, and the aquatic ecosystems and fish species would be a very slow and prolonged process. It would be very difficult to detect any measureable effects on aquatic ecosystems well beyond the life of the LRMP.

The effects of oil and gas leasing and development would range from highest in Alternative A, to Alternatives D, B, and C, in descending order, and could likely be adverse to the flannelmouth sucker downstream from this activity found in the Dolores, Mancos, La Plata, Animas, Florida, Los Pinos, Piedra, San Juan, and Navajo Rivers or their tributaries, or in McElmo Creek, Disappointment Creek, or

Yellowjacket Canyon at the lower elevations of the SJNF and TRFO. The impacts are mainly due to water depletion and reduced stream flows over time and subsequently reduced fishery habitat available for use. Since the effects from oil and gas development are speculative, more precise effects cannot be determined until the location, timing, size, and exact design of the projects are known. There would be concerns for new oil and gas development in the Dolores or Mancos River watersheds, or within the McElmo Creek or Disappointment Creek watersheds with salinity issues, high road densities, or sensitivity to disturbance (e.g., degraded fishery habitat). If no new leases were made available, the impacts on the flannelmouth sucker would be as a result of existing lease only.

Mining activities on the SJNF and TRFO may include suction dredging, gravel mining operations, hard rock mining, uranium and vanadium mining, and recreational gold panning. LRMP Chapter 2 displays the potential acreage of disturbance per year from these activities. The impacts to flannelmouth suckers from mining or mining reclamation would be mainly due to erosion and sediment impacts (e.g., degraded fishery habitat), saline runoff or heavy metal loading of streams (e.g., toxic levels for aquatic species), and/or altered stream channels and associated fishery habitat.

Generally, the effects related to mining and mining reclamation would be similar under all alternatives and may adversely affect specific individuals but would overall be minor for the populations of flannelmouth sucker found in the La Plata, Animas, Florida, Los Pinos, Piedra, San Juan, and Navajo Rivers at the lower elevations of the SJNF and TRFO. Specific uranium and vanadium mining projects in the Dolores or Mancos River drainages or within the McElmo Creek or Disappointment Creek watersheds under all alternatives with salinity issues, high road densities, or sensitive to disturbance would likely result in adverse effects to the flannelmouth sucker because of its more tenuous situation, similar to the bluehead sucker. Again, since the exact details for these projects are unknown presently, the impacts continue to be speculative.

The effects from vegetation management (timber harvesting, mechanical fuels reduction, rangeland treatments, prescribed burns, etc.) may adversely affect specific individuals but would overall be minor for the population of flannelmouth suckers. Since all alternatives have generally the same levels of timber harvest, hazardous fuels treatment, etc. (only 1800 acres separate Alternative D with the greatest levels of harvest and Alternative C with the least amount of vegetation treatment), the effects would be nearly the same for all alternatives. Again, the impacts are driven by sediment and stream temperature influences on fishery habitat quality.

Cumulative Impacts

Flannelmouth suckers are BLM and USFS sensitive species as a result of past cumulative effects, locally and regionally, including the introduction of non-native species. For all alternatives, the primary adverse cumulative effects on this warm water species, found in the Dolores, Mancos, La Plata, Animas, Florida, Los Pinos, Piedra, San Juan, and Navajo Rivers and their tributaries, or in McElmo Creek, Disappointment Creek, and Yellowjacket Canyon at the lower elevations of the SJNF and TRFO, presently, would occur from activities that lead to additional water depletions and reduced stream flows (i.e., reduced or eliminated fishery habitat that is available for use). Again, these activities would mainly be water use and development projects on or off the SJNF and TRFO, or oil and gas development from current leases and projected new leases on or off the SJNF and TRFO. The demands for water use and development projects are difficult to analysis because they are driven by proponents rather than by the USFS's and BLM's programs or budgets. Because of heightened concerns about sediment and salinity inputs and downstream effects on fishery habitat quality, ground-disturbing activities (new road construction, uranium and vanadium mining, etc.) in the Dolores or Mancos Rivers watershed or within the McElmo Creek or Disappointment Creek watersheds may also adversely affect the flannelmouth sucker. However, since the exact details for these projects and activities in the Dolores or Mancos River watersheds, or within the McElmo Creek or Disappointment Creek watersheds are unknown presently, the impacts continue to be speculative.

Gas development on private and state mineral estate development may add an additional 810 wells to those projected for development on federal mineral estate in the Paradox Basin. These private and state well numbers equate to 6,540 and 166 acre-feet of water used for drilling, fracturing, and completion for the GSGP gas development and Paradox conventional gas development, respectively. For the San Juan Sag (within the San Juan River Basin), existing leases on NFS lands are estimated to have used 7 acre-feet for well drilling and completion. Existing leases for the San Juan Basin CBM and conventional gas wells are estimated to have used 160 and 14 acre-feet of water, respectively, for BLM lands, and 487 and 42 acre-feet of water, respectively, for NFS lands. Private and state mineral estate development may use an additional 722 acre-feet of water for CBM gas wells in the San Juan Basin. The water usage estimates for the above San Juan Basin CBM gas wells (all ownerships) also includes gas production-induced depletions of river and stream flow.

Water is produced in conjunction with the production of CBM gas in the Northern San Juan Basin. Within the Basin in Colorado, there are concerns that the removal of water from the tributary Fruitland – Pictured Cliffs aquifer may result in stream depletions that impact downstream water users and fisheries. These concerns have prompted four studies spanning 2000 to 2009 that quantify groundwater/surface water impacts and their interactions.

The RFD scenario for CBM in the Northern San Juan Basin includes 450 wells to be developed at 80-acre spacing on existing leases. On BLM lands for infill CBM development and production, about 103 acre-feet of water would be needed for well drilling and completion and water depletion from intercepted groundwater potentially bound for streams and river over the next 15 years. On NFS lands, approximately 241 acre-feet of water would be needed for well drilling and completion and water depletion from intercepted groundwater potentially bound for streams and rivers over the next 15 years, due to infill CBM development and production. Private and state mineral estate development may use an additional 516 acre-feet of water over the next 15 years for infill CBM development and production.

Future development in the Northern San Juan Basin would occur on existing oil and gas leases, most of which have already been developed. The decision as to whether the existing lease can be developed is a function of project level decision-making and subject to the rights granted by the associated leases. Consequently, federal lease development in the Northern San Juan Basin is not considered a direct effect of the LRMP decisions, but is considered in cumulative effects analysis.

It is likely there would be cumulative effects from as many as 3,900 new gas wells drilled on or adjacent to the SJNF and TRFO over the next planning period. In addition to an estimated 875 new wells that may be drilled on new leases on federal lands (discussed under Direct/Indirect Effects), there could be as many as 450 new and infill gas wells drilled in the Northern San Juan Basin, 800 to 1,000 new wells drilled on the Southern Ute Indian Tribal lands adjacent to the planning area, and 1,600 new wells on previously leased land in the Paradox Basin and Northern San Juan Basin. The RFD projected wells would require new roads, pipelines, and associated disturbance for gas well construction. Consequently, oil and gas development may have large potential to have substantial cumulative effects when compared to all other activities that affect the SJNF and TRFO. The magnitude of new road/pipeline construction and other disturbances would vary only slightly by alternative.

Determination:

All LRMP revision alternatives, including Alternative A, may adversely impact individuals (flannelmouth suckers), but would not likely result in a loss of population viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide. The rationale for this determination is as follows:

- The planning area is at the periphery of the flannelmouth sucker's range of distribution, and occurrences are expected to be varied and somewhat rare within the planning area. Occurrences on BLM and NFS lands are strongly influence by the distribution and abundance of populations immediately downstream of these lands. The abundance and distribution of these downstream populations are dictated by a variety of non-agency activities and factors, primarily related to consumptive water uses. While BLM and USFS actions may have a minor influence on downstream river flows, they would not be significant relative to the major consumptive water uses known to dictate population viability and species viability range wide.
- Although the flannelmouth sucker distribution and abundance have diminished, they still occupy a wide geographic area and range of locations outside the planning area.

- Through the desired conditions, objectives, standards, and guidelines, leasing stipulations, BLM and USFS manuals and handbooks, and BMPs, the effects of BLM and USFS actions to the flannelmouth sucker would be minimized.
- The SJNF and TRFO would continue to work cooperatively with CPW to develop proactive management programs to reduce adverse effects to the flannelmouth sucker and other warm water sensitive fish species.

5.2.3 Bluehead Sucker (BLM and USFS Sensitive)

Natural History and Background

Distribution

The bluehead sucker is native to the Colorado River Basin and ancient Lake Bonneville in Idaho, Utah, and Wyoming (Ptacek et al. 2005). Historically, bluehead suckers occurred in streams and rivers in the Colorado River Basin (Bezzerides and Bestgen 2002; Joseph et al. 1977), as well as in the drainages of the upper Snake, Weber, and Bear Rivers (Sigler and Miller 1963; Sublette et al. 1990). Within the Colorado River Basin, bluehead suckers are presently found in the Colorado, Dolores, Duchesne, Escalante, Fremont, Green, Gunnison, Price, San Juan, San Rafael, White, and Yampa Rivers and numerous smaller tributaries (Bezzerides and Bestgen 2002; Vanicek et al. 1970).

Bluehead sucker populations are known to exist in several tributary streams immediately downstream of lands managed by the SJNF and TRFO. Miller and Rees (2000) indicated that the bluehead sucker was among the most common fish species collected in tributaries on the San Juan River. While most of these tributaries originate on the SJNF and TRFO, their study area did not extend onto BLM and NFS lands. These tributary streams include the Florida, La Plata, and Los Pinos Rivers. The bluehead sucker is known to occur on SJNF and TRFO of the upper San Juan River, Piedra River, Animas River, Dolores River, Disappointment Creek, McElmo Creek, and Yellowjacket Canyon (Japhet, CPW, Senior Aquatic Biologist for the Southwest District, personal communication with Dave Gerhardt, 2006, Nickell, BLM, Wildlife Biologist for TRFO, personal communication with Mike Johnson, 2008).

Reason for Concern

Recent work suggests that bluehead sucker populations are declining throughout their historic range (Bezzerides and Bestgen 2002; Weitzel 2002; Wheeler 1997). Currently, they are found in only 45 percent of their historic range in the Upper Colorado River Basin (Bezzerides and Bestgen 2002). The reasons for this decline are mostly due to water diversion and alteration of stream flow regimes in mainstem rivers and tributary streams, changes in water temperature regimes of these streams, degradation of habitat, and interactions with non-native species (Ptacek et al. 2005). Dams, impoundments, and water use practices (e.g., diversion ditches) are probably the major reasons for modified natural river flows and channel characteristics in the both mainstem rivers and tributary streams. Dams on the mainstem rivers have segmented the river system, blocking spawning migrations, and changing flows and temperatures (e.g., conversion of warm water habitat to cold water habitat). Other water use and development projects have reduced or eliminated suitable habitat due to water depletions and reduced stream flows. Major changes in species composition have occurred with the introduction of non-native species. The decline of bluehead sucker seems related to predation, competition, or other behavioral interactions with non-native fishes. Alterations in the natural fluvial environment from land management activity have exacerbated this problem (USFWS 1995). To minimize land management effects and proactively assist bluehead sucker populations, the BLM and USFS have signed the Range-wide Conservation Agreement and Strategy for Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker (Utah Department of Natural Resources 2006).

Historically, the bluehead, flannelmouth, and razorback suckers comprised the medium to large size Catostomid population in the Upper Colorado River Basin. Again, distribution and abundance of bluehead suckers have diminished (Bezzerides and Bestgen 2002). The introduced white sucker and channel catfish (*Ictalurus punctatus*) have diets that partially overlap with bluehead sucker and are thus competitors for food resources. In addition to competing with bluehead suckers, several non-native and native fishes prey on bluehead suckers (Brooks et al. 2000; Ruppert et al. 1993).

Life History

Although this species sometimes occupies areas of suitable habitat in larger, low-elevation, mainstem streams, it is most commonly collected in small or mid-sized tributaries of the Upper Colorado River Basin (Ptacek et al. 2005). Most reaches of this system receive heavy sediment loads and high annual peak flows that contrast with low base flows. Little is known about the specific influence of these annual events, but healthy bluehead sucker populations have persisted in habitats with a wide range of annual flows, sediment transport, and even sediment deposition, providing that these physical events are associated with a natural flow regime (Ptacek et al. 2005).

Adult bluehead suckers exhibit a strong preference for specific habitat types (Holden and Stalnaker 1975). In-stream distribution is often related to the presence of rocky substrate, which they prefer (Holden 1973). This species has been reported to typically be found in runs or riffles with rock or gravel substrate (Carlson et al. 1979; Holden and Stalnaker 1975; Sublette et al. 1990; Vanicek 1967). Juveniles have been collected from shallow riffles, backwaters, and eddies with silt or gravel substrate (Vanicek 1967).

Although the species generally inhabits streams with cool temperatures, bluehead suckers have been found inhabiting small creeks with water temperatures as high as 28 degrees Celsius (Smith 1966). This species is found in a large variety of river systems ranging from large rivers with discharges of several hundred cubic meters per second to small creeks with less than 0.05 cubic meter per second (Smith 1966).

Bluehead suckers spawn in the spring and early summer (McAda and Wydoski, 1983). Holden (1973) and Andreasen and Barnes (1975) reported spawning activity occurring during June and July in the Upper Colorado River Basin. All ripe fish that were collected by Vanicek (1967) during spawning occurred in pools or slow runs associated with large cobbles or boulders. Spawning occurred when water temperatures ranged from 18.2 to 24.6 degrees Celsius (Maddux and Kepner 1988).

Hybridization between bluehead suckers and other sucker species occurs throughout the range of this species. Bluehead suckers are known to hybridize with the native flannelmouth sucker and mountain sucker, as well as the non-native white sucker (Bezzerides and Bestgen 2002). In natural or minimally altered systems, certain undefined mechanisms (e.g., depth and velocity requirements, habitat selection, spawning timing) likely isolate spawning individuals of bluehead sucker and flannelmouth sucker; however, hybrids of these two species do occur (Hubbs and Hubbs 1947; Hubbs and Miller 1953; Whiteman 2000). The most common instance of hybridization, and perhaps the most detrimental, occurs with the non-native white sucker.

Very little information is available on the influence of turbidity on the sensitive Colorado River fishes. It is assumed that turbidity is important particularly as it affects the interaction between introduced fishes and the endemic Colorado River fishes. Because these endemic fishes have evolved under natural conditions of high turbidity, it is probable high turbidity is important. Reduction of turbidity may enable introduced species to gain a competitive edge, which could further contribute to the decline of bluehead sucker (USFWS 1995).

Effects Analysis

Direct/Indirect Effects

LRMP revision activities that could potentially influence the bluehead sucker include water use and development projects, livestock grazing, road management and construction, oil and gas leasing and development, mining and mine reclamation, and vegetation management projects.

As previously stated, water diversions and depletions have had the greatest effect on bluehead suckers and other warm water sensitive fish species. Water diversions and depletions occur as a result of municipal and domestic uses, water storage, irrigation, stock ponds, transbasin diversions, snowmaking, and numerous other reasons. The effects from water use and development projects (including diversion ditches, storage reservoirs, pipelines, wells, etc.) are reduced or eliminated stream flows and reduced or eliminated fishery habitat that is not available for use. Water depletions reduce peak flow and durations. This causes losses of backwater pools for spawning and rearing. It also reduces suspended sediments, which may confer a competitive advantage on non-native species. Additional impacts include increased stream temperatures and reduced dissolved oxygen levels. These effects could be more pronounced during periods of natural cyclic flow reductions (in fall and winter) or during summer months in a drought.

The effects from water use and development projects would likely be adverse to bluehead suckers immediately downstream from these projects found in the Dolores, La Plata, Animas, Florida, Los Pinos, Piedra, and San Juan Rivers or their major tributaries or in Disappointment Creek, McElmo Creek, and Yellowjacket Canyon at the lower elevations of the SJNF and TRFO under all alternatives. The impacts of reduced or eliminated fishery habitat would result from water depletions and reduced stream flows. The impacts are not expected to vary between alternatives since the demand for water use authorizations are driven by proponents rather than by the USFS's and BLM's programs or budgets. Because the effects of water use and development projects are speculative, more precise effects cannot be determined until the location, timing, size, and exact design of the projects are known.

Livestock grazing can degrade in-stream habitat and water quality. Effects generally are increased sedimentation, increased stream temperatures, and fecal/bacteria contamination caused by stream bank trampling, stream widening, and vegetation removal in riparian areas. Use of LRMP standards, guidelines, additional referenced guidance, and manuals should ensure proper rangeland management and minimal effects to fisheries. The effects from livestock grazing and big game use under all alternatives may adversely affect specific individuals but would overall be minor for the populations of the bluehead sucker. Because of the lag time to influence existing conditions, Alternative C with its reductions in suitable and available livestock grazing areas may reduce grazing effects on fisheries from the present conditions in the long term but not in the short term. For Alternative D with its increases in suitable and available livestock grazing areas, grazing may increase effects on these fisheries from the present in the long term but not in the short term. Although there would be localized improvements in grazing management and implementation of rangeland health improvement projects, the impacts of sediment and increased water temperatures on fishery habitat quality should continue.

The effects of roads are primarily through sediment production. Eroded material may be delivered to streams as fine sediment and deposited in channels or transported downstream. The actual amount of sediment from these land‐disturbing activities that reaches stream channels or still water bodies would be a result of numerous factors, including the location of roads, number of road/stream crossings, slope steepness and length, amount of exposed soil, type of vegetation in the area, frequency and intensity of rainfall, soil type, and the implementation and effectiveness of BMPs. Heavy sediment loads can reduce pool depths, bury stream substrates and spawning gravels, adhere to aquatic insects and the gills of fish, alter channel form and function, and result in other forms of habitat degradation. Improperly placed, shaped, and sized culverts can act as fish barriers on key streams or exacerbate erosion and cause head-cutting. Where sediment production is high in areas of exposed marines shales, elevated salinity levels, over extended periods of time, may become toxic for aquatic ecosystems and fish species.

Small amounts of water are used in road construction and reconstruction, road maintenance, and dust abatement. This water would be obtained from federal and/or private sources. Since this water is connected to a federal action, it is considered a depletion from a major river basin and would require preparation of a biological assessment and coordination and consultation with the USFWS for threatened and endangered species, under Section 7 of the ESA. Because of miles of roads, these activities are almost entirely confined to NFS lands. For all alternatives, about 9 acre-feet of water in the San Juan River Basin and 6 acre-feet of water in the Dolores River Basin are used on NFS lands over a 15-year period for road construction and reconstruction, road maintenance, and dust abatement, excluding road-related activities with gas well drilling and completion.

Generally, the effects from roads may adversely affect specific individuals but overall would be minor for the populations of bluehead suckers found in the La Plata, Animas, Florida, Los Pinos, Piedra, and San

Juan Rivers and their tributaries at the lower elevations of the SJNF and TRFO under all alternatives. Projects that implement the LRMP requiring new road construction in the Dolores River drainage or Disappointment Creek or McElmo Creek watersheds could likely result in adverse effects to the bluehead sucker because of the salinity issues and higher sediment production from these sensitive watersheds. Again, since the exact details for these projects are unknown presently, the impacts continue to be speculative.

There are indications that oil and gas resource potential may result in leasing and exploration east of Pagosa Springs (in the San Juan Sag area) on NFS lands, and on the BLM portion (especially in the Disappointment Valley, Big Gypsum Valley, and Dry Creek Basin, and along the Dolores River Canyon) and the NFS portion (especially in the Glade and McPhee Reservoir areas, and along the Dolores River Canyon) of the Paradox Basin. There are two types of possible gas development (i.e., conventional gas and GSGP) within the Paradox Basin. Exploration could include one to two wildcat wells per year in the San Juan Sag area. For conventional development in the Paradox Basin, four to seven exploratory gas wells per year may be developed on BLM lands for the 15-year period, and five to eight wildcat gas wells per year may be developed on NFS lands for the same period. For the GSGP development within the Paradox Basin, exploratory wells are slowly developed for the first 7 years, then accelerated development occurs. For BLM lands, two to three exploratory gas wells per year are constructed for the first 7 years, then nine to 24 gas wells per year are developed for the next 8 years. For NFS lands, six to eight wildcat wells are constructed for the first 7 years, then 37 to 68 gas wells per year are developed for the next 8 years.

In total, approximately 8 to 12 acres per year may be disturbed from well pads and roads on BLM public lands from oil and gas development activity for the first 7 years. For the next 8 years, about 36 to 96 acres per year may be disturbed. For all oil and gas development on NFS lands, approximately 24 to 32 acres per year may be disturbed from well pads and roads for the first 7 years. For the following 8 years, about 148 to 272 acres per year may be disturbed. If paying quantities of gas are discovered in the San Juan Sag and Paradox Basin (for both conventional and GSGP gas development), as many as 263 and 611 production wells are projected for BLM lands and NFS lands, respectively.

The potential impacts to bluehead suckers from oil and gas leasing and development would be mainly related to water depletions and some reduced stream flows. This would, subsequently, reduce fishery habitat available for use, increase sediment production, and result in degraded fishery habitat. Other potential effects include salinity and water contamination from petroleum products, drilling mud, and other contaminants. For the San Juan Sag (within the San Juan River Basin), 35 acre-feet of water is projected to be used in well drilling, fracturing, and completion process for unleased mineral estate over the next 15 years for all alternatives.

Substantial quantities of water are projected to be used in the drilling, fracturing, and completion process for both the GSGP and Paradox conventional development (see Table T.20 above). The major river basins affected by the projected development in the Paradox Leasing Analysis Area are the Dolores and San Juan River Basins. GSGP gas wells in the Paradox Basin would use approximately 7.9 to 13.1 acre-feet of water per well in the drilling and completion process. This level of water consumption is six to 11 times the amount of water used to drill and complete a conventional gas well and 11 to 18 times the amount of water used to drill and complete a CBM gas well. Paradox conventional gas wells would use 3.3 acre-feet of water per well in the drilling and completion process. This level of water use is 2.5 times the amount of water used to drill and complete other conventional wells and five times the amount of water used to drill and complete a CBM well.

It is assumed that all water associated with GSGP and Paradox conventional gas development and production would be purchased and trucked into the project area, as the water would not be obtained from water sources on public land. The sources of this private water are unknown, but would occur within the San Juan River Basin and Dolores River Basin. Since this water is connected to a federal action, it is considered a depletion from a major river basin, and would require preparation of a biological assessment and coordination and consultation with the USFWS for threatened and endangered species, under Section 7 of the ESA (see Tables T.21 and T.22; and see Appendix J).

Water can also be depleted during gas field production. For the GSGP and Paradox conventional, small quantities of water are produced or pumped from the gas producing formation(s) in order to release the pressure on the gas tied-up in the seam and allow it to flow. In some cases, as wells are drilled and the formation(s) fractured, groundwater may be connected to surface water streams. With the large number of gas wells proposed in the GSGP and Paradox conventional development (see Tables T.21 and T.22 above), the amount of produced water removed may reduce some stream flows in stream systems with warm water sensitive fisheries or tributary to downstream sensitive fishery streams. Because of difficulties in quantifying effects on stream flow, water depleted due to gas field production was not estimated for the GSGP and Paradox conventional wells.

Decreased stream flows may impact bluehead sucker populations by reducing or eliminating both the extent and quality of suitable habitat by increasing stream temperatures and, subsequently, reducing dissolved oxygen levels. Such impacts may be more pronounced during periods of natural cyclic flow reductions during fall and winter or during summer months during periods of drought. A loss of stream flow can also reduce a stream's ability to transport sediment downstream and result in increased deposition which, in turn, can impact the numbers and diversity of benthic macro invertebrates and, ultimately, aquatic habitat.

Clearing of drill pads and roads and their continued use can expose soil to both wind and water erosion. Given the number of well pads and roads projected in the Paradox Leasing Analysis Area, consequential sedimentation of streams and still water bodies has the potential to impact fishery and aquatic resources (see Table T.23 above). These impacts may be more pronounced in the Paradox Basin because of the number of sensitive watersheds with sediment and salinity concerns that may be upstream of bluehead suckers. Eroded material may be delivered to streams as fine sediment and deposited in channels or transported downstream. The actual amount of sediment from these land-disturbing activities that reaches stream channels or still water bodies would be a result of numerous factors including the location of roads, number of road/stream crossings, slope steepness and length, amount of exposed soil, type of vegetation in the area, frequency and intensity of rainfall, soil type, and the implementation and effectiveness of BMPs. A typical concern with sedimentation is that sediment loads, above background levels, can reduce pool depths, bury stream substrates and spawning gravels, adhere to aquatic insects and the gills of fish, alter channel form and function, and result in other forms of habitat degradation. Where sediment production is high in areas of exposed marine shales, elevated salinity levels, over extended periods of time, may become toxic for aquatic ecosystems and fish species.

LRMP direction addresses potential aquatic impacts from surface disturbance. Where gas facilities are developed within the Paradox Basin, soil erosion and sediment deposition, and corresponding potential to impact aquatic and riparian habitat would be limited by implementing lease stipulations that require avoidance of sensitive, erosion-prone areas and riparian areas, secondly by using standards and guidelines in the LRMP and thirdly by the application of BMPs. Some of these BMPs may include, for example, graveling road surfaces to avoid dust and loss of soil to wind erosion; revegetating or covering any soil stockpiles that would remain for extended periods to avoid significant wind and water erosion; installing slope breaks and silt fences on slopes to slow and filter storm water runoff that might carry exposed soils to surface water drainages; timely reclaiming disturbed areas to minimize erosion after construction of facilities, and avoiding locations having highly erosive soils where possible. Non-productive wells would also be immediately reclaimed. The applicable lease stipulations to protect aquatic ecosystems and fish species are listed in Table T.24 above.

Another potential impact to fisheries from the projected gas development and production would be the potential for various chemical leaks and spills. This impact is mitigated through the use of BMPs that apply to well drilling operation maintenance and material handling.

In regard to air quality, the effects on bluehead suckers would be negligible over the life of the LRMP. The air analysis was focused on the entire planning area, not just the Paradox Leasing Analysis Area. It is a modeling effort with many assumptions, including a gas development scenario as depicted in the RFD scenario. The potential impacts of nitrogen loading or sulfur dioxide deposition to lakes, streams, and the aquatic ecosystems and fish species would be a very slow and prolonged process. It would be very difficult to detect any measureable effects on aquatic ecosystems well beyond the life of the LRMP.

The effects of oil and gas leasing and development would range from highest in Alternative A, to Alternatives D, B, and C, in descending order, and could likely be adverse to the bluehead sucker downstream from this activity found in the Dolores, La Plata, Animas, Florida, Los Pinos, Piedra, and San Juan Rivers or their tributaries or in Disappointment Creek, McElmo Creek, or Yellowjacket Canyon at the lower elevations of the SJNF and TRFO. The impacts are mainly due to water depletion and reduced stream flows over time and subsequently reduced fishery habitat available for use. Since the effects from oil and gas development are speculative, more precise effects cannot be determined until the location, timing, size, and exact design of the projects are known. There would be concerns for new oil and gas development in the Dolores River, Disappointment Creek, or McElmo Creek watersheds with salinity issues, high road densities, or sensitivity to disturbance (e.g., degraded fishery habitat). If no new leases were made available, the impacts on the bluehead sucker would be as a result of existing leases only.

Mining activities on the SJNF and TRFO may include suction dredging, gravel mining operations, hard rock mining, uranium and vanadium mining, and recreational gold panning. LRMP Chapter 2 displays the potential acreage of disturbance per year from these activities. The impacts to bluehead suckers from mining or mining reclamation would be mainly due to erosion and sediment impacts (e.g., degraded fishery habitat), saline runoff or heavy metal loading of streams (e.g., toxic levels for aquatic species), and/or altered stream channels and associated fishery habitat.

Generally, the effects related to mining and mining reclamation would be similar under all alternatives; and may adversely affect specific individuals but would overall be minor for the populations of bluehead sucker found in the La Plata, Animas, Florida, Los Pinos, Piedra, and San Juan Rivers at the lower elevations of the SJNF and TRFO. Specific uranium and vanadium mining projects in the Dolores River, Disappointment Creek, or McElmo Creek watersheds under all alternatives with salinity issues, high road densities, or sensitive to disturbance would likely result in minor adverse effects to the bluehead sucker because of populations in other unaffected drainages. Again, since the exact details for these projects are unknown presently, the impacts continue to be speculative.

The effects from vegetation management (timber harvesting, mechanical fuels reduction, rangeland treatments, prescribed burns, etc.) may adversely affect specific individuals but would overall be minor for the population of bluehead suckers. Since all alternatives have generally the same levels of timber harvest, hazardous fuels treatment, etc. (only 1,800 acres separate Alternative D with the greatest levels of harvest and Alternative C with the least amount of vegetation treatment), the effects would be nearly the same for all alternatives. Again, the impacts are driven by sediment and stream temperature influences on fishery habitat quality.

Cumulative Impacts

Bluehead suckers are BLM and USFS sensitive species as a result of past cumulative effects, locally and regionally, including introduction of non-native species. For all alternatives, the primary adverse cumulative effects on this warm water species, found in the Dolores, La Plata, Animas, Florida, Los Pinos, Piedra, and San Juan Rivers and their tributaries and in Disappointment Creek, McElmo Creek, and Yellowjacket Canyon at the lower elevations of the SJNF and TRFO, presently, would occur from activities that lead to additional water depletions and reduced stream flows (i.e., reduced or eliminated fishery habitat that is available for use). Again, these activities would mainly be water use and development projects on or off the SJNF and TRFO, or oil and gas development from current leases and projected new leases on or off the SJNF and TRFO. The demands for water use and development projects are difficult to analysis because they are driven by proponents rather than by the USFS's and BLM's programs or budgets. Because of heightened concerns about sediment and salinity inputs and downstream effects on fishery habitat quality, ground-disturbing activities (new road construction, uranium and vanadium mining, etc) in the Dolores River, Disappointment Creek, or McElmo Creek watersheds may also adversely affect the bluehead sucker. However, since the exact details for these projects and activities are unknown presently, the impacts continue to be speculative.

Gas development on private and state mineral estate development may add an additional 810 wells to those projected for development on federal mineral estate in the Paradox Basin. These private and state well numbers equate to 6,540 and 166 acre-feet of water used for drilling, fracturing, and completion for the GSGP gas development and Paradox conventional gas development, respectively. For the San Juan Sag (within the San Juan River Basin), existing leases on NFS lands are estimated to have used 7 acre-feet for well drilling and completion. Existing leases for the San Juan Basin CBM and conventional gas wells are estimated to have used 160 and 14 acre-feet of water, respectively, for BLM lands, and 487 and 42 acre-feet of water, respectively, for NFS lands. Private and state mineral estate development may use an additional 722 acre-feet of water for CBM gas wells in the San Juan Basin. The water usage estimates for the above San Juan Basin CBM gas wells (all ownerships) also includes gas production-induced depletions of river and stream flow.

Water is produced in conjunction with the production of CBM gas in the Northern San Juan Basin. Within the Basin in Colorado, there are concerns that the removal of water from the tributary Fruitland – Pictured Cliffs aquifer may result in stream depletions that impact downstream water users and fisheries. These concerns have prompted four studies spanning 2000 to 2009, which quantify groundwater/surface water impacts and their interactions.

Our RFD scenario for CBM in the Northern San Juan Basin includes 450 wells to be developed at 80-acre spacing on existing leases. On BLM lands for infill CBM development and production, about 103 acre-feet of water would be needed for well drilling and completion and water depletion from intercepted groundwater potentially bound for streams and river over the next 15 years. On NFS lands, approximately 241 acre-feet of water would be needed for well drilling and completion and water depletion from intercepted groundwater potentially bound for streams and rivers over the next 15 years, due to infill CBM development and production. Private and state mineral estate development may use an additional 516 acre-feet of water over the next 15 years for infill CBM development and production.

Future development in the Northern San Juan Basin would occur on existing oil and gas leases, most of which have already been developed. The decision as to whether the existing lease can be developed is a function of project level decision-making and subject to the rights granted by the associated leases. Consequently, federal lease development in the Northern San Juan Basin is not considered a direct effect of the LRMP decisions, but is considered in cumulative effects analysis.

It is likely there would be cumulative effects from as many as 3,900 new gas wells drilled on or adjacent to the SJNF and TRFO over the next planning period. In addition to an estimated 875 new wells that may be drilled on new leases on federal lands (discussed under Direct/Indirect Effects), there could be as many as 450 new and infill gas wells drilled in the Northern San Juan Basin, 800 to 1,000 new wells drilled on the Southern Ute Indian Tribal lands adjacent to the planning area, and 1,600 new wells on previously leased land in the Paradox Basin and Northern San Juan Basin. The RFD projected wells would require new roads, pipelines, and associated disturbance for gas well construction. Consequently, oil and gas development may have large potential to have substantial cumulative effects when compared to all other activities that affect the SJNF and TRFO. The magnitude of new road/pipeline construction and other disturbances would vary only slightly by alternative.

Determination

All LRMP revision alternatives, including Alternative A, may adversely impact individuals (bluehead suckers), but would not likely result in a loss of population viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide. The rationale for this determination is as follows:

- The planning area is at the periphery of the bluehead sucker's range of distribution, and occurrences are expected to be varied and somewhat rare within the planning area. Occurrences on BLM and NFS lands are strongly influence by the distribution and abundance of populations immediately downstream of these lands. The abundance and distribution of these downstream populations are dictated by a variety of non-agency activities and factors, primarily related to consumptive water uses. While BLM and USFS actions may have a minor influence on downstream river flows, they would not be significant relative to the major consumptive water uses known to dictate population viability and species viability range wide.

- Although the bluehead sucker distribution and abundance have diminished, they still occupy a wide geographic area and range of locations outside the planning area.
- Through the desired conditions, objectives, standards, and guidelines, leasing stipulations, BLM and USFS manuals and handbooks, and BMPs, the effects of BLM and USFS actions to the bluehead sucker would be minimized.
- The SJNF and TRFO would continue to work cooperatively with CPW to develop proactive management programs to reduce adverse effects to the bluehead sucker and other warm water sensitive fish species.

5.2.4 Colorado River Cutthroat Trout (BLM and USFS Sensitive)

Natural History and Background

Distribution

The Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) is a species native to western Colorado. The Colorado River cutthroat trout historically occupied portions of the Colorado River drainage in Wyoming, Colorado, Utah, Arizona, and New Mexico (Behnke 1992). Its original distribution probably included portions of larger streams, such as the Green (Simon 1935), Yampa, White, Colorado, and San Juan Rivers. Behnke and Zarn (1976) suggested this subspecies was absent from the lower reaches of many large rivers because of summer thermal barriers. Portions of the lower reaches may have been used in winter (Young 1995).

Remaining populations occur mostly in headwater streams and lakes, and in several isolated headwater tributaries of the San Juan River. In southwest Colorado, conservation populations (i.e., a reproducing and recurring population that is managed to preserve the historical genome and/or unique genetic, ecological, and/or behavioral characteristics within specific populations and within geographic units) of the Colorado River cutthroat trout can be found in the San Juan River System (Augustora Creek, Beaver Creek, Himes Creek, Red Creek, Flint Creek, Cutthroat Creek, Headache Creek, North Fork Sand Creek, Falls Creek, East Fork Piedra River, Sand Creek, Cimarrona Creek, East Fork Coldwater Creek, West Fork Coldwater Creek, Flagler Fork, West Virginia Gulch, East Fork Shearer Creek, North Fork Shearer Creek, West Fork Shearer Creek, Big Bend Creek, Clear Creek, East Fork Hermosa Creek, Shearer Creek, Castle Creek, Engine Creek, Grasshopper Creek, Pasture Creek, Bear Creek, Little Bear Creek, Hermosa Creek No. 2, Deep Creek). Most of these creeks and rivers are located on the SJNF and TRFO. Several tributaries in the Hermosa drainage of the SJNF are managed as a metapopulation for Colorado River cutthroat trout—a collection of localized populations that are geographically distinct, yet are genetically interconnected through natural movement of individual fish between populations.

Reason for Concern

The abundance and distribution of Colorado River cutthroat trout have declined so much over the past 100 years that calls have been made for federal listing (Behnke and Zarn 1976; Young 1995). Colorado River cutthroat trout now occupy less than 1% of their historic range (Behnke 1979). In 2001, the Colorado River Cutthroat Trout Conservation Agreement and Strategy was established for the states of Colorado, Utah, and Wyoming to help state and federal agencies and Indian tribes to work collaboratively and cooperatively to implement conservation measures to maintain and increase the species, and to avoid listing as a threatened or endangered species under the ESA (Colorado River Cutthroat Trout Task Force 2001). Efforts have been underway for a number of years to reverse the declines in Colorado River cutthroat trout populations and reclaim pieces of its historic habitat so that the range of occupied cutthroat habitat is increased. However, the declines over time have been so severe that this subspecies of cutthroat has been petitioned for federal listing several years ago. The USFS decided against listing because of no evidence of major declines in the overall distribution or abundance over the last several decades (Durango Herald 2007), and because of restoration efforts by CPW, the USFS, and other groups. These restoration efforts included stream reclamation, barrier planning and design, development of two broodstocks from local pure Colorado River cutthroat trout strains, stocking of barren waters with these pure strains, genetic testing of local populations, etc.

Introductions of non-native salmonids have had the greatest effect on Colorado River cutthroat trout (Young 1995). Stocking of non-natives began before 1900 and has been very widespread. Interactions with other species impact Colorado River cutthroat trout differently. Brook trout (*Salvelinus fontinalis*) dislodge most subspecies of inland cutthroat when in sympatry, especially at lower elevations (Fausch 1989). The mechanism favoring brook trout is poorly understood; however, it is clear higher water temperatures favor brook trout (DeStaso and Rahel 1994). Rainbow trout (*Oncorhynchus mykiss*) and other cutthroat subspecies readily hybridize with Colorado River cutthroat trout and produce fertile offspring. More populations of Colorado River cutthroat trout have probably been lost through hybridization than through any other means (Behnke and Zarn 1976).

A wide variety of land management practices have been suggested to affect populations of Colorado River cutthroat trout. These include livestock grazing, mining activities, road construction, and water diversions (Binns 1977; Jespersen 1981). Although the primary risk factors for this species are biological (non-native species and to some degree disease), roads can further affect Colorado River cutthroat trout populations through creation of barriers to fish movement, degradation of habitat by constraining streams and eliminating riparian vegetation, introduction of sediment, and the provision of access to anglers. Diversions and other water use practices have reduced or eliminated suitable habitat, fragmented streams, and restricted movement between formerly connected Colorado River cutthroat trout populations and created small, isolated populations. Although this subspecies has been regarded as the “canary in the mine” with regard to habitat degradation (Behnke and Benson 1980), it has also persevered in sub-optimal habitats (Binns 1977).

Life History

The diversity of Colorado River cutthroat trout life histories is probably reduced from historic levels (Young 1995). Adfluvial stocks were once common, but have largely been eliminated. Most remaining stocks are fluvial or resident.

Spawning by this subspecies begins after flows have peaked in spring or early summer and ends before runoff subsides (Quinlan 1980; Young 1995). Water temperature may be a cue for spawning. Colorado River cutthroat trout typically spawn in gravel substrate, mean particle size from 3.7 to 30 mm (Young 1995). The best survival rates are found in substrates with mean particle sizes from 13.8 to 15.9 mm or larger (Young et al. 1991). Redds tend to be located where velocity, depth, and bottom configuration induce water flow through the stream substrate (Young 1989). Redds are generally located where the water is between 11 and 18 cm deep and nose velocity is 15 to 35 cm per second (Young 1995).

Emergence generally occurs in late summer depending on elevation and annual climatic variation. Fry summer microhabitats are usually deeper than 3 cm and water velocity is slower than 6 cm per second (Bozek and Rahel 1991). Woody debris, boulders, and rootwads shelter these sites from higher flows.

Colorado River cutthroat trout reach maturity at age 3 and rarely live past age 6 (Young 1995). Growth rates are among the lowest of all salmonids, probably due to the short growing seasons and colder temperatures at the higher elevations to which Colorado River cutthroat trout are currently confined. Lakes and streams with beaver ponds tend to have higher growth rates.

Some studies have shown spawning habitat, riffle water velocity, and cover to be the most important factors in determining trout biomass, with spawning habitat being the most significant (Jesperson 1981). Herger (1993) found most larger cutthroat trout in pools, and that trout density increased with pool depth. Young (1995) found coarse woody debris to be an important factor in determining Colorado River cutthroat trout biomass. He also noted meander habitats were underused, and occupied sites were deeper than average with slower water velocities.

Cutthroat trout, in some streams, do migrate (Jespersen 1981). Adults often move upstream to spawn and then downstream to deeper waters following spawning (Young 1995). Lake populations move in and out of tributaries. It is common to find smaller cutthroat upstream and the larger fish downstream (Jespersen 1981). Cutthroat may move from tributaries to larger river systems to overwinter.

The influence of predatory species on Colorado River cutthroat trout is not known, but dippers, mink, and other predatory birds and mammals do feed on them (Young 1995). The daytime positions of cutthroats are not associated with banks or overhead cover, and they may face a greater risk of predation to focus on daytime foraging.

Effects Analysis

Direct/Indirect Effects

LRMP revision activities that could potentially influence the Colorado River cutthroat trout include water use and development projects, livestock grazing, road management and construction, oil and gas leasing and development, mining and mine reclamation, vegetation management projects, and fishery, watershed, and riparian area improvement projects.

The effects from water use and development projects (including diversion ditches, storage reservoirs, pipelines, wells, etc.) on Colorado River cutthroat trout immediately downstream from these projects is from reduced or eliminated stream flows and reduced or eliminated fishery habitat that is not available for use. Additional impacts include increased stream temperatures and reduced dissolved oxygen levels. These effects could be more pronounced during periods of natural cyclic flow reductions (in fall and winter) or during summer months in a drought. Also, snowmaking for ski areas that drains water from streams or from water wells that are likely connected by groundwater to streams also reduces winter base flows that are limiting to habitat and populations of this species.

Depending on the location of the water use and development project, the effects on Colorado River cutthroat trout could vary from no impact to an adverse impact immediately downstream of the project under all alternatives. Again, the impacts are predominately due to water depletions and reduced stream flows and the subsequent effects on fishery habitat available for use. The impacts are not expected to vary between alternatives since the demand for water use authorizations are driven by proponents rather than by the USFS's and BLM's programs or budgets.

Livestock grazing can degrade in-stream habitat and water quality. Effects generally are increased sedimentation, increased stream temperatures, and fecal/bacteria contamination caused by stream bank trampling, stream widening, and vegetation removal in riparian areas. Use of LRMP standards, guidelines, additional referenced guidance, and manuals should ensure proper rangeland management and minimal effects to fisheries. The effects from livestock grazing and big game use under all alternatives may adversely affect specific individuals but would overall be minor for the populations of Colorado River cutthroat trout. Because of the lag time to influence existing conditions, Alternative C with its reductions in suitable and available livestock grazing areas may reduce grazing effects on fisheries from the present conditions in the long term but not in the short term. For Alternative D with its increases in suitable and available livestock grazing areas, grazing may increase effects on these fisheries from the present in the long term but not in the short term. Although there would be localized improvements in grazing management and implementation of rangeland health improvement projects, the impacts of sediment and increased water temperatures on fishery habitat quality should continue.

The effects of roads are primarily through sediment production. Eroded material may be delivered to streams as fine sediment and deposited in channels or transported downstream. The actual amount of sediment from these land-disturbing activities that reaches stream channels or still water bodies would be a result of numerous factors including the location of roads, number of road/stream crossings, slope steepness and length, amount of exposed soil, type of vegetation in the area, frequency and intensity of rainfall, soil type, and the implementation and effectiveness of BMPs. Heavy sediment loads can reduce pool depths, bury stream substrates and spawning gravels, adhere to aquatic insects and the gills of fish, increase habitat for *Tubifex* worms (an intermediate host for whirling disease), alter channel form and function, and result in other forms of habitat degradation. Improperly placed, shaped, and sized culverts can act as fish barriers on key streams or exacerbate erosion and cause head-cutting. In addition to being potential sediment sources, roads and specifically road crossings create opportunities for stocking of non-native fish and for introducing diseases such as whirling disease. Roads may be sediment sources and closing them has a beneficial impact on stream. Additionally, closing roads that provide access to Colorado River cutthroat trout streams would reduce fishing pressure and have a positive impact on the

Colorado River cutthroat trout population. Because of the locations of streams with conservation populations, roads under all alternatives may adversely impact individuals but would overall be minor for the population of the Colorado River cutthroat trout.

Small amounts of water are used in road construction and reconstruction, road maintenance, and dust abatement. This water would be obtained from federal and/or private sources. Since this water is connected to a federal action, it is considered a depletion from a major river basin and would require preparation of a biological assessment and coordination and consultation with the USFWS for threatened and endangered species, under Section 7 of the ESA. Because of miles of roads, these activities are almost entirely confined to NFS lands. For all alternatives, about 9 acre-feet of water in the San Juan River Basin and 6 acre-feet of water in the Dolores River Basin are used on NFS lands over a 15-year period for road construction and reconstruction, road maintenance, and dust abatement, excluding road-related activities with gas well drilling and completion.

There are indications that oil and gas resource potential may result in leasing and exploration east of Pagosa Springs (in the San Juan Sag area) on NFS lands, and on the BLM portion (especially in the Disappointment Valley, Big Gypsum Valley, and Dry Creek Basin, and along the Dolores River Canyon) and the NFS portion (especially in the Glade and McPhee Reservoir areas, and along the Dolores River Canyon) of the Paradox Basin. There are two types of possible gas development (i.e., conventional gas and GSGP) within the Paradox Basin. Exploration could include one to two wildcat wells per year in the San Juan Sag area. For conventional development in the Paradox Basin, four to seven exploratory gas wells per year may be developed on BLM lands for the 15-year period, and five to eight wildcat gas wells per year may be developed on NFS lands for the same period. For the GSGP development within the Paradox Basin, exploratory wells are slowly developed for the first 7 years, then accelerated development occurs. For BLM lands, two to three exploratory gas wells per year are constructed for the first 7 years, then nine to 24 gas wells per year are developed for the next 8 years. For NFS lands, six to eight wildcat wells are constructed for the first 7 years, then 37 to 68 gas wells per year are developed for the next 8 years.

In total, approximately 8 to 12 acres per year may be disturbed from well pads and roads on BLM public lands from oil and gas development activity for the first 7 years. For the next 8 years, about 36 to 96 acres per year may be disturbed. For all oil and gas development on NFS lands, approximately 24 to 32 acres per year may be disturbed from well pads and roads for the first 7 years. For the following 8 years, about 148 to 272 acres per year may be disturbed. If paying quantities of gas are discovered in the San Juan Sag and Paradox Basin (for both conventional and GSGP gas development), as many as 263 and 611 production wells are projected for BLM lands and NFS lands, respectively.

The potential impacts to Colorado River cutthroat trout from oil and gas leasing and development would be mainly related to water depletions and some reduced stream flows. This would, subsequently, reduce fishery habitat available for use, increase sediment production, and result in degraded fishery habitat. Other potential effects include salinity and water contamination from petroleum products, drilling mud, and other contaminants. For the San Juan Sag (within the San Juan River Basin), 35 acre-feet of water is projected to be used in well drilling, fracturing, and completion process for unleased mineral estate over the next 15 years for all alternatives.

Substantial quantities of water are projected to be used in the drilling, fracturing, and completion process for both the GSGP and Paradox conventional development (see T.20 above). The major river basins affected by the projected development in the Paradox Leasing Analysis Area are the Dolores and San Juan River Basins. GSGP gas wells in the Paradox Basin would use approximately 7.9 to 13.1 acre-feet of water per well in the drilling and completion process. This level of water consumption is six to 11 times the amount of water used to drill and complete a conventional gas well and 11 to 18 times the amount of water used to drill and complete a CBM gas well. Paradox conventional gas wells would use 3.3 acre-feet of water per well in the drilling and completion process. This level of water use is 2.5 times the amount of water used to drill and complete other conventional wells and five times the amount of water used to drill and complete a CBM well.

It is assumed that all water associated with GSGP and Paradox conventional gas development and production would be purchased and trucked into the project area, as the water would not be obtained from water sources on public land. The sources of this private water are unknown, but would occur within the San Juan River Basin and Dolores River Basin. Since this water is connected to a federal action, it is considered a depletion from a major river basin, and would require preparation of a biological assessment and coordination and consultation with the USFWS for threatened and endangered species, under Section 7 of the ESA (see Tables T.21 and T.22; and see Appendix J).

Water can also be depleted during gas field production. For the GSGP and Paradox conventional, small quantities of water are produced or pumped from the gas producing formation(s) in order to release the pressure on the gas tied-up in the seam and allow it to flow. In some cases, as wells are drilled and the formation(s) fractured, groundwater may be connected to surface water streams. With the large number of gas wells proposed in the GSGP and Paradox conventional development (see Tables T.21 and T.22 above), the amount of produced water removed may reduce some stream flows in stream systems with warm water sensitive fisheries or tributary to downstream sensitive fishery streams. Because of difficulties in quantifying effects on stream flow, water depleted due to gas field production was not estimated for the GSGP and Paradox conventional wells.

Decreased stream flows may impact Colorado River cutthroat trout populations by reducing or eliminating both the extent and quality of suitable habitat by increasing stream temperatures and, subsequently, reducing dissolved oxygen levels. Such impacts may be more pronounced during periods of natural cyclic flow reductions during fall and winter or during summer months during periods of drought. A loss of stream flow can also reduce a stream's ability to transport sediment downstream and result in increased deposition which, in turn, can impact the numbers and diversity of benthic macro invertebrates and, ultimately, aquatic habitat.

Clearing of drill pads and roads and their continued use can expose soil to both wind and water erosion. Given the number of well pads and roads projected in the Paradox Leasing Analysis Area, consequential sedimentation of streams and still water bodies has the potential to impact fishery and aquatic resources (see Table T.23above). Eroded material may be delivered to streams as fine sediment and deposited in channels or transported downstream. The actual amount of sediment from these land-disturbing activities that reaches stream channels or still water bodies would be a result of numerous factors including the location of roads, number of road/stream crossings, slope steepness and length, amount of exposed soil, type of vegetation in the area, frequency and intensity of rainfall, soil type, and the implementation and effectiveness of BMPs. A typical concern with sedimentation is that sediment loads, above background levels, can reduce pool depths, bury stream substrates and spawning gravels, adhere to aquatic insects and the gills of fish, alter channel form and function, and result in other forms of habitat degradation.

LRMP direction addresses potential aquatic impacts from surface disturbance. Where gas facilities are developed within the Paradox Basin, soil erosion and sediment deposition, and corresponding potential to impact aquatic and riparian habitat would be limited by implementing lease stipulations that require avoidance of sensitive, erosion-prone areas and riparian areas, secondly by using standards and guidelines in the LRMP and thirdly by the application of BMPs. Some of these BMPs may include, for example, graveling road surfaces to avoid dust and loss of soil to wind erosion; revegetating or covering any soil stockpiles that would remain for extended periods to avoid significant wind and water erosion; installing slope breaks and silt fences on slopes to slow and filter storm water runoff that might carry exposed soils to surface water drainages; timely reclaiming disturbed areas to minimize erosion after construction of facilities, and avoiding locations having highly erosive soils where possible. Non-productive wells would also be immediately reclaimed. The applicable lease stipulations to protect aquatic ecosystems and fish species are listed in Table T.24 above.

Another potential impact to fisheries from the projected gas development and production would be the potential for various chemical leaks and spills. This impact is mitigated through the use of BMPs that apply to well drilling operation maintenance and material handling.

In regard to air quality, the effects on Colorado River cutthroat trout would be negligible over the life of the LRMP. The air analysis was focused on the entire planning area, not just the Paradox Leasing Analysis

Area. It is a modeling effort with many assumptions, including a gas development scenario as depicted in the RFD scenario. The potential impacts of nitrogen loading or sulfur dioxide deposition to lakes, streams, and the aquatic ecosystems and fish species would be a very slow and prolonged process. It would be very difficult to detect any measureable effects on aquatic ecosystems well beyond the life of the LRMP.

The effects of oil and gas leasing and development would range from highest in Alternative A, to Alternative D, B, and C, in descending order. Given the locations of the conservation populations and the lease parcels, the effects on Colorado River cutthroat trout could vary from no impact to minor under all alternatives. The Colorado River cutthroat trout is only found in a stream on the far eastern edge of the Paradox Leasing Analysis Area, outside the GSGP on NFS lands. This species is also found in streams on NFS lands within the San Juan Sag, which has little development and water usage projected for future leases. Leasing stipulations for watershed, soils, steep slopes, riparian areas, wetland, and floodplain concerns and Colorado River cutthroat trout populations and habitat (NSO stipulation for Alternatives A, B, and C, and CSU stipulation for Alternative D) would generally protect the species' habitat and minimize impacts. However, if oil and gas development is proposed in the vicinity of streams or potential habitat occupied with Colorado River cutthroat trout, the impacts could be adverse immediately downstream over time. Again, the impacts are predominately due to water depletions and the subsequent effects from reduced stream flows. If no new leases were made available, there would be no impacts on the Colorado River cutthroat trout because all existing leases would occur downstream of Colorado River cutthroat trout habitat.

Mining activities on the SJNF and TRFO may include suction dredging, gravel mining operations, hard rock mining, uranium and vanadium mining, and recreational gold panning. LRMP Chapter 2 displays the potential acreage of disturbance per year from these activities. The impacts to Colorado River cutthroat trout from mining or mining reclamation would be mainly due to erosion and sediment impacts (i.e., degraded fishery habitat), saline runoff or heavy metal loading of streams (i.e., toxic levels for aquatic species), and/or altered stream channels and associated fishery habitat. Depending on the location of the action, the effects of mining or mining reclamation, which is nearly identical under all alternatives, on Colorado River cutthroat trout could vary from no impact to adversely affecting specific individuals but would overall be minor for the planning area's population.

Timber harvesting within USFS standards has little impact on stream habitats except for the roads and trails necessary to skid logs to landings and to haul logs to mills. Construction and use of the roads exposes soil and may accelerate erosion. If these areas of bare soil are connected to the stream network, sedimentation can occur. Connectivity of disturbed areas can be due to road crossings, rills, gullies, and poorly designed road drainage systems. Fine sediments in streams can reduce spawning habitat and limit macroinvertebrate populations. If sediment enters the stream during incubation, it can smother the eggs. Sediment can also deposit in pools and reduce pool depth and volume. Adult fish may move out of these pools to find more suitable areas.

Beyond the effects of sediment from vegetation management, fisheries and aquatic species can be impacted by a reduction of streamside vegetation. A reduction in streamside vegetation can increase average annual and average daily stream temperature by reducing shade and decrease the recruitment of large woody debris in streams. Overhanging vegetation provides hiding cover for fish and it helps cool stream temperatures. Large woody debris recruitment is important, because it dissipates erosive stream energy, regulates sediment movement downstream, provides nutrients, and creates pools important to aquatic species.

The effects from vegetation management (timber harvesting, mechanical fuels reduction, rangeland treatments, prescribed burns, etc.) may adversely affect specific individuals but would overall be minor for the population of Colorado River cutthroat trout. Since all alternatives have generally the same levels of timber harvest, hazardous fuels treatment, etc. (only 1,800 acres separate Alternative D with the greatest levels of harvest and Alternative C with the least amount of vegetation treatment), the effects would be nearly the same for all alternatives. Again, the impacts are driven by sediment and stream temperature influences on fishery habitat quality.

With a changing climate, the observed temperature record in southwest Colorado shows average annual warming of about 2 degrees Fahrenheit over the last 30 years (Western Water Assessment 2008). Since river runoff on the SJNF and TRFO is primarily driven by snowmelt, the warming climate from 1978 to

2004 has caused the onset of spring snowmelt and river snowmelt runoff to occur 2 to 3 weeks earlier in southwest Colorado (Clow 2007). Changes in the timing and amount of runoff may impact aquatic ecosystems. Coldwater fish species, especially Colorado River cutthroat trout, may be especially vulnerable to increasing stream temperatures and hydrologic changes such as reduced late-season base stream flows (Nydick et al. 2012). Changes in physical hydrology may favor some non-native or invasive aquatic species and may increase the incidence of diseases such as whirling disease, adding stress to this sensitive species.

Over the last 25 years, a variety of fish habitat improvement projects such as stream bank stabilizations, pool-forming structure placements, spawning habitat enhancement, fish barriers, and culvert replacements have been implemented on the SJNF and TRFO. In addition, the SJNF and TRFO has assisted CPW in conserving and reintroducing genetically pure, wild populations of Colorado River cutthroat trout in selected streams, particularly in Hermosa Creek watershed. On occasions and after project-level analysis and public involvement, some desired, non-native fish populations are removed in order to favor establishment of native fish populations, such as the Colorado River cutthroat trout. In these instances, the SJNF, TRFO, and CPW work closely together to achieve all environmental objectives. Because of locations of specific streams with conservation populations or a reintroduction effort, these improvement projects would either have no impact or a beneficial impact to Colorado River cutthroat trout under all alternatives.

Cutthroat trout populations can be susceptible to over-angling. CPW has an artificial lures and catch and release regulation on many Colorado River cutthroat trout streams. Angling mortality is rarely heavy enough to reduce population viability, but it can change the age structure of fish populations. Loss of breeding individuals could lead to increased inbreeding and long-term loss of viability.

Whirling disease occurs in many fish hatcheries throughout Colorado and infected fish have been stocked statewide. Whirling disease is a parasitic, protozoan that attacks the cartilage of young fish. Whirling disease affects rainbow, cutthroat, brook, and to a lesser degree, brown (*Salmo trutta*) trout. Mortality rates for rainbow, cutthroat, and brook trout can exceed 80%. Dramatic declines in rainbow trout populations have been recorded in the Madison River in Montana, and the Colorado and Fryingpan Rivers in Colorado. Research has shown cutthroat trout are as susceptible as rainbows. Infected fish, birds, mammals, boats, fishermen, and other equipment can spread the spores from area to area.

Cumulative Impacts

The Colorado River cutthroat trout is both a USFS and BLM sensitive species as a result of introductions of non-native fish species and past cumulative effects on a local and regional basis. Like the other sensitive species, the primary adverse cumulative effects under all alternatives, presently, would occur from activities on the SJNF and TRFO that lead to further water depletions and reduced stream flows (i.e., reduced or eliminated fishery habitat for use). Depending on the location of ground-disturbing activities, the cumulative effects of sedimentation may be adverse for certain stretches of stream habitat and individual fish. To help avoid federal listing, the SJNF and TRFO would focus the majority of its fishery habitat improvement efforts in the next 10 to 15 years to the recovery of the Colorado River cutthroat trout.

Gas development on private and state mineral estate development may add an additional 810 wells to those projected for development on federal mineral estate in the Paradox Basin. These private and state well numbers equate to 6,540 and 166 acre-feet of water used for drilling, fracturing, and completion for the GSGP gas development and Paradox conventional gas development, respectively. For the San Juan Sag (within the San Juan River Basin), existing leases on NFS lands are estimated to have used 7 acre-feet for well drilling and completion. Existing leases for the San Juan Basin CBM and conventional gas wells are estimated to have used 160 and 14 acre-feet of water, respectively, for BLM lands, and 487 and 42 acre-feet of water, respectively, for NFS lands. Private and state mineral estate development may use an additional 722 acre-feet of water for CBM gas wells in the San Juan Basin. The water usage estimates for the above San Juan Basin CBM gas wells (all ownerships) also includes gas production-induced depletions of river and stream flow.

Water is produced in conjunction with the production of CBM gas in the Northern San Juan Basin. Within the Basin in Colorado, there are concerns that the removal of water from the tributary Fruitland – Pictured Cliffs aquifer may result in stream depletions that impact downstream water users and fisheries. These concerns have prompted four studies spanning 2000 to 2009, which quantify groundwater/surface water impacts and their interactions.

The RFD scenario for CBM in the Northern San Juan Basin includes 450 wells to be developed at 80-acre spacing on existing leases. On BLM lands for infill CBM development and production, about 103 acre-feet of water would be needed for well drilling and completion and water depletion from intercepted groundwater potentially bound for streams and river, over the next 15 years. On NFS lands, approximately 241 acre-feet of water would be needed for well drilling and completion and water depletion from intercepted groundwater potentially bound for streams and rivers over the next 15 years, due to infill CBM development and production. Private and state mineral estate development may use an additional 516 acre-feet of water over the next 15 years for infill CBM development and production.

Future development in the Northern San Juan Basin would occur on existing oil and gas leases, most of which have already been developed. The decision as to whether the existing lease can be developed is a function of project-level decision-making and subject to the rights granted by the associated leases. Consequently, federal lease development in the Northern San Juan Basin is not considered a direct effect of the LRMP decisions, but is considered in cumulative effects analysis.

With the exception of some lands in the upper Animas watershed and the northwestern portions of the SJNF and TRFO, there are no water courses that originate on lands of other ownership that flow onto the SJNF and TRFO. Importantly for the Colorado River cutthroat trout, the cumulative effects of activities from private lands, Indian tribal lands, and other jurisdictions that could affect this species are generally downstream from the remaining Colorado River cutthroat populations, their potential habitat, or potential recovery areas. For instance, it is likely there would be cumulative effects from as many as 3,900 new gas wells drilled on or adjacent to the SJNF and TRFO over the next planning period. In addition to an estimated 875 new wells that may be drilled on new leases on federal lands (discussed under Direct/Indirect Effects), there could be as many as 450 new infill gas wells drilled in the Northern San Juan Basin, 800 to 1,000 new wells drilled on the Southern Ute Indian Tribal lands adjacent to the planning area, and 1,600 new wells on previously leased land in the Paradox Basin and Northern San Juan Basin. The RFD projected wells would require new roads, pipelines, and associated disturbance for gas well construction. Consequently, oil and gas development may have large potential to have substantial cumulative effects when compared to all other activities that affect the SJNF and TRFO. The magnitude of new road/pipeline construction and other disturbances would vary only slightly by alternative.

Determination

All LRMP revision alternatives, including Alternative A, may adversely impact individuals (Colorado River cutthroat trout), but would not likely result in a loss of population viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide. The rationale for this determination is as follows:

- Although the Colorado River cutthroat trout distribution and abundance have diminished, they still occupy a variety of locations on the SJNF.
- Existing Colorado River cutthroat trout populations are somewhat secluded and located in areas where there is little potential for agency actions to occur that could have any negative effects on these populations.
- Through the desired conditions, objectives, standards, and guidelines, leasing stipulations, USFS and BLM manuals and handbooks, and BMPs, effects to the Colorado River cutthroat trout would be minimized.
- The SJNF and TRFO would continue to work cooperatively with CPW in conserving and reintroducing genetically pure, wild populations of Colorado River cutthroat trout in selected streams and establishing several metapopulations.
- The SJNF would focus much of its fishery habitat improvement efforts in the next 10 to 15 years to the recovery of Colorado River cutthroat trout.

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