

Appendix J

Biological Assessment for the Final San Juan National Forest Land and Resource Management Plan

**Biological Assessment for the
Final San Juan National Forest
Land and Resource Management Plan**

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CHAPTER 1 – INTRODUCTION

This Biological Assessment (BA) analyzes the potential effects of the proposed 2013 revision of the Land and Resource Management Plan (LRMP) for the U.S. Forest Service (USFS) San Juan National Forest (SJNF) and Bureau of Land Management (BLM) Tres Rios Field Office (TRFO) on threatened, endangered, and proposed wildlife, invertebrate, and plant species, as well as proposed critical habitat. Section 7(a)(2) of the Endangered Species Act (ESA) states that each federal agency, in consultation with the Secretary of the Interior or Secretary of Commerce, must ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Section 7(c) of the ESA requires preparation of a BA if listed species or critical habitat may be present in a project area to assess whether the Proposed Action may affect a listed species or its critical habitat. This BA is prepared in accordance with the legal requirements set forth under Section 7(c) of the ESA, and USFS manual direction to address potential effects to listed species from proposed activities.

1.1 Decisions to be Made Under the Revised Land and Resource Management Plan

The LRMP for which we are consulting provides strategic guidance for future management of National Forest System (NFS) lands managed by the SJNF. The LRMP guides the restoration or maintenance of the health of SJNF lands using an ecosystem management approach that provides for the conservation of all wildlife and plant species. The LRMP also promotes a sustainable flow of uses, benefits, products, services, and visitor opportunities. The LRMP provides a framework for decision-making, and guides resource management programs, practices, uses, and projects. It does not include specific project and activity decisions. Those decisions are made later, after more detailed analysis and further public involvement.

Four alternatives have been developed for management of the SJNF. Each is a management strategy that in different ways emphasizes an ecosystem management approach to species conservation. Alternative B, which is detailed below, is our Proposed Action (Preferred Alternative).

Alternative B 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 are already roaded. Relatively undeveloped areas and areas that are unroaded would, for the most part, remain that way.

The alternatives not selected are:

- Alternative A, which represents the continuation of current management direction under the existing 1983 San Juan National Forest Land and Resource Management Plan. The alternative reflects the implementation of existing management goals, objectives, and management practices based on the existing land use plan.
- Alternative C, which 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. 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, which 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.

There are two related but different decisions for which we are consulting; each will have a separate Record of Decision:

- Adopting a revised LRMP for the SJNF. The new LRMP replaces the current LRMP adopted in September 1983.
- Determining the NFS lands that would be administratively available for oil and gas leasing, as well as the associated leasing stipulations. The USFS considers leasing availability decisions to be separate from, but closely linked to, planning decisions, with both planning- and project-level components. NFS lands in the planning area are currently managed for leasing under the analysis and decision for the 1983 San Juan National Forest Land and Resource Management Plan. Under the LRMP, 1,367,769 acres were open for leasing, mostly under standard lease terms. Approximately 95,500 acres are currently leased.

The lands analyzed in the Final Environmental Impact Statement (FEIS) encompass the approximately 1,867,800 acres of the SJNF, administered by the USFS. The planning area is located in Archuleta, Conejos, Dolores, Hinsdale, La Plata, Mineral, Montezuma, San Juan, and San Miguel Counties, Colorado.

The Tiered Decision-Making Process: Resource Commitments

The LRMP revision is part of a two level decision-making framework. The FEIS, from which the BA is developed, examines potential environmental impacts that could occur as a result of land use allocations and the implementation of actions associated with final planning decisions. Potential subsequent projects and/or activities are discussed in the FEIS in order to analyze the differences between the alternatives. These projects and activities are actions that could occur, but are not authorized or approved by the LRMP, and would need to be analyzed through subsequent project-level environmental analysis. The LRMP Record of Decision will not approve or execute project-level activities.

The oil and gas availability decisions follow the same path as other activities. After the oil and gas leasing availability decision is made for NFS lands, the USFS may authorize the BLM to lease specific lands. Subsequent lease nominations submitted to the BLM by industry would be subject to verification that leasing has been adequately addressed in a separate National Environmental Policy Act (NEPA) analysis and is consistent with the LRMP, assurance that conditions of surface occupancy identified in the leasing availability decision are properly included as stipulations in resulting leases, and determination that operations and development could be allowed somewhere on each proposed lease, except where stipulations prohibit all surface occupancy.

Ground-disturbing activities, such as drilling exploratory wells, would require further NEPA analysis when an application for permit to drill (APD) is received. Proposals to develop a well field would also require site-specific NEPA analysis before being approved. However, this BA treats the leasing decision component of the revised LRMP as if it is an irreversible and irretrievable commitment of resources and therefore analyzes the effects of oil and gas development similar to that which would occur for a project-level analysis.

The Nine Key Land and Resource Management Plan Decisions

The proposed LRMP contains the following key components and decisions that comprise the SJNF's management system. Each of these decisions may affect threatened, endangered, and candidate species either beneficially or negatively, and provide projected outcomes which are the basis for this consultation:

- The establishment of management area (MA) direction, allowable uses, allocations, restrictions, and prohibitions (36 Code of Federal Regulations [CFR] 219.11).
- The establishment of desired outcomes, including multiple-use goals and objectives. Goals are expressed as desired condition in the form of aspirations for which our MA direction, objectives, standards, and guidelines have been directed (36 CFR 219.11(b)).
- The establishment of management requirements, including measures or criteria that would be applied in order to guide day-to-day activities. These are primarily expressed as standards

- and guidelines in the Preferred Alternative (resource integration requirements of 36 CFR 219.13–219.16).
- The designation of research natural areas (RNAs) and other special designations.
 - The recommendations of lands for inclusion in the National Wilderness Preservation System.
 - The identification of river segments that are suitable for inclusion in the National Wild and Scenic Rivers System.
 - The designation of suitable timber lands and the establishment of allowable sale quantity (36 CFR 219.14).
 - The designation of suitable grazing lands.
 - The establishment of monitoring and evaluation requirements (36 CFR 219.11(d)).

Oil and Gas Leasing

In addition to the key LRMP decisions listed above, this BA also addresses the decision to make certain lands available or unavailable for oil and gas leasing. This leasing decision is not an LRMP decision and will be issued under a separate Record of Decision. However, the analysis for this decision is combined with the analysis of the LRMP decisions in the FEIS and in this BA.

1.2 Forest Planning Consultation History

The current SJNF LRMP was approved in 1983. The associated 1983 BA concluded that there would be no adverse effect to the species consulted on from the LRMP's implementation. The U.S. Fish and Wildlife Service (USFWS) concurred with this determination on May 20, 1983, at which time both agencies agreed that site-specific analysis of projects on a case-by-case basis would be a primary mechanism for meeting responsibilities under Section 7 of the ESA.

Subsequently, a major amendment of the LRMP was implemented in 1992. Through programmatic evaluation of that action, a "No Effect" determination was reached. The USFWS concurred with this determination on April 11, 1991. Site-specific analysis and ESA Section 7 consultation on a case-by-case basis, as needed, was reiterated as the primary mechanism for evaluating potential effects on federally listed species.

This action constitutes a revision of the 1983 LRMP, as amended in 1992.

1.3 The Land and Resource Management Plan

Overarching Land and Resource Management Plan 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. 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 regulation under 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 and TRFO. This approach includes 1) the designation and management of protected areas, which include SJNF wilderness areas, the Piedra Area, Colorado Roadless Areas (CRAs), and RNAs; 2) the application of ecosystem management using sustainable ecosystem concepts; 3) the development and application of the LRMP components

presented below (desired conditions, objectives, standards, and guidelines) that provide a framework for the management and preservation of ecosystems; 4) the monitoring of effects of management activities on the SJNF and TRFO; and 5) the 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 we have dedicated to the protection and maintenance of biological diversity. Within this BA, protected areas are used in context of the LRMP and have no specific relationship to listed species as may be found within some recovery plans. The definition of protected areas is found within Appendix J.A. These areas would serve as conservation reserves and refuges to protect the native biodiversity within them and 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 is 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 (TNC) fine-filter approach, which is intended to protect species with known conservation concerns (Hunter et al. 1988; Noss 1987; TNC 1982).

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. Existing and updated guidance is not repeated within the LRMP but is referenced within the Other Referenced Guidance sections for each resource area within the LRMP. The relevant standards and guidelines, along with desired conditions and management objectives, and leasing stipulations, are listed in Appendix J.B.

Standards

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.

Guidelines

A guideline (worded as “should”) is a requirement that we have 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 in 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.

Other Referenced Guidance

The LRMP also uses appropriate components that address specific needs of federal listed species. This includes direction found in recovery plans, adoption of guidance such as that found within the Southern Rockies Lynx Amendment (SRLA), and new information and direction as agreed to in consultation with the USFWS. Appropriate agency manuals, handbooks, laws, regulation, policy, memoranda of agreement (MOUs), etc., are listed in this section for each resource area.

1.4 Management Area Allocations

The MA prescriptions, which represent the allocation of SJNF lands to various emphases, have been assigned to land areas of the on the SJNF (Table J.1)

Table J.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 area 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 designations. These areas include RNAs, 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

Management Area Allocations	Preferred Alternative (acres)
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 7 areas, 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.

1.5 Land Suitability and Program Objectives Decisions

Lands Suitable For Livestock Grazing and Projected Stocking

These two LRMP decisions (suitability and objectives) designate where livestock grazing would occur on the SJNF and the objectives for livestock grazing as defined by projected stocking levels (Table J.2). Lands where grazing has been found unsuitable include areas with high soils hazard, low forage production potential, closed canopy spruce, and currently closed allotments, and others. Suitable lands are lands that have been determined to have adequate productivity that are not eliminated by the preceding factors. Table J.2 does not include suitable acres outside active allotments, such as in forage reserve or vacant allotments.

Table J.2: Suitable Grazing Lands and Stocking Rates

Livestock Grazing	Proposed Action (Preferred Alternative)
Animal Unit Months (AUMs)	
Sheep: permitted AUMs	6,396
Cattle: permitted AUMs	105,809
Livestock Grazing Suitable and Available acres	
Sheep: suitable areas on active allotments	76,921
Cattle: suitable areas on active allotments	666,160

Lands Suitable for Timber Production and Timber Management Objectives

Lands suitable for timber production are lands where we have determined timber production is compatible with desired conditions and objectives (Table J.3). These lands are in MA 5 areas where timber harvests would occur on a regulated, scheduled basis. The land characteristics are generally lands outside roadless areas, on slopes less than 40%, capable of producing greater than 20 cubic feet per acre per year. These lands were available in the previous management plans.

Table J.3: Timberlands Suitable for Production and Allowable Sales Quantity

Suitable Timberlands and Timber Production	Proposed Action
Suitable for timber production - SJNF (acres)	311,583
Other tentatively suitable lands where non-commercial timber harvest may occur - SJNF (acres)	361,282
Total Acres where Timber Harvesting May Occur on the SJNF	672,865
Allowable sale quantity (million cubic feet/million board feet)	4.0/19.9

Suitable Timberlands and Timber Production	Proposed Action
Ponderosa pine acres treated	1000 Rest. 500 PC
Warm-dry mixed conifer acres treated	250 Rest. 250 PC
Cool-moist mixed conifer acres treated	125 PC
Aspen acres treated	500 CC
Spruce-fir acres treated	100 PC
Rest = Restoration, a form of partial cut where post-harvest residual density is partially or closely tied to HRV. PC = Partial cut; includes single-tree and group selection, improvement cuts, shelterwood, and other partial-cut harvesting methods, generally removing 30% or less of the existing overstory. CC = Clearcut; Coppice.	

Under the LRMP, the majority of timber harvesting would be used to meet desired vegetative conditions including improvements in age-class distribution, reduction of hazardous fuels, and improvements in stand structure or composition designed to return forest vegetation to desired conditions. The SJNF may be managed in order to reduce the intensity and extent of disturbances (e.g., wildfire or insect epidemics) that otherwise might result in damage to ecosystem processes and functions. Management activities may also be used to maintain forested vegetation at a desired point within the HRV in order to avoid broad swings in various elements that have occurred naturally over time, but are undesired today. To best meet these goals, commercial and non-commercial timber harvest would be concentrated in the lower-elevation forested vegetation types.

Lands Suitable for Motorized and Non-motorized Recreation

Motorized *suitable* areas designated in the LRMP have existing developed road and/or motorized trail systems that, for the most part, serve current recreation and resource access needs for a particular area. The road and motorized trail system in motorized suitable areas would generally not be considered for expansion or substantial alteration of the transportation system. Importantly, the Proposed Action eliminates over-ground cross-country motorized use, and as such no over-ground cross-country acreages are included in Table J.4. Table J.4 only displays suitability of lands for over-ground and over-snow travel, it does not authorize or make any decisions or changes to the over-ground or over-snow system. This does not affect or change conditions as consulted on concerning snow compaction for lynx habitat.

Table J.4: Recreation Suitability and Objectives

SJNF Motorized Travel Over Ground (acres)	
Not suitable	928,054
Suitable areas	936,778
Total	1,864,832
Motorized Travel Over Snow (acres)	
Not suitable areas	1,072,520
Suitable areas	792,312
Total	1,864,832

The areas identified as *unsuitable* for over-ground or over-snow travel have boundaries similar to MA 1, which are wilderness areas or other areas where natural processes dominate. The areas identified as *suitable* for over-ground travel or *suitable* for over-snow travel have boundaries that correspond to MA 3 (natural landscapes with limited management), MA 4 (high use recreation emphasis), MA 5 (active management), MA 7 (public and private land intermix) and MA 8 (highly developed). On NFS lands, large tracts of non-motorized areas, such as roadless areas are classified as unsuitable.

Oil and Gas Availability Decision and Projected Development

As compared to the current LRMP, the Proposed Action has more lands stipulated No Surface Occupancy (NSO), Controlled Surface Use (CSU), and Timing Limitation (TL), to protect sensitive

biological and physical resources. Designated wilderness areas and the Piedra Area are withdrawn from leasing by law. Approximately 67,700 acres are recommended for wilderness and Wild and Scenic River (WSR) designation (wild river segments) and are administratively not available for lease. Roadless areas are stipulated NSO. For lands outside of roadless areas, a full range of stipulations are assigned, including NSO stipulations, and for lands outside roadless areas, a full range of leasing stipulations are assigned including NSO, TL, CSU, and standard lease terms to protect various resources such as highly erosive soils, steep slopes, critical wildlife habitat, and areas with special management designations such as archaeological areas (Table J.5).

Table J.5: Oil and Gas Leasing Availability

SJNF	Proposed Action (acres)
Federal mineral acres	1,863,402
Acres withdrawn from leasing	509,954
Acres administratively not available for leasing	73,636
Acres available for leasing	1,279,811
NSO	876,266
TL	882,532
CSU	527,489
Standard lease terms	143,722

Prospective oil and gas development areas include the Paradox Basin portion of the SJNF, the northern San Juan Basin (existing leases), and the San Juan Sag.

Table J.6 tabulates the cumulative number of wells, miles of well access roads, and acres of projected development of existing and future leases. Northern San Jun Basin development at 80-acre spacing would involve expansion of existing well pads only. A certain percentage of wells drilled do not produce product or enough to be economically viable. The table projects the number of wells that would be non-producing. These non-producing wells and any infrastructure associated with them are required to be reclaimed to a natural state.

Table J.6: Proposed Action: Projection of Well Pads and Access Road Miles, and Corresponding Disturbance Acres on National Forest Lands, 2013–2027

	Existing Producing Wells	Existing Well Sites Projected to be Reclaimed (2011–2027)	Projected Well Pads on Existing Leases		Projected Well Pads on Future Leases	
			Non-productive (reclaimed)	Production (long-term)	Non-productive (reclaimed)	Production (long-term)
Northern San Juan Basin – CBM	32	0	0	255	0	0
Northern San Juan Basin – conventional	0	0	30	0	0	0
San Juan Sag	0	0	5	0	25	0
Conventional gas	0	0	2	6	14	93
- Gothic Shale	0	0	8	59	42	279
Total	32	0	45	320	81	372
	Existing Road Miles	Existing Road Miles Projected to be Reclaimed (2011–2027)	Projected Road Miles for Projected Well Pads on Existing Leases		Projected Road Miles for Projected Well Pads on Future Leases	
			Non-productive (reclaimed)	Production (long-term)	Non-productive (reclaimed)	Production (long-term)
Northern San Juan Basin – CBM	16	0	0	70	0	0
Northern San Juan Basin – conventional	0	0	0	0	0	0
San Juan Sag	0	0	2	0	12	0
Conventional gas	0	0	1	3	7	46
Gothic Shale	0	0	4	36	21	140
Total	16	0	7	109	40	186
	Existing Wells and Roads		Projected Disturbance Existing Leases		Projected Disturbance Future Leases	
	Total Acres Disturbed	Total Acres Projected to be Reclaimed	Non-productive Wells and Associated Roads (reclaimed)	Total Acres Disturbed – Production Wells and Roads	Non-productive Wells and Associated Roads (reclaimed)	Total Acres Disturbed – Production Wells and Roads
Northern San Juan Basin – CBM	110	0	0	585	0	0
Northern San Juan Basin – conventional	0	0	15	0	0	0
San Juan Sag	0	0	20	0	100	0
Conventional gas	0	0	10	25	55	370
Gothic Shale	0	0	60	435	320	2120
Total Acres	110	0	105	1045	475	2490
Only roads for administrative use (closed to public) are included. Pipelines are projected to be in road rights-of-way, so road disturbance acres include pipeline disturbance. CBM = coalbed methane.						

Water Consumption Resulting from Drilling, Completion, and Well Operations

Substantial quantities of water are projected to be used to drill, fracture, and complete wells for both Gothic Shale Gas Play (GSGP) and conventional well development (see Appendix J.C). GSGP wells would use approximately 7.9 to 13.1 acre-feet of water per well for the entire 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 gas well. Paradox conventional gas wells would use 3.3 acre-feet of water per wells to drill and complete. In the Northern San Juan Basin, coalbed methane (CBM) wells would be drilled on existing leases, but doubling the number of wells on each well pad. In total, 126 federal wells are projected. Water consumption to drill, complete, and operate the wells over their 20-year economic life is 241 acre-feet. 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 (Table J.7).

Table J.7: Projected Water Used to Develop Conventional and Gothic Shale Wells, Coalbed Methane Development, and Conventional Wells within the San Juan Basin for the Proposed Action

Area	Water Usage (acre-feet)
Dolores Basin - Leased and unleased GSGP and Paradox conventional	4,831
San Juan Basin - Leased and unleased GSGP and Paradox conventional	201
Northern San Juan Basin new 80-acre infill development	241
San Juan Sag (San Juan Basin) - new lease development	35
Total	5,308

Fire and Fuels Management Decisions

Under the revised LRMP, the SJNF would use prescribed burns and mechanical treatments to achieve multiple objectives, including hazardous and natural fuels reduction, wildlife habitat improvement, ecosystem restoration, and range betterment. Approximately 8,500 to 10,500 acres of hazardous fuels would be treated annually, primarily through prescribed burning. Mechanical treatments would constitute approximately 30% of the overall fuels program. For the SJNF, much of the focus on reducing fire risk is on the wildland urban interface (WUI) areas where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. These areas often are within MA 7 areas. The focus of the treatment program would be vegetative treatments in the lower-elevation vegetation types. Management of naturally ignited wildfire for resource benefit would be the preferred management approach for the higher-elevation forest types. Wildland fire would be used in order to maintain public land conditions within the HRV while, at the same time, recognizing that other resource and social values may determine the appropriate management responses. Use of managed fire, along with mechanical and other fuels management strategies, may create forest conditions that meet desired conditions for the natural vegetation types within the planning area.

Table J.8: Acres of Fuels Treatments (annual)

Vegetation Type	Treatment	Proposed Action (annual)
Pinyon-juniper	Mastication and Prescribed Fire	1,000 acres
Mixed shrubland/no pine	Mastication	2,000 acres
	Prescribed fire	1,000 acres
Oakbrush understory in pine	Mastication	2,500 acres
Ponderosa pine	Mastication & Mechanical	1,500 acres Restoration Treatment
	Prescribed fire	3,500 acres
Warm-dry mixed conifer	Mechanical	500 acres Restoration Treatment
	Prescribed fire	1,000 acres
Mixed vegetation types	Fire managed for resource benefit	1–50,000 acres
Spruce-fir	Fire managed for resource benefit	1–50,000 acres

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. The new LRMP brings forth the current procedural management requirements, but because MAs change, there would be a change in terms of where developments are allowable and discouraged.

There is a difference in terms of how the Proposed Action conditions and ultimately manage new and existing authorizations. New authorizations would be subject to all of the requirements of the new LRMP. They would be also be conditioned by MA direction, which can be more restrictive in MAs 1, 2 and 3. Some new special use applications may not be compatible with these three MAs and may be rejected; other applications may have valid existing rights, which, as a result, may afford the USFS less discretion to reject outright an application not compatible with MA direction. Existing authorizations are not subject to immediate retroactive application of LRMP requirements. However, upon expiration and application for reauthorization, they must be adjusted to conform to current LRMP requirements.

For the purposes of impact 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 of the Proposed Action. However, overlaying MAs with threatened and endangered species habitat provides a rough indication of areas where species protection would be highest. Given the assumption that MAs 1, 2, and 3 are more restrictive (especially where these MAs correlate with special designations such as Colorado Roadless Areas, etc.) they are most favorable to threatened and endangered species. Conversely, MA 5 and 7 areas are less restrictive and would be more compatible with special uses development. Ultimately, the degree of the impacts of any project would depend on approved conservation strategies, critical habitat designations, and Biological Opinions (BOs) that mandate specific management requirements for land uses. These requirements would not be known until specific project proposals are submitted and assessed.

Habitat Improvement Objectives

The Proposed Action has annual wildlife habitat improvement, fish habitat improvement, and watershed restoration objectives, including erosion control, stream restoration, riparian/lake/fen treatments, and road decommissioning. In addition, the objectives for vegetation management, including timber harvest and the fire program objectives, have direction for wildlife habitat improvement by creating conditions guided by HRV desired outcomes. Table J.9 lists objectives for habitat improvement. The acres for accomplishment are mostly accomplished through other resource programs other than with wildlife program budget. Resource areas such as timber would design timber accomplishment, as listed in Table J.3, to achieve habitat improvement goals as listed below. Thus, the acres listed below are also captured as the same accomplishment for the timber program listed in Table J.3, not in addition to the acres listed in that table.

Table J.9: Watershed, Riparian, and Aquatic and Terrestrial Habitat Improvement

Estimated Resource and Program Management Activities	Proposed Action
Water and Habitat Improvement Projects	
Watershed road densities reduced – road decommissioning	3 miles
Fish habitat enhanced or improved	6 miles
Wildlife Habitat Improvement Projects	
Terrestrial wildlife habitat improvement and restoration	2,000 acres
Ponderosa pine restoration to support associated wildlife populations	3,000 acres
Cool-moist mixed conifer and spruce-fir restoration to support associated wildlife populations	2,000 acres
Winter range habitat improvement for big game	5,000 acres

Estimated Resource and Program Management Activities	Proposed Action
Aspen restoration to support associated wildlife populations	3,000 acres
Invasive plant acres treated	1,500 acres/year

CHAPTER 2 – ENVIRONMENTAL BASELINE

The environmental baseline used for this BA is the existing environmental condition, which includes the past and present impacts of all federal, state, and private actions and other activities occurring within the action area; the anticipated impacts of all proposed federal projects within the action area that have already undergone formal Section 7 consultation; and the impact of state or private actions occurring during the same period of time as the consultation process. It should be noted that the environmental baseline that would be applied to certain analyses related to LRMP implementation may differ from that used for ESA consultation purposes.

2.1 Species Considered and Species Evaluated

Tables J.10, J.11 and J.12 list the wildlife, invertebrate, fish, and plant species that are being evaluated. The USFWS approved this species list on December 21, 2012. These species fall under the requirements of Section 7 of the ESA [16 United States Code [USC] 1531 et seq.], which outlines the procedures for federal interagency cooperation designed to conserve federally listed species and designated critical habitats. Since list concurrence, the North American wolverine (*Gulo gulo luscus*) has been designated as proposed threatened, and the Gunnison sage-grouse (*Centrocercus minimus*) has been designated as proposed endangered with proposed critical habitat. In addition, the yellow-billed cuckoo (*Coccyzus americanus*) is a federal candidate species and is analyzed in the LRMP FEIS Biological Evaluation.

Table J.10: Threatened and Endangered Wildlife Species

Species	Federal Listing Category	Primary Habitat Association	General Habitat and Status on the SJNF
Canada lynx (<i>Lynx canadensis</i>)	Threatened	Spruce-fir	Primarily inhabits high-elevation spruce-fir forests; also cool-moist mixed conifer, high-elevation aspen mixed with spruce or cool-moist mixed conifer, and willow-riparian adjacent to the above habitats. Closely associated with snowshoe hare (<i>Lepus americanus</i>) as a primary prey item. The SJNF is considered part of the core habitat for the state lynx reintroduction program.
Gunnison sage-grouse (<i>Centrocercus minimus</i>)	Proposed Endangered	Sagebrush	Lower-elevation contiguous landscapes of varied sagebrush habitats.
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	Threatened	Pinyon-juniper/ mixed conifer	Mixed conifer or ponderosa pine/mixed conifer located in steep rock-walled canyons. Individuals have been documented on the SJNF; no documented reproduction to date.
North American wolverine (<i>Gulo gulo luscus</i>)	Proposed Threatened	Spruce-fir and alpine	Primarily inhabits high-elevation spruce-fir forests; also cool-moist mixed conifer, high-elevation aspen mixed with spruce or cool-moist mixed conifer, and willow-riparian adjacent to the above habitats.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	Threatened	Riparian/ Wetland	Willow-riparian patches of at least 30 × 30 × 5 feet tall and at least 0.25 acre or larger. Individuals have been documented on the SJNF; no documented reproduction to date.
Uncompahgre fritillary butterfly (<i>Boloria acrocneema</i>)	Endangered	Alpine	Alpine habitat above 12,500 feet with a snow willow (<i>Salix nivalis</i>) component. Sites are generally found on north, northeast, and east aspects and represent the coolest microclimates in high alpine cirques. One small population is known to occur on the SJNF.

We are consulting on five fish species, the bonytail chub (*Gila elegans*), humpback chub (*G. cypha*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and lineage greenback cutthroat trout (*Oncorhynchus clarki stomias*) (see Table J.11). The first four species are found downstream of the planning area in mainstem reaches of the San Juan, Dolores, and Colorado Rivers. The greenback cutthroat trout is found in Stoner Creek, Little Taylor Creek, Rio Lado Creek, and Roaring Forks Creek, all of which are tributaries of the Dolores River System.

Table J.11: Threatened and Endangered Fish Species

Species	Status	Known to Occur on SJNF lands	General Habitat
Bonytail chub (<i>Gila elegans</i>)	Endangered	No	Large warm water rivers
Colorado pikeminnow (<i>Ptychocheilus lucius</i>)	Endangered	No	Large warm water rivers
Humpback chub (<i>Gila cypha</i>)	Endangered	No	Large warm water rivers
Razorback sucker (<i>Xyrauchen texanus</i>)	Endangered	No	Large warm water rivers
Lineage greenback cutthroat trout (<i>Oncorhynchus clarki stomias</i>)	Threatened	Yes	Cold water rivers and streams

Table J.12: Threatened and Endangered Plant Species

Species	Status	Habitat Description	Known to Occur on SJNF Lands
Knowlton's cactus (<i>Pediocactus knowltonii</i>)	E	Rolling, gravelly hills in pinyon-juniper/sagebrush communities at about 6,200 to 6,300 feet elevation. Strongly associated with pea- to cobble-sized gravels (tertiary alluvial deposits of the San Jose Formation) covering a majority of the soil, black sagebrush (<i>Artemisia nova</i>), and occurrence of reindeer lichen (<i>Hypogymnia physodes</i> var. <i>vittata</i>).	No
Pagosa skyrocket (<i>Ipomopsis polyantha</i>)	E	Found on barren shale, montane grasslands, ponderosa pine, juniper/Gambel oak plant communities on the Mancos Shale Formation At elevations of 6,750–7,775 feet, but possible between 6,400 and 8,100 feet.	No

*E=Endangered

On February 4, 2013, the USFWS published a proposed rule to list the distinct population segment (DPS) of the North American wolverine occurring in the contiguous United States as a threatened species under the ESA (USFWS 2013a). The DPS evaluation in the proposed rule concerns the segment of the wolverine species occurring within the contiguous 48 states, including the northern and southern Rocky Mountains, Sierra Nevada Range, and North Cascades Range (USFWS 2013a). The proposed rule did not propose any critical habitat for the species.

There are numerous historical records of North American wolverines from the Colorado Rocky Mountains; however, the species is believed to have been extirpated from the southern Rocky Mountains in Colorado, New Mexico, and Wyoming by the early 1900s (Aubry et al. 2007 cited in USFWS 2013b). The lack of records for Colorado and Utah after 1921 suggests that the southern Rocky Mountains population of wolverines was extirpated in the early 1900s, concurrent with widespread systematic predator control by government agencies and livestock interests (USFWS 2013a).

The Preferred Alternative is not likely to jeopardize the continued existence of North American wolverine, as there is currently no wolverine population on the SJNF or State of Colorado, and the available scientific and commercial information does not indicate that other potential stressors such as land management, recreation, infrastructure development, and transportation corridors pose a threat to the

DPS (USFWS 2013a). Section 7 (a)(4) of the ESA requires conferencing with the USFWS when a Proposed Action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. Because the Proposed Action is not likely to jeopardize the continued existence of North American wolverine, conferencing is not required.

On January 11, 2013, the USFWS published a proposed rule to list the Gunnison sage-grouse as an endangered species under the ESA (USFWS 2013c). In addition, approximately 1,704,227 acres are being proposed for designation as critical habitat in Chaffee, Delta, Dolores, Gunnison, Hinsdale, Mesa, Montrose, Ouray, Saguache, and San Miguel Counties in Colorado, and in Grand and San Juan Counties in Utah (USFWS 2013d).

Gunnison sage-grouse currently occur in seven widely scattered and isolated populations in Colorado and Utah, occupying 3,795 square kilometers (1,511 square miles) (USFWS 2013c). The seven populations are Gunnison Basin, San Miguel Basin, Monticello–Dove Creek, Pinyon Mesa, Crawford, Cerro Summit–Cimarron–Sims Mesa, and Poncha Pass (USFWS 2013c). There are approximately 48 acres of proposed critical habitat on the SJNF in Dolores County. Based on the best available information, there are no Gunnison sage-grouse present on the proposed critical habitat location or on any other lands managed by the SJNF.

The proposed critical habitat for Gunnison sage-grouse on lands managed by the SJNF is considered very marginal given its fragmented nature from other habitat, lack of sagebrush (*Artemisia* sp.), and existing disturbances associated with use of an access road, adjacent gravel pit, and agricultural activities on adjacent private lands. The habitat is located on a mesa, surrounded by mostly non-habitat. Habitat is therefore isolated from other sage-grouse habitat, the closest being approximately 1 mile west. Sagebrush vegetation is sparse on the site, encompassing less than 25% of the vegetative species composition. The eastern portion of the site occurs on a steep slope with pinyon-juniper vegetation. There is an access road that runs through the middle of the site that accesses a gravel pit located on state lands on the northern end. And finally, there is irrigated farm land south and adjacent to the habitat. There are approximately 50 acres of potential habitat on adjacent private lands to the southwest.

The Preferred Alternative is not likely to jeopardize the continued existence of Gunnison sage-grouse or adversely modify proposed critical habitat on the SJNF. There are currently no sage-grouse present on the SJNF. The proposed critical habitat present on SJNF lands is isolated from other patches of sage-grouse habitat. At this time, there are no actions planned that would adversely modify proposed critical habitat. The LRMP contains management direction specific to sage-grouse to minimize adverse impacts from land management actions. Section 7 (a)(4) of the ESA requires conferencing with USFWS when a Proposed Action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. Because the Preferred Alternative is not likely to jeopardize the continued existence of Gunnison sage-grouse, or destroy or adversely modify proposed critical habitat, conferencing is not required. Section 7 consultation would be reinitiated with the USFWS for future activities that have potential to effect sage-grouse and proposed critical habitat.

2.2 Assessment of Threatened and Endangered Terrestrial Wildlife Species and Invertebrates

Consultation History

The following is a list of SJNF-level Section 7 consultations that have occurred on the SJNF related to the Proposed Action.

- Biological Opinion for the Southern Rockies Lynx Amendment, ES/CO: USFS/SRLA, TAILS: 65412-2008-F-00370, BO ES/LK-6-CO-08-F-024 (USFWS 2008).
- Supplemental Biological Assessment for the Southern Rockies Lynx Amendment (USFS 2008).
- Biological Opinion for the Management and Control of Noxious Plants on the San Juan and Rio Grande National Forests, ES/CO: SJ/RGPLC, TAILS 65413-2011-I-0136 (USFWS 2011a).

- Biological Assessment for the Management and Control of Noxious Plants on the San Juan and Rio Grande National Forests (USFS 2011).

Canada Lynx (*Lynx canadensis*)

Background

The Canada lynx was listed as a federally threatened species under the ESA in March 2000. The species is also listed as endangered by the State of Colorado. Currently, there has been no federal recovery plan published for the species. In November 2006, the USFWS designated critical habitat for the contiguous United States DPS of the Canada lynx (USDA Forest Service and USFWS 2006). There was no critical habitat designated for the species in the southern Rockies (Colorado and southern Wyoming). These lands were not included due to the Conservation Agreement between the USFS and USFWS (USFS 2005a) and an agreement by the USFS to incorporate conservation measures in the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000). The Recovery Outline (USFWS 2005) identifies core areas, secondary areas and peripheral areas, based on historical and current occurrence records, as well as confirmed breeding. The southern Rockies were identified as a Provisional Core Area. This designation was identified because this area contains a reintroduced population, which has documented reproduction in the recent past.

Canada lynx habitat on NFS lands in Region 2 is managed in accordance with the SRLA (USFS 2008). The SRLA amended eight Forest Plans in Region 2 that are within the Southern Rocky Mountains Geographic Area (SRMGA). The San Juan Mountains and SJNF lie at the southern end of the SRMGA. The SRLA contains management direction in the form of management objectives, standards, and guidelines that are intended to provide a consistent approach to conserve lynx and lynx habitat. Much of the management direction in the SRLA was based on management recommendations contained in the LCAS.

The following is a summary of the status and distribution, habitat requirements, and risk factors for Canada lynx in the southern Rocky Mountains and the SJNF. Much of the information was taken from the BA and BO for the SRLA (USFS 2008; USFWS 2008), the LCAS, and the Ecology and Conservation of Lynx in the United States (Ruggiero et al. 2000a), and monitoring reports by the Colorado Division of Wildlife, currently referred to as Colorado Parks and Wildlife (CPW) (Colorado Division of Wildlife 2009). More detailed information on the species life history, risk factors, and other pertinent biological information can be obtained in the documents mentioned above.

Status and Distribution

Most of the records and literature on Canada lynx abundance and distribution in the southern Rocky Mountains indicate that historically, populations were relatively rare, compared to populations in Alaska and the northern portions of Washington and Montana. Verified records after the 1920s are rare in southern Wyoming and in Colorado, with central Colorado being the “core” area of lynx records until the early 1970s. A statewide lynx verification program was conducted in Colorado from 1978 to 1980 and concluded that a viable but low-density lynx population persisted in Eagle, Pitkin, Lake, and Clear Creek Counties with evidence of lynx occurrence in Grand and Park Counties, Utah. Lack of evidence from other parts of lynx range in Colorado may have been due to lack of adequate surveys. Several surveys conducted since then have not confirmed lynx to be present. While the surveys did not cover the entire state, they were sufficient to conclude that lynx at that time were rare in the southern Rockies.

Even though lynx individuals appeared to persist in the southern Rocky Mountains, the population had not rebounded despite the removal of key suppressing factors such as commercial trapping and indiscriminate predator control. It was believed that the population was so small in Colorado that it was incapable of rebounding and was augmented with a re-establishment program by CPW in 1999. A total of 218 lynx was released in the San Juan Mountains from 1999 to 2006. The San Juan Mountains are part of the core research area, which is located from the New Mexico border, north to Gunnison, west to Taylor Mesa, and east to Monarch Pass. In 2010, CPW declared the reintroduction program a success when recruitment exceeded mortality.

The majority of surviving lynx from the reintroduction effort currently continue to use high-elevation (9,500 feet) forested terrain in an area bounded on the south by New Mexico north to Independence Pass, west as far as Taylor Mesa and east to Monarch Pass. Lynx continue to occupy suitable habitat in the core release area and other locations across Colorado. Most movements away from the core release area were to the north. Numerous travel corridors within Colorado have been used repeatedly by more than one lynx. These travel corridors include the Cochetopa Hills area for northerly movements, the Rio Grande Reservoir-Silverton-Lizardhead Pass for movements to the west, and southerly movements down the east side of Wolf Creek Pass to the Conejos River valley.

Within the areas of high use in southwest Colorado, site-scale habitat use, documented through snow tracking, supports mature Engelmann spruce-subalpine fir (*Picea engelmannii-Abies lasiocarpa*) forest stands with 42% to 65% canopy cover and 15% to 20% conifer understory cover as the most commonly used areas in southwest Colorado. Little difference in aspect (slight preference for north-facing slopes), slope, or elevation were detected for long beds, travel, and kill sites. Den sites, however, were located at higher elevations and more commonly north-facing slopes with a dense understory of coarse woody debris.

Habitat in the Southern Rocky Mountains

Lynx habitat in the southern Rocky Mountains is usually found in the subalpine and upper montane forest zones, typically between 8,000 and 12,000 feet in elevation. Upper-elevation subalpine forests are dominated by subalpine fir and Engelmann spruce. As the subalpine zone transitions down to the upper montane, spruce-fir forests begin to give way to a predominance of lodgepole pine (*Pinus contorta*), aspen (*Populus tremuloides*), or mixed stands. Engelmann spruce and/or subalpine fir may retain dominance on cooler, more mesic mid-elevation sites, intermixed with aspen, lodgepole pine, and Douglas-fir (*Pseudotsuga menziesii*). White fir (*Abies concolor*) appears in the San Juan Mountains, Sangre de Cristo Range, and Wet Mountains in southern Colorado. The lower montane zone is dominated by ponderosa pine (*Pinus ponderosa*), pinyon-juniper communities, and Douglas-fir, with pine typically dominating on lower, drier, more exposed sites, and Douglas-fir occurring on moister and more sheltered sites. Although the lower montane zone is generally below occupied lynx habitat, montane forests can be important as connective travel habitat that may facilitate lynx dispersal and movements between blocks of lynx habitat, and may provide some foraging opportunities during those movements.

Lynx forage in forested stands with a high density of young, healthy trees or shrubs tall enough to protrude above the snow. These areas provide habitat for snowshoe hare (*Lepus americanus*) (primary prey), and may occur in early successional stands following disturbance (such as vegetation treatments, wind throw, and wildfire) or in older forests with a substantial understory of shrubs and young conifers. Willow riparian areas also provide year-round foraging habitat for hares. Denning habitat consists of mid-aged or mature and older forests with complex physical structure on the ground such as downed logs, trees, or rocks and boulders. Forested areas that lack complex physical structure on the ground provide little value for denning.

Habitat on the San Juan National Forest

Lynx habitat on the SJNF was modeled using habitat criteria in the LCAS and through coordination with USFWS. Updates to the SJNF lynx habitat model and Lynx Analysis Unit (LAU) boundaries were completed in December 2010 based on guidance provided by the USFWS. Modeled lynx habitat consists of spruce-fir, cool-moist mixed conifer, high-elevation aspen mixed with spruce-fir or cool-moist mixed conifer, and willow riparian adjacent to these habitats. Modeled habitat is based on existing vegetation and habitat attributes such as tree size and canopy closure within forested stands. Vegetation data and habitat attributes were obtained from the SJNF's geographic information system (GIS) vegetation database. LAUs represent planning units that approximate home ranges for female lynx. They provide a scale in which to evaluate and monitor the effects of management actions on lynx habitat over time (Ruediger et al. 2000). The remapping of lynx habitat also resulted in the re-delineation of LAUs to better meet the intent of LAUs representing the biological needs for lynx home ranges. Due to a better understanding of lynx habitat as it relates to the habitat criteria described within the SRLA and adjusted for local condition, and in consultation with the USFWS, acreages of lynx habitat across the SJNF have

changed. The initial mapping effort, prior to the SRLA identified 1,048,567 acres of lynx habitat on the SJNF. The current model identified 752,435 acres across the SJNF, Table J.13 describes existing lynx habitat and LAUs across the SJNF.

Table J.13: Existing Lynx Habitat on the San Juan National Forest

LAU Name	LAU Number	LAU Gross Acres	LAU Net NFS Acres	Total Suitable Lynx Habitat (acres)	Total Stand Initiation (acres)	Total Lynx Habitat (acres)	Percent Stand Initiation	Non Habitat (acres)
Bear Creek	21,327	45,779	44,101	32,194	2,417	34,611	7%	9,491
Black Mesa	21,329	78,289	75,435	52,253	1,836	54,089	3.4%	21,346
East Dolores River	21,328	47,347	46,135	35,020	1,314	36,334	3.6%	9,801
East Fork San Juan River	21,318	72,906	67,926	44,593	72	44,665	0.2%	23,262
Engineer	21,331	89,976	84,796	39,552	3,149	42,701	7.4%	42,095
Fourmile-Turkey	21,336	45,897	42,555	19,518	5	19,523	0.0%	23,032
Hermosa	21,304	80,080	79,042	61,016	917	61,934	1.5%	17,108
Junction Creek	21,325	85,183	80,817	47,709	224	46,933	0.5%	33,884
Lower Pine River	21,333	60,821	58,286	40,310	2,353	42,663	5.5%	15,623
Mancos	21,326	69,800	65,534	38,249	430	38,679	1.1%	26,855
Missionary-Florida	21,324	66,434	60,494	33,383	4,311	37,694	11.4%	22,800
Mosca-Coldwater	21,334	42,720	42,700	29,819	1,839	31,659	5.8%	11,042
Needles	21,308	62,601	62,245	25,864	997	26,861	3.7%	35,384
Piedra River Headwaters	21,314	86,770	84,680	46,909	156	47,066	0.3%	37,614
Rico	21,330	75,730	71,126	51,612	221	51,833	0.4%	19,293
Rio Blanco	21,321	81,221	75,500	48,750	87	48,837	0.2%	26,662
Upper Pine River	21,335	37,450	37,450	20,441	0	20,442	0.0%	17,009
Vallecito Creek	21,311	61,935	60,287	26,319	4,029	30,348	13.3%	29,939
Weminuche	21,332	44,291	41,090	27,503	8	27,510	0.0%	13,580
West Fork San Juan River	21,316	57,011	53,032	32,356	176	32,533	0.5%	20,499

Currently, there are approximately 752,435 acres of suitable lynx habitat and approximately 24,479 of unsuitable habitat (habitat in the stand initiation stage) across the SJNF. The vast majority of the primary lynx habitat is located in subalpine forests in designated wilderness (Lizard Head, Weminuche, and South San Juan) and other protected areas such as roadless areas. The SRLA also provided for land management activities that could occur under exceptions or exemptions to the SRLA guidance. The acres that could be affected under the exceptions and exemptions were capped at a percentage of lynx habitat across the landscape. These were initially based on mapped acreages from the first habitat model. These have been readjusted to reflect the current habitat model acreages for SJNF.

In 2006 the SJNF identified areas important for lynx movement and/or connectivity. Five linkage areas were identified including Wolf Creek Pass, North La Plata Mountains, Lizard Head Pass, Molas Pass – Coal Bank Pass, and Red Mountain – South Mineral (Schultz et al. 2006). The Wolf Creek Pass linkage area includes areas on both sides of U.S. Highway 160 east of Pagosa Spring and provides for north-

south movement. At the top of Wolf Creek Pass, it connects with the Rio Grande National Forest linkage area. Monitoring by CPW indicates that the area is being used by lynx. The primary concern in this linkage area is a high-volume, four-lane highway (U.S. Highway 160), which continues to receive periodic upgrades. Other concerns include old clearcut areas, as well as forest roads and meadows with concentrated snowmobile use and other winter recreation activity. Wolf Creek ski area is directly east of and next to this linkage area. There is proposal by a private owner to build a village adjacent to the ski area surrounded by NFS lands managed by the Rio Grande National Forest. The Wolf Creek Pass area likely provides the primary connectivity between the southern San Juan Mountains (South San Juan wilderness) and the central San Juan Mountains (Weminuche wilderness).

The North La Plata Mountains linkage area is centered on the ridgeline above Hermosa Creek, which connects the Lizard Head and Molas area to the La Plata peaks block of habitat. It incorporates the Divide Road (Forest Road 564) and the narrowest segment of spruce-fir habitat from north to south, which is fragmented both naturally and by past timber harvest activities. The primary concern in this linkage area is maintaining a narrow and relatively fragmented band of primary lynx habitat along a restricted ridgeline that is the only high-elevation connection into the La Plata Mountains. This linkage area probably provides the primary connectivity between the Rico Mountains and central San Juan Mountains to the north and the relatively isolated and disjunct La Plata Mountains to the south.

The Lizard Head Pass linkage area includes a rough triangle extending from Lizard Head Pass (U.S. Highway 145) to Rico to East Hermosa. It connects with the Uncompahgre National Forest linkage area at the top of Lizard Head Pass. Lynx movements have been documented throughout this linkage area. The primary concern is a high-speed, two-lane highway (U.S. Highway 145). Lynx habitat is disjunct near the crest of the pass (meadows), but safe crossing of the highway is important all along the linkage area. This linkage area includes private land south of U.S. Highway 145 that contains significant primary lynx habitat and is considered likely to be key to linkage integrity. This area provides linkage between disparate blocks of primary habitat, as well as movement within a known lynx high-use area.

The Molas Pass – Coal Bank Pass linkage area includes areas on both sides of U.S. Highway 550 from the north side of Molas Pass south to the south side of Coal Bank Pass, and south of Silverton (U.S. Highway 550). It extends north to the South Mineral portion of the Red Mountain Pass linkage area and has a shared linkage boundary at Deadwood Gulch. Lynx habitat throughout the linkage area is naturally fragmented and patchy, due to high-relief topography, pre-settlement fires, and steep terrain. There is well-documented lynx use, however, throughout the area. The primary concern in this linkage area is for east-west crossing of a high-volume, two-lane highway (U.S. Highway 550), and crossing is important all along the linkage area. A lynx fatality near Durango Mountain Resort is evidence that the area is being used by lynx, and that highway crossing is a valid concern (Schultz et al. 2006). This area is an east-west connection between habitat blocks on both sides of the highway and between the West Needle Mountains and Rico Mountains and Ophir Mountains.

The Red Mountain – South Mineral linkage area includes both sides of U.S. Highway 550 from Silverton to the top of Red Mountain Pass, where it connects with the Uncompahgre National Forest linkage area. It includes the entire South Mineral Creek drainage from U.S. Highway 550 to the San Miguel County line. Lynx habitat throughout the linkage area is naturally fragmented and patchy, due to high elevation and steep terrain. There is well-documented lynx use, however, throughout much of the linkage area. The primary concern is east-west crossing of a high-volume, two-lane highway (U.S. Highway 550), and crossing is important all along the linkage area. The South Mineral drainage is included in this linkage area to provide a connection west toward the known lynx use areas of Trout Lake and Lizard Head Pass. The South Mineral drainage is also the most probable east-west connection between the Lizard Head Pass area to the west and the expansive central San Juan Mountains east of Silverton and farther east to Lake City.

There was very minimal alteration of lynx habitat over the last planning cycle (~30-year period). During this period, the primary impacts to habitat resulted from natural disturbances such as wildfire and, to a much larger extent, insects and disease. Spruce-fir forests have experienced widespread spruce bark beetle (*Ips typographus*) activity, resulting in impacts to mature and late successional spruce-fir forests. Large areas of spruce mortality were noted in the early 2000s with activity spreading from the Wolf Creek

Pass area west to the upper Los Pinos River Drainage. Large stands of Engelmann spruce have either died or are dying due to the epidemic beetle infestation, causing major changes to forest structure. The resulting changes include the loss of the forest overstory in some areas with a corresponding increase in understory vegetation (grasses, forbs, and shrubs). These changes have and would continue to affect habitat for lynx and primary and alternate prey species.

A variety of recreational activities occur across lynx habitat on the SJNF. Potential effects to lynx from recreation management stem from the use of forest roads, developed recreation, non-winter dispersed recreation, and dispersed winter recreation. There are approximately 2,761 miles of forest roads (maintenance levels 1–5) across the SJNF, and approximately 1,041 miles occur of which in lynx habitat. Roads designated as open to motorized use receive varying degrees of use during summer. Many of the recreationists enjoy traveling on forest roads that provide access to high elevations because of the scenery present and the vast amount of outdoor activities available (day hiking, mountain biking, backpacking, horseback riding, and in some areas designated off-highway vehicle [OHV] use, etc.). During winter, the vast majority of forest roads are closed to motorized use, except for areas designated/approved for over-snow motorized use. Currently, approximately 321,269 acres of lynx habitat is suitable/available for winter motorized recreation. The SJNF has seen an increase in many forms of winter recreation (snowmobiling, snowshoeing, cross-country skiing, back-country skiing, hybrid skiing-use of snowmobiles to access downhill ski terrain, etc.). The SJNF also has numerous developed recreation facilities (campgrounds, visitor centers, day use areas, trailhead parking areas, etc.) that receive extensive use during summer, with some areas (trailhead parking areas) receiving extensive use during winter. These recreational activities have resulted in impacts to lynx habitat. The overall impact from all these activities to lynx is uncertain; however, cumulatively these activities have likely not resulted in appreciable adverse impacts to lynx due the vast amount of suitable habitat present across the SJNF and the vast amount of habitat available that receives limited to non-existent use by humans during summer and winter.

Direct and Indirect Effects

The SRLA BA and BO address key risk factors affecting lynx productivity, mortality, and movement in the southern Rocky Mountains. As noted in the BO, management actions that affect lynx productivity include vegetation management (timber harvest, fuels treatments, and salvage harvest), fire management, recreation management (forest roads, developed recreation, non-winter dispersed recreation, and winter dispersed recreation), minerals and energy, and livestock grazing. Management actions affecting mortality include trapping, competition and predation, predator control, and incidental or illegal shooting. Management actions affecting movement include highways and associated developments and private land development. This BA describes how the proposed management actions associated with the Preferred Alternative would affect key risk factors for lynx. The BA summarizes the direct and indirect effects from the proposed management actions and also tiers to the effects findings described in the SRLA BA and BO.

Management Actions Affecting Lynx Productivity

Vegetation Management: Under the Preferred Alternative, timber harvesting may occur across approximately 672,865 acres of the SJNF. These acreages include lands that are suitable for timber production and other tentatively suitable lands where non-commercial timber harvest may occur. Of the total, approximately 315,027 acres are lynx habitat and include approximately 9,620 acres of unsuitable habitat or habitat in the stand initiation stage.

Under the Preferred Alternative, approximately 675 acres of lynx habitat may be treated annually over the life of the LRMP (approximately 15-year period), which includes 125 acres of cool-moist mixed conifer, 500 acres of aspen, and 50 acres of spruce-fir. In total, approximately 10,125 acres of lynx habitat would be treated via timber management across the SJNF. Treatment methods in cool-moist mixed conifer and spruce-fir forests would include single tree and group selection, improvement cuts, shelterwood, and other partial-cut harvesting methods generally removing 30% or less of the existing overstory.

Timber outputs associated with the Proposed Action are expected to have minimal influences on lynx habitat because of the minor amount of acreage involved and application of SRLA management direction. As described in the SRLA BA and BO, some treatments may improve denning, dispersal, and foraging habitat, while others may have negative short-term impacts that render the habitat unsuitable on a temporary basis. Although no new road construction is expected, timber management activities may involve the reconstruction and re-opening of existing roads, which may cause additional disturbance and possibly result in increases in recreational activities such as snowmobiling. Additional road use may result in additional snow compaction, possibly increasing competition from coyotes and other competitors.

Vegetation treatments occurring across the SJNF would review objectives (VEG O1, O2, O3 and O4) and adhere to standards (VEG S1, S2, S5, and S6) and guidelines (VEG G1, G4, G5, G10, and G11) in the SRLA. With application of the SRLA objectives, standards, and guidelines, potential adverse effects to lynx from vegetation management projects are expected to be reduced. The SJNF would continue to report on the use of exemptions and exceptions to the SRLA vegetation management standards. The current baseline information for exemptions and exceptions are listed in Tables J.14 and J.15.

Table J.14: Wildland Urban Interface Fuels Treatment Exemptions Used in Lynx Habitat on the San Juan National Forest

Total Acres of Lynx Habitat Treated (fuels and non-fuels vegetation treatments)	Acres of Lynx Habitat Treated inside the WUI	Acres of Lynx Habitat Treated under the WUI Exemption	Forest Allocation per SRLA Incidental Take Statement (acres)	Current Forest Balance (acres)	Cumulative % Change from SRLA ITS Allocation (D-E/Dx100)
254	0	0	23,307	23,307	0.0%

Table J.15: VEG S5 and S6 Exceptions Used in Lynx Habitat on the San Juan National Forest

Acres of Lynx Habitat Treated under Exceptions 1-4 in VEG S5 and Exceptions 1-3 in VEG S6 (0.5% of lynx habitat)	Forest Acreage Allocation per SRLA Incidental Take Statement (0.5%)	Current Balance of Forest Allocation (0.5%) (acres)	Acres of Lynx Habitat Treated Under Exception 5 in VEG S5 (1% of lynx habitat)	Forest Acreage Allocation (1%) per SRLA Incidental Take Statement (ITS) (1%)	Current Balance of Forest Allocation (1%) (Acres)	Combined Allocation per Incidental Take Statement (1.5%) (B+E)	Combined Current Balance of Forest Allocation (1.5%) (C+F)	Cumulative % Change from Combined Incidental Take Statement Allocation (G-H/Gx100)
114	3,885	3,771	0	7,769	7,769	11,654	11,540	1.0%

Fuels treatments such as mechanical vegetation thinning are generally not associated with the cover types that comprise lynx habitat. These treatments would occur in Gambel oak (*Quercus gambelii*) shrublands, ponderosa pine, and warm-dry mixed conifer cover types.

Fire Management: Prescribed fire through application of ground or aerial ignition methods are generally not associated with the cover types that comprise lynx habitat. Prescribed fire would be applied in the same cover types as fuels treatments described previously.

Wildfires that result from natural ignitions (lightning) would be managed under the SJNF's wildland fire use program, where fires are managed for resource benefits. Under the Preferred Alternative, fires that are managed for resource benefits may occur on 1 to 60,000 acres annually. These fires are a primary means for restoring natural disturbance processes to high-elevation forest cover types and are likely to occur in lynx habitat.

The influence of wildland fire in lynx habitat could involve short- to long-term reductions in denning habitat due to the removal of dead and down woody material. Other effects include a temporary reduction in suitable snowshoe hare habitat. In most areas, wildland fire should promote the regeneration of snowshoe hare habitat over time. Despite the potential for large wildfire occurrence, large blocks of lynx habitat on the SJNF are expected to remain available. In general, wildland fire can be expected to have greater influences on snowshoe hare and lynx habitat suitability when fires burn at mixed intensity and severity across the landscape. In these cases, the influences on habitat suitability and prey species may last longer due to the presence of habitat attributes preferred by lynx and prey species. In most cases, long-term benefits to both prey and predator are expected from wildfire managed for resource benefits.

ESA Section 7 emergency consultation may be initiated with the USFWS where discretionary actions are taken that have effects on lynx or lynx habitat when managing fires caused by natural ignitions. In some instances the construction of line via hand or mechanical equipment may be necessary to help confine or contain the fire to pre-established management boundaries. Wildfire management conservation measures identified in the LCAS would be applied to reduce potential effects from discretionary actions.

Recreation Management: Potential effects to lynx from recreation management stem from the use of forest roads, developed recreation, non-winter dispersed recreation, and dispersed winter recreation.

Under the Preferred Alternative, there are approximately 936,778 acres suitable for motorized travel over ground. Of the total, approximately 792,313 acres provide suitable motorized travel over snow. The amount of lynx habitat present in suitable motorized areas is discussed below. Designated suitable motorized areas have existing developed road and/or motorized trail systems that, for the most part, serve current recreation and resource access needs for a particular area. The road and motorized trail system in motorized suitable areas would generally not be considered for expansion or substantial alteration of the transportation system. More importantly, the Preferred Alternative eliminates cross-country motorized use.

Under the Preferred Alternative, approximately 281,713 acres of lynx habitat are present in areas identified as suitable for winter motorized recreation. In these areas, snowmobiles would be allowed to operate in designated areas, such as unplowed forest roads, and away from forest roads in the designated areas. Much of the designated winter motorized areas are heavily forested, and occur in relatively steep terrain. Although openings or "play areas" are present, they tend to be limited across the SJNF. Some of the more popular designated play areas include the Wolf Creek Pass area, the Molas Pass – Coal Bank Pass areas, the Red Mountain Pass area, and west of the Durango Mountain Resort ski area.

The SJNF has completed a baseline snow compaction mapping (Schultz et al. 2006). Across the SJNF, there are approximately 101,027 acres of compacted snow in 100 individual areas. Of these, 82,043 acres of mapped snow compaction are within or immediately adjacent to LAUs. There are also approximately 1,663 linear miles of snow-compacted routes, of which 1,390 miles are within or lead recreational users into LAUs. And finally, there are 46 winter access points, of which 31 are within LAUs. Projects implemented under the Preferred Alternative would be evaluated for snow compaction and would assess potential effects to lynx from interspecific competition with other predators for available food sources (refer to the Competition and Predation section below).

Lynx are known to have been killed by vehicle collisions in Colorado, Minnesota, Maine, New York, and Idaho (USFWS 2008). Preliminary information suggests that lynx do not avoid roads (Ruggiero et al. 2000b), except at high traffic volumes. Additionally, lynx have shown no preference or avoidance of unpaved SJNF roads, and the existing road density does not appear to affect habitat selection (McKelvey et al. 2000). High traffic volumes may impede or create barriers to lynx movement and may increase the

likelihood of lynx mortality through vehicle collisions. To date, there have been no incidents reported where lynx have been killed by vehicle collision on roads managed by the USFS in the SRLA area (USFS 2008). The USFWS believes that lynx mortality on forest roads from vehicle collisions are less likely, due primarily to the relatively slow speeds at which vehicles on these roads travel (due to topography and road conditions (USFWS 2008).

The Preferred Alternative incorporates an objective and several guidelines from the SRLA to address potential impacts of forest roads. Objective HU 06 directs that adverse effects of highways can be reduced by working cooperatively with other agencies to provide for lynx movement and habitat connectivity, and to reduce lynx mortality. Guidelines HU G6, G7, G8, and G9 address issues such as upgrading forest roads, habitat connectivity, and brush removal. With application of the SRLA objectives and guidelines, potential effects to lynx from the use of forest roads are expected to be minimized.

There are numerous developed recreation areas (campgrounds, day use areas/visitor centers, or picnic areas) and one ski area (Durango Mountain Resort) occurring in lynx habitat on the SJNF. Existing facilities have been accounted for in the environmental baseline's existing habitat acreage. Developed recreation areas may have direct and indirect effects to lynx resulting from the direct loss of habitat and associated development of the surrounding areas. Any proposed recreational developments, such as campgrounds, may have additional impacts on lynx habitat and habitat use. These developments are usually small in acreage, so actual impacts to habitat and disturbances to lynx are expected to be minor.

Ski area developments such as the Durango Mountain Resort have had some historic impacts on lynx habitat including modifications of denning, foraging, and dispersal habitat, and increased disturbance. In some cases, however, occasional reports are received from the ski area indicating that lynx still utilize portions of the development. Monitoring of lynx by CPW also show use in and adjacent to the ski area. The Preferred Alternative includes approximately 603 acres of potential expansion associated with the Wolf Creek ski area. The entire potential expansion area contains suitable lynx habitat, and falls within the Wolf Creek Pass linkage area.

Future proposals to expand or modify existing facilities would incorporate guidelines for ski areas such as Guideline HU G1 (maintaining adequately sized inter-trail islands that includes course woody debris to provide for winter snowshoe hare habitat), G2 (provide lynx habitat consistent with ski area operation needs especially where lynx habitat occurs as narrow bands of coniferous forest across mountain slopes), and G11 (consider locating access roads and lift termini to maintain and provide lynx security when developing or expanding ski areas and trails). Any future proposals to expand or modify existing facilities in the ski area would require and undergo project-specific NEPA analysis and Section 7 consultation with the USFWS.

Non-winter dispersed recreation activities such as hiking, mountain biking, horseback riding, camping, etc., are common forms of spring, summer, and fall recreation across the SJNF. Many of these activities occur in lynx habitat in both designated (on designated or established trails) and undesignated areas (areas open to cross-country travel). These activities represent low risk of adverse effects to lynx habitat, except possibly for disturbance near den sites.

Dispersed winter recreation use and activities such as snowmobiling, cross-country skiing, and snowshoeing are increasing in higher elevation environments. These activities may result in additional snow compaction and have negative influences on lynx habitat due to increases in snow compaction. Effects to lynx and lynx habitat from use of compacted snow routes are discussed below under competition and predation.

Energy Development: Under the Preferred Alternative, the most common of forms of energy development include oil and gas leasing and development. The SJNF is not a priority area for other energy development such as wind or solar energy. Under the Preferred Alternative, approximately 1,279,811 acres of NFS lands are available for oil and gas leasing. Designated wilderness areas and the Piedra Area are areas withdrawn from leasing by law. Additionally, approximately 73,636 acres are recommended for wilderness and WSR designation, and are administratively not available for lease.

The Preferred Alternative incorporates a number of lease stipulations that guide how potential development could occur across leased areas. Some land designations, which include lynx habitat, are withdrawn from leasing or are not available for leasing and would not be impacted by leasable minerals development. This would include areas with wilderness designation and those such as the Piedra Area. On lands available for leasing, lease stipulations are applied to protect various resources (soils, watersheds, terrestrial and aquatic wildlife and habitat, cultural resources, etc.) from adverse impacts from development activities. There is no NSO stipulation specific for lynx. However, roadless areas do have an NSO stipulation applied, and this would also apply to lynx habitat where it lies within roadless areas or any other areas where NSO is applied for any reason. For lands outside roadless areas, a full range of leasing stipulations are assigned including NSO, TL, CSU, and standard lease terms to protect various resources. All lynx habitat available for leasing is covered by NSO, CSU, TL, or standard lease terms. Standard lease terms apply to all lands available for leasing.

NSO, for any resource reason, prevent surface development on lynx habitat where it overlays that habitat. CSU and TL vary in requirements depending on their purpose. Therefore, the SJNF only inventories acreage specific to lynx CSU and TL within lynx habitat for the numbers reported below.

Of the total area available for lease, approximately 435,924 acres are present in lynx habitat. The different types of leasing stipulations are not mutually exclusive on any one piece of land and may, in fact, overlap on top of each other.

Of the total acreage in lynx habitat, an NSO stipulation has been applied across approximately 345,517 acres or 79% of the habitat. A CSU stipulation has been applied across all of the habitat and a TL stipulation has been applied across approximately 172,453 acres or 37% of the habitat. And finally, standard lease terms apply across approximately 16,241 acres or 3% of the habitat.

Under the Preferred Alternative, areas with high potential for prospective oil and gas development include the GSGP area, the Northern San Juan Basin, the San Juan Sag, and the Paradox Basin. The Paradox Basin and the San Juan Sag are development areas that contain lynx habitat.

Approximately 6,468 acres of lynx habitat are present in the GSGP area. Of the total habitat present in the GSGP area, approximately 6,026 acres are available for lease, of which 1,443 acres (24%) include an NSO stipulation, 4,458 acres (74%) include a CSU stipulation, 158 acres (3%) include a TL stipulation, and standard lease terms apply across 1,259 acres (21%).

Approximately 74,666 acres of lynx habitat are present in the San Juan Sag area. Of the total habitat present in San Juan Sag area, approximately 63,219 acres are available for lease, of which 54,580 acres (86%) include an NSO stipulation, 52,393 acres (83%) include a CSU stipulation, 11,537 acres (18%) include a TL stipulation, and standard lease terms apply across 368 acres (1%).

The leasing of areas with potential for mineral and energy development, and development of the areas, may result in impacts to lynx such as direct habitat loss and potential for increased disturbance from dispersed recreation activity. The increase in dispersed recreation activity may result in additional snow compaction and competition with competitors (coyotes [*Canis latrans*], foxes, mountain lion [*Puma concolor*], etc.). The Preferred Alternative incorporates objectives and guidelines from the SRLA that specifically address minerals and energy projects or actions to minimize the potential impacts to lynx and lynx habitat. Objective HU O5 refers to managing human activities such as mineral and oil and gas exploration and development to reduce impacts on lynx and lynx habitat. Guideline HU G4 encourages remote monitoring of sites and facilities to reduce snow compaction, and G5 addresses reducing impact to lynx habitat through reclamation of closed sites and facilities. G12 addresses limiting winter access for mineral and energy exploration and development by limiting access to designated routes or designated over-snow routes. With application of the SRLA objectives and guidelines, and lease stipulations listed in the Conservation Measures section, potential effects to lynx from mineral and energy developments are expected to be minimized.

Livestock Management: The Preferred Alternative designates where livestock grazing would occur on suitable lands across the SJNF. Suitable lands are lands that have been determined to have adequate

productivity for domestic livestock, while meeting forage needs for wildlife. Areas suitable for cattle and horse grazing exist on approximately 666,160 acres. Areas suitable for domestic sheep and goat grazing exist on approximately 76,921 acres. Of the areas suitable for cattle and horse grazing, approximately 346,472 acres contain lynx habitat of which approximately 266,304 acres are within active or vacant allotments. Of the areas suitable for domestic sheep and goat grazing, approximately 434,088 acres are in lynx habitat, of which approximately 311,412 acres are in active or vacant allotments.

Livestock grazing occasionally occurs in some lynx habitat; however, most grazing occurs in non-preferable areas such as open grassland and shrublands. Livestock grazing that occurs within lynx habitat has the potential to influence cover components utilized by snowshoe hare or influence food supplies such as the regeneration of aspen. The development of range improvements (fencing, stock ponds, spring developments, etc.) may also result in minimal habitat loss and minimal disturbance to individuals should they occur in the area. The Preferred Alternative incorporates one objective (GRAZ 01) and several guidelines (GRAZ G1, G2, G3, and G4) in the SRLA. With application of the SRLA objectives and guidelines, potential effects to lynx from livestock grazing are expected to be minimal.

Management Actions Affecting Lynx Mortality

Trapping: Lynx appear to be vulnerable to trapping and as a result may have been over exploited in the past. Road access may increase the vulnerability of lynx to trappers. At low population levels or in situations where reproduction or recruitment are low, trapping mortality can be additive and lead to population declines. Incidental trapping may occur where regulated trapping is permitted for other species (such as coyote and fox) whose range overlaps with that of the lynx.

Regulations on trapping are not within the jurisdiction of the USFS. Trapping is regulated by CPW. There is no trapping season for lynx in Colorado. It is possible that lynx could be incidentally trapped during trapping seasons for other species. Trapping with leghold traps for all species is illegal in Colorado. The final rule for listing indicates trapping does not currently appear to be a significant mortality factor in the SRMGA. The Preferred Alternative does not specifically address trapping activities on the SJNF. Trapping would continue to be regulated by CPW.

Competition and Predation: Buskirk et al. (in Ruggiero et al. 2000a) described the two major competition impacts to lynx as exploitation (competition for food) and interference (avoidance).

It is hypothesized that coyotes, bobcats (*Lynx rufus*), and mountain lions could be competitors with lynx.

Where historically the ranges of these species overlapped with lynx, deep snow excluded them from winter habitats for the lynx. Lynx have evolved a competitive advantage in deep soft snow environments that tend to exclude other predators during the middle of winter, a time when prey is most limiting.

Widespread human activity (snowshoeing, cross-country skiing, snowmobiling, snow cats, etc.) may lead to patterns of snow compaction that make it possible for competing predators such as coyotes and bobcats to occupy lynx habitat throughout the winter, reducing its value to and even possibly excluding lynx (Ruediger et al. 2000; Ruggiero et al. 2000a). The lynx and coyote seem to hunt under different snow conditions with coyotes using shallower and more compacted snow while lynx tend to use deeper snow areas. Coyotes have greatly expanded their range, and the use of packed snow trails and plowed roads may allow them to occupy winter habitats of lynx in some cases.

Plowed roads and snow compaction of roads and trails associated with a variety of forest management and recreational activities may also increase the potential for competitors to move into lynx habitat. The SRLA provides management recommendation to minimize the impacts from snow compaction to lynx and lynx habitat. Future projects and activities implemented under the LRMP would incorporate guidelines in the SRLA, notably HU G10, which addresses the non-expansion (outside baseline areas of consistent snow compaction) of designated over-snow routes or designated play areas, unless designation serves to consolidate use and improve lynx habitat. With application of the SRLA guidelines, potential effects to lynx resulting from snow compaction activities are expected to be reduced.

Predator Control: Predator control activities occur on the SJNF to protect livestock from predation. Predator control activities are conducted by the U.S. Department of Agriculture Animal and Plant Health Inspection Service, Wildlife Services. These activities are directed at specific animals or target species. Predator control activities that affect lynx or lynx habitat on NFS lands must be done in compliance with the ESA. These activities are subject to their own separate Section 7 consultation process and must be done in compliance with the LRMP. Predator control activities can occur in lynx habitat, but more often take place outside lynx habitat and at lower elevations.

Under the Preferred Alternative, predator control would be managed in cooperation with CPW, USFWS, Animal and Plant Health Inspection Service, and other appropriate agencies and cooperators in order to reduce damage to other resources (and to direct control toward removing only the offending animal). Preventive methods of denning, aerial gunning, and poisons of any kind towards predators would not be allowed on NFS lands within the planning area under any circumstances. Under these requirements, the risks of any adverse effects to lynx from predator control activities are expected to be low.

Management Actions Affecting Lynx Movement

Ruggiero et al. (2000b) indicates that we know little about the degree of connectivity or its role in the viability of lynx, but assumes that connectivity plays an important role. Protecting, maintaining, and improving lynx habitat afforded by the various conservation measures contribute to the conservation of lynx and population viability. Maintaining habitats to provide for dispersal movements and interchange among individuals and subpopulations may be the most important provision for maintenance of population viability contained in the LCAS. An interconnected ecosystem can be essential to maintain the ability of subpopulations to expand and colonize new habitats, recolonize areas where subpopulations have been locally extirpated, provide population support to declining populations, allow individuals to find mates among neighboring subpopulations, and affect dispersal and genetic interchanges (Noss and Cooperrider 1994).

The negative effects of highways on rare carnivores include habitat fragmentation, direct mortalities, direct loss of habitat, displacement due to noise and human activity, and secondary loss of habitat due to associated urban sprawl. When traffic volume increases, there is an evolution of highways from gravel roads to paved two-lane roads, and from two-lane highways to more problematic four-lane highways, and the interstate highways, which have the most adverse effects to wildlife movements. The result of this progression of upgrades in the transportation system is the mortality of individuals attempting to cross the highway and potential subpopulation isolation, both of which result in a slow decline in the population and ultimately can affect viability for some of the low density carnivores such as lynx and wolverine (Ruediger et al. 2000a). Critical points in development of highways occur when gravel forest or backcountry roads are paved, which results in higher speeds, higher traffic volumes, and increased human developments.

Habitat for lynx across the SJNF and SRMGA is naturally fragmented. The Preferred Alternative incorporates SRLA objectives, standards, and guidelines to maintain habitat connectivity across the SJNF. The application of SRLA objectives, standards, and guidelines would lessen adverse impacts to habitat from management actions across lynx habitat, and especially in identified linkage areas.

Conservation Measures

The Preferred Alternative would adhere to standards and Guidelines in the SRLA.

Minerals and Energy Lease Stipulations

The following lease stipulations would be applied to minerals and energy leases where lynx habitat is present.

Controlled Surface Use - Lynx, Landscape Linkage, Denning and Winter Foraging Habitat

Surface occupancy or use is subject to the following special operating constraints: Limitations on surface use and/or operational activities may be required. TL (especially during winter and/or in lynx

habitat) and restrictions on snow compaction activities may be applied in consultation with the USFWS as necessary to protect habitat and linkage area function and limit access by potential lynx competitors. Actions would be consistent with direction found in the LCAS, best available science as determined by the managing agencies and the USFWS, and/or the SRLA, each where applicable.

On the lands described below:

- Within identified current active denning locations
- Within identified landscape linkage areas
- Within identified lynx habitat in an LAU

For the purpose of: Protection of lynx and lynx habitat in compliance with the ESA.

Justification: The Canada lynx is a threatened species, with suitable habitat within portions of the SJNF. CSU would apply in these habitat areas to protect the habitat and the species.

Exceptions: The Authorized Officer in consultation with the USFWS may grant an exception to this stipulation if an environmental analysis and subsequent consultation indicates that the proposed or conditioned activities would not affect current and subsequent, suitability or utility of established lynx linkage corridors or lynx habitat within the LAU.

Modifications: The Authorized Officer, in consultation with USFWS, may modify the size of the stipulation area or time frames if an environmental analysis indicates that a portion of the area is nonessential to function and utility of established lynx linkage corridors and lynx habitat, and not impair the utility of the corridors and LAU for current or subsequent lynx use or occupation.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer in consultation with the USFWS, only through a land use plan amendment if site conditions have changed sufficient to preclude current and subsequent lynx occupation of the LAU or use of linkage corridors.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or Forest Service Manual [FSM] 1950 and 2820.)

Timing Limitation - Lynx Denning Sites

No surface use is allowed during the following time period: March 1–August 30 (this stipulation applies to all lease activities).

No surface use is allowed during the following time period on the lands described below: Within 1 mile of known, active, den sites.

For the purpose of: Protection of denning habitat for Canada lynx in compliance with the ESA.

Justification: The Canada lynx is a threatened species, with suitable habitat within portions of the SJNF. A TL would apply in these habitat areas to protect the habitat and the species.

Exceptions: An exception can be granted if an environmental analysis of the Proposed Action and subsequent consultation indicates that the nature or conduct of the activity could be conditioned so as not to impair the utility of habitat for current or subsequent reproductive activity or occupation.

Modifications: The Authorized Officer, in consultation with USFWS, may modify the size of the stipulation area or time frames if an environmental analysis shows that the modification would not impair the utility of the habitat and LAU for current or subsequent lynx reproductive activity or occupation.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer in consultation with USFWS only through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Cumulative Effects

The cumulative influences of numerous past, present, and future activities that may occur on various land ownerships within the southern Rocky Mountains could affect lynx and contribute positively or negatively toward its recovery in the state of Colorado. Land management activities that occur on the SJNF would be particularly important to the conservation of lynx because the majority of suitable habitat occurs in high-elevation forests on USFS lands. Some activities, features, or trends that occur on other land ownerships would also affect lynx within the greater southern Rocky Mountains. These include highways, commercial and residential development, expansion of recreational activities, and other uses that are closely tied to human population growth. While all of these cumulative actions/activities may negatively affect lynx and lynx habitat, the SJNF would continue to meet the goals and objectives of the LCAS and SRLA and provide vast amounts of suitable habitat for lynx. This is expected to result in the persistence of the species on the SJNF.

Determination

The Preferred Alternative “**may affect and is likely to adversely affect**” Canada lynx and lynx habitat. The primary reason for an adverse effect determination is due to direct and indirect effects associated with vegetation management across the SJNF. Under the Preferred Alternative, 23,307 acres of lynx habitat within the WUI would be exempt from standards VEG S1, S2, S5 and S6 for fuels treatments. Some or all of these acres would be treated in various ways that are incompatible with lynx habitat needs. Additionally, approximately 11,654 acres of lynx habitat can be treated under exceptions 1–4 in VEG S5 and exceptions 1–3 in VEG S6. Additional direct and indirect effects associated with the Preferred Alternative include habitat loss from recreational activities (development of facilities such as campgrounds, day use areas, trailhead parking areas, etc.), minerals and energy developments, and livestock grazing management. The activities may also result in disturbance impacts to lynx, which are expected to be limited in scale and duration. The Preferred Alternative also has potential to increase snow compaction, increasing the potential for competition with other predators for food resources and predation from competitors. The planning components in the LRMP include desired conditions, objectives, and design criteria that would continue to meet or exceed management considerations and recovery objectives associated with the lynx. The application of SRLA standards and guidelines is expected to reduce adverse effects to lynx, thereby maintaining the long-term persistence of the species across the SJNF.

Uncompahgre Fritillary Butterfly (Boloria acrocne)

Background

The Uncompahgre fritillary butterfly was discovered in 1978 and described as a new species in 1980. This butterfly has the smallest range of any North American butterfly and is restricted to a small geographical area in the San Juan Mountains and southern Sawatch Range in southwest Colorado. The Uncompahgre fritillary butterfly is endemic to high elevation (>12,500 feet) alpine peaks of Colorado's San Juan Mountains. It was listed as endangered under the ESA in 1991 due to population declines observed in the 1980s (USFWS 1994). Over collection is considered the greatest human-caused threat to the species persistence.

The Uncompahgre fritillary butterfly is dependent on snow willow (*Salix reticulata nivalis*) for food and shelter, and even adult butterflies are rarely found far from patches of snow willow (USFWS 1994). The Uncompahgre fritillary butterfly has a biennial life cycle, with two overlapping populations representing even and odd years present at each occupied site (USFWS 1994). Eggs laid in year one become caterpillars, then become adults in year two. Adult butterflies fly for only about 3 weeks, usually beginning in early to mid-July (Dr. Kevin Alexander, Western State Colorado University, personal communication). Adult butterflies feed on nectar from a wide variety of alpine flowers. Females lay their

eggs on snow willow plants or in litter within snow willow patches, which shelters the caterpillars and provides them with their sole source of food.

Various concerns regarding the butterfly's continued persistence have been presented including extensive adult butterfly collection, possibility of disruption of larval microhabitat by livestock grazing, and prolonged local drought conditions (USFWS 1994). Trampling damage by livestock has been identified by the Recovery Team as a minor potential threat to Uncompahgre fritillary butterfly larvae.

Critical habitat has not been designated for this species. The SJNF continues to be part of the recovery team effort and would refine baseline habitat conditions for the Uncompahgre fritillary butterfly as the information warrants.

Status and Distribution

Since 1983, the number of known Uncompahgre fritillary butterfly colonies has increased as more extensive surveys have been initiated. Currently, the species is known or suspected to occur at 11 colony sites, all of which contain various numbers of population clusters (Alexander and Keck 2011). After at least 10 years of intensive inventory, all probable locations for finding additional Uncompahgre fritillary butterfly colonies are nearly exhausted. There are no additional priority sites to survey on the SJNF that may possibly support the species.

Currently, there are enough known colonies of sufficient size to down list the Uncompahgre fritillary butterfly. However, the down listing criteria calls for 10 stable colonies for a period of 10 years, and not enough colonies have been known for that long. There is also a need for more long-term monitoring data to determine population changes over time. Enough quantitative population information has been collected over the years to start statistical analysis to establish population trend information at the end of the 2011 field season. Continued monitoring and confidentiality of the colony locations are the primary conservation measures that would be pursued to aid in the recovery of this species.

The Uncompahgre fritillary butterfly was not known to occur on the SJNF until 2004 when two of six habitat patches of one colony on adjacent NFS land were identified as occurring east of the Continental Divide. These two patches contain approximately 10 acres of snow willow and have been identified as Patch H and Patch G in the annual Uncompahgre fritillary butterfly monitoring reports (Ellingson 1998). There are no habitat threats identified for this colony due to its remoteness, and the habitat patches are suspected to be stable because of annual presence. The existing data indicate that the population is persistent and that the colony currently remains one of the most extensive of the known populations (Ellingson 2003).

Habitat for Uncompahgre Fritillary Butterfly across Its Geographic Range

The primary habitat for the Uncompahgre fritillary butterfly consists of suitable snow willow patches that are located above 12,000 feet at north through east aspects. In general, these habitats involve very high maximum elevations (often above 13,500 feet), extensive contiguous areas of suitable elevation and aspect, and rolling or terraced terrain. Snow willow serves as the host plant for the eggs and larvae of the Uncompahgre fritillary butterfly, and suitable snow willow sites appear to be restricted to topographic features that occur rarely. They often involve glacial cirque, and are remote and inaccessible. These patches are usually situated below snow fields lasting late into the summer, which provides a source of melt water for snow willow plants during the brief summer growing season.

Habitat on the San Juan National Forest

Initial efforts on the SJNF identified and surveyed approximately 3,200 acres of potential Uncompahgre fritillary butterfly habitat without discovering any colonies or high-potential habitat (Ellingson 2001). Rather, the surveys indicated that characteristics of snow willow on the SJNF differ from those in the remainder of the species range and, where patches do occur, they are rarely extensive enough to support the Uncompahgre fritillary butterfly. The reasons for this are unclear, but may be related to soil and moisture factors.

Existing Uncompahgre fritillary butterfly habitat is located in the Weminuche wilderness. Existing management activities in the area include livestock grazing and recreation management. Occupied habitat is located in a small section of the Pine River Domestic Sheep and Goat Grazing Allotment. Grazing in the portion of the Pine River Allotment where the Uncompahgre fritillary butterfly colony is located began in the very early 1900s and continued annually through 1980. The Pine River Allotment was last grazed by domestic sheep in 1980. The permitted grazing season was mostly from July 1 through September 15 each year. The area where the Uncompahgre fritillary butterfly colony is located was permitted for 2,000 head of sheep until 1947. Beginning in 1948, the permitted numbers were reduced to 850 through 1950, then increased to 1,050 head in 1951, where it remained until 1978. In 1978, this area was combined with two other areas to form the current Pine River Allotment. The combined Pine River Allotment was permitted for 850 head, but grazing actually occurred for only three more seasons, being last grazed in 1980. There is ongoing NEPA analysis (Weminuche Sheep Grazing Analysis) that proposes to close the Pine River Allotment to all livestock grazing. Currently, there are no impacts to the Uncompahgre fritillary butterfly colony from grazing as the area has not been grazed since 1980.

Recreation activities (day hiking and backpacking) occur in the vicinity of the Uncompahgre fritillary butterfly colony. The activities are mostly incidental, and to date no adverse impacts to the colony have been documented.

There are four small areas in the Rock Creek Domestic Sheep and Goat Grazing Allotment located in the Weminuche wilderness, totaling 233 acres, that appear to have suitable Uncompahgre fritillary butterfly habitat attributes and the potential for butterfly occurrence appears to be high. Dr. Kevin Alexander, the lead USFWS interagency species recovery team butterfly researcher, has visited the area and believes there is high potential for Uncompahgre fritillary butterfly occurrence. However, the area has not been surveyed during the primary Uncompahgre fritillary butterfly survey season to adequately determine the status of butterfly occurrence. For this reason, until the area can be adequately surveyed, the area would be presumed to be occupied by Uncompahgre fritillary butterfly and domestic sheep would be managed to avoid and not impact habitat. The Rock Creek Allotment is proposed for forage reserve status under the Preferred Alternative of the ongoing Weminuche Sheep Grazing Analysis.

Domestic sheep grazing in the Rock Creek Allotment began in the very early 1900s and continued annually through 1970. The Rock Creek Allotment has not been grazed by sheep since 1971. Early on, the Rock Creek Allotment was combined with the Leviathan Allotment, and the combined allotment was permitted for 1,300 head of sheep from 1928 through 1930. In 1931 the permitted number on the combined allotment was increased to 1,500 head. In 1932, the Rock Creek Allotment was separated from the Leviathan Allotment, and the number permitted on Rock Creek was reduced to 600 head. In 1947, the Rock Creek Allotment was combined with the adjacent Vallecito Allotment and the combined allotment was permitted for a total of 850 head (reduced from a previous combined total of 1,800 head across both allotments). The permitted number for the combined Rock Creek Allotment remained at 850 head until grazing ended in 1970.

As part of the ongoing NEPA analysis, a polygon was delineated with assistance from the USFWS that includes the four small potential Uncompahgre fritillary butterfly areas, within which domestic sheep grazing activities would be restricted. This restricted area polygon was designed to have boundaries that can be readily identified on the ground by sheep herders managing the domestic sheep flocks. This polygon is 676 acres in size. The grazing permittee is responsible for ensuring their herders manage the movement, activities, and presence of sheep around this restricted area polygon to ensure that grazing sheep do not enter the area or degrade butterfly key habitat attributes.

Salting, bedding, and intentional grazing of sheep would not be permitted in this restricted area polygon. Trailing through the polygon would not be necessary because of its location along a very steep and rugged margin of the forage reserve allotment that is not needed to be crossed to move sheep within the allotment or move sheep to or from other allotments.

There are no system trails leading into the area around the polygon but the area receives regular dispersed recreation by backpackers and climbers on user-created trails. Peaks around the polygon are

popular with climbers, and the basin adjacent to the polygon provides a well-used route to and from the climbing areas.

Direct and Indirect Effects

There are few management actions associated with the LRMP that may affect the Uncompahgre fritillary butterfly or its habitat because the species is restricted to higher-elevation alpine habitats that are often inaccessible. Most of the potential habitat is also protected as designated wilderness. The one known colony with habitat patches on the SJNF is considered secure and stable. There are no habitat threats identified for this colony due to its remoteness, and the habitat patches are suspected to be stable because of presence from long-term monitoring. The existing data indicate that the population is persistent and that the colony currently remains one of the most extensive of the known populations (Ellingson 2003).

As mentioned previously, the ongoing Weminuche Sheep Grazing Analysis proposes to close the Pine River Allotment to all livestock grazing. Currently, there are no impacts to the Uncompahgre fritillary butterfly colony in the Pine River Allotment from grazing as the area has not been grazed since 1980. As part of the Weminuche Sheep Grazing Analysis, a restricted area has been identified in Uncompahgre fritillary butterfly habitat in the Rock Creek Allotment that would ensure domestic sheep do not enter the area or degrade key butterfly habitat attributes. As noted previously, various forms of recreational use occur in the vicinity of the current Uncompahgre fritillary butterfly colony and in the areas presumed to be occupied by Uncompahgre fritillary butterfly in the Rock Creek Allotment. There have been no impacts to Uncompahgre fritillary butterfly habitat reported from recreational activities.

Most of the potential habitat on the SJNF is considered poor quality and occurrence is unlikely. Within some of these locations, however, it is possible that recreational activities and/or livestock grazing might influence habitat or individuals if occurrence is eventually documented. Where access to habitat areas exists, the risk of illegal collection may also increase if the species is found there in the future.

In summary, management activities implemented under the Preferred Alternative are not expected to have any adverse direct or indirect effects to occupied Uncompahgre fritillary butterfly habitat in the Pine River Domestic Sheep Grazing Allotment or habitat patches presumed to be occupied in the Rock Creek Domestic Sheep Grazing Allotment. The LRMP standards and guidelines adopt the Uncompahgre Fritillary Butterfly Recovery Plan (USFWS 1994) and the interagency agreement to conserve the species. The SJNF would continue to participate in and adopt the relevant findings from the annual field report, the interagency recovery team, and new direction as agreed to in consultation with the USFWS to further management and conservation of the species. Butterfly surveys would be conducted before proposed actions are implemented in suitable habitat, and actions that would negatively impact known habitat or populations would be avoided. In areas of occupied habitat, regulations that prohibit collecting would be implemented and enforced by the agencies.

Conservation Measures

In addition to adopting the conservation measures identified in the Uncompahgre Fritillary Butterfly Recovery Plan, the LRMP revision has the following standard that further protects Uncompahgre fritillary butterfly habitat and populations

Standard

Butterflies: Management actions that could adversely impact reproductive habitat for occupied BLM and USFS sensitive butterfly species must be designed to sustain host plant species.

Cumulative Effects

The Uncompahgre fritillary butterfly has been recorded only above 12,500 feet in elevation. There are few activities on federal lands that are expected to influence the existing known population or potential habitat for the species. The only private lands that occur at that elevation within the boundary of the SJNF are mining claims, most of which are no longer active. Although unlikely, there is a potential that

some high-elevation private lands could continue to influence potential habitat for the Uncompahgre fritillary butterfly. However, the vast majority of potential habitat occurs on public lands and is expected to remain secure from potential impacts. No other actions on private or state lands have been identified that would affect the potential habitat for this species.

Determination

Actions associated with the Preferred Alternative are expected to have minimal influences on the Uncompahgre fritillary butterfly and its habitat. The planning components in the LRMP include desired conditions, objectives, and design criteria, including mitigation, and conservation measures that would continue to meet or exceed management considerations and recovery objectives associated with the Uncompahgre Fritillary Butterfly Recovery Plan. With implementation of the recovery plan, direction in the LRMP, and direction as agreed to in consultation with the USFWS, the Preferred Alternative **may affect, but is not likely to adversely affect** Uncompahgre fritillary butterfly and its habitat. Separate site- and project-specific NEPA analysis would occur if any activities are proposed in or near potential Uncompahgre fritillary butterfly habitat.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

Background

The southwestern willow flycatcher is one of four or five recognized subspecies of the willow flycatcher (Sedgwick 2001). It is a neotropical migratory bird that breeds in the southwestern United States. In the late summer or early fall it migrates south into Mexico and Central America. Historically it was found in southern California, Arizona, New Mexico, west Texas, southwest Colorado, south Utah, extreme southern Nevada, and extreme northwestern Mexico (Unitt 1987).

In March 1995, the southwestern willow flycatcher was listed as a federally endangered species by the USFWS. The USFWS recently revised its 2005 designation of critical habitat for the species, identifying 1,227 stream miles within the 100-year floodplain of waters in California, Arizona, Nevada, Utah, Colorado, and New Mexico, encompassing a total area of approximately 208,973 acres (USFWS 2013e). During this designation, there was no critical habitat identified on the SJNF.

Southwestern willow flycatchers are considered to be a riparian-obligate species nesting in riparian willows (*Salix* sp.), buttonbush (*Cephalanthus occidentalis*), box alder (*Acer negundo*), saltcedar (*Tamarix* sp.), and other riparian associated species. There is currently no upper elevation limits described for the species. Habitat may consist of riparian willows or other suitable vegetation at least 5 feet high and as small as 30 × 30 feet in area. This small area may be composed of subsequent smaller patches in close proximity.

The southwestern willow flycatcher is an insectivore, foraging within and above dense riparian vegetation, feeding on insects on the wing or gleaning them from within the vegetation (USFWS 2002a). Parasitism by brown-headed cowbirds (*Molothrus ater*) is a serious problem. These birds lay their eggs inside the willow flycatcher's nest and remove some of the flycatcher's eggs. In addition, the loss of riparian vegetation and the replacement of native vegetation with exotic species are occurring within the range of the willow flycatcher. Low numbers of nesting pairs within their range may affect population viability (USFWS 2002a). The nesting season which begins in late May and early June and fledging from late June through mid-August (USFWS 2002a), is the most critical time to prevent nest parasitism or nest predation from occurring.

The final rule determining endangered status for the southwestern willow flycatcher listed a variety of threats to the species. The primary threats include the following:

1. Large-scale loss of riparian wetlands, particularly cottonwood (*Populus* sp.)/willow, and changes in riparian plant communities resulting in the reduction, degradation, and elimination of nesting habitat. These losses and changes can result from:
 - a) Water diversion, impoundment, and channelization,
 - b) OHV and other recreational uses,

- c) Impacts from livestock grazing, which affects plant community structure, species composition, and relative abundance of species and plant density,
 - d) Invasion by the exotic saltcedar,
 - e) Logging in the upper reaches of southwestern rivers, which could increase the likelihood of damaging floods in southwestern willow flycatcher nesting habitat.
2. Predation, which may be increasing with habitat fragmentation.
 3. Brood parasitism by brown-headed cowbirds.
 4. Direct mortality from livestock grazing in and near occupied habitat. Livestock in riparian habitats sometimes make physical contact with nests or supporting branches, resulting in destruction of nests and spillage of eggs or nestlings.
 5. Pesticides in agricultural areas, and recreation, particularly during the warm summer months, may constitute potential threats.

Status and Distribution on the San Juan National Forest

The current survey information suggests that southwestern willow flycatchers are localized and uncommon in southwest Colorado. Despite extensive surveys and suspected suitable habitat in some locations, there are no confirmed breeding populations on the SJNF. The total population of southwestern willow flycatcher consists of one site on the Weminuche Devil Grazing Allotment that has been occupied intermittently for at least 10 years by zero to four singing males (USFS 2005b). The population at this site is too small to detect a long-term trend, but the pattern of occupancy indicates occurrence of individual flycatchers has persisted over the past 10+ years and therefore continued survey and monitoring efforts are warranted. Direction concerning maintenance of habitat for this site results from that found in the species' recovery plan and that developed in consultation with the USFWS. This direction is adopted by the plan as other referenced guidance within the LRMP's terrestrial wildlife section. If occupation or nesting is observed elsewhere on the SJNF, consultation with the USFWS would be initiated. There have been no reports of southwestern willow flycatchers elsewhere across the across the SJNF.

Increasing trends in southwestern willow flycatcher populations across the species range and limited suitable riparian habitat on the SJNF suggest that habitat is available if the subspecies eventually begins nesting on the SJNF. The current information suggests that the SJNF does not measurably contribute to the recovery or overall viability of the southwestern willow flycatcher. The possibility of future individual breeding pairs, however, cannot be discounted as the recovery of the subspecies expands. Continued monitoring of potential and occupied habitats would continue to utilize the USFWS protocol. Maintenance of occupied habitats, if and when identified, would occur to aid in the recovery of this species.

Habitat for Southwestern Willow Flycatcher across Its Geographic Range

The southwestern willow flycatcher breeds in dense riparian habitats in all or parts of seven southwestern states, from sea level in California to over 8,500 feet in Arizona and southwest Colorado (Finch and Stoleson 2000). The species breeds only in dense riparian vegetation near surface water or saturated soil (Finch and Stoleson 2000). Other habitat characteristics such as dominant plant species, size, and shape of habitat patch, canopy structure, vegetation height, etc., vary widely among sites. In Colorado, willow or other riparian habitat must be on average at least 5 feet high to be suitable for southwestern willow flycatcher (USFWS 2003, 2011b). Below 8,500 feet, habitat patches as small as 0.25 acre (30 feet wide by 30 feet long by average 5 feet high) could support a flycatcher territory. Above 8,500 feet, however, a minimum patch size of 5 acres or greater is considered necessary to support breeding territories in Colorado (USFWS 2011b). These minimum territory sizes may be made up of two or more closely associated smaller patches of habitat. Slow moving or standing surface water, or subsurface water, is nearly always found near breeding territories, but habitat occupancy cannot be ruled out if habitat of sufficient width exists near flowing streams.

Habitat on the San Juan National Forest

A habitat model was developed to identify suitable southwestern willow flycatcher habitat across the SJNF. The model was developed in cooperation with the USFWS and contains many of the

characteristics and criteria described above. The habitat model has identified 846 acres of suitable southwestern willow flycatcher habitat. Most of the suitable habitat consists of patches that are less than 5 acres in size. Existing habitat across the SJNF occurs in elevations up to approximately 10,500 feet. Current management actions occurring in habitat include domestic livestock grazing (mostly cattle), recreational use (developed and dispersed recreation), and to a lesser extent other management actions such as prescribed fire, watershed restoration, timber management, minerals and energy development, and lands and special uses management. Presently, the primary activity with potential to affect southwestern willow flycatcher consists of livestock grazing in suitable and occupied habitat. Livestock grazing in suitable and occupied habitat occurs under criteria developed in conjunction with the USFWS for the Williams Reservoir site. If occupation or nesting is identified elsewhere on the unit consultation would be initiated. Potential effects associated with other management actions mentioned previously are largely mitigated through the use of timing restrictions or avoidance of habitat.

Direct and Indirect Effects

Risk factors associated with the southwestern willow flycatcher under the Preferred Alternative are similar to those described elsewhere throughout the species' range and primarily related to activities that may occur within or influence willow-riparian systems. These include activities that might occur directly within suitable habitat, such as livestock grazing, recreation, minerals and energy development, vegetation management, or activities that may occur off-site but indirectly influence the health of riparian systems. Examples of the latter category include roads, OHV use, and numerous other activities.

These risk factors can influence the amount and distribution of riparian vegetation that may provide breeding habitat for the southwestern willow flycatcher (Marshall and Stoleson 2000; Tibbetts et al. 1994). Activities that occur within or near southwestern willow flycatcher habitat are of concern because they may increase the potential for injury or mortality, loss and degradation of habitats, nest parasitism, and disturbance resulting from human activity. LRMP direction is expected to minimize or eliminate effects to the flycatcher and maintain or improve habitat condition for the species as listed under the conservation measures. Examples of potential risk factors under the Preferred Alternative are as follows.

Livestock grazing: Under the Preferred Alternative, approximately 306 acres of suitable southwestern willow flycatcher habitat exists in active/vacant cattle and horse allotments. Approximately 305 acres of suitable habitat exists in active/vacant domestic sheep and goat grazing allotments. Livestock grazing has potential to affect plant community structure, species composition, and relative abundance of species and plant density. Grazing also has potential to disturb and physically impact nest sites. Grazing management in the occupied pasture at Williams Reservoir was modified in consultation with USFWS. No other occupation is known on the SJNF. With application of livestock grazing conservation measures listed below, adverse effects to southwestern willow flycatcher and habitat for the species area expected to be minimized. Consultation would be initiated if additional occupation or nesting is observed on the SJNF.

Recreation Management: Under the Preferred Alternative, a variety of developed and dispersed recreation activities have potential to affect southwestern willow flycatcher habitat. Approximately 3 acres of suitable habitat is associated with developed recreation sites. The potential effects associated include disturbance and limited habitat loss associated with brushing activities to improve site distances and to achieve other vegetation management objectives at the developed recreational sites. The potential for human disturbance and displacement of the species also exists for these sites. There is no known occupation of habitat within the developed recreational sites. Consultation would be initiated if occupation or nesting is observed at these sites.

Dispersed recreation activities (day hiking, fishing along stream corridors, wildlife watching, horseback riding, etc.) also have potential to cause disturbance during the nesting season. Direct impacts to habitat are less likely from dispersed recreation, although some activities such as repeated use, and therefore creation of trails into habitat, could result in minor habitat loss and disturbance. Generally, suitable habitat is not traversed by recreationists due to site characteristics. Recreationists usually take the path of least resistance when on foot or horseback and choose easier routes outside flycatcher habitat. Impact to habitat from these activities is expected to be minimal. Subsequent site-specific, project-level analysis

would be conducted during LRMP implementation, with potential impacts to southwestern willow flycatcher and habitat minimized through application of LRMP design criteria and other efforts to minimize adverse effects from developed and dispersed recreation activities. The USFS and USFWS conducted informal consultation with a site visit to the Williams Reservoir occupation site and did not identify any dispersed recreation issues that needed to be addressed for the site. There is strong LRMP direction for maintaining habitat condition in southwestern willow flycatcher habitat as discussed below in Conservation Measures. No known nesting occurs on the SJNF. Consultation would be initiated if additional occupation or nesting is observed on the SJNF.

Energy Development: Under the Preferred Alternative, the most common of forms of energy development include oil and gas leasing and development. The SJNF is not a priority area for other energy development such as wind or solar energy. Under the Preferred Alternative, approximately 1,279,811 acres of NFS lands are available for oil and gas leasing. 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 are administratively not available for lease.

The Preferred Alternative incorporates a number of lease stipulations that guide how potential development could occur across areas leased areas. Lease stipulations are applied to protect various resources (soils, watersheds, terrestrial and aquatic wildlife and habitat, cultural resources, etc.) from adverse impacts from development activities. Roadless areas have an NSO stipulation, and for lands outside roadless areas, a full range of leasing stipulations are assigned including NSO, TL, CSU, and standard lease terms to protect various resources.

Of the total area available for fluid minerals lease, approximately 283 acres are present in southwestern willow flycatcher habitat.

The different types of leasing stipulations are not mutually exclusive on any one piece of land and may, in fact, overlap on top of each other. Of the total acreage in southwestern willow flycatcher habitat, an NSO stipulation has been applied across approximately 242 acres or 86% of the habitat available for lease. A CSU stipulation has been applied across 271 acres or 96% of the habitat, and TL has been applied across approximately 283 acres or 100% of the habitat.

The previous paragraph includes all areas of potential leasing within southwestern willow flycatcher habitat. Most of these acres fall into areas of geological formation that show little to no potential for containing or recovery of fluid minerals. Under the Preferred Alternative, leasable areas with high potential for prospective oil and gas development include the GSGP area, the Northern San Juan Basin, the San Juan Sag, and the Paradox Basin. The San Juan Sag is the only high potential development area that contains habitat for southwestern willow flycatcher. Approximately 29 acres of southwestern willow flycatcher habitat are present in the San Juan Sag area. Of the total habitat present in San Juan Sag area, 25 acres are available for lease. NSO, CSU, and TL stipulations, which overlap here, are applied across all 25 acres.

The leasing of areas with potential for mineral and energy development, and development of the areas, may result in impacts to southwestern willow flycatcher such as direct habitat loss, and potential for increased disturbance from noise, human presence, and other activities. The addition of lease stipulations applied across the vast majority of southwestern willow flycatcher habitat would minimize adverse effects resulting from loss of habitat and disturbance during the breeding season. Site-specific analysis would be conducted for any new developments, with potential impacts to southwestern willow flycatcher and habitat minimized through application of LRMP design criteria and other efforts to minimize adverse effects from mineral and energy developments. This would include direction such as that found within the Watershed Conservation Practices Handbook; for example, Allow no action that will cause long-term change away from desired condition in any riparian or wetland vegetation community. Consider management of stream temperature and large woody debris recruitment when determining desired vegetation community. In degraded systems, progress toward desired condition within the next plan period. (USDA Forest Service 2006)

OHV Use: Under the Preferred Alternative, the use of OHVs is restricted to designated motorized routes to be consistent with national direction, which is incorporated into the LRMP as other referenced guidance. Any new designations would be evaluated through site-specific NEPA analysis, and appropriate measures would be taken to either avoid or minimize direct impacts to southwestern willow flycatcher habitat, and potential disturbance. Analysis of the impacts of travel management actions on southwestern willow flycatcher habitat would be further evaluated in a separate but related process—travel management planning. The SJNF is currently in the process of travel management planning in response to new national direction for all NFS lands. During travel management planning, more detailed analysis of roads and trails that would be open, closed, or created would be analyzed. Impacts to southwestern willow flycatcher would be considered, as well as other resources and use patterns in developing these transportation plans. Where appropriate, consultation would be initiated concerning southwestern willow flycatcher as project-level analysis occurs for landscapes.

On NFS lands, motorized travel would be limited to existing designated routes, except where specifically authorized or through a travel management plan decision. Because the SJNF has completed travel management planning on more than half of the lands (as well as closing cross-country travel through a special order), there is less cross-country travel on SJNF lands. Project-level implementation must be compliant with Section 7 requirements and LRMP direction. The LRMP contains direction to minimize or eliminate effects to habitat and potential disturbance. Project implementation would be required to follow LRMP direction, which includes that found under the species' recovery plan and any additional direction developed in consultation with the USFWS. These are listed under other referenced guidance in the terrestrial wildlife section of the LRMP.

Conservation Measures

Land and Resource Management Plan Standards and Guidelines and Other Referenced Guidance:

LRMP Section 2.1 Ecological Framework and the Conservation of Species explains the approach the LRMP takes in providing for species (Appendix J.A). The LRMP contains numerous standards and guidelines that provide for the species and its habitat on the SJNF. These provide for basic ecological components of soils, water, and air, to those more specifically focused on maintaining or improving the riparian habitat characteristics required by the species. This guidance is found under the various resource sections of the LRMP. Most of the relevant direction is found under LRMP sections, including Terrestrial Wildlife, Riparian Area and Wetland Ecosystems, Aquatic Ecosystems and Fisheries, Water Resources, Livestock and Rangeland Management, and Invasive Species. Examples include:

- 2.4.21. Management actions must not cause long-term change away from desired conditions in riparian or wetland vegetation communities.
- 2.4.25. Livestock browsing should not remove more than 25% of the annual leader growth of hydrophytic shrubs and trees.
- 2.4.26. Agency actions should avoid or otherwise mitigate adverse impacts to the abundance and distribution of willows to maintain or improve the ecological integrity of riparian area and wetland ecosystems.
- 2.4.28. Woody riparian vegetation along low-gradient ephemeral and permanent stream channels should be maintained or restored to ensure terrestrial food sources for invertebrates, fish, birds, and mammals, and to minimize water temperature changes.
- 2.5.18a. From April 1 through September 30, an instantaneous minimum flow equal to 40% of the average annual flow; from October 1 through March 31, an instantaneous minimum flow equal to 20% of the average annual flow (Tennant 1972).
- 2.6.30. Activities must not be allowed within aquatic management zones that will cause a long-term change from desired conditions. The protection or improvement of riparian values, water quality, aquatic community, and for long-term stream health in these areas must be emphasized. Aquatic management zones have a minimum horizontal width from the top of each bank of 100 feet or the mean height of the mature late-seral vegetation, whichever is greater.
- 2.7.13. Project-level NEPA analysis and decisions, and the resultant AMPs, must identify key herbaceous and woody plant species and their respective utilization guidelines.

- 2.7.22. Grazing management activities should be modified in, or livestock excluded from, riparian areas that are “nonfunctional” or “functional-at risk” with a downward trend (as rated by the Proper Functioning Condition protocol), where livestock have been determined to be a key causative agent.
- 2.7.23. Trailing of livestock should be avoided along riparian areas to the extent practicable.
- 2.8.11. Invasive species must be managed using integrated weed management principles.
- 2.8.18. For all proposed projects or activities, the risk of invasive aquatic and plant species introduction or spread should be determined and appropriate prevention and mitigation measures implemented.

Where guidance already exists, it is not repeated in the LRMP but is captured as “Other Referenced Guidance” under each resource section of the LRMP. These include guidance such as that found under agency manuals and handbooks, threatened and endangered species recovery plans, and direction resulting from consultation, law, regulation, policy, MOUs, etc. Some of the more applicable guidance to the southwestern willow flycatcher is discussed below. Stipulations concerning development of leasable minerals have been developed for the LRMP and are also discussed below.

Forest Service Handbook (FSH) 2509.25, Watershed Conservation Practices Handbook: This handbook contains extensive guidance for NFS lands for maintaining and/or improving the ecological functioning and vegetation potentials within the riparian zone. Some examples of applicable direction include:

- Allow no action that will cause long-term change to a lower stream health class in any stream reach. In degraded systems (that is At-risk or Diminished stream health class), progress toward robust stream health within the next plan period.
- Allow no action that will cause long-term change away from desired condition in any riparian or wetland vegetation community. Consider management of stream temperature and large woody debris recruitment when determining desired vegetation community. In degraded systems, progress toward desired condition within the next plan period.
- Maintain the organic ground cover of each activity area so that pedestals, rills, and surface runoff from the activity area are not increased. The amount of organic ground cover needed will vary by different ecological types and should be commensurate with the potential of the site.
- Restore the organic ground cover of degraded activity areas within the next plan period, using certified local native plants as practicable; avoid persistent or invasive exotic plants.
- Locate new concentrated-use sites outside the water influence zone (WIZ) if practicable and outside riparian areas and wetlands. Armor or reclaim existing sites in the WIZ to prevent detrimental soil and bank erosion.
- Manage livestock use through control of time/timing, intensity, and duration/frequency of use in riparian areas and wetlands to maintain or improve long-term stream health. Exclude livestock from riparian areas and wetlands that are not meeting or moving towards desired condition objectives where monitoring information shows continued livestock grazing would prevent attainment of those objectives.
- Keep stock tanks, salt supplements, and similar features out of the WIZ if practicable and out of riparian areas and wetlands always. Keep stock driveways out of the WIZ except to cross at designated points. Armor water gaps and designated stock crossings where needed and practicable.
- Design grazing systems to limit utilization of woody species. Where woody species have been historically suppressed, or where the plant community is below its desired condition and livestock are a key contributing factor, manage livestock through control of time/timing, intensity, and duration/frequency of use so as to allow for riparian hardwood growth extension and reproduction. Manage woody species in riparian areas to provide for stream temperature, bank stability and riparian habitat.
- Adjust management in riparian areas and wetlands to improve detrimental soil compaction whenever it occurs.

Southwestern Willow Flycatcher Species Recovery Plan: A flycatcher habitat “patch” contains relatively contiguous willow/woody riparian vegetation, but open areas within the patch may commonly occur. It is up to the professional judgment of biologists certified by the USFWS in flycatcher survey methods to determine the continuity of habitat and what constitutes a flycatcher habitat patch.

In addition to adopting the conservation measures identified in the Southwestern Willow Flycatcher Recovery Plan, the SJNF has consulted with USFWS to develop more applicable guidance for habitat identification, and inventory and monitoring procedures that better fit the unique nature of flycatcher habitat on the SJNF, below. Habitat for southwestern willow flycatcher on the SJNF is present at elevations exceeding most areas across the species range (USFS 2012). The USFWS responded with a letter concurring with the following discussed habitat definitions, periodicity of site visits, and survey protocol, and would serve as guidance for Section 7 consultation until new information becomes available (USFWS 2012a).

Habitat Definitions: A flycatcher habitat patch contains relatively contiguous willow/woody riparian vegetation, but open areas within the patch may commonly occur. It is up to the professional judgment of biologists certified by the USFWS in flycatcher survey methods to determine the continuity of habitat and what constitutes a flycatcher habitat patch.

Suitable flycatcher habitat on the SJNF is defined as a patch that is at least 30 feet in width, on average at least 5 feet in height, has a relatively dense canopy cover (roughly 60% or greater) dominated by willows as well as understory vegetation, and has relatively slow or standing surface water present within the patch during most of the flycatcher breeding season, sufficient to maintain suitable vegetation conditions and insect prey abundance.

Willow patches greater than 0.25 acre in size and at least 30 feet wide and averaging greater than 5 feet in height are considered suitable for flycatcher occupancy. However, in response to USFWS guidance, for habitat above 8,500 feet in elevation, only those willow patches greater than 5 acres in size are required to be surveyed for flycatcher occupancy. Previously, above 8,500 feet, all habitat patches down to 0.25 acre in size required surveys. This change in USFWS guidance recognizes that habitat above 8,500 feet declines substantially in the potential for supporting flycatchers and therefore limited survey and monitoring resources should be focused on the largest patches of habitat that have the greatest potential for flycatcher occupancy. However, if flycatchers were located in a habitat patch less than 5 acres in size, full habitat protection and flycatcher monitoring requirements would be applied to that site.

Periodicity of Site Visits: Above 8,500 feet, only patches of suitable flycatcher habitat greater than 5 acres in size require protocol surveys prior to project implementation, compared to the previous requirement to survey all patches greater than 0.25 acre in size. Additionally, above 8,500 feet, only 1 year’s worth of protocol survey effort is required in suitable flycatcher habitat, compared to the previous 2-year survey requirement.

Below 8,500 feet, patches greater than 0.25 acre in size require surveys prior to project implementation, and only 1 year’s worth of protocol survey effort is required.

New proposed project actions, including renewal of term grazing permits, require surveys of suitable flycatcher habitat. A determination about whether surveys are needed should be based on the patch size and elevation criteria described above. Flycatcher surveys should be completed prior to, but not more than 1 year before, signing the NEPA decision or term permit renewal. If surveys cannot be completed prior to signing the decision, the decision document should include provisions for completing surveys before project implementation begins and include mitigation/conservation measures that would be implemented if flycatchers were detected during those surveys.

Within active livestock allotments, the USFWS believes surveying suitable flycatcher habitat patches only once every 10 years is not sufficient to determine if flycatchers have occupied suitable habitat and/or make decisions about appropriate management responses. For this reason, protocol flycatcher surveys should be completed prior to, but not more than 1 year before signing the 10-year term permit renewal, and at least once every 5 years thereafter during the term of the permit. If grazing management changes

or monitoring shows that suitable flycatcher habitat is not being maintained in a stable or upward trend, the USFWS should be contacted to determine if more frequent surveys may be required and/or changes in livestock management practices is necessary.

For allotments that are stocked annually under valid term grazing permits, suitable flycatcher habitat patches should be resurveyed at least once every 5 years. However, only a 1-year protocol survey is required, compared to the previous 2-year survey requirement. For example, if a flycatcher protocol survey was completed in 2009, flycatcher surveys would not be needed in 2010, 2011, 2012, or 2013, but a 1-year resurvey would be needed in 2014, completing the 5-year cycle for periodic resurveys of suitable flycatcher habitat patches. Following the 2014 survey season, no flycatcher surveys would be needed in 2015, 2016, 2017, or 2018, but a 1-year resurvey would be required in 2019 to maintain compliance with the ESA. This schedule would meet the USFWS's requirement for a 1-year resurvey every 5 years to check for possible occupancy of suitable flycatcher habitat within a landscape of ongoing livestock grazing during the operation of a 10-year term grazing permit.

If surveys detect flycatchers during the breeding season, the USFWS should be contacted to determine the appropriate periodicity for monitoring efforts, but surveys would likely be conducted once every 3 years, instead of once every 5 years. If habitat monitoring showed that suitable flycatcher habitats were not being maintained in a stable or upward trend, the USFWS should be contacted to discuss if changes in livestock management practices is necessary and determine if more frequent surveys are needed.

Survey Protocol: For project-specific clearance surveys, the current flycatcher survey protocol requires a total of five surveys be conducted across the survey season, with individual surveys separated by a minimum of 5 days. The protocol calls for one survey in the first survey period, at least one survey in the second survey period, and third surveys in the third survey period.

At higher-elevation sites on the SJNF (sites typically above 8,500 feet), access to survey sites is sometimes not possible until after the end of the first flycatcher survey period due to roads remaining blocked by remaining winter snow. In these cases, the first survey period may be skipped, but surveys should begin as soon as access to the site is possible. In these cases, two surveys should be done during the second survey period and three surveys done in the third survey period, again with individual surveys separated by a minimum of 5 days.

If surveys are being done for the purpose of "clearing" a proposed project in or near suitable flycatcher habitat, then all five surveys should be completed during the survey season. If surveys are being done for the purpose of periodically checking to see if flycatchers have occupied suitable habitat then three surveys are sufficient for the purpose of a general occupancy inventory. But in this case, at least two surveys should be completed in the second survey period and at least one survey should be completed in the third survey period.

Land and Resource Management Plan Leasable Minerals Stipulations: The following lease stipulations would be applied to minerals and energy leases where southwestern willow flycatcher habitat is present.

Timing Limitation

No surface use is allowed during the following time period(s): May 1 to August 15 in mapped suitable nesting habitat.

For the purpose of: Prevent disruption of reproductive activity during the production period.

Justification: The southwestern willow flycatcher is a federally designated endangered species with suitable breeding habitat within the planning area. Oil and gas activities have the potential to adversely affect the species.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: The Authorized Officer, in consultation with the USFWS, may grant an exception if an environmental analysis indicates that the Proposed Action could be conditioned so as not to affect current or subsequent breeding behavior, nest attendance, egg/chick survival, or nesting success.

Modifications: The Authorized Officer, in consultation with the USFWS, may modify the size or dates of the TL area if an environmental analysis indicates that the Proposed Action could be conditioned so as not to affect current or subsequent nest attendance, egg/chick survival, or nesting success. Seasonal time frames may be modified if operations could be conditioned to not disrupt current or subsequent breeding behavior and bird distribution within suitable breeding habitat.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer in consultation with the USFWS only through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

No Surface Occupancy

No surface occupancy is allowed on the lands described below: Within 325 feet of the ordinary high water mark in mapped habitat.

For the purpose of: Prevent disruption of reproductive activity in mapped habitat.

Justification: The southwestern willow flycatcher is a federally designated endangered species with suitable breeding habitat within the planning area. Oil and gas activities have the potential to adversely affect the species.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: The Authorized Officer in consultation with the USFWS, may grant an exception to this stipulation if an environmental analysis indicates that the proposed or conditioned activities would not affect current or subsequent suitability or utility of riparian habitat suitable for the southwestern willow flycatcher.

Modifications: The Authorized Officer in consultation with the USFWS, may modify the configuration of the stipulation area or time frames if an environmental analysis indicates that a portion of the area is currently and subsequently nonessential to the function and utility of riparian habitat, or that the Proposed Action could be conditioned so as not to impair the utility of habitat for the southwestern willow flycatcher.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer in consultation with the USFWS only through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Cumulative Effects

The southwestern willow flycatcher's current range is believed to be similar to its historical range, but the quality and quantity of habitat has been significantly reduced causing habitat to be less common and more isolated (USFWS 2004). Thus, the primary cause of the flycatcher's decline is loss and modification of habitat (USFWS 2002a). Historically, these habitats have always been dynamic (i.e., habitat size and location evolve over time) due to natural disturbance and regeneration events such as floods, fire, and drought. With increasing human populations and the related industrial, agricultural, and urban developments, these habitats have been further modified, reduced, and eliminated by various mechanisms (USFWS 2002a).

Human influences on local riparian habitats on the SJNF and southwest Colorado have historically been similar to those described elsewhere throughout the range of the southwestern willow flycatcher. Although riparian zones are protected by various laws and regulation, pressures on these systems on public and/or private land can be expected to continue. The influence of past and current cumulative effects on riparian willow systems on public lands is expected to lessen as riparian areas receive greater management attention and continue to improve over time. Potential cumulative effects on willow flycatcher habitat on private lands can be expected to continue and perhaps increase as human development pressures and other activities increase.

Determination

Willow carrs and other riparian systems are recognized in the LRMP for their limited distribution and unique ecological values. As such, there are numerous conservation measures and standards and guidelines to protect, maintain, and improve these features. These include an NSO fluid minerals leasing stipulation for southwestern willow flycatcher habitat, guidance found in Region 2 Watershed Conservation Practices Handbook (Region 2 FSH 2509.25-2006-1), and additional standards and guidelines found mainly in the Terrestrial Wildlife, Riparian Area and Wetland Ecosystems, Aquatic Ecosystems and Fisheries, Water Resources, and Livestock and Rangeland Management sections of the LRMP. The contained direction addresses hydrology, soils, and vegetation health for maintaining or improving functionality and riparian habitat throughout the SJNF, including that suitable for the flycatcher. The application of the conservation measures/standards and guidelines in the LRMP are expected to avoid any direct habitat loss of willow or other riparian systems, as well as minimize potential indirect effects. Consultation for management of the one occupied site has occurred. Extensive surveys have been completed across the planning unit with no additional observations. If additional occupation or nesting is identified elsewhere, consultation would be initiated. Other indirect influences mentioned as potential risk factors to the species, such as nest parasitism of by brown-headed cowbirds, have not been documented on the SJNF and are currently not considered a local management concern. With application of LRMP standards and guidelines, and conservation measures described above, management actions associated with the Preferred Alternative **may affect but are not likely to adversely affect** southwestern willow flycatcher or its habitat.

Mexican Spotted Owl (*Strix occidentalis lucida*)

Background

The Mexican spotted owl is one of three recognized subspecies of spotted owl. The Mexican subspecies is geographically isolated from both the California and northern subspecies. Studies suggest that the Mexican spotted owl is genetically isolated from the other subspecies (Barrowclough and Gutiérrez 1990; see also Funk et al. 2008). It has the largest range of the three spotted owl subspecies, extending north from Mexico through the mountains of Arizona, New Mexico, and west Texas into the canyons of Utah and south and west Colorado.

In 1993 the USFWS listed the Mexican spotted owl as threatened under the ESA (USFWS 1995a). Critical habitat for Mexican spotted owl was designated in 2004 on federal lands in Arizona, Colorado, New Mexico, and Utah. No critical habitat is designated on the SJNF. The Mexican spotted owl was also state listed as threatened by CPW in 1993.

The Mexican spotted owl inhabits coniferous mixed woodlands in isolated mountain ranges and canyon lands of the southwestern United States and into Mexico (USFWS 2012b). The Mexican spotted owls range is fragmented, occupying isolated mountains and canyon lands, and it is believed that the historic and current range is similar. The 2012 Mexican Spotted Owl Recovery Plan divides the species' range into five Ecological Management Units (USFWS 2012b).

Mexican spotted owls consume a wide variety of prey throughout their range. Feeding primarily at night, they feed on small to medium-sized rodents such as deer mice (*Peromyscus* sp.), voles, and the larger woodrats (*Neotoma* sp.). They would also catch flying prey such as birds and large insects.

The reasons for listing under ESA are discussed in the recovery plan and fall within five categories:

- A. Present or threatened destruction, modification, or curtailment of habitat or range.
- B. Overutilization for commercial, recreational, scientific, or educational purposes.
- C. Disease or predation.
- D. Inadequacy of existing regulatory mechanisms.
- E. Other natural or human-made factors affecting the species' continued existence.

Appendix C of the 2012 Mexican Spotted Owl Recovery Plan (USFWS 2012b) provides management recommendations for addressing these five categories.

Status and Distribution on the San Juan National Forest

Based on habitat definitions in the 2012 recovery plan and subsequent consultation with the USFWS, an updated habitat model was used to in the first quarter of 2013 to determine habitat across the SJNF. Previous surveys, since the late 1980s to determine occupation, have covered 22% of the habitat identified under the current Mexican spotted owl habitat model for the SJNF. Despite extensive surveys, only two verified juvenile females, one verified juvenile male, and one probable detection of an individual have occurred on the SJNF. All have been in the lower elevations of the southeast portion of the SJNF within steep canyons containing mature mixed conifer vegetation. These detections may represent dispersing or migratory individuals. Surveys have not identified any nesting pairs or reproductive activity on the SJNF. The closest known nesting is located south of the SJNF in and around Mesa Verde National Park within deep canyon country with mature mixed conifer vegetation. The occurrence of Mexican spotted owl on the SJNF appears to be incidental and uncommon, and similar to other locations in Colorado, where apparently suitable habitat remains unoccupied. As no populations occur on the SJNF, no population trends can be established. The current information suggests that the SJNF does not measurably contribute to the recovery or overall viability of the Mexican spotted owl. The recovery plan shows no designated critical habitat essential for the conservation of the species and necessary to support recovery on the SJNF. The recovery plan also states that observations of birds on the SJNF are considered transitory. No protected activity centers related to critical life function are designated on the Forest. The observed birds are not considered part of a breeding population on SJNF, contributing to the maintenance and recovery of populations. The possibility of future individual breeding pairs; however, cannot be discounted as the recovery of this subspecies expands.

Habitat for Mexican Spotted Owl across its Geographic Range

Throughout its lifetime, a Mexican spotted owl would use a variety of habitats to meet different life-history needs. To maintain a diversity of habitat types for the various activities of the owl, key habitat variables are required. These include nesting, roosting, and foraging habitat patches with structural, compositional, and successional diversity, as well as connectivity among suitable patches. Specifics regarding key habitat variables are found in the Recovery Plan, Appendix C, describing desired conditions.

Mexican spotted owls have been observed to nest, roost, forage, and disperse among a wide array of biotic communities, the owl is typically considered a "habitat specialist" in that roost and nest habitats generally occur in late seral forests or rocky canyon habitats. Some Mexican spotted owls undergo altitudinal migrations during winter to areas where habitat structure and composition differ from that used during breeding (USFWS 2012b). Dispersing juveniles can occur in a wide variety of habitats, including mixed conifer forests, pinyon-juniper woodlands, and riparian areas surrounded by grasslands.

Mexican spotted owl habitat is limited by the availability of nesting and roosting habitat (Ganey and Balda 1994). Territories consist of a core of mature or late successional mixed conifer forest or steep, narrow, rocky canyons for nesting and roosting. These stands are typically on steep, north-facing slopes with complex structures including high snag and downed wood densities and very high canopy closures (USFWS 2012b). The Recovery Plan uses 43 hectare (100 acres) as minimum patch size for nesting and roosting habitat within a minimum 600-acre protected activity center.

The proposed rule to designate critical habitat for the Mexican spotted owl was completed by the USFWS in February 2001. That proposal included 4.6 million acres across Colorado, Utah, Arizona, and New

Mexico. The 2001 proposal was considered inadequate by the courts in October 2003, and a new final rule to designate critical habitat was published in August 2004. The 2004 rule included 8.6 million acres across federal lands in Colorado, Utah, Arizona, and New Mexico. Approximately 322,326 acres (3.7%) of this land occurs in Colorado. The SJNF was not included in the 2001 nor the 2004 critical habitat designations.

Habitat on the San Juan National Forest

The SJNF is split between the Colorado Plateau and the Southern Rockies Ecological Management Units. No protected activity centers have been designated on the SJNF. Recovery habitat on the SJNF is almost identical for both Ecological Management Units and differs slightly in the composition of some canyon habitats. The SJNF mapped areas of Mexican spotted owl recovery habitat, where data are available, using habitat criteria developed in cooperation with the USFWS. These criteria include mature mixed conifer vegetation on slopes of greater than 40%, with 40% to 70% and above crown closure. Adjacent bottoms to these habitats that also contain these mature forest types can be considered recovery habitat. There are limited narrow, rocky canyons occurring on the SJNF. It is thought that where this vegetation condition occurs within narrow rocky canyons, that this would represent the more suitable habitat conditions on the SJNF. Also, the upper portions of some side canyons originating along the main Dolores River canyon reach NFS lands along the western boundary. These habitat types are also considered recovery habitat, although suitability of habitat across the SJNF is generally considered marginal (Charles Johnson, personal communication 2003). A reliable inventory of the slot canyons and side canyons of the Dolores River are not available for the SJNF. GIS queries would capture a portion of these when the forested or canyon component is present in large enough areas to be captured in the GIS database. Some isolated sites suitable for nesting may only be identified during project-level ground surveys as the specific criteria producing an isolated microclimate conducive for nesting may not occur in areas large enough to be identified by a GIS habitat model exercise. These areas are identified through on-the-ground habitat evaluation that occurs during project-level analysis for proposed management actions.

GIS queries have modeled the forested categories of recovery habitat for the SJNF. In total, 65,511 acres of habitat were mapped throughout the SJNF. These areas represent approximately 3% of the total acreage on the SJNF. Habitat trend analysis show minor changes, less than 1%, to this habitat type (mature 4B and 4C mixed conifer) across the entire landscape since the inception of the first LRMP in the early 1980s.

The Mexican spotted owl utilizes a wide variety of habitat types throughout its range. The USFS and USFWS are currently cooperating to better define recovery habitat characteristic specifically occurring on SJNF. The recovery plan is adopted in the LRMP revision for providing guidance for management activities occurring on the SJNF. This and continued monitoring and maintenance of occupied habitats, if identified, are the primary conservation measures that the SJNF would utilize to aid in the recovery of this species.

Most of the existing Mexican spotted owl habitat on the SJNF is located in protected areas, which include CRAs (33,888 acres), designated wilderness and the Piedra Area (16,483 acres), and RNAs (29 acres). Additionally, there are 240 acres in the Chimney Rock National Monument, which will have limited management that would affect Mexican spotted owl habitat. Approximately 14,871 acres of habitat are not within a protected area. Very few projects/activities have occurred in protected areas. Those that have occurred include prescribed burning (Piedra Area and Hermosa area), vegetation management (Chimney Rock National Monument), and livestock grazing. Livestock grazing has occurred in most protected areas except Chimney Rock National Monument, which is closed to grazing. Limited grazing has also occurred in designated wilderness and RNAs. Projects that have occurred outside protected areas include mechanical vegetation treatments, recreation, and livestock grazing.

Although management activities have occurred in Mexican spotted owl habitat, their occurrences have been small in scale and have not resulted in adverse impacts to habitat. The largest influences to owl habitat have resulted from fire suppression, wildland fires, and insects and disease. Existing Mexican spotted owl habitat at the only known occupied owl site on the SJNF has been negatively affected by

insects and disease. Monitoring at the site has shown structural changes to mixed conifer habitat located on the north-facing steep slopes in and outside canyons. There has been an increase in mixed conifer mortality (primarily Douglas-fir) resulting from insect and disease activity. There are numerous dead and dying Douglas-fir trees of all age classes on north-facing slopes. In these areas, downfall is extensive, and in other areas, the open canopy has created favorable growing conditions for mixed shrub species. These declining habitat conditions have degraded habitat for Mexican spotted owl, likely affecting occupancy at the site, and increasing the vulnerability of the area to severe wildland fire. The site has remained unoccupied by Mexican spotted owl for the last 5 years.

Wildfires are a very common occurrence across the SJNF. Wildfire occurrences have resulted from natural ignitions and, to a lesser extent, caused by humans either intentionally or unintentionally. Approximately 5,000 acres of Mexican spotted owl habitat were influenced by wildfires from 2000 to 2012. The vast majority of the habitat burned resulted from the Little Sand Fire of 2012 and Missionary Ridge Fire of 2002. Effects to habitat from these fires have not been quantified, as the areas burned were not classified as habitat for Mexican spotted owl prior to the recent mapping effort. General observations of the burn areas have shown areas of high-intensity fire, and areas of low- to moderate-intensity fire. The overall effects to habitat have been positive and negative as described below.

Existing recreational use in Mexican spotted owl habitat is limited, and therefore potential effects on Mexican spotted owl from recreationists are expected to be minimal. There are limited designated roads and designated trails (summer or winter) in Mexican spotted owl habitat. Additionally, there are no developed recreation sites in owl habitat. Portions of habitat that may contain roads or trails would include the well-developed open riparian bottoms, adjacent to suitable nesting habitat that owls could utilize for foraging and/or roosting habitat. Where engineering allows for stability and ecological sustainability, limited roads may exist through some steep slope mature mixed conifer habitat, but would be considered unusual on the SJNF. No system roads or trails are located within the narrow slot canyon habitat, which is considered the most suitable habitat for the owl on SJNF (Charles Johnson, personal communication 2003). Most of the owl habitat across the SJNF is in areas that receive limited use by recreationists because of the remote nature and rugged topography making access difficult. Use that does occur is limited to hiking, with most hiking occurring during the spring and fall turkey hunting season, late summer/early fall small game seasons, and fall big game hunting seasons. Occasional use occurs outside hunting seasons but is generally minimal.

Direct and Indirect Effects

The Mexican Spotted Owl Recovery Plan identifies listing factors/activities influencing Mexican spotted owl across its range (USFWS 2012b). These factors were identified in the background section. Their relationship to and/or influences from the LRMP's Preferred Alternative are discussed below.

Actions proposed under the Preferred Alternative are not likely to contribute to Factor B, overutilization of commercial, recreational, scientific, or educational purposes. Mexican spotted owl occurrence and occupancy across the SJNF is very limited. The lack of Mexican spotted owl populations minimizes risk from activities associated with Factor B.

Actions proposed under the Preferred Alternative are not likely to contribute to Factor C, disease and predation. The final rule for listing implied that forest management created transition habitats (i.e., ecotones) favored by great horned owls (*Bubo virginianus*), thus creating an increased likelihood of contact between the two. The Preferred Alternative adopts management recommendations in the Mexican Spotted Owl Recovery Plan, which provides guidelines for minimizing impacts to habitat from actions such as vegetation treatments that create transition habitats predisposing the species to predation.

Actions proposed under the Preferred Alternative are not likely to contribute to Factor D, inadequacy of existing regulatory mechanisms. The Preferred Alternative adopts management recommendations in the recovery plan, which provides guidelines for minimizing impacts to Mexican spotted owl habitat from a variety of land use activities. The extent of various land use activities proposed under the Preferred Alternative are described below.

Actions proposed under the Preferred Alternative are not likely to contribute to Factor E, other natural or human-made factors affecting the species' continued existence. This factor identifies several threats to the Mexican spotted owl such as the potential for increasing malicious and accidental anthropogenic harm to the species and potential for barred owl to expand its range into that of Mexican spotted owl habitat resulting in potential competition and/or hybridization. Presently, Mexican spotted owl occurrence on the SJNF is very limited. The lack of known occurrences minimizes the risk of malicious and accidental anthropogenic harm to the species. Barred owls are currently not present on the SJNF, and their presence in Colorado is rare, therefore minimizing risk of competition and hybridization.

Federal actions affecting Mexican spotted owl fall primarily within Factor A, present or threatened destruction, modification, or curtailment of habitat or range. Factor A includes activities/risk factors such as stand-replacing fire, fire suppression, burned area response, WUI treatments (discussed under Fire and Fuels Management below), silvicultural treatments (discussed under Timber Management below), insects and disease, livestock grazing, energy development, roads and trails, land development, recreation, and water developments. These activities may not necessarily be threats per se, depending on their level of intensity, duration, or geographic extent (USFWS 2012b). The analysis of direct and indirect effects focuses on activities/risk factors identified under Factor A.

Stand-replacing Fire: Human-managed alteration of forests in the southwestern United States has resulted in extensive areas of Mexican spotted owl habitat that are now more vulnerable to the effects of stand-replacing wildland fires (USFWS 2012b). Current forest conditions in Mexican spotted owl habitat across the SJNF have the potential to sustain landscape-scale stand-replacing fires that would positively or negatively alter owl habitat over extensive areas in a single fire incident, depending on certain conditions. As described in the recovery plan, the extent of any positive or negative effects would depend on whether the fire and/or suppression activities are within owl habitat, type of habitat involved (e.g., nest/roost, foraging, dispersal habitat), severity and intensity of the wildland fire, areal extent, location, intensity of suppression activities, frequency and cumulative effects of the suppression activities, and time of year.

Direct and indirect fire effects to Mexican spotted owl habitat from stand-replacement fire include the alteration of vegetation structure, soil, and watershed conditions. These effects can be detrimental, beneficial, or both depending on the factors listed above. The evaluation of effects is also dependent on temporal scale; effects that are detrimental in the near term may have long-term beneficial effects. Conversely, fires may provide short-term benefits, but result in stand degradation over time. The fire-severity class is directly related to the magnitude of these effects, and it also influences whether such effects are positive or negative on owl habitat. High-severity burns have the most negative long-term effects on spotted owl nest and roost habitats but could enhance foraging habitats used by owl prey species (e.g., woodrats or deer mice) (Franklin et al. 2000; Kyle and Block 2000).

The Preferred Alternative includes management actions such as prescribed burning and mechanical vegetation treatments that would help minimize risk of stand-replacement wildfire. Treatments may occur in and adjacent to Mexican spotted owl habitat. Priority areas for mechanical vegetation treatments would include the WUI where communities are at risk to fire, where fires are a greater threat to people and property, and where fire applications have much greater risk and liabilities. In most WUI areas, fire regime and vegetation structure and composition have been moderately to substantially altered, representing Fire Regime Condition Classes 2 and 3. Many of the identified WUI areas also coincide with big game winter range habitat and habitat for Mexican spotted owl.

Fire Suppression: Varying levels of fire suppression activities have occurred across the SJNF since it was proclaimed in 1905. Suppression efforts coupled with other management actions such as historic timber harvest and livestock grazing have altered forest conditions, thereby increasing the risk of high-intensity wildfire. The SJNF continues to manage wildland fire using appropriate management response strategies which may include full suppression actions to initiating limited suppression such as the case when managing fires for resource benefits under the wildland fire use program.

Regardless, of the suppression actions taken, suppression activities can result in habitat loss through building of firelines, construction of support areas such as helipads and fire camps, and ignition of

backfires and burnouts to reduce the amount of fuel available to wildland fires. Whether the habitat effects of fire-suppression activities cause more or less impact to Mexican spotted owl habitat than the benefits gained by controlling the fire can only be determined site specifically, and then only to the extent that with-suppression and without-suppression scenarios can be accurately evaluated (USFWS 2012b). The SJNF has and would continue taking actions to reduce suppression impacts to federally listed species by assigning resource advisors to incident management teams. Resource advisors provide input to help reduce impacts to listed species and their habitats.

Burned Area Response: Emergency stabilization and burned area rehabilitation treatments are applied to stabilize and rehabilitate burned areas so they can recover more rapidly (USFWS 2012b). Methods of emergency stabilization and burned area rehabilitation include aerial mulching and seeding, tree planting, and construction of water/soil control structures (e.g., gabions, water bars, and straw bales). From a habitat standpoint, these activities are probably beneficial to Mexican spotted owl in that they provide protection of soils, thereby reducing the likelihood of permanent soil loss in preparation for longer-term rehabilitation efforts. Use of non-native species, however, for post-fire seeding is often ineffective at meeting management objectives and may have long-term implications on forest ecology (Peppin et al. 2010 cited in (USFWS 2012b).

The SJNF has and would continue to conduct emergency stabilization and burned area rehabilitation treatments for wildfires for resource recovery. As described above under fire suppression, resource advisors are usually assigned to assist with emergency stabilization and burned area rehabilitation treatments, providing input designed to reduce impacts to federally listed species.

Fire and Fuels Management: The Mexican Spotted Owl Recovery Plan lists a primary threat to Mexican spotted owl population in the United States as an increased risk of stand-replacing wildland fire. It also recognized that climate change conditions in the southwestern United States compound that risk of stand-replacement fires within Mexican spotted owl habitat. Recent forest management, including the LRMP, now emphasizes sustainable ecological function and a return toward pre-settlement fire regimes, both of which are more compatible with maintenance of spotted owl habitat conditions than the even-aged management regime practiced at the time of listing, and being consistent with strategies outlined within the recovery plan. The LRMP identifies large landscapes, much within or adjacent to Mexican spotted owl habitat, which are currently susceptible to stand-replacement fire in need of fuels treatment to move habitat toward desired conditions more representative of HRV. Conditions resulting from strict fire exclusion management of the twentieth century are a factor leading to current condition outside of HRV and the resulting risk of loss of suitable condition to Mexican spotted owl habitat function on the SJNF. Under the Preferred Alternative, approximately 6,000 acres of hazardous fuels would be treated annually via prescribed fire in vegetation types that are within or adjacent to Mexican spotted owl habitat. Mechanical treatments would constitute approximately 7,000 acres of the annual hazardous fuels treatments, also in vegetation types that are within or adjacent to Mexican spotted owl habitat. In total, approximately 90,000 acres of prescribed burning and approximately 105,000 acres of mechanical vegetation treatments may occur in vegetation types that are within or adjacent to Mexican spotted owl habitat over the life of the LRMP.

Naturally ignited wildland fire, managed for resource benefits, may occur up to 60,000 acres annually in mixed vegetation types that are within or adjacent to Mexican spotted owl habitat. Use of managed fire, along with mechanical and other fuels management strategies, is expected to create forest conditions that meet desired conditions for the natural vegetation types within the planning area. The use of prescribed fire through application of ground or aerial ignition methods is expected to continue in Mexican spotted owl habitat under the Preferred Alternative. Prescribed burns would occur during early spring or fall when conditions are favorable to meet desired project burn plan objectives. Summer burns are possible in areas where prior treatments (mechanical or prescribed fire) have occurred and conditions are favorable to reduce risk of high-intensity fire.

Prescribed burning in Mexican spotted owl habitat would generally occur on mesas, in canyons, and in steep-slope mixed conifer. Low- to moderate-intensity understory burns are expected, resulting in the consumption of leaf and needle litter, down and dead woody debris, and small-diameter trees and shrubs. Burning would reduce surface fuel loading and the “ladder effect” that results from fire moving into the

crowns of trees due to fuel build-up (small trees, shrubs, and litter) beneath the crowns. Torching of individual trees or groups of trees and some scorching of trees due to fuel loading and potential heat build-up under individual or groups of trees is expected. The torching and scorching of individual or groups of trees has potential to affect roosting habitat. Burning would also consume down and dead course woody debris and some snags, all habitat components utilized by prey species. Direct impacts to owl habitat and habitat components utilized by prey species are expected to be minimal due to burn prescription parameters and treatment objectives. Overall, suitable Mexican spotted owl habitat is not expected to be converted to an unsuitable condition.

Approximately 20,290 acres or 31% of Mexican spotted owl habitat on the SJNF is located in the WUI. Mechanical vegetation treatments in the WUI would focus on thinning primarily small to mid-sized trees in project areas to break-up fuel continuity and to reduce the ladder effect of fuels as described previously. The resulting stand structure and general appearance would be more open, with small openings interspersed within clumps of mature and older trees.

Wildfires that result from natural ignitions (lightning) would be managed under the SJNF's wildland fire use program where fires are managed for resource benefits. These fires are a primary means for restoring natural disturbance processes and are likely to occur in or adjacent to Mexican spotted owl habitat. Effects to owl habitat from wildland fire use are expected to be similar to prescribed fire described above, but likely occurring across a larger scale. ESA Section 7 emergency consultation may be initiated with the USFWS where discretionary actions are taken that effect Mexican spotted owl or habitat when managing natural ignitions. In some instances, the construction of line via hand or mechanical equipment may be necessary to help confine or contain the fire to pre-established management boundaries, potentially affecting habitat as described above.

Mexican spotted owl protocol surveys described in the recovery plan would be conducted prior to prescribed fire and mechanical vegetation treatments to determine owl occupancy and potential breeding activity in project areas. Treatments would be consistent with fire and fuels management recommendations in the recovery plan. Effects from burn activities would be evaluated and Section 7 consultation would be initiated with the USFWS to ensure consistency with the recovery plan.

Timber Management: Under the Preferred Alternative, timber harvesting may occur across approximately 707,616 acres of the SJNF. These acreages include lands that are suitable for timber production and other tentatively suitable lands where non-commercial timber harvest may occur. Of the total, approximately 2,004 acres or 3% of Mexican spotted owl habitat are in lands identified as suitable for timber production. Approximately 20,417 acres or 31% of Mexican spotted owl habitat occur in other lands tentatively suitable for timber harvest. Timber harvest may occur on these lands for purposes other than for timber production, but is not scheduled or regulated. The remaining approximately 43,090 acres of habitat are in lands that are generally not suitable for timber production.

Under the Preferred Alternative, approximately 500 acres of warm-dry mixed conifer may be treated annually over the life of the LRMP (approximately 15-year period), which includes 250 acres via restoration treatment and 250 acres via partial cutting. Additionally, approximately 125 acres of cool-moist mixed conifer may be treated annually via partial cutting. In total, approximately 9,375 acres of mixed conifer habitat may be treated over the life of the LRMP via timber management across the SJNF. At this time, site-specific information is not available and the portion of the treatment areas that may comprise Mexican spotted owl habitat are not determined at this programmatic level of planning.

Timber outputs associated with the Preferred Alternative are expected to have minimal influence to Mexican spotted owl habitat. Direct and indirect effects to stand structure are expected to be similar to those described for fuels treatments. Ponderosa pine and warm-dry mixed conifer forests currently have less acres in both young and old growth structural stages compared to HRV conditions. Other timber types also vary from HRV condition for various structural stages. In the recovery plan, managing for habitat perpetuity into the future is listed as one of the five key elements designed to conserve the subspecies throughout its range. Where suitable on the planning landscape, harvest for either timber production or for purposes other than timber production, would be designed to meet the needs for habitat sustainability. These are described under the LRMP in the Ecological Framework and the Conservation

of Species and the Terrestrial Ecosystems and Plant Species sections, which include direction for providing and maintaining sustainable habitat structural stages of timber types and assure that suitable habitat structural stages are maintained and replaced through successional processes, including harvest. These harvest amounts are designed to move these habitat types toward HRV condition and are consistent with the recovery plan design to provide habitat for the species over the long term. We are unable to quantify total acreage of habitat treated under the Preferred Alternative; however, only 3% of the habitat is suitable for timber production. Treatment in suitable areas is expected to be limited as habitat is largely located on steep slopes and in rugged terrain, areas generally not conducive for harvest equipment. Potential timber harvest in other lands tentatively suitable for harvest would likely result in fewer impacts to habitat as treatment is more restricted (must occur in order to meet other desired conditions and resource objectives, as opposed to production). Timber management can affect Mexican spotted owl and its habitat both positively or negatively depending on project design and site-specific factors. Timber management in owl habitat would be consistent with recommendations in the recovery plan and with additional LRMP components designed to move habitat toward HRV condition, maintain or improve habitat suitability for Mexican spotted owl, and reduce the threat of stand-replacing wildfire potential. Effects from timber management actions in Mexican spotted owl habitat would be evaluated under site-specific analysis, and Section 7 consultation would be initiated with the USFWS to ensure compliance with the recovery plan.

Insects and Disease: Insect and disease aerial detection data from the USFS Rocky Mountain Region Forest Health Management Program show approximately 16,970 acres of Mexican spotted owl habitat have been influenced by insects and disease from 2007 to 2011. These data depict the occurrence and location of forest insect, disease, and other biotic and abiotic causes of tree mortality and tree damage. Aerial survey data are collected by observing areas of tree damage or tree mortality from an aircraft and manually recording the information onto a map. Due to the nature of aerial surveys, these data can only provide rough estimates of location, intensity, and the resulting trend information for agents detectable from the air.

Native forest insects and diseases are natural ecosystem processes with which the Mexican spotted owl has evolved. The influences of these ecosystem processes on owls can be either negative or positive, depending on intensity and extent, both within and among forest-pathogen types (USFWS 2012b). Native insects and disease likely are an issue for owl habitat only when they reach epidemic levels. Insects and disease of primary interest in Mexican spotted owl habitat on the SJNF include Douglas-fir beetle (*Dendroctonus pseudotsugae*), fir engraver beetle (*Scolytus ventralis*), western spruce budworm (*Choristoneura occidentalis*), Douglas-fir pole beetle (*Pseudohylesinus nebulosus*), root rot (*Armillaria ostoyae*), white trunk rot (*P. tremulae*), fir broom rust (*Melampsorella caryophyllacearum*), annosus root rot (*Heterobasidium annosum*), and Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*). Insects and diseases, while naturally occurring, can pose some risk to Mexican spotted owl when they involve exotic species or when native-species infestations are exacerbated by unnatural stand conditions, drought, climate change, or other factors. If the range of the owl becomes hotter and drier, insect and disease outbreaks can be expected to increase in frequency, extent, intensity, and duration (USFWS 2012b).

As mentioned earlier, insects and disease have affected habitat occupied by Mexican spotted owl on the SJNF. These activities have degraded habitat for Mexican spotted owl, and could have contributed to the only known occupied site being vacated by owls. The Preferred Alternative includes management actions that would help address forest health concerns related to insects and disease; however, the potential still exists for continued impacts to owl habitat from insect and disease. Native insects and disease play a role in ecological functioning and are not usually considered a problem when found at normal endemic levels. Currently, varying species of bark beetle are spreading at epidemic rates in the western states, including the SJNF, killing trees within particular age classes within varying life zones. Where a disproportionate percent of the forest consists of the vulnerable tree species and age classes, large portions of that age class may be affected. The current rate of spread on the SJNF is being attributed mainly to the compounding factors of climate change and extended drought. The LRMP direction takes a sustainable ecological function approach and is focused on providing long-term healthy forest conditions, which are more resistant to outbreaks and their resiliency for recovery and for minimizing the extent of new outbreaks. Commodity uses, such as timber production, must fit within the LRMP constraints and

contribute to the ecological framework set up in the Ecological Framework and Conservation of Species section of the LRMP and within the latter sections such as Terrestrial Ecosystems and Plant Species. This is achieved by managing for balanced ecological representation of tree species and age classes which fit within the HRV conditions. These changes are not instantaneous on the landscape and require long-term planning to achieve the desired conditions, especially where current condition varies significantly from those conditions found under HRV. Managing for recovery habitat into the future is one of the five key elements of the recovery strategy designed to conserve the subspecies throughout its range. The LRMP and its direction concerning disease and insects are consistent with the guidelines for disease and insects listed within the Mexican Spotted Owl Recovery Plan.

Livestock Grazing: The Preferred Alternative designates where livestock grazing can occur on suitable lands across the SJNF. Suitable lands are lands that have been determined to have adequate productivity for domestic livestock, while meeting forage needs for wildlife. Areas suitable for cattle and horse grazing exist on approximately 666,160 acres. Areas suitable for domestic sheep and goat grazing exist on approximately 76,921 acres. Of the areas suitable for cattle and horse grazing, approximately 10,902 acres contain Mexican spotted owl habitat, of which approximately 6,655 acres or 61% are within active or vacant allotments. Of the areas suitable for domestic sheep and goat grazing, approximately 20,363 acres are in Mexican spotted owl habitat, of which approximately 9,941 acres or 49% are in active or vacant allotments.

Effects to Mexican spotted owl from grazing by domestic livestock and wild ungulates are complex, and multiple factors may determine specific influences. These factors include local and regional climatic patterns, biotic community associations and ecology, soil types and conditions, and the timing, intensity, and duration of vegetation removal associated with the presence of grazing animals (USFWS 2012b). Although the effects of grazing on Mexican spotted owl are complex, they generally fall into two categories: 1) those that result in relatively short-term effects requiring short recovery periods to restore suitable habitat characteristics, and 2) those that result in long-term alterations in plant species composition and vegetation structure (USFWS 2012b). Grazing by domestic livestock and wild ungulates is a potential threat to Mexican spotted owl when managed insufficiently, with respect to effects on prey species habitat (e.g., reducing herbaceous ground cover), nest/roost habitat (e.g., limiting regeneration of important tree species, especially in riparian areas), and the capacity for resource managers to restore and maintain conditions supporting natural fire regimes within an array of habitat types.

Grazing by domestic livestock and wild ungulates on the SJNF is prevalent and reoccurring in most Mexican spotted owl habitat. The level of grazing is limited due to the overall lack of preferred grass-forb forage in closed canopy, steep-sloped mixed conifer owl habitat. Livestock generally prefer open habitats that support an abundance of forage species. Steep slopes and closed canopy of mature timber stands utilized by Mexican spotted owl as nesting and brood rearing habitat provide little livestock forage and are utilized and impacted minimally by livestock. Areas suitable for livestock use, which overlap with Mexican spotted owl habitat, consist of more open areas which support livestock forage species and subsequently support prey species and foraging habitat for the Mexican spotted owl. There are a number of conservation measures represented in standards and guidelines for range management and ecological sustainability, as well as other referenced guidance, including agency manual and handbook direction and the Mexican Spotted Owl Recovery Plan direction. This is expected to provide for healthy ecosystem conditions where managed livestock use would additionally provide for conditions that support Mexican spotted owl forage species. Grazing under the Preferred Alternative is not expected to have adverse impacts to owl habitat based on current grazing intensities (low to moderate) in owl habitat. Grazing management recommendation from the Mexican Spotted Owl Recovery Plan would be applied to grazing activities occurring across active/vacant livestock grazing allotments. The application of grazing recommendations is expected to reduce livestock grazing impacts to Mexican spotted owl under the Preferred Alternative.

Energy Development: Under the Preferred Alternative, the most common of forms of energy development include oil and gas leasing and development. The SJNF is not a priority area for other energy development such as wind or solar energy. Under the Preferred Alternative, approximately 1,301,352 acres of NFS lands are available for oil and gas leasing. 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 are administratively not available for lease.

The Preferred Alternative incorporates a number of lease stipulations that guide how potential development could occur across areas leased areas. Lease stipulations are applied to protect various resources (soils, watersheds, terrestrial and aquatic wildlife and habitat, cultural resources, etc.) from adverse impacts from development activities. Roadless areas have an NSO stipulation, and for lands outside roadless areas, a full range of leasing stipulations are assigned including NSO, TL, CSU, and standard lease terms to protect various resources.

Of the total area available for lease, approximately 40,717 acres are present in Mexican spotted owl habitat, as modeled. The different types of leasing stipulations are not mutually exclusive on any one piece of land and may, in fact, overlap on top of each other. Of the total habitat acreage leased, an NSO stipulation has been applied across 35,130 acres (86%), a CSU stipulation has been applied across 28,522 acres (70%), a TL stipulation has been applied across 9,782 acres (24%), and standard lease terms apply across approximately 968 acres (2%) of the habitat.

Under the Preferred Alternative, areas with high potential for prospective oil and gas development include the GSGP area, the Northern San Juan Basin, the San Juan Sag, and the Paradox Basin.

Approximately 2,531 acres of Mexican spotted owl habitat are present in the GSGP area. Of the total habitat present in the GSGP area, approximately 2,067 acres are available for lease, of which 1,786 acres (86%) include an NSO stipulation, 575 acres (28%) include a CSU stipulation, 103 acres (5%) include a TL stipulation, and standard lease terms apply across 65 acres (3%).

Approximately 1,905 acres of Mexican spotted owl habitat are present in the Northern San Juan Basin area. Of the total habitat present in the Northern San Juan Basin area, approximately 1,681 acres are available for lease, of which 1,435 acres (85%) include an NSO stipulation, 420 acres (25%) include a CSU stipulation, 789 acres (47%) include a TL stipulation, and standard lease terms apply across 71 acres (4%).

Approximately 8,455 acres of Mexican spotted owl habitat are present in the San Juan Sag area. Of the total habitat present in San Juan Sag area, approximately 7,410 acres are available for lease, of which 5,615 acres (76%) include an NSO stipulation, 5,105 acres (69%) include a CSU stipulation, 2,961 acres (40%) include a TL stipulation, and standard lease terms apply across 318 acres (4%).

Approximately 1,961 acres of Mexican spotted owl habitat are present in the Paradox Basin area. Of the total habitat present in Paradox Basin area, approximately 1,689 acres are available for lease, of which 1,226 acres (73%) include an NSO stipulation, 627 acres (37%) include a CSU stipulation, 141 acres (8%) include a TL stipulation, and standard lease terms apply across 65 acres (4%).

Oil and gas development may affect owls through alteration of habitat caused by facility (e.g., well pads and pipelines) and/or road construction, as well as exploration equipment. Construction activities often involve use of large equipment potentially directly impacting habitat through removal of large trees, dead and down materials, etc. Such activities may also increase accessibility, opening areas to increased human disturbance.

Under the Preferred Alternative, the overall impacts to Mexican spotted owl habitat are expected to be minimal given the large amount of habitat with various lease stipulations applied. Additionally, an NSO stipulation would apply to Mexican spotted owl habitat to maintain the utility of suitable breeding and brood rearing habitat as defined in the recovery plan to promote recovery (see Conservation Measures). This stipulation would greatly reduce impacts to Mexican spotted owl, as there would be no alteration of surface habitat. The remaining stipulations, particularly CSU and TL, would also reduce impacts to habitat through protection of other resources (watersheds, soils, and terrestrial and aquatic wildlife habitat). Additionally, the application of energy-related development recommendations identified in the recovery plan would further reduce adverse effects to owl habitat.

Roads and Trails: The construction of roads and trails in owl habitat can result in direct and indirect effects such as direct loss of habitat and disturbance from human presence. The presence of roads also encourages public use resulting in additional impacts to habitat such as the removal of large logs, snags, and hardwoods through fuelwood cutting and dispersed camping. Access into owl habitat also increases potential for human presence and disturbance.

Under the Preferred Alternative, the construction of roads is unlikely to occur in Mexican spotted owl habitat due to topography that makes access difficult (steep terrain and in some locations physical features such as rock and riparian areas). In addition, analysis of the impacts of travel management actions on Mexican spotted owl habitat would be further evaluated in a separate but related process—travel management planning. The SJNF is currently in the process of travel management planning in response to new national direction for all NFS lands. During travel management planning, more detailed analysis of roads and trails that would be open, closed, or created would be analyzed. Impacts to Mexican spotted owl would be considered, as well as other resources and use patterns, in developing these transportation plans. Where appropriate, consultation would be initiated concerning Mexican spotted owl as project-level analysis occurs for landscapes. The proposed construction of roads in Mexican spotted owl habitat and subsequent project-level analysis and implementation would require NEPA analysis and protocol surveys to determine occupancy and breeding status in the project area, and must be compliant with Section 7 requirements and LRMP direction. The LRMP contains direction to minimize or eliminate effects to habitat and potential disturbance. LRMP direction includes that found under the species' recovery plan and any additional direction developed in consultation with the USFWS. The recovery plan is listed under other referenced guidance in the terrestrial wildlife section of the LRMP.

Land Development: Land development is the conversion of natural land covers to non-natural surfaces for human use, including housing, commercial enterprises, and the associated infrastructure such as roads, trails, and utility structures. Land development occurs along a gradient from urban development to exurban and rural development.

Under the Preferred Alternative, the conversion of Mexican spotted owl habitat on NFS lands to non-natural surfaces for human use, including housing developments or use by commercial enterprises is not expected. Potential effects to Mexican spotted owl habitat from roads and trails is discussed above.

Recreation: Recreational activities may affect owls directly through disturbances caused by human activity (e.g., hiking, shooting, and OHV use at nesting, roosting, or foraging sites, or indirectly through alteration of habitats such as damage to vegetation, soil compaction, illegal trail creation, and increased risk of wildland fires (USFWS 2012b). Whether managed or unmanaged (i.e., user-created), development of new recreational facilities (e.g., trailheads and OHV and mountain bike trails) and expansion of existing facilities (e.g., campgrounds and hiking trails) may alter owl habitat (USFWS 2012b).

Under the Preferred Alternative, a variety of recreation activities are expected. The addition of developed recreation projects/activities (roads and trails, campgrounds, trailheads, parking areas, and associated motorize use etc.) in owl habitat are possible, but highly unlikely due to the general nature and location of habitat. Dispersed recreation activities (hiking, camping, horseback riding, etc.) are expected to continue in owl habitat with overall use and potential effects similar to existing conditions. The risk of illegal OHV use in owl habitat is possible; however, occurrences and potential impacts are expected to be minimal due to difficult access. Proposed future recreation management actions under the Preferred Alternative would require NEPA analysis, protocol surveys to determine occupancy and breeding status in project areas, and site-specific Section 7 consultation with the USFWS. Proposed projects would incorporate management recommendations described in the recovery plan to reduce impacts to Mexican spotted owl and habitat from recreation activities.

Water Developments: Water development such as dams, permanent flooding of riparian habitats, bed degradation below dams, stream dewatering, diversions, altered-flow regimes, and artificial watering ponds (e.g., stock tanks) have potential to effect Mexican spotted owl and habitat (USFWS 2012b). Effects of development on owls vary, but can include loss or degradation of habitat, habitat fragmentation, disruption of migration corridors, inhibited gene flow, and altered grazing patterns by wild and domestic ungulates (USFWS 2012b).

The development of dams, permanent flooding of riparian areas, bed degradation below dams, stream dewatering, and activities that alter flow regimes are possible, but unlikely to occur under the Preferred Alternative. The construction and installation of watering ponds could occur in or adjacent to owl habitat to help improve livestock or wildlife distribution. Proposed water developments in owl habitat would require NEPA analysis, possibly surveys to determine occupancy and breeding status in project areas, and site-specific Section 7 Consultation with the USFWS. Proposed projects would incorporate management recommendations described in the recovery plan to reduce impacts to Mexican spotted owl and habitat from water development projects.

Conservation Measures

The Preferred Alternative would incorporate management recommendations in the Mexican Spotted Owl Recovery Plan for projects/activities occurring in owl habitat.

Minerals and Energy Lease Stipulations

The following lease stipulations would be applied to minerals and energy leases where Mexican spotted owl habitat is present.

No Surface Occupancy

No surface occupancy is allowed on the lands described below: In Mexican spotted owl habitat, as determined by a qualified biologist at the time, NSO would be allowed. Surveys of the lease area may be required to determine the presence of suitable habitat, occupation, and, if warranted, designation determination for a protected activity center.

If it is determined that suitable nesting and fledgling Mexican spotted owl habitat exists and surveys cannot be conducted, a TL would be placed from March 1 to August 31.

For the purpose of: Preventing actions that may result in take as defined under the ESA.

Justification: The Mexican spotted owl is a threatened species with suitable habitat within portions of the SJNF and TRFO. NSO would be allowed in these habitat areas to maintain the utility of suitable breeding and brood-rearing habitat as defined in the Mexican Spotted Owl Recovery Plan to promote recovery.

Exceptions: An exception can be granted if an environmental analysis of the Proposed Action and subsequent consultation indicates that the nature or conduct of the activity could be conditioned so as not to impair the utility of habitat for current or subsequent reproductive activity or occupancy. No exceptions would be granted within a protected activity center.

Modifications: The Authorized Officer may modify habitat configuration or extent based on new information. Modification of a protected activity center would be completed in consultation with the USFWS.

Waivers: A waiver of this stipulation maybe granted by the Authorized Officer only through a land use plan amendment. No waivers shall be granted within designated protected activity centers.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Lease Notice

A survey of the lease area may be required to determine if unsurveyed suitable habitat is present, and the agencies should prioritize completing surveys where expressions of interest have been made for leasable mineral development. A 2-year protocol survey to determine occupation by the species would be required prior to any development activity within the identified suitable habitat. Surveys would be completed by a qualified biologist as determined by the USFWS and the managing agencies. No development activity

would take place in resultant occupied habitat until a determination is made by the USFWS and the managing agencies for designation of a protected activity center.

Cumulative Effects

Mexican spotted owl populations in Colorado are low in comparison to the core range area of New Mexico and Arizona. There are very few known breeding pairs in Colorado. There has been no breeding activity documented on the SJNF, despite the vast amount of apparently suitable habitat present. Spotted owl habitat on the SJNF consists of steep slopes containing mature or late successional mixed conifer, as well as mixed conifer forests associated with steep rocky canyons. Habitat conditions are declining to varying degree forest-wide due insects and disease and fire suppression. The potential for high-intensity wildfire is therefore a concern on both public and private lands. Land use practices occur on non-federal lands that may influence Mexican spotted owl habitat include timber management and recreation. Residential developments are also encroaching on public lands in some locations. While much of this development occurs in locations that are not considered owl habitat, it may synergistically contribute to potential effects on spotted owl habitat, such as increased fire risks or increased recreational use of public lands.

Determination

The Preferred Alternative “**may affect but is not likely to adversely affect**” Mexican spotted owl and owl habitat. Program activities such as fire and fuels management, timber management, livestock grazing, energy development, roads and trails, and water developments may result in potential effects (positive and negative) to Mexican spotted owl. Approximately 31% of Mexican spotted owl habitat is located in WUI areas, 3% in areas suitable for timber production, 31% in other lands tentatively suitable for timber harvest, 16% in active/vacant cattle and horse grazing allotments, 31% in active/vacant domestic sheep and goat grazing allotments, and 62% in areas available for oil and gas leasing. The Preferred Alternative includes management actions such as prescribed fire, wildland fire use, fuels, and timber management that may reduce and or help reverse impacts to owl habitat from insects and disease and stand-replacement wildfire. The Preferred Alternative includes management requirements to minimize impacts from activities such as oil and gas leasing and development by including numerous lease stipulations to protect various resources occurring in owl habitat, and more importantly an NSO stipulation in owl habitat to prevent habitat alteration. Overall, the effects from management actions are expected to be minimal based on the level of potential activity occurring in owl habitat and application of management requirements in the LRMP and management recommendations described in the Mexican Spotted Owl Recovery Plan.

2.3 Assessment of Threatened and Endangered Aquatic Species

Greenback Cutthroat Trout (Oncorhynchus clarki stomias)

The following policy discussion related to lineage greenback cutthroat trout is taken from the USFWS position paper on ESA consultations for lineage greenback cutthroat trout (updated October 4, 2012). It is relevant to all lineage greenback populations known to occur on SJNF lands.

Background

The greenback cutthroat trout was listed as an endangered species in 1967 under a precursor to the ESA. It was relisted as endangered under the current act in 1974 and down listed to threatened status in 1978.

Until recently, greenback cutthroat trout have been considered native to the headwaters of the South Platte and Arkansas River drainages in eastern Colorado, and a few headwater tributaries of the South Platte in a small area of southeastern Wyoming (Behnke 1992). Another cutthroat trout subspecies, the Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*), is known to occur in the Colorado and Green River drainages in the west slope of Colorado, southwestern Wyoming, and eastern Utah. The Rio Grande cutthroat trout (*O.c. virginialis*), a candidate species, is known to occur within the Rio Grande

drainage. A fourth subspecies in Colorado, the yellowfin cutthroat trout (*O.c. macdonaldi*), was known to occur in the headwaters of the Arkansas River drainage and is believed to be extinct.

A recent genetic study (Metcalf et al. 2012) provided new information on the native range of the cutthroat trout in Colorado, as provided in the following text:

- Six cutthroat trout lineages were originally present in the state, of which two lineages have gone extinct.
- Greenbacks were native only to the South Platte drainage.
- The only known greenback cutthroat trout population, a federally threatened species, is present in Bear Creek in the Arkansas drainage.
- Cutthroat trout on the west slope of Colorado are actually divided into two lineages: the native range of the Colorado River cutthroat, also referred to as Lineage CR, is located in the Yampa/White River drainages, while another lineage, referred to as Lineage GB at this time, has a native range that is located in the Gunnison/Colorado River drainages.
- Another cutthroat trout lineage was present in the San Juan Mountains; it is now believed to be extinct.
- Other cutthroat trout present in streams on the east slope, which have been previously considered to be greenback cutthroat trout, are actually cutthroats that had been stocked earlier from Colorado River cutthroat and Lineage GB streams originating on the west slope of Colorado.

The USFWS has not confirmed its position on the new information by Metcalf et al. (2012) and is waiting for the completion of a meristic study of cutthroat trout in Colorado before conducting any reviews and making decisions on listing status. The meristic study, which was designed to complement the genetic study, is being conducted by researchers at Colorado State University and should be completed in 2013. Following completion of the meristic study, the USFWS intends to conduct a scientific peer review of the genetic and meristic studies together, involving genetic and cutthroat experts from throughout the country. Following this scientific review, the USFWS would conduct a status review of the cutthroat groups, evaluating threats and population trends, etc. If, at that time, it is determined that a new listing or a revision to an existing listing is appropriate, the USFWS would then conduct a formal rulemaking process.

Section 7 Consultation Requirements

The identification of Lineage GB fish in western Colorado and eastern Utah has raised concerns regarding whether there is a need for application of the ESA (particularly Section 7 consultation) in these areas. Although the greenback was listed range-wide, its distribution was designated only as Colorado. Thus, any greenback lineage fish found in Utah or Wyoming would not currently receive any protections under the ESA.

Until the review and rulemaking process, if necessary, have been completed, the USFWS has advised federal agencies to continue to conduct consultations for actions that may affect the currently listed cutthroat trout in Colorado; therefore, this would include all cutthroat populations that have been identified as greenback, including Lineage GB and Lineage CR on the eastern slope and Lineage GB on the western slope of Colorado.

Colorado River Cutthroat Trout Conservation

The Colorado River Cutthroat Trout Conservation Team updated the Conservation Strategy and Agreement in March 2006. Signatories to the agreement include the state wildlife agencies of Colorado, Utah, and Wyoming; the USFS; the BLM; and the USFWS (Colorado River Cutthroat Trout Conservation Team 2006). The purpose of the strategy is to provide a framework for the long-term conservation of the Colorado River cutthroat trout and reduce or eliminate the threats that warrant its status as a sensitive species or species of concern by federal and state resource agencies. The objectives of the strategy are to identify and characterize all core and conservation populations, secure and enhance conservation populations, restore populations, secure and enhance watershed conditions, and conduct public outreach, data sharing, and coordination. The three states, USFS, BLM, and USFWS have committed to implement the strategy.

The USFWS believes that implementation of the Colorado River Cutthroat Trout Conservation Team strategy to conserve and protect Colorado River cutthroat trout populations throughout its range would also adequately protect any Lineage GB populations. Therefore, agencies should include these activities in their Biological Evaluations/Assessments (BE/BAs as conservation measures for Lineage GB populations.

Existing Condition

Once widespread, the greenback cutthroat trout is now thought to be limited to a single population located in Bear Creek within the Arkansas drainage. What is now being referred to as “lineage greenback cutthroat trout” is present in the Arkansas, South Platte, and Colorado River systems. These fish inhabit clear, cold foothill and mountain waters and require clean gravel substrates to successfully spawn and reproduce. The greenback evolved in environments containing low species diversity with few competitors and their competitive mechanisms are not well developed. This compromises their ability to coexist with other species of trout. They are also known to be relatively easy to harvest by anglers, which renders them susceptible to overfishing.

Populations of greenback began to decline when settlers first arrived and began developing areas associated with greenback occurrence. Mining in its native river basins led to sediment and toxic runoff, which compromised the greenbacks aquatic habitats. This, along with water diversion for agriculture and overfishing, contributed to the decline of many greenback populations. However, the introduction of non-native and non-endemic species such as brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), and other cutthroat species (*Oncorhynchus clarki* spp.) has likely had the greatest ongoing detrimental impact to greenback cutthroat populations. The two fall spawning species, brown trout and brook trout, directly compete and displace the greenback. The two spring spawning species, rainbow trout and other cutthroat subspecies, interbreed with the greenback resulting in genetic hybrid progeny.

Lineage Greenback Populations Occurring on the San Juan National Forest

Four populations of lineage greenback trout are known to occur on the SJNF, all of which occupy tributaries of the Dolores River system: Rio Lado Creek, Little Taylor Creek, Spring Creek, and Roaring Forks Creek. The Rio Lado Creek population is isolated due to a migration barrier installed by the USFS in 2003. Although some degree of isolation exists for the other three locations, there are no well-defined barriers that preclude upstream migration of non-native species.

While easily accessible, the four locations do not receive much recreational fishing use and angling mortality is low. These are relatively small, first and second order streams with very low stream flows occurring in late summer and winter periods. Habitat constraints resulting from low natural stream flow is likely a controlling biological factor for all four greenback populations.

Grazing Suitability Decision

All four lineage greenback streams are located within established livestock grazing allotments. The Rio Lado and Divide (Roaring Forks Creek) allotments are presently vacant and no grazing has occurred in recent years. The Little Taylor and Spring Creek allotments are open to grazing and are being stocked annually. The Spring Creek allotment is heavily stocked and some sections of the stream may be affected by grazing activity. No studies have been done to evaluate the potential effects of grazing on the lineage greenback population in Spring Creek. A walkthrough evaluation conducted in 2011 suggests there are no grazing impacts to Little Taylor Creek.

Timber Suitability Decision

Under the Proposed Action, portions of the four occupied watersheds are identified as being suitable for timber harvest. Lands designated as suitable include 70% of the Spring Creek watershed, 53% of the Rio Lado watershed, 90% of the Little Taylor Creek watershed, and 84% of the Roaring Forks Creek watershed. However, the suitability determination does not reflect the likelihood or extent of timber harvest that may occur. Presently, the commercial demand for timber is very low and there are no plans

to conduct any harvest activities within the four occupied watersheds. Any harvest that may occur would likely be done to maintain forest health (i.e., beetle kill salvage and Sudden Aspen Decline salvage). Under any harvest scenario, LRMP objectives, standards, and guidelines would minimize any potential effects of harvest activities to the occupied streams (see Appendix J.B).

Special Uses

There are no known special use activities (e.g., water development projects) present, planned, or proposed for any of the four greenback locations. However, should future proposals be developed, the LRMP habitat maintenance standards specific to aquatic species would apply (see Appendix J.B, Section 2.5 and 2.6).

Oil and Gas Leasing

All four lineage greenback populations are located to the east of the Paradox Basin and other areas suitable for conventional and gothic shale development. It is improbable that the cumulative effects of water consumption resulting from any oil and gas development on the SJNF would influence the availability of water in the four occupied streams.

Direct, Indirect, and Cumulative Effects Related to Land and Resource Management Plan Implementation

Being small headwater streams surrounded by NFS lands, there is little potential for habitats occupied by lineage greenback cutthroat to be influenced by state and private actions. No private inholdings or mining claims occur within the occupied areas of these watersheds. Therefore, the potential for cumulative adverse effects associated with state and private actions is very low.

Of primary concern to the Spring Creek, Little Taylor Creek, and Roaring Forks Creek is the potential for the introduction of other species of trout into the stream section now occupied by lineage greenback cutthroat. The SJNF and CPW plan to conduct evaluations to determine the potential for non-native species introductions, specifically to identify the need for the installation of barriers to prevent upstream migration of non-native species. There is no decision under the LRMP revision that would increase the potential for exotic species introductions into these streams.

For the Spring Creek and Little Taylor Creek watersheds, the potential for adverse effects from livestock grazing presents the next highest risk to these two populations, followed by the potential for wildfire, water developments, timber harvest, and recreational activities, which apply to all four occupied watersheds. All of these activities have the potential to impact the quantity or quality of aquatic habitats that greenback rely upon.

Livestock grazing can impact riparian vegetation, reduce overhead cover, compromise stream bank integrity, increase bank erosion and sedimentation, and alter the width to depth ratios of a stream. These alterations can directly influence the biological limiting factors for a variety of life stages of fish, including spawning habitats, rearing habitats, foraging habitats, and overwintering habitats.

Wildfire can have devastating impacts on aquatic habitats. Some fires reduce ground cover and sterilize soils to the point where long-term erosion and sedimentation preclude fish survival. Short-term impacts may also occur as a result of fire retardant applications. To minimize the potential for these impacts, the SJNF has an aggressive prescribed fire program intended to reduce fuels and reduce the potential for catastrophic wildfires. The SJNF has also established a 600-foot buffer zone around all perennial streams where fire-retardant application is not allowed.

On-going water developments have major impacts on many streams within the planning area. These developments reduce the quantity and quality of aquatic habitats by removing water, the basic component that often dictates the abundance and distribution of fish populations within the planning area. As previously stated, no water developments exist within the occupied stream reaches and it is unlikely that any future water developments would be permitted that would affect the occupied reaches. In the unlikely

event that such developments would be authorized, the instream flow standards of the LRMP would be applied (see Appendix J.B, 2.5.18).

Timber harvest may also impact a variety of aquatic habitat characteristics that fish rely upon. Of primary concern is a reduction in woody debris recruitment to the stream, which in turn reduces habitat complexity, overwintering habitat features, and organic nutrients and overall stream productivity. Roads and trails used to conduct timber harvest can also be problematic since they may increase erosion and act as hydrologic conduits that transport sediment to the streams.

Oil and gas leasing would not be associated with any of the four occupied watersheds. Therefore, the oil and gas leasing decision would have no direct, indirect, or cumulative effects on lineage greenback cutthroat trout.

A variety of management direction and planning components (planning objectives, desired conditions, standards, and guidelines) for aquatic species contained in the revised LRMP are intended to mitigate any ongoing effects and prevent new adverse effects to the four lineage greenback populations (see Appendix J.B, Sections 2.2, 2.5, and 2.6). Considering all decisions to be implemented under the revised LRMP, and with consideration of the overall approach to species conservation contained within the LRMP (see Appendix J.A), it is our determination that implementation of the Proposed Action **may effect, but is not likely to adversely affect** any of the four lineage greenback populations occurring on the SJNF.

Federally Listed Fish Species Occurring Off-Forest

A variety of actions occurring on SJNF lands have the potential to affect four federally listed fish species that occupy segments of the Upper Colorado River and the San Juan River. Two species, the Colorado pikeminnow and the razorback sucker, are known to occupy the San Juan River. These two species and two additional species, the humpback chub and bonytail chub, are known to occupy the upper Colorado River and some of its tributaries, including the lower Dolores River. Two endangered fish recovery programs are applicable to actions occurring within the planning area. The Upper Colorado River Endangered Fish Recovery Program applies to the Dolores River and its tributaries, while the San Juan River Basin Recovery Implementation Program applies to the San Juan River and its tributaries (Public Law 106-392, 114 Stat. 1602, as amended; Public Law 107-375, 116 Stat. 3113).

Consultation History

For historic SJNF actions associated with the Dolores River drainage, formal consultation was conducted under the Programmatic Biological Assessment for Minor Water Depletions Associated with Routine Forest Decisions In the Upper Colorado River Basin (USFS 1993), and the related BO by the USFWS, the Final Biological Opinion for Small Water Depletions on Seven National Forests in Colorado and One in Wyoming (USFWS 1993). For the San Juan River Basin, the SJNF initiated formal consultation in January 1996 under the San Juan National Forest Programmatic Biological Assessment for Water Depletions Associated with Routine Forest Actions Occurring within the Upper San Juan River Basin (USFS 1996) and the related BO of March 1996 (USFWS 1996). These two consultations addressed the majority of historic water uses authorized by the SJNF that were determined to have adverse effects on the four endangered fish species. Numerous other project-level consultations have occurred since then, primarily to address new consumptive water uses.

Colorado Pikeminnow (*Ptychocheilus lucius*)

Background and Existing Condition

The Colorado pikeminnow is the largest member of the cyprinid family native to North America, with reports of individuals up to 6 feet long and weighing over 100 pounds. It evolved as the top predator of all native species in the Colorado River system. It was once found throughout warm water reaches of the entire Colorado River Basin down to the Gulf of California, including reaches of the upper Colorado River and its major tributaries, the Green River and its major tributaries, the San Juan River and some of its tributaries, and the Gila River system in Arizona (Platania 1990; Seethaler 1978). Seethaler (1978) indicates the species was abundant in suitable habitat throughout the entire Colorado River Basin prior to

the 1850s. However, pikeminnow were not known to occur in colder, headwater streams, which describe the majority of streams occurring throughout the planning area.

The decline in Colorado pikeminnow populations is correlated with the construction of dams and reservoirs occurring between the 1930s and 1960s, the introduction of non-native fishes, and the removal of vast quantities of water from the Colorado River system. Dams, impoundments, and water use practices are the major reasons for drastically modified natural river flows and channel characteristics in the Colorado River Basin. Dams on the mainstem have segmented the river system, blocking spawning migrations and changing flows and temperatures. Major changes in species composition have occurred with the introduction of non-native species. In the upper Colorado River Basin, declines in pikeminnow populations occurred primarily after the 1960s, when the following dams were constructed: Glen Canyon Dam on the mainstem Colorado River, Flaming Gorge Dam on the Green River, Navajo Dam on the San Juan River, and the Aspinall Unit dams on the Gunnison River.

The decline of pikeminnow is also related to competition or other behavioral interactions with non-native fishes. Alterations in the natural fluvial environment have exacerbated this problem (USFWS 1995b).

By the 1970s, pikeminnow were extirpated from the entire lower Colorado River Basin (downstream of Glen Canyon Dam) and from portions of the upper Colorado River Basin, as a result of major alterations to riverine environments. Having lost approximately 75% to 80% of its former range, the pikeminnow was federally listed as an endangered species in 1967 (USFWS 1967).

In 1994, critical habitat was designated within the 100-year floodplain of the Colorado pikeminnow's historical range for several sections of the Colorado River system (59 Federal Register 13374). The section relevant to actions occurring within the planning area is limited to the following critical habitat designation:

New Mexico, San Juan County; and Utah, San Juan County. The San Juan River and its 100-year floodplain from the State Route 371 Bridge in Section 17, Township 29 North, Range 13 West (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in Section 26, Township 41 South, Range 11 East (Salt Lake Meridian) up to the full pool elevation.

Life History and Limiting Factors

The pikeminnow recovery goals summarize threats to the species as follows: stream regulation, habitat modification, competition with and predation by non-native fish, and pesticides and pollutants (USFWS 2002b). The life history phases that appear to be most limiting for pikeminnow populations include spawning, egg hatching, development of larvae, and the first year of life. These phases of pikeminnow development are tied closely to specific habitat requirements.

Known spawning sites are characterized by riffles or shallow runs with well-washed coarse substrate containing relatively deep interstitial voids (for egg deposition) in association with deep pools or areas of slow non-turbulent flow used as staging areas by adults (Lamarra et al. 1985; Tyus and Karp 1990). Recent investigations at a spawning site in the San Juan River by Bliesner and Lamarra (1995) are consistent with these characteristics. The most unique feature at the sites used for spawning, in comparison with otherwise similar sites nearby, is the lack of embeddedness of the cobble substrate and the depth to which the rocks are devoid of fine sediments (Bliesner and Lamarra 1995; Lamarra et al. 1985).

Pikeminnow often migrate considerable distances to spawn in the Green and Yampa Rivers (Archer et al. 1985; Miller et al. 1982; Tyus 1985, 1990; Tyus and McAda 1984), and similar movement has been noted in the mainstem San Juan River. A fish captured and tagged in the San Juan arm of Lake Powell in April 1987 was recaptured in the San Juan River approximately 80 miles upstream in September 1987 (Platania 1990).

Ryden and Ahlm (1996) found that pikeminnow in the San Juan River aggregated at the mouth of the Mancos River prior to spawning. Miller et al. (2000) also recorded two pikeminnow in both 1993 and 1994 at the mouth of the Mancos River prior to the spawning period. Historical spawning areas for the pikeminnow in the San Juan River are unknown; however, Platania (1990) speculated that spawning likely occurred upstream at least to Rosa, New Mexico.

Tributaries are the primary area of residence to which the adults return after spawning. Tributaries to the San Juan River no longer provide habitat for adults because they are totally dewatered or access is restricted (Holden 2000). Pikeminnow utilized the Animas River in the late 1800s. The Animas could still provide suitable habitat; however, the uppermost location of the present pikeminnow population is approximately 50 miles downstream from the mouth of the Animas River (Holden 2000). Pikeminnow are known to have aggregated at the mouth of the Mancos River prior to spawning as late as the early 1990s (Miller et al. 2000; Ryden and Ahlm 1996).

Successful reproduction was documented in the San Juan River in 1987, 1988, and 1992 through 1996, by the collection of larval and fingerling pikeminnow. Platania (1990) noted that, during 3 years of studies on the San Juan River (1987–1989), spring flows and pikeminnow reproduction were highest in 1987. Recent studies also found catch rates for fingerling pikeminnow to be highest in high water years, such as 1993 (Buntjer et al. 1994; Lashmett 1994).

Due to the low numbers of pikeminnow collected in the San Juan River, it is not possible to quantify population size or trends. Estimates during a 7-year research period between 1991 and 1997 suggest that there were fewer than 50 adults in a given year (Ryden 2000).

The ability of the pikeminnow to withstand adverse impacts to its populations and its habitat is difficult to determine given the longevity of individuals and their scarcity within the San Juan River Basin. The younger life stages are considered the most vulnerable to predation, competition, toxic chemicals, and habitat degradation. It may take many years for a population of pikeminnow to recover from these types of impacts.

Surface water and groundwater quality in the Animas, La Plata, Mancos, and San Juan River drainages have become concerns in recent years (Abell 1994). Changes in water quality and contamination of associated biota are known to occur in reclamation projects in the San Juan drainage (i.e., irrigated lands on the Pine and Mancos Rivers) where return flows from irrigation make up a portion of the river flow (Sylvester et al. 1988). Increased loading of the San Juan River and its tributaries with heavy metals; elemental contaminants such as selenium, salts, polycyclic aromatic hydrocarbons; and pesticides have degraded water quality of the San Juan River in critical habitat (Abell 1994; Holden 1999; Wilson et al. 1995).

Razorback Sucker (*Xyrauchen texanus*)

Distribution

The razorback sucker was historically abundant and widely distributed within warm water reaches throughout the Colorado River Basin. It was found in the mainstem Colorado River and major tributaries in Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming, and Mexico (Ellis 1914; Minckley 1973). It was once so numerous early settlers used it for food, and as recently as 1949 commercially marketable quantities were being caught in Arizona (Bestgen 1990).

The current distribution and abundance of the razorback sucker has been significantly reduced throughout the Colorado River system. The only substantial population of razorback suckers remaining is in Lake Mohave and consists of mostly old adults (McCarthy and Minckley 1987). This population is not successfully reproducing and recruiting. Limited numbers of razorbacks do persist in other locations in the lower Colorado River, but they are considered rare or incidental and may be continuing to decline.

In the Upper Basin, above Glen Canyon Dam, razorback suckers are found in limited numbers in both lentic and lotic environments. The largest population of razorback in the Upper Basin is found in the Upper Green River and lower Yampa River (Tyus 1987). In the Colorado River, most razorback suckers

occur in the Grand Valley area near Grand Junction, but they have declined drastically since 1974 (Osmundson and Kaeding 1991). The lack of recruitment suggests a combination of biological, physical, and/or chemical factors that may be affecting the survival and recruitment of early life stages of razorback suckers. Recovery efforts include the capture and removal of razorback suckers for hatchery programs (USFWS 1990).

Reason for Concern

A marked decline in populations of razorback suckers can be attributed to construction of dams and reservoirs, introduction of non-native fishes, and removal of large quantities of water from the Colorado River system. Dams on the main stem Colorado River and its major tributaries have segmented the river system and drastically altered flows, temperatures, and channel geomorphology. Major changes in species composition have occurred due to the introduction of numerous non-native fishes, many of which thrived due to human-induced changes to the natural river system (USFWS 1995b).

Life History

A natural hydrograph with a large spring peak, gradually descending limb into early summer, and low stable flows through summer, fall, and winter are thought to create the best habitat conditions for razorback suckers. Prior to construction of large mainstem dams and the suppression of spring peak flows, low-velocity off-channel habitats were commonly available throughout the Upper Basin. The present absence of these seasonally flooded riverine habitats is believed to be a limiting factor in the successful recruitment of razorback suckers in their native environment (Osmundson and Kaeding 1991; Tyus and Karp 1989).

Springtime aggregations of razorback suckers in off-channel impoundments and tributaries are believed to be associated with reproductive activities (Tyus 1987). These off-channel habitats are warmer than the mainstem. Razorback suckers use these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle (Tyus and Karp 1990). Sexually mature razorback suckers are generally collected on the ascending limb of the hydrograph from mid-April through June and are associated with coarse gravel substrates (USFWS 1990).

Outside the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats, including low runs, shallow to deep pools, backwaters, eddies, and other relatively slow-velocity areas associated with sand substrates (Osmundson and Kaeding 1989; Tyus 1987; Tyus and Karp 1989).

Habitat requirements of young and juvenile razorback suckers in the wild are largely unknown, particularly in native riverine environments. Life stages, other than adults, have not been collected in the Upper Basin in recent times (USFWS 1995b).

Humpback Chub (*Gila cypha*)

Distribution

Humpback chub originally inhabited the mainstem Colorado River from what is now Lake Mead to the canyon areas of the Green and Yampa River Basins. It was considered less common than other endemic fish of the region, but occurred in fairly large numbers where reproducing populations existed. The greatest concentrations of humpback chub occur in the Grand Canyon portion of the Colorado and Little Colorado Rivers and Westwater/Blackrocks region of the Colorado River. Smaller populations and incidental catches are reported from the Yampa River; Desolation, Gray, and Whirlpool Canyons of the Green River; and Cataract Canyon of the Colorado River (USFWS 1995b).

Reason for Concern

Shoreline eddies associated with sand and boulders are important breeding areas. Availability of shoreline eddy habitat is greatest with spring flooding and decreases thereafter with decreasing summer flows; spring runoff forms and maintains these habitats. Loss of spring runoff could reduce availability of spawning habitat and consequently adversely affect humpback chub reproduction. Habitat alteration may

also promote hybridization. Flow reductions and decreased temperatures were implicated as factors curtailing successful spawning and increasing competition in the Colorado River (USFWS 1995b).

Life History

During spring and early summer, humpback chub are most prevalent in high-gradient, rocky-run, riffle, and rapid dominated whitewater reaches. Adult fish are most often collected in seasonally flooded shoreline eddies that are downstream of large boulders and upstream of rapids. Juveniles are more common in smaller eddies in rocky shoreline runs. Feeding habits of humpback chub are relatively unknown; however, stomachs of sampled fish contained hymenopterans and plant debris. They also feed on Mormon crickets (*Anabrus simplex*) and presumably other foods. In fall and winter, fish remain in pools and eddies of impounded water and rapids in low flow conditions (Tyus and Karp 1990).

Humpback chub generally spawn between temperatures of 16°C to 20°C but may also spawn in temperatures as low as 11.5°C and as high as 20.5°C (Kaeding and Zimmerman 1983; Valdez and Clemmer 1982). Eggs are adhesive, but little is known about preferred substrate for egg deposition. Hatchery success diminishes as temperatures vary from their optimum of 20°C. The eggs generally hatch in 5 to 7 days (Hamman 1982).

Humpback chub spawn in spring and early summer following highest spring flows. This includes May and June in low and average years, but extended to July during the high flow year 1986. Ripe fish are predominately captured in shoreline eddy habitats, and there is some indication that these fish remain in or near specific eddies for extended periods and return to the same eddy during different spawning seasons (Tyus and Karp 1990).

Larval and young of the year humpback chub are generally found in low-velocity microhabitats associated with backwaters and eddies. Fish grow from 7.5 to 10.5 centimeters during their first year of life, and by age 2 many are 200 millimeters. Males begin reaching sexual maturity at age 2 and females at age 3. Once humpback chubs reach sexual maturity growth slows considerably (USFWS 1995b).

Bonytail Chub (*Gila elegans*)

Distribution

Historically the bonytail chub occurred throughout the Colorado River mainstem and its major tributaries, including the Gila and Salt Rivers in the lower basin and the Green, Yampa, White, Gunnison, and San Juan Rivers in the upper basin. Recent collections indicate the fish is extremely rare and is extirpated from much of its former range, although individual fish are still occasionally collected from the upper and lower basins. Supplemental stocking from hatchery fish and maintaining stocks in hatcheries may be necessary to preclude this species from becoming extinct. The recovery goal for bonytail chub is to "prevent immediate extinction" (USFWS 1995b).

Reason for Concern

This species has drastically declined since 1960. Until recently, the USFWS considered the species extirpated from the upper basin; however, a recently collected specimen, which exhibits many bonytail chub characteristics, could indicate a small extant population (Kaeding et al. 1986).

Life History

A radio tracking study of adult bonytail chub movement indicated they are crepuscular and are inactive during the day and night. Spawning is believed to occur from between mid-June and early July when water temperatures are near 18°C. The optimum temperature for hatching success is 20°C to 21°C. Hatching success decreases considerably when water temperatures vary plus or minus 10°C. Hatching occurs in 4 to 7 days under optimum conditions (Hamman 1982). Little data exist on larval and juvenile bonytail chubs. Their survival and growth are presumed to be dependent on low-velocity habitats (USFWS 1995b).

Effects Determinations

The cause and effect relationships as related to actions occurring on SJNF lands within the San Juan and Dolores River Basins are identical for the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub. Therefore, a single effects analysis is provided that applies to all four species.

Direct, Indirect, and Cumulative Effects Related to Land and Resource Management Plan Implementation

The USFWS has determined that the effects of water depletions and regulated flows are the activities with the greatest potential to impact the four endangered Colorado River fishes. Consumptive water uses reduce the magnitude and duration of peak flows. This causes losses of backwater pools for spawning and rearing. It also reduces suspended sediments, which confer a competitive advantage on non-native species. These water depletions occur on federal, state, and privately owned lands primarily as a result of agricultural irrigation, municipal and domestic uses, oil and gas development, ski area operations, and reservoir evaporation.

In addition, reservoir operations have changed the natural flow and temperature regimes, reduced suspended sediments, created barriers to fish migration, and transformed thousands of miles of lotic habitats into lentic habitats. The reservoirs have also been stocked with an assortment of non-native fish species, which are now competing with the native fishes

There are a variety of federal actions occurring within the planning area that have the potential to alter the quantity, quality, or timing of water leaving the SJNF. These actions have the potential to negatively affect the four endangered fish species that reside downstream. Primary among these is the authorization of reservoirs and diversion structures, and the leasing of lands for the purpose of oil and gas development. In addition, there are numerous actions that result in minor water depletions, such as campground developments, road construction and dust abatement, construction of small stock ponds, domestic well construction, etc. Also, very small increases in water yield are predicted to be associated with timber harvest and prescribed fire treatments. Ski area management also has an influence on water availability and the timing of flows. As new ski area terrain is developed, it is likely that more snowmaking would occur, altering quantity and timing of flow leaving NFS lands. The acreage cleared of timber to accommodate new ski runs may also affect water yield and the timing of winter and spring flows.

The impacts related to water use and development projects (including diversion ditches, storage reservoirs, pipelines, and wells) on water quantity, timing, water quality, fisheries, and aquatic species are specifically described in the Water Resources and Aquatic Ecosystems and Fisheries sections of the LRMP. The primary impact to aquatic ecosystems and aquatic species would be from reduced or eliminated stream flows, and the related degradation or elimination of aquatic habitats. Additional impacts on fisheries and aquatic species may include increased stream temperatures and reduced dissolved oxygen levels. These impacts may be more pronounced during periods of natural cyclic flow reductions (during fall and winter) or during summer months in a drought. Winter base flows would also be reduced when ski area operations divert water from streams and/or utilize well water that may be connected to and influence surface flows. This may limit aquatic habitats and dependent aquatic communities.

Collectively, the aforementioned uses have dramatic effects on stream flows and aquatic habitats occupied by the four endangered Colorado River fishes. Even though they may be located on NFS lands and affect SJNF resources, many of these uses (especially large reservoir operations) are not under the discretion of the USFS. Many other uses occur on state and private lands, typically located downstream of NFS lands.

It is expected that SJNF special use authorizations (primarily existing and new water developments), recreational developments, road maintenance activities, and stock pond construction would deplete varying amounts of water from the San Juan and Dolores River Basins. Where possible, the estimated water volumes associated with these activities are discussed in Appendix J.C. Project-level assessments would add to and refine these amounts when necessary.

Water Depletions Associated with Livestock Grazing

The impacts related to livestock grazing on bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker would generally be minor because these fish species do not occur within the planning area. With the exception of associated water depleting activities, livestock grazing would not impact their habitats. The development of new stock watering features (stock ponds and springs) would result in minor water depletions to the San Juan and Dolores River Basins. It is unknown exactly how many facilities might be constructed over the life of the LRMP, but it is expected that the associated cumulative net depletion amount would be less than 5 acre-feet per year.

Water Depletions Associated with Road Maintenance and Construction

Small amounts of water would be used for road construction and reconstruction, road maintenance, and dust abatement, resulting in short-term water depletions to the San Juan and Dolores River Basins. This water would be obtained from federal and private sources and would include contracted actions (e.g., Schedule A maintenance by counties to apply magnesium chloride, etc.). It is estimated that these actions would use approximately 9 acre-feet per year from the San Juan River Basin and 6 acre-feet per year from the Dolores River Basin over a 15-year period, excluding road-related activities with gas well drilling and completion.

Other Actions

There are a variety of other actions that may be implemented during the life of the LRMP. The USFS cannot predict the type, location, or extent of these actions, as they would likely be in response to external special use proposals. As necessary, these proposed actions would undergo project-level NEPA assessments and be subject to terms and conditions connected to the LRMP components (see Appendix J.B) and may be subject to additional Section 7 ESA consultation requirements.

Determination for the Land and Resource Management Plan

Providing adequate stream flows to maintain aquatic habitats for the four endangered fish species is a primary component of the recovery efforts for the four endangered big river fishes. Ongoing and new consumptive water uses, such as those likely to be authorized and implemented under the LRMP, run counter to these efforts and would add to the overall cumulative impacts to these species. Therefore, implementation of the LRMP **may affect and is likely to adversely affect** the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub.

Direct, Indirect, and Cumulative Effects Related to Oil and Gas Leasing

Substantial quantities of water are projected to be used to drill, fracture, and complete wells for both GSGP and conventional well development. The projected water uses are described in detail in Appendix J.C. Applicable mitigation measures (LRMP components) and oil and gas leasing stipulations are described in Appendix J.B.

GSGP wells would use approximately 7.9 to 13.1 acre-feet of water per well for the entire process. This level of 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 single CBM well. Paradox conventional gas wells would use 3.3 acre-feet of water per wells to drill and complete. Total water consumption for GSGP and conventional oil well development in the Dolores and San Juan River Basins is estimated at 4,831 and 201 acre-feet, respectively (see Table 7 in Appendix J.C).

In the Northern San Juan Basin, CBM wells would be drilled on existing leases, but doubling the number of wells on each well pad. In total, 126 new federal wells are projected. Water consumption to drill, complete, and operate the wells over their 20-year economic life is estimated at 241 acre-feet. 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 (see Table 7 in Appendix J.C).

Determination for Oil and Gas Leasing

Providing adequate stream flows to maintain aquatic habitats for the four endangered fish species is a primary component of the recovery efforts for the four endangered big river fishes. Ongoing and new consumptive water uses, such as those to be implemented under the oil and gas leasing decision, run counter to these efforts and would add to the overall cumulative impacts to these species. Therefore, implementation of the LRMP **may affect and is likely to adversely affect** the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub.

2.4 Assessment of Threatened and Endangered Plant Species

Pagosa skyrocket (Ipomopsis polyantha)

Background

Pagosa skyrocket is an herbaceous biennial in the phlox family, typically from 12 to 24 inches tall. It has short, tubular white flowers that are often flecked with purple dots (Anderson 2004). The species typically blooms from mid-June to mid-July. During a pollinator study in 1992 and 1993, over 30 different insects were collected visiting Pagosa skyrocket, with bee species being the primary pollinators (Collins 1995). However, the study did not determine which species was the most important pollinator of Pagosa skyrocket (Wilken 2003). Based on the findings from this study, and the fact that Pagosa skyrocket sets far less fruit when self-pollinated than when pollinators are present, it has been concluded that pollinators and their associated habitats are essential for the long-term successful reproduction and conservation of the plant. Pagosa skyrocket is considered a ruderal species, which means it is one of the first plant species to colonize disturbed lands (USFWS 2012c).

Pagosa skyrocket was listed as endangered under the ESA, effective August 26, 2011 (USFWS 2011c). Critical habitat for Pagosa skyrocket was designated on August 13, 2012 (USFWS, 2012), and is discussed in more detail below. There is currently no recovery plan for this species.

Status and Distribution

Pagosa skyrocket is found only on Mancos Shale soils in and around the town of Pagosa Springs in Archuleta County. Population numbers fluctuate greatly from year to year, as is typical with biennial species. In 2011, it was estimated that there were 162,220 flowering plants between the two known populations. Collectively, these two populations occupy approximately 388 acres. The larger of the two populations is found on municipal and private lands in and around the town of Pagosa Springs and is estimated to contain 161,950 flowering plants on 342 acres. The second, smaller population is found on BLM, private, and Colorado Department of Transportation (CDOT) and Archuleta County ROWs near the old town site of Dyke, Colorado, approximately 13 miles to the west of the first population. In 2011, it was estimated that this population contained 270 flowering plants on 46 acres. Only 2.5% of the habitat occupied by this species is on federally managed land, with the remaining occupied habitat occurring on private and municipal lands, as well as along CDOT, Archuleta County, and private road ROWs (USFWS 2011c). This species is not known to occur on NFS lands, but is found on BLM land.

Habitat

Suitable Habitat: As would be expected from a ruderal species, Pagosa skyrocket is found only within areas with light to moderate or discontinuous disturbances. Current populations are limited to Mancos Shale soils from the Upper Cretaceous period, at elevations between 6,750 and 7,775 feet (USFWS 2011c). This includes, but is not limited to ROWs alongside U.S. Highways 84 and 160, in roadside ditches, in areas cleared for overflow parking at the local rodeo grounds, along utility corridors, and in previously heavily grazed pasture land. It is often found on barren shales where very little other vegetation grows, but can also be found within a variety of vegetation types, including montane grasslands, within and at the edges of ponderosa pine stands, and in juniper/Gambel oak plant communities (Anderson 2004; USFWS 2012c). Within these vegetation types, it is typically found in more open areas or in small, sparsely vegetated areas where plant cover is less than 5% or 10% (USFWS 2012c). Although outcrops of Mancos Shale and soils derived from Mancos Shale within the elevation

range of Pagosa skyrocket are common in Archuleta County and surrounding areas, the species is found on only a very tiny portion of this formation. Work conducted by Collins in 1995 on seed germination and pH measurements suggest that this species has very specific physiological requirements for germination and growth that might prevent its spread to other locations. However, it may also be dispersal limited, which may preclude its colonization of otherwise suitable sites (Anderson 2004). There are approximately 148,442 acres of suitable habitat for Pagosa skyrocket in Archuleta County. Approximately 27%, or 41,373 acres, occurs on the SJNF. Pagosa skyrocket has never been found on any of the suitable habitat on the SJNF. Approximately 2%, or 3,282 acres, occurs within the TRFO. Pagosa skyrocket has been found in a small portion of an isolated 42-acre parcel of BLM. The remaining suitable habitat on BLM lands in Archuleta County is unoccupied.

Critical Habitat: On August 13, 2012, the USFWS designated approximately 9,641 acres of critical habitat for Pagosa skyrocket for the purpose of conserving the species and its habitat. Four critical habitat units were designated in Archuleta County. These are, as they occur from west to east, 1) Dyke, 2) O'Neal Hill, 3) Pagosa Springs, and 4) Eight Mile Mesa. Both the Pagosa Springs unit and the Dyke unit are currently occupied by Pagosa skyrocket. The O'Neal Hill and Eight Mile Mesa units are unoccupied, but were designated as critical habitat because the USFWS felt that two populations do not offer adequate redundancy for the survival and recovery of Pagosa skyrocket (USFWS, 2012).

The Pagosa Springs unit is the largest at 6,456 acres, occurring on municipal, state, and private lands, and contains a majority of the known Pagosa skyrocket (USFWS, 2012). The Dyke unit is a total of 1,475 acres, with 42 acres on BLM lands and the remaining acreage on private lands and within CDOT and Archuleta County ROWs. This unit contains the smaller of the known populations and the only known portion of the population that occurs on federal land. The O'Neal Hill unit (564 acres) and Eight Mile Mesa unit (1,146 acres) are both entirely on NFS lands within the Pagosa Ranger District of the SJNF. Currently, Pagosa skyrocket does not occur in these two units, so they are considered unoccupied critical habitat. The O'Neal Hill unit is partially within the O'Neal Hill Special Botanical Area (SBA). All of the critical habitat units, occupied and unoccupied, contain the primary constituent elements needed to support the life-history processes of this species. The primary constituent elements described by the USFWS in the critical habitat designation include:

1. Mancos shale soils;
2. Suitable elevations and climate conditions – elevations between 6,400 to 8,100 feet, and climate conditions that provide suitable precipitation, cold, dry springs and winter snow;
3. Suitable plant communities – barren shales, open montane grassland, clearings within ponderosa pine, juniper, and/or oak communities;
4. Habitat for pollinators – a mosaic of native plant communities that can provide pollinator ground and twig nesting areas suitable for a wide range of pollinators, connectivity between areas, availability of floral resources, and a 1,000-meter area beyond occupied habitat to conserve pollinators essential for plant reproduction); and
5. Appropriate disturbance regimes – appropriate disturbance levels (light to moderate, or intermittent or discontinuous disturbance) and naturally maintained disturbances through soil erosion, or human-maintained disturbances, which can include light grazing, occasional ground clearing, and other disturbances that are not severe or continual. (USFWS 2012c)

Direct and Indirect Effects

The final rule listing Pagosa skyrocket as endangered described several threats to this species. These include 1) the direct mortality and permanent loss of habitat due to development on private, commercial, residential, municipal, and agricultural property, including impacts associated with installation of utilities and access roads; 2) the destruction of flowering plants, rosettes, and seeds from heavy livestock use; 3) inadequate regulatory mechanisms on private, commercial, residential, municipal, and agricultural property to address the primary threats to the species; and 4) other natural and human-made factors, including effects of drought and climate change, lack of proven methods for propagation and reintroduction, specific soil and germination requirements, and fragmented habitat. Activities that may occur on the SJNF within potentially suitable habitat for Pagosa skyrocket include livestock grazing, installation and/or maintenance of utility corridors, mineral and energy development, vegetation management, fire management, road use and maintenance, and management of noxious weeds.

Drought and climate change may also impact potentially suitable habitat for Pagosa skyrocket on the SJNF. The impacts of each activity would vary and are dependent on factors such as location, timing, and intensity. Specific conservation measures (standards, guidelines, and leasing stipulations) would be adopted as part of the LRMP to help eliminate, reduce, or mitigate the potential impacts from these activities. These are discussed in more detail below.

Livestock Grazing: Permitted livestock grazing occurs across much of the suitable habitat for Pagosa skyrocket on the SJNF. Livestock grazing is also permitted on portions of the O'Neal Hill critical habitat unit, which is part of a currently active allotment, and on the Eightmile Mesa critical habitat unit, which is part of a currently vacant allotment. Impacts from grazing to potentially suitable habitat could include soil disturbance from trampling and a potential increase in noxious weed due to this soil disturbance. Impacts to Pagosa skyrocket from livestock grazing would be minimized by the application of LRMP Standard 2.2.63, which requires that permitted livestock grazing in habitat occupied by federally listed plant species or in critical habitat for federally listed plant species, and be managed to prevent adverse effects to those federally listed plant species and their habitat. This standard would prevent the destruction of flowering plants, rosettes, and seeds from heavy livestock use and would prevent adverse effects to the native plant communities used by potential pollinators. Guidelines are also in place stating that long-term impacts to suitable habitat for federally listed plant species should be minimized.

Installation and Maintenance of Utility Corridors: Much of the suitable habitat for Pagosa skyrocket occurs within the public and private lands intermix, where the public need to access private land often requires the installation of new utilities and/or the maintenance of existing utilities. This typically requires ground-disturbing activities such as digging trenches to install utilities, replacement of power poles, or motorized access to aboveground utilities for maintenance. Threats to Pagosa skyrocket from these activities would be minimized by the application of LRMP Guideline 2.2.66, which states that new ground-disturbing activities should be managed to avoid habitat occupied by federally listed plant species in order to prevent the loss of habitat and prevent adverse effects to federally listed plant species. This guideline would prevent the direct mortality and permanent loss of habitat for Pagosa skyrocket. In addition, Guideline 2.2.71 would help prevent adverse impacts to habitat by avoiding or mitigating soil erosion or compaction on Mancos Shale. Changes to the primary constituent elements needed to support the life-history processes of this species, particularly those related to suitable plant communities and habitat for pollinators, would also be minimized by Guideline 2.2.71, as well as by Guideline 2.2.80, which states that persistent non-natives and invasive exotic plant species should be avoided in seed mixes.

Mineral and Energy Development: The known population of Pagosa skyrocket and the designated critical habitat for this species are not currently under lease for mineral and energy development. Only 4% of the suitable habitat for Pagosa skyrocket on SJNF lands is currently under lease. Mineral and energy development often requires ground disturbing activities which could potentially impact Pagosa skyrocket and its habitat. 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 this species, its suitable habitat, and its designated critical habitat. There is also a guideline in the LRMP that states that activities should be managed to minimize long-term impacts to the suitable habitat of federally listed plant species. These design criteria can be used to condition the approval of development on existing leases. In **new lease** areas, impacts to this species and designated critical habitat would be prevented by application of the NSO stipulation in areas occupied by federally listed plant species and within a 650-foot buffer around those lands. It also includes an NSO stipulation for SBAs. These stipulations would prevent the direct mortality of Pagosa skyrocket, prevent the permanent loss of habitat for Pagosa skyrocket, and prevent adverse effects to the native plant communities in occupied habitat used by potential pollinators.

Vegetation Management: Vegetation management (such as mechanical thinning and fuels treatments) may occur within suitable habitat for Pagosa skyrocket. Impacts to Pagosa skyrocket and its habitat are possible from these activities but would be minimized through the application of various standards and guidelines designed to 1) avoid new ground-disturbing activities in habitat occupied by federally listed plant species (Guideline 2.2.66); 2) minimize adverse effects to habitat for federally listed plant species (Guideline 2.2.67); 3) minimize impacts to Mancos Shale soil (Standard 2.2.61 and Guideline 2.2.71); 4)

provide habitat for pollinators by retaining adequate slash (Guideline 2.2.73); and 5) prevent establishment of non-native plant species by avoiding the use of non-native and invasive exotic plant species during revegetation projects (Guideline 2.2.80). These standards and guidelines would minimize impacts to both occupied and unoccupied habitat.

Management-ignited Fires: Management-ignited fires may also occur within suitable habitat for Pagosa skyrocket. The standards and guidelines listed above for vegetation management projects would also apply to management-ignited fire, and would help prevent or minimize impacts to this species and its habitat. In addition, management-ignited fires are typically conducted in the spring (March, April, or May), prior to flowering of Pagosa skyrocket, or in the fall (October and November), after flowering and seed set, which should help minimize impacts to flowering individuals that may be present. Management-ignited fires would not impact the barren shale where this species can be found, but could impact the other vegetation types that provide habitat. However, the more open areas, and small, sparsely vegetated areas in these vegetation types with less than 5% or 10% cover where Pagosa skyrocket is typically found would likely experience low fire intensity and low burn severity, thus minimizing impacts to suitable habitat and any individuals that may be present. Prior to Euro-American settlement in the 1880s, low-intensity fire was a common disturbance event in the vegetation types where Pagosa skyrocket is found. Low-intensity management-ignited fires are not severe or continual disturbance, but instead would be considered light to moderate or intermittent or discontinuous disturbance, which is one of the primary constituent elements needed to support the life-history processes of this species. Impacts to pollinators and their habitat are also possible since many fine fuels on the ground surface are consumed during burning. However, this impact would be localized and of relatively short duration. There are typically many patches of varying size that are left unburned after management-ignited fires, so many twigs and branches would still be available to pollinators. In addition, only a very small percentage of pollinator habitats within suitable Pagosa skyrocket habitat would be impacted by management-ignited fires in any given year. If fireline is needed to provide a control feature for a management-ignited fire, impacts would be minimized in both occupied and unoccupied habitat by the application of LRMP Guidelines 2.2.66 and 2.2.67. In addition, the disturbance caused by building fireline would impact only a very small fraction of suitable habitat for this species and would be considered an intermittent or discontinuous disturbance, which is appropriate to support the life-history processes of this species.

Wildfires: Impacts to suitable Pagosa skyrocket habitat from wildfires would be similar to those described for management-ignited fires, but more impacts could occur from suppression activities such as building fireline and mop-up activities. Naturally ignited fires in the public and private lands intermix and adjacent areas are usually suppressed as quickly as possible and are therefore typically less than a few acres in size, making the impacts of wildfire suppression very localized. As with management-ignited fires, the intermittent or discontinuous disturbance caused by building fireline would impact only a very small fraction of suitable habitat for this species with impacts from the construction of fireline being minimized in both occupied and unoccupied habitat by the application of LRMP Guidelines 2.2.66 and 2.2.67.

Road Use and Maintenance: Numerous roads currently exist within suitable Pagosa skyrocket habitat on the SJNF, including U.S. Highway 160, NFS roads, and permitted roads and driveways used to access private land. Impacts to suitable habitat from the maintenance of these roads are possible. In habitat occupied by Pagosa skyrocket, this impact can be mitigated using LRMP Guideline 2.2.66, which states that new ground-disturbing activities should be managed to avoid habitat occupied by federally listed plant species in order to prevent the loss of habitat and prevent adverse effects to federally listed plant species. In unoccupied habitat, impacts from periodic road maintenance would be considered intermittent or discontinuous disturbance, which is appropriate to support the life-history processes of this species. Loss of unoccupied habitat would be mitigated by the application of Guideline 2.2.67, which minimizes adverse effects to habitat for federally listed plant species by minimizing effects from ground-disturbing activities. Impacts from related activities, such as seeding roadsides to prevent erosion and weed establishment, could also impact suitable habitat. These potential impacts would be mitigated by the application of Guideline 2.2.80, which would help reduce competition with non-native species.

Noxious Weed Treatment: Noxious weeds are commonly found on roadsides and other disturbed areas that are considered suitable habitat for Pagosa skyrocket. Treatment of noxious weeds in unoccupied suitable habitat would minimize the amount of non-natives species that are present in suitable habitat, thus helping preserve native plant communities that provide habitat for potential pollinators. In habitat occupied by federally listed plant species, or in critical habitat for these species, LRMP Standard 2.2.63 requires that noxious weed treatment be managed to prevent adverse effects to those species and their habitat. Weed treatment crews would be trained to identify Pagosa skyrocket and its habitat and instructed to avoid this species during treatment activities.

Drought and Climate Change: In addition to the specific management actions discussed above, drought and climate change may also impact potentially suitable habitat for Pagosa skyrocket. Although the SJNF has no control over the intensity or timing of these events, a management emphasis on maintaining resilient plant communities and ecosystems would help mitigate potential adverse effects from drought and climate change. These include managing for productive soils and native plant communities (LRMP Desired Conditions 2.2.2, 2.2.6, 2.2.13, 2.2.15, 2.2.32, 2.2.33, 2.2.39, 2.2.40, and 2.2.41), restricting the use of non-native plant species that compete with federally listed plant species for resources and space (Guideline 2.2.80), planning for long-term seed storage of vulnerable plant species (Objective 2.2.55), and prohibiting heavy livestock grazing that could adversely impact suitable Pagosa skyrocket habitat and other native plant communities used by pollinators (Standard 2.2.63, Guidelines 2.2.66 and 2.2.67).

Critical habitat for Pagosa skyrocket was designated for the purpose of conserving this species and its habitat. As stated in Section 3 of the ESA, these areas may require special management considerations or protection. This is accomplished in the LRMP through the adoption of standards, guidelines, and leasing stipulations discussed above. The management activities that have potential to occur within the O'Neal Hill, Eightmile Mesa, and Dyke critical habitat units, including livestock grazing, road use and management, vegetation treatments, or oil and gas development, must abide by the direction found in the LRMP. The effects of these activities have been previously discussed.

In addition to the protections offered by management of critical habitat units, and the adoption of the standards, guidelines, and leasing stipulations found in the LRMP, some protections to Pagosa skyrocket are also offered through the designation of special areas and unique landscapes in MA 2. The O'Neal Hill SBA, which was designated in order to protect and preserve Pagosa bladderpod (*Lesquerella pruinos*) (a USFS Region 2 sensitive plant species) and its habitat, is one of these areas. Although this SBA was not established specifically for Pagosa skyrocket, it contains similar Mancos shale habitat and the other primary constituent elements needed to support the life-history processes of Pagosa skyrocket. The protections provided by the SBA would help maintain self-sustaining populations of Pagosa skyrocket and the native plant communities used by potential pollinators of this species.

Cumulative Effects

It is likely that past and current activities such as development, the construction and maintenance of roads and utility lines, and livestock grazing have all contributed to diminished distribution and a loss of habitat for Pagosa skyrocket across its entire global range. Approximately 70% of all suitable habitat for this species, and 98% of known populations, occur on commercial, residential, municipal, and agricultural properties on non-federal lands where there are few, if any, regulatory mechanisms available to address the primary threats to this species. Reasonably foreseeable future activities on non-federal land include continued commercial and residential expansion around Pagosa Springs, road maintenance and expansion, continued ROW maintenance, and exotic species control. Plans for development in and around Pagosa Springs affect almost the entire global range of Pagosa skyrocket and a majority of its suitable habitat.

The actions proposed on SJNF and TRFO lands under the Preferred Alternative would contribute to the past, present, and future impacts to Pagosa skyrocket described above, and thus contribute to cumulative impacts to this species. However, these impacts would be minimized by the application of standards, guidelines, leasing stipulations, and special area designations, as well as project-level mitigation.

Determination

Activities on the SJNF and TRFO authorized under the LRMP, including livestock grazing, installation and/or maintenance of utility corridors, mineral and energy development, vegetation management, fire management, road use and maintenance, and noxious weed control **may affect, but are not likely to adversely affect** Pagosa skyrocket and its suitable habitat, and **would not result in the destruction or adverse modification of designated critical habitat** for Pagosa skyrocket. The effects of these activities would be minimized through the application of the standards, guidelines, and leasing stipulations, as described under direct and indirect impacts. In addition, impacts to Pagosa skyrocket, its suitable habitat, and designated critical habitat would be analyzed on a project-specific basis and impacts minimized with the development of project specific design criteria.

Knowlton's cactus (*Pediocactus knowltonii*)

Background

Knowlton's cactus is a diminutive ball cactus measuring up to 2.2 inches tall with solitary or clustered stems and pink flowers. It has very short spines and flowers in late April to early May (USFWS 2010). The most common pollinators seen on the flowers are small native bees, but pollination for Knowlton's cactus has not been specifically studied and very little is actually known about pollination of this species (USFWS 2013f).

Knowlton's cactus was listed as endangered under the ESA on October 29, 1979 (USFWS 1985). In 1985, the Knowlton Cactus Recovery Plan was completed by the USFWS. The two main goals of the 1985 recovery plan were to protect populations from present and future human threats, and ensure the maintenance of vigorous self-sustaining population in the species natural habitat (USFWS 1985). The 5-year review completed in 2010 recommended that the recovery plan be revised to incorporate new information on biology, ecology, management recommendations, and objectives, and that measurable recovery criteria for down and delisting of the species be developed, which address all listing factors relevant to the species. To date, the recovery plan has not been revised (USFWS 2010). No critical habitat for this species has been designated.

Status and Distribution

Knowlton's cactus is currently known from a single natural population of approximately 6,100 plants within a 25-acre preserve owned by TNC in northern San Juan County, New Mexico. A few cacti (approximately 55) also occur on adjoining BLM land within approximately 33 feet of the TNC boundary. In 1986, 1987, and 1995, numerous Knowlton's cactus were transplanted to a nearby site owned by the Bureau of Reclamation in an attempt to establish a new population. Only two new plants were recruited into this population from 1987 to 2006, with rodent or rabbit predation killing most of the transplanted cacti.

By 2007, with mortality consistently exceeding recruitment, only a few individuals remained, and the attempt was deemed a failure. In 1991, another transplant was attempted on BLM land within the Reese Canyon Area of Critical Environmental Concern. By 2008, only three new plants had been recruited into this population, and the remaining transplanted cacti were being seriously impacted by rodent or rabbit predation. As of 2008, only 48 of the originally transplanted cacti remained alive, making the long-term persistence at this transplant site unlikely (USFWS 2010).

Knowlton's cactus is not known to occur in Colorado, although inaccurate reports of the species occurring in Colorado are still common in federal, state, and conservation organization literature and websites (Glennie 2013; USFWS 2010). However, the known population of Knowlton's cactus is within 30 meters of the Colorado border (USFWS 2010), and there is suitable habitat for the species on both private and federal lands in La Plata and Archuleta Counties in southern Colorado (Glennie 2013), including lands managed by the SJNF.

At the time of its listing in 1985, there were an estimated 7,000 plants in the natural population (USFWS 1985). Population surveys begun in 1992 showed that the population increased through the late 1980s and early 1990s to a peak of approximately 14,000 individuals in 1994 (USFWS 2010). Since 1994,

however, the population has been gradually but steadily declining. Mortality in this population has consistently exceeded recruitment, with relatively few new seedlings becoming established since 1994. Both drought and predation by rodents seem to be contributing factors in this trend. The most recent population estimates from 2008 estimated that 6,100 cacti were present on the site (Sivinski 2008; USFWS 2010).

Habitat

The current known population of Knowlton's cactus is found on varying aspects between 6,200 to 6,300 feet in elevation, on alluvial deposits with pea to cobble-sized gravel overlying the San Jose Formation. These rolling, gravelly hills are dominated by a pinyon-juniper-sagebrush vegetation community.

Although not known to occur in Colorado, an analysis of best available geology, soils, and vegetation information shows that there is potentially suitable habitat present in both La Plata and Archuleta Counties in southern Colorado (Glennie 2013). Surveys for this species and field reconnaissance of some of the areas considered most likely to contain suitable habitat for this species were done by the USFS on May 9 and 17, 1995. This included Ignacio Creek, Skull Canyon, Goose Creek, Turkey Creek, Spring Creek, and Salt Canyon. No Knowlton's cactus was found during these surveys, and it was determined that these areas did not contain suitable habitat based on the lack of pinyon-juniper-sagebrush communities in these areas and the lack of cobbly riverine alluvial soils (Dickerson 1995). Surveys of potentially suitable habitat have also been done on nearby lands managed by the Bureau of Indian Affairs, but the species has never been found (Friedley 2013).

Direct and Indirect Effects

The 5-year review of Knowlton's cactus listed several potential threats to Knowlton's cactus, including continued oil and gas exploration, illegal collection by cactus enthusiasts, predation by rabbits or rodents, and continued and worsening drought conditions due to changes in climate. Management activities that may occur on the SJNF under the Preferred Alternative within potentially suitable habitat for Knowlton's cactus include livestock grazing, minerals and energy development, and vegetation management. The impacts of each activity would vary and are dependent on factors such as location, timing, and intensity. Specific conservation measures (standards, guidelines, and leasing stipulations) would be adopted as part of the LRMP to help eliminate, reduce, or mitigate the potential impacts from these activities. These are discussed in more detail below.

Livestock Grazing: Permitted livestock grazing occurs within portions of the potentially suitable habitat for Knowlton's cactus on the SJNF. Impacts from grazing to potentially suitable habitat could include soil disturbance from trampling and a potential increase in noxious weed due to this soil disturbance. Impacts to Knowlton's cactus and its habitat from permitted livestock grazing would be minimized by the application of Standard 2.2.66, which requires that permitted livestock grazing in habitat occupied by federally listed plant species, or in critical habitat for federally listed plant species, and be managed to prevent adverse effects to those federally listed plant species and their habitat. Guidelines are also in place stating that long-term impacts to suitable habitat for federally listed plant species should be minimized.

Mineral and Energy Development: Approximately 38% of the area considered suitable habitat for Knowlton's cactus is currently under lease for potential mineral and energy development. Mineral and energy development often requires ground-disturbing activities that could potentially impact Knowlton's cactus and its habitat. 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 this species and its suitable habitat. There is also a guideline in the LRMP that states that activities should be managed to minimize long-term impacts to the suitable habitat of federally listed plant species. These design criteria can be used to condition the approval of development on existing leases. In **new lease** areas, impacts to this species would be prevented by application of the NSO stipulation in areas occupied by federally listed plant species, and within a 650-foot buffer around those lands. The NSO stipulation for federally listed species would be applied under each alternative. These stipulations

would prevent both the direct mortality of Knowlton's cactus and the permanent loss of habitat for the species.

Vegetation Management: Vegetation management (such as mechanical thinning and fuels treatments) may occur within potentially suitable habitat for Knowlton's cactus. Impacts to Knowlton's cactus and its habitat are possible from these activities but would be minimized through the application of various standards and guidelines designed to minimize new ground-disturbing activities in habitat occupied by federally listed plant species (Guideline 2.2.66) and prevent establishment of non-native plant species by avoiding the use of non-native and invasive exotic plant species during revegetation projects (Guideline 2.2.80). These standards and guidelines would minimize impacts to potentially suitable habitat for Knowlton's cactus.

Cumulative Effects

Past and present activities that have impacted Knowlton's cactus include continued oil and gas exploration, illegal collection by cactus enthusiasts, predation by rabbits or rodents, and continued and worsening drought conditions due to changes in climate. Past and current activities on the SJNF and TRFO that could impact Knowlton's cactus include livestock grazing, vegetation management projects, and oil and gas leasing. The actions proposed on SJNF and TRFO lands under the Preferred Alternative could contribute to the past, present, and future impacts to Knowlton's cactus described above, and thus contribute to cumulative impacts to this species. However, these impacts would be minimized by the application of standards, guidelines, and leasing stipulations, as well as project-level mitigation.

Determination

Actions associated with the Preferred Alternative **may affect, but are not likely to adversely affect** Knowlton's cactus and its suitable habitat. The application of the standards, guidelines, and special leasing stipulations described above should minimize adverse effects to Knowlton's cactus and its potential habitat on the SJNF. In addition, this species would continue to receive consideration during project-level planning for activities proposed in or near potential Knowlton's cactus habitat, which would include measures designed to avoid impacts to this species and its habitat as necessary.

CHAPTER 3 – REFERENCES

- Abell, R. 1994. San Juan River Basin water quality contaminants review. Volume 1. Unpublished report prepared by the Museum of Southwestern Biology, University of New Mexico for the San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque.
- Aubry, K.B., K.S. McKelvey, and J.P. Copeland. 2007. Distribution and broadscale habitat relations of the wolverine in the contiguous United States. *Journal of Wildlife Management* 71:2147–2158.
- Alexander, K., and A.G. Keck. 2011. Uncompahgre fritillary butterfly monitoring, inventory, and mapping: 2010 report and status. Unpublished Report, Western State College, Gunnison, Colorado.
- Anderson, D. 2004. *Ipomopsis polyantha* (Rydberg) V. Grant (Pagosa Ipomopsis): A Technical Conservation Assessment. Report produced for the U.S. Department of Agriculture, Forest Service, Rocky Mountain Region, Species Conservation Project, Lakewood, Colorado.
- Archer, D.L., L.R. Kaeding, B.D. Burdick, and C.W. McAda. 1985. *A Study of the Endangered Fishes of the Upper Colorado River*. Final Report-Cooperative Agreement, 14-16-006-82-959. U.S. Department of the Interior, Fish and Wildlife Service, Grand Junction, Colorado.
- Barrowclough, G.F., and R.J. Gutiérrez. 1990. Genetic variation and differentiation in the spotted owl (*Strix occidentalis*). *Auk* 107:737–744.
- Behnke, R.J. 1992. Greenback cutthroat trout. In *Native Trout of Western North America*, pp. 146–148. American Fisheries Society Monograph 6, Bethesda, Maryland: American Fisheries Society.
- Bliesner, R., and V. Lamarra. 1995. *San Juan River Habitat Studies - 1994 Annual Report*. Logan, Utah: Keller Bliesner Engineering and Ecosystems Research Institute.
- Buntjer, M.J., T. Chart, and L. Lentsch. 1994. *Early Life History Fishery Survey of the San Juan River, New Mexico and Utah*. Salt Lake City: Utah Division of Wildlife Resources.
- Colorado River Cutthroat Trout Conservation Team. 2006. *Conservation Strategy for Colorado River Cutthroat Trout (Oncorhynchus clarki pleuriticus) in the States of Colorado, Utah, and Wyoming*. Fort Collins, Colorado: Colorado Division of Wildlife.
- Colorado Division of Wildlife. 2009. Wildlife research report, July 2008 – August 2009. Post-release monitoring of Lynx reintroduced to Colorado. Colorado Division of Wildlife, Denver, CO.
- Collins, Christine 1995. *The Natural History and Reproductive Biology of the Pagosa Gilia, Ipomopsis polyantha* (Rydberg) V. Grant var. *polyantha* (Polemoniaceae). M.S. Thesis. California State University, Fullerton, CA
- Dickerson, Jimmy. 1995. *Survey Report for Knowlton's Cactus. On file: Pagosa Ranger District, San Juan National Forest*.
- Ellingson, A.R. 1998. *Uncompahgre Fritillary Butterfly Monitoring and Inventory: 1997 Field Report and Status*. Report prepared for U.S. Forest Service, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service.
- . 2001. *Uncompahgre Fritillary Butterfly Monitoring and Inventory: 2000 Field Report and Status*. Report prepared for U.S. Forest Service, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service.
- . 2003. *Uncompahgre Fritillary Butterfly Monitoring and Inventory: 2002 Field Report and Status*. Report prepared for U.S. Forest Service, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service.

- Ellis, N.M. 1914. *Fishes of Colorado*. University of Colorado Studies Vol.11(1).
- Finch, D. M., and S. H. Stoleson, eds., 2000. *Status, Ecology, and Conservation of the Southwestern Willow Flycatcher*. General Technical Report RMRS-GTR-60. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Franklin, A.B., D.R. Anderson, R.J. Gutiérrez, and K.P. Burnham. 2000. Climate, habitat quality, and fitness in northern spotted owl populations in northwestern California. *Ecological Monographs* 70:539–590.
- Friedley, Jim. 2013. Personnel communications regarding Knowlton's cactus surveys conducted by the Bureau of Indian Affairs.
- Funk, W.C., E.D. Forsman, T.D. Mullins, and S.M. Haig. 2008. Introgression and dispersal among spotted owl (*Strix occidentalis*) subspecies. *Evolutionary Applications* 1:161–171.
- Ganey, J.L., and R.P. Balda. 1994. Habitat selection by Mexican spotted owls in northern Arizona. *Auk* 111:162–169.
- Glennie, Gina. 2013. Personnel communications regarding Knowlton's cactus.
- Grinnell, J., and A.H. Miller. 1944. The distribution of the birds of fornia. *Pacific Coast Avifauna* 27.
- Hamman, R.L. 1982. Spawning and culture of Humpback chub. *Progressive Fish-Culturist* 44:213–216.
- Holden, P.B., editor. 1999. *Flow Recommendations for the San Juan River*. San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service. Albuquerque, New Mexico.
- Holden, P.B., editor. 2000. *Program evaluation report for the 7-year research period (1991-1997)*. San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
- Hunter, M.L., G.J. Jacobson Jr., and T. Webb III. 1988. Paleoecology and the coarse-filter approach to maintaining biological diversity. *Conservation Biology* 2:375–385.
- Kaeding, L.R., B.D. Burdick, P.A. Schrader, and W.R. Noonan. 1986. Recent capture of a bonytail (*Gila elegans*) and observations on this nearly extinct cyprinid from the Colorado River. *Copeia* 1986:1021–1023.
- Kaeding, L.R., and M.A. Zimmerman. 1983. Life history and ecology of the humpback chub in the Little Colorado and Colorado rivers of the Grand Canyon. *Transactions of the American Fisheries Society* 112:557–594.
- Kyle, S.C., and W.M. Block. 2000. Effects of wildfire severity on small mammals in northern Arizona ponderosa pine forests. In *Fire and Forest Ecology: Innovative Silviculture and Vegetation Management*, edited by W.K. Moser and C.F. Moser, pp. 163–168. Tall Timbers Fire Ecology Conference Proceedings 21. Tallahassee, Florida: Tall Timbers Research Station.
- Lamarra, V., M. Lamarra, and J. Carter. 1985. Ecological investigations of a suspected spawning site of Colorado squawfish on the Yampa River, Utah. *Western North American Naturalist* 45:127–140.
- Lashmett, K. 1994. *Fishery Survey of the Lower San Juan River and the Upper Arm of Lake Powell* (RM 4.0-[]0.8) 1993 B Annual Report. Durango, Colorado: Bureau of Reclamation.
- Marshall, R.M., and S.H. Stoleson. 2000. Threats in Status, Ecology, and Conservation of the Southwestern Willow Flycatcher. Edited by D.M. Finch and S.H. Stoleson. U.S. Forest Service General Technical Report RMRS-GTR-60. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

- McCarthy, C.W., and W.L. Minckley. 1987. Age estimation for razorback sucker from Lake Mohave, Arizona and Nevada. *Journal Arizona-Nevada Academy of Science* 21:87–97.
- McKelvey, K.S., Y.K. Ortega, G. Koehler, K. Aubry, and D. Britnell. 2000. Canada lynx habitat and topographic use patterns in north central Washington: a reanalysis. Chapter 10. In *Ecology and Conservation of Lynx in the United States*, L.F. Ruggiero, K.B. Aubry, S.W. Buskirk. Boulder: University Press of Colorado.
- Metcalfe, J.L., S.L. Lovell, C.M. Kennedy, K.B. Rogers, D. McDonald, J. Epp, K. Keepers, A. Cooper, J.J. Austin, and A.P. Martin. 2012. Historical stocking data and 19th century DNA reveal human-induced changes to native diversity and distribution of cutthroat trout. *Molecular Ecology* (2012).
- Miller, W.J., J.A. Ptacek, Miller Ecological Consultants, U.S. Fish and Wildlife Service, and San Juan River Basin Recovery Implementation Program. 2000. *Colorado Pikeminnow Habitat Use in the San Juan River, New Mexico and Utah: Final Report*. Albuquerque, New Mexico: U.S. Fish and Wildlife Service, San Juan River Basin Recovery Implementation Program.
- Miller, W.H., D.L. Archer, H.M. Tyus, and R.M. McNatt. 1982. Yampa River Fishes Study. Final Report. Salt Lake City: U.S. Fish and Wildlife Service.
- Minckley, W.L. 1973. *Fishes of Arizona*. Arizona Game and Fish Department, Phoenix, AZ.
- Nature Conservancy (TNC). 1982. *Natural Heritage Program Operations Manual*. Arlington, Virginia: The Nature Conservancy.
- Noss, R.F. 1987. From plant communities to landscapes to conservation inventories: a look at the Nature Conservancy, USA. *Biological Conservation* 41:11–37.
- Noss, R.F., and A.Y. Cooperrider. 1994. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Washington D.C.: Island Press.
- Osmundson, D.B., and L.R. Kaeding. 1989. *Studies of Colorado squawfish and razorback sucker use of the 15-mile reach of the upper Colorado River as part of conservation measures for the Green Mountain and Ruedi Reservoir water sales*. Final report to U.S. Bureau of Reclamation. U.S. Fish and Wildlife Service, Grand Junction, Colorado.
- Osmundson, D.B., and L.R. Kaeding, 1991. Flow Recommendations for Maintenance and Enhancement of Rare Fish Habitat in the 15-mile Reach during October-June. Final Report. Grand Junction, Colorado: U.S. Fish and Wildlife Service.
- Platania, S.P. 1990. Biological summary of the 1987 to 1989 New Mexico-Utah ichthyofaunal study of the San Juan River. Unpublished report to the New Mexico Department of Game and Fish, Santa Fe, New Mexico.
- Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada Lynx Conservation Assessment and Strategy. Forest Service Publication #R1-00-53. Missoula, Montana: U.S. Department of Agriculture, Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and National Park Service.
- Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires, eds. 2000a. *Ecology and Conservation of Lynx in the United States*. Boulder, Colorado: University Press of Colorado.
- . 2000b. The scientific basis for lynx conservation: qualified insights. In *Ecology and Conservation of Lynx in the United States*, edited by L.F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires, pp. 443–454. Boulder, Colorado: University Press of Colorado.

- Ryden, D.W., and L.A. Ahlm. 1996. Observations on the distribution and movement of Colorado Squawfish, *Ptychocheilus Lucius*, in the San Juan River, New Mexico, Colorado, and Utah. *The Southwestern Naturalist* 41(2):161–168.
- Ryden, D.W. 2000. *Adult fish community monitoring on the San Juan River, 1991-1997*. San Juan River Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
- Schultz, C., A. Garcia, and J. Redders. 2006. *Developing a Lynx Habitat Conservation Model, Assumptions, Criteria, and Components*. Durango, Colorado: San Juan National Forest.
- Sedgwick, J.A. 2001. Geographic variation in the song of Willow Flycatchers: differentiation between *Empidonax traillii adastus* and *E. t. extimus*. *Auk* 118:366–379.
- Seethaler, K.H. 1978. Life History and Ecology of the Colorado Squawfish (*Ptychocheilus lucius*) in the Upper Colorado River Biological Assessments. M.S. Thesis, Utah State University, Logan, Utah.
- Sivinski, R. 2008. Referenced in: USFWS, 2010. *Knowlton's Cactus (Pediocactus knowltonii) 5-Year Review: Summary and Evaluation*. U. S. Fish and Wildlife Service, Albuquerque, New Mexico.
- Sylvester, M.A., J.P. Deason, H.R. Feltz, and R.A. Engberg. 1988. *Preliminary Results of Department of Interior Drainage Studies*.
- Tennant, D.L. 1972. A method for determining instream flow requirements for fish, wildlife and aquatic environment. In *Proceedings of the Instream Flow Requirement Workshop*. Portland, Oregon: Pacific Northwest River Basins Commission.
- Tibbitts, T.J., M.K. Sogge, and S.J. Sferra. 1994. *A Survey Protocol for the Southwestern Willow Flycatcher (Empidonax traillii extimus)*. U.S. Department of the Interior, National Park Service. Technical Report NPS/NAUCPRS/NRTR-94/04. Flagstaff, Arizona: Colorado Plateau Research Station, Northern Arizona University.
- Tyus, H.M. 1985. *Homing behavior noted for Colorado Squawfish*. *Copeia* 1985:213-215.
- Tyus, H.M. 1987. Distribution, reproduction, and habitat use of the razorback sucker in the Green River, Utah, 1979-1986. *Transaction of the American Fisheries Society* 116:111–116.
- Tyus, H.M., and C.W. McAda. 1984. Migration, movements and habitat preferences of Colorado squawfish *Ptychocheilus lucius*, in the Green, White and Yampa rivers, Colorado and Utah. *Southwest Naturalist* 29:289–299.
- Tyus, H.M., and C.A. Karp. 1990. Spawning and movements of razorback sucker in the Green River Basin of Colorado and Utah. *Southwest Naturalist* 35(4):427–433.
- . 1989. *Habitat Use and Streamflow Need of Rare and Endangered Fishes, Yampa River, Colorado*. U.S. Fish and Wildlife Service, Biology Report 89(14).
- Tyus, H.M., R.A. Valdez, and B.D. Williams. 1986. Status of endangered fishes in the Upper Colorado River, 1985. *Proceedings Bonneville Chapter American Fisheries Society* 1986:20–30.
- Unitt, P. 1987. *Empidonax traillii extimus*: An endangered subspecies. *Western Birds* 18(3):137–162.
- USDA Forest Service and U.S. Fish and Wildlife Service (USFS and USFWS). 2006. Canada Lynx Conservation Agreement. USFS Agreement #00-MU-11015600-013. Missoula, MT. Unpublished. 13 pp.

- U.S. Fish and Wildlife Service (USFWS). 1967. Endangered Species List. Available at:
http://www.fws.gov/southwest/es/arizona/Documents/Federal%20Registers/FR_List3_67.pdf
Accessed on August 14,2003.
- . 1985. *Knowlton's Cactus Recovery Plan*. Albuquerque, New Mexico: U.S. Fish and Wildlife Service.
- . 1987. *Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin*. Lakewood, Colorado: U.S. Fish and Wildlife Service.
- . 1990. *Policy and Guidelines for Planning and Coordinating Recovery of Endangered and Threatened Species*. Washington, D.C: U.S. Fish and Wildlife Service.
- . 1993. *Final Biological Opinion for Small Water Depletions on Seven National Forests in Colorado and One in Wyoming*. Lakewood, Colorado: U.S. Fish and Wildlife Service.
- . 1994. *Uncompahgre Fritillary Butterfly Recovery Plan*. Denver: U.S. Fish and Wildlife Service.
- . 1995a. Endangered and threatened wildlife and plants; Determination of critical habitat for the Mexican spotted owl; final rule. *Federal Register*, Vol. 60, no. 108, June 6, 1995. pp. 29913–29951.
- . 1995b. *San Juan River Basin Recovery Implementation Program*. Albuquerque, New Mexico: U.S. Fish and Wildlife Service, Region 2.
- . 1996. *Final Biological Opinion for Water Depletions Associated with Routine Forest Actions Occurring within the Upper San Juan River Basin*. Lakewood, Colorado: U.S. Fish and Wildlife Service.
- . 2002a. *Southwestern Willow Flycatcher Recovery Plan*. Albuquerque, New Mexico: U.S. Fish and Wildlife Service.
- . 2002b. *Razorback Sucker (Xyrauchen texanus) Recovery Goals: Amendment and Supplement to the Razorback Sucker Recovery Plan*. Denver: U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.
- . 2003. Letter dated April 11, 2003 giving notice of the Final Recovery Plan for Southwestern Willow Flycatcher. Grand Junction, Colorado: U.S. Fish and Wildlife Service, Ecological Services, Grand Junction Field Office.
- . 2004. Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*): Proposed Rule. *Federal Register* Volume 69, No. 196, 60706.
- . 2005. Recovery plan outline: contiguous United States distinct population segment of the Canada lynx. Unpublished. Helena, Montana: U.S. Fish and Wildlife Service Montana Field Office.
- . 2005a. Canada lynx conservation agreement. USFS Agreement #00-MU-11015600-013. Missoula, MT. Unpublished. 9 pp.
- . 2008. *Supplement Biological Opinion for the Southern Rockies Lynx Amendment*. Denver: U.S. Fish and Wildlife Service, Region 6.
- . 2010. *Knowlton's Cactus (Pediocactus knowltonii) 5-Year Review: Summary and Evaluation*. Albuquerque, New Mexico: U.S. Fish and Wildlife Service.
- . 2011a. *Biological Opinion for the Management and Control of Noxious Plants on the San Juan and Rio Grande National Forests*. Grand Junction, Colorado: U.S. Fish and Wildlife Service, Ecological Services.

-
- . 2011b. Letter dated July 12, 2011 describing changes to southwestern willow flycatcher survey protocol requirements for projects occurring in Colorado. Grand Junction, Colorado: U.S. Fish and Wildlife Service, Ecological Services.
- . 2011c. *Federal Register* Vol. 76, No. 144. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Ipomopsis polyantha* (Pagosa Skyrocket) and Threatened Status for *Penstemon debilis* (Parachute Beardtongue) and *Phacelia submutica* (DeBeque Phacelia). July 27, 2011.
- . 2012a. Unit Species List of Federal Threatened, Endangered, and Candidate Species for the San Juan National Forest, December 21, 2012. Email from U.S. Fish and Wildlife Service, Grand Junction, Colorado. On file at the San Juan National Forest Supervisor's Office, Durango, Colorado.
- . 2012a. Section 7 Consultation Procedures for the Southwestern Willow Flycatcher on the San Juan National Forest. Grand Junction, Colorado: U.S. Fish and Wildlife Service, Ecological Services.
- . 2012b. Southwest Region. Mexican Spotted Owl Recovery Plan, First Revision (*Strix occidentalis lucida*). Albuquerque, New Mexico: U.S. Fish and Wildlife Service.
- . 2012c. *Federal Register* Vol. 77, No. 156. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Ipomopsis polyantha* (Pagosa skyrocket), *Penstemon debilis* (Parachute beardtongue), and *Phacelia submutica* (DeBeque phacelia). August 13, 2012.
- . 2013a. Endangered and Threatened Wildlife and Plants: Threatened Status for the Distinct Population Segment of the North American Wolverine Occurring in the Contiguous United States. *Federal Register*/Vol. 78, No. 23, February 4, 2013. Pages 7864–7890.
- . 2013b. Endangered and Threatened Wildlife and Plants: Establishment of a Nonessential Experimental Population of the North American Wolverine in Colorado, Wyoming, and New Mexico. *Federal Register*/Vol. 78, No. 23, February 4, 2013. Pages 7890–7905.
- . 2013c. Endangered and Threatened Wildlife and Plants: Endangered Status for Gunnison Sage-Grouse. *Federal Register*/Vol. 78, No. 8, January 11, 2013. Pages 2486–2538.
- . 2013d. Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for Gunnison Sage-Grouse. *Federal Register*/Vol. 78, No. 8, January 11, 2013. Pages 2540–2570.
- . 2013e. News Release: Service Identifies Important Habitat Recovery of Southwestern Willow Flycatcher. Arizona Ecological Services, Phoenix, Arizona.
- U.S. Forest Service. 1991a. Forest and rangeland birds of the United States, natural history and habitat use. *Agriculture Handbook* 688.
- . 1993. *Programmatic Biological Assessment for Minor Water Depletions Associated with Routine Forest Decisions in the Upper Colorado River Basin*. Glenwood Springs, Colorado: U.S. Department of Agriculture, Forest Service.
- . 1996. *San Juan National Forest Programmatic Biological Assessment for Water Depletions Associated with Routine Forest Actions Occurring Within the Upper San Juan River Basin*. Durango, Colorado: U.S. Department of Agriculture, Forest Service.
- . 2005a. *Aquatic, Riparian, and Wetland Ecosystem Assessment San Juan National Forest*. U.S. Forest Service, Rocky Mountain Region.
- . 2005b. Southwestern Willow Flycatcher Species Assessment for the San Juan National Forest. Unpublished Report. Durango, Colorado: San Juan National Forest.

- . 2006. FSH 2509.25. Region 2 Watershed Conservation Practices Handbook (Region 2 Supplement).
- . 2008. *Supplemental Biological Assessment for the Southern Rockies Lynx Amendment*. Lakewood, Colorado: U.S. Department of Agriculture, Forest Service, Region 2.
- . 2011. *Biological Assessment for the Management and Control of Noxious Plants on the San Juan and Rio Grande National Forests*. Durango, Colorado: San Juan National Forest.
- . 2012. Letter to USFWS from the San Juan National Forest requesting concurrence on Southwestern willow flycatcher habitat management procedures. Durango, Colorado: San Juan National Forest Supervisor's Office.
- U.S. Forest Service and U.S. Fish and Wildlife Service (USFS and USFWS). 2005. Canada lynx conservation agreement.
- U.S. Forest Service and U.S. Fish and Wildlife Service (USFS and USFWS). 2006. Occupied mapped lynx habitat amendment to the Canada lynx Conservation Agreement. Missoula, MT. Unpublished. 5 pp.
- Valdez, R.A., and G.H. Clemmer. 1982. Life history and prospects for recovery of the humpback and bonytail chub. In *Fishes of the Upper Colorado River Systems, Present and Future*, edited by W.H. Miller, H.M. Tyus, and C.A. Carlson. Bethesda, Maryland: Western Division, American Fisheries Society.
- Wilken, D. 2003. Referenced in: Anderson, D. 2004. *Ipomopsis polyantha* (Rydberg) V. Grant (*Pagosa ipomopsis*): A Technical Conservation Assessment. Report produced for the U.S. Department of Agriculture, Forest Service, Rocky Mountain Region, Species Conservation Project, Lakewood, Colorado.
- Wilson, R.M., J.D. Lusk, S. Bristol., B. Waddell, and C. Wiens. 1995. Environmental Contaminants in Biota from the San Juan River and Selected Tributaries in Colorado, New Mexico, and Utah. U.S. Fish and Wildlife Service, Regions 2 and 6.

APPENDIX J.A – LRMP SECTION 2.1- SPECIES CONSERVATION

2.1 Ecological Framework and the Conservation of Species

The following strategies, concepts, and components are used in this LRMP to establish an ecological framework for the conservation and management of ecosystems, habitats, and species. These are overarching strategies that have relevance to a wide range of program areas and agency actions occurring on TRFO and SJNF lands. They are especially important to the four program areas of terrestrial ecosystems and plant species, terrestrial wildlife, riparian and wetland ecosystems, and aquatic ecosystems (Sections 2.2–2.5).

Sustainable Ecosystem Strategy

Ecosystems are communities of living organisms interacting with each other and with their physical environment (Kaufmann et al. 1994). They are dynamic systems that change in response to succession, climate, and the effects of disturbances, including those caused by fire, insects, disease, drought, wind, and humans. Humans are an integral part of ecosystems and depend on them for their short- and long-term well-being. In order to meet the social and economic needs of future generations, ecosystems are to be managed for sustainability. To ensure the long-term sustainability of ecosystems, humans must manage within the physical and biological capabilities of the land, maintain all of the ecological components and processes, and not irreversibly alter ecosystem integrity and resilience. The concept of sustainability is a fundamental component of the LRMP and is guided by the Multiple-Use Sustained-Yield Act (MUSY) and the FLPMA. The MUSY directs that federal lands are managed in a manner that provide a framework of social, economic, and ecological conditions that sustain native ecosystems, support a diversity of native plant and animal species, and provide a continuous flow of goods and services to the nation. The FLPMA directs that public lands be managed based on multiple use and sustained yield, as well as the protection of other values including, but not limited to, scenic, historical, ecological, environmental, air and atmospheric, and water resource values.

The MUSY identifies three interrelated and interdependent elements of sustainability for the USFS: social, economic, and ecological. Social and economic sustainability is associated with the provision of goods and services from the TRFO and SJNF to people and communities over the long term. Sustainability takes into account the social and economic conditions of the planning area, including recreational opportunities, multiple uses that contribute to local and regional economies, and cultural resources. Ecological sustainability is intended to provide the ecological conditions that maintain or restore the diversity of native ecosystems and natural disturbance processes. This in turn will maintain suitable habitats for a wide range of plant and animal species and provide for the diversity and viability of plant and animal species, populations, and communities. When applied effectively, the sustainable ecosystems strategy will result in ecological conditions similar to those under which native species evolved. Achieving these conditions offers some assurance against further losses of biodiversity (Seymore and Hunter 1999). Managing for ecological sustainability is intended to ensure that ecosystems of the TRFO and SJNF continue to maintain the ecological conditions necessary to provide goods and services needed by people and communities, now and in the future. This strategy is also consistent with the management of public lands as prescribed under the FLPMA.

The sustainable ecosystems strategy of the TRFO and SJNF includes 1) protected area designation and preservation (a coarse-filter approach), 2) ecosystem management using sustainable ecosystem concepts, 3) the development and application of plan components (desired conditions, objectives, standards, and guidelines) that provide a framework for the management and preservation of ecosystems, and 4) monitoring the effects of management activities on the TRFO and SJNF and the application of adaptive management principles. Effective monitoring and evaluation of how management activities are affecting ecosystems and species, and the correct application of adaptive management principles, will be critical to maintaining functional, sustainable ecosystems and addressing the needs of dependent species. Refer to Chapter 4 for a description of the SJNF and TRFO monitoring components.

Disturbances and the Historical Range of Variability

Major disturbances, including those caused by fire, insects, disease, drought, wind, floods, and humans, can have a profound effect toward shaping the composition, structure, and function of ecosystems at multiple scales and in creating a heterogeneous pattern of vegetation communities and habitats across the planning area. Disturbances vary in magnitude, size, and frequency, some of which humans have little control over. Multiple disturbances can interact in complex ways and often act in concert, which can predispose ecosystems to more intense effects. Many of these disturbances have significant long-term effects on terrestrial, riparian area and wetland, and aquatic ecosystems. It is not a question of whether disturbances will happen, but when, where, and at what scale they will happen. Disturbances can have a major influence (adverse or beneficial) on the agencies' ability to achieve the desired conditions and objectives of the LRMP.

The Historical Range of Variability (HRV) of ecosystems is determined by major disturbances and also less dramatic changes occurring over a long period of time. HRV is an important concept used in the LRMP to guide the management of ecosystems and to achieve ecosystem sustainability. HRV provides a tool used to gain a better understanding of complex ecological systems. It can be used to establish an ecological baseline, allowing managers to identify trends, assess the need for ecological restoration, and evaluate the consequences of management activities (Kaufmann et al. 1994; Kulakowski and Veblen 2006; Landres et al. 1999; Moore et al. 1999; Swetnam et al. 1999; Veblen and Donnegan 2005). HRV describes a dynamic set of boundaries within which most native biota have persisted through time and across space (Landres et al. 1999; Swetnam et al. 1999).

Using a reference period of indigenous settlement that occurred from the 1500s to the late 1800s, HRV first describes the range of ecological conditions that occurred on TRFO and SJNF lands under more "natural" disturbance regimes. Conditions occurring during this period represent those that existed prior to European-American settlement, which introduced sweeping ecological changes due to activities such as large-scale timber harvest, livestock grazing, fire suppression, dams, consumptive water uses, and roads.

The HRV is then used to evaluate the current ecological conditions of ecosystems on TRFO and SJNF lands by comparing them to the ecological conditions that occurred during the reference period. The HRV concept assumes that as ecological conditions depart from the range of historic conditions (primarily due to human actions), the risk of species loss increases (Duffy et al. 1999). Since native species evolved under HRV conditions, maintaining a full range of similar conditions will offer some assurance against the loss of biodiversity (Seymore and Hunter 1999). As reflected in the desired conditions, objectives, and standards and guidelines that follow, the intent is to use HRV to better describe and understand ecosystems within TRFO and SJNF lands and to help develop attainable LRMP components that are intended to protect and sustain ecosystems and species, while meeting a variety of public needs where possible. The intent is not to mandate that HRV conditions be achieved in all cases.

Protected Areas

Protected areas are key components of the sustainable ecosystems strategy. Protected areas are lands especially dedicated to the protection and maintenance of biological diversity (International Union for Conservation of Nature 1994). They are large, mostly unaltered, undeveloped, and roadless lands that contain terrestrial, riparian area and wetland, and aquatic ecosystems at multiple scales. They serve as conservation reserves and refuges to protect the native biodiversity within them (Norton 1999; Noss 1991). They also provide wildlife movement corridors and landscape linkage areas that connect habitats and landscapes, which in turn facilitate the interaction of species.

Management objectives for protected areas on TRFO and SJNF lands include:

- Preserving habitats, ecosystems, and species in as undisturbed a state as possible;
- Conserving the area's biodiversity through protection, not through active management;
- Ensuring the integrity of its ecosystems; and
- Maintaining established ecological processes.

Establishing and preserving protected areas is a means to maintain ecosystem diversity, which presumably will protect the diversity and viability of native plant and animal species and communities, and the ecological processes occurring within those ecosystems. The maximum level of biodiversity will be preserved if the maximum diversity of habitats is represented in protected area networks (Noss and Peters 1995; Scott et al. 1993). The establishment and preservation of protected areas is analogous to the Nature Conservancy's (TNC) coarse-filter conservation approach, which is well-documented in the literature and has broad support in the scientific community (Hunter et al. 1988; Noss 1987; TNC 1982). Protected areas, which make up about 48% of public lands within the planning area, include wilderness areas, the Piedra Area, WSAs, research natural areas (RNAs), and CRAs (see Figure 2.1.1).

Unaltered, unroaded, high-elevation terrestrial, riparian, and wetland ecosystems are very well represented in protected areas on both SJNF and TRFO lands. These include alpine areas, spruce-fir forests, aspen forests, Thurber fescue mountain grasslands, riparian forests and shrublands, fens, and herbaceous riparian areas and wetlands. Unaltered, unroaded, mid-elevation ecosystems are also well represented in SJNF and TRFO protected areas. These include cool-moist mixed conifer forests, warm-dry mixed conifer forests, ponderosa pine forests, pinyon-juniper woodlands, mountain shrublands, Arizona fescue mountain grasslands, deciduous riparian forests and shrublands, and herbaceous riparian areas and wetlands. Unaltered, unroaded, low-elevation ecosystems are less common and not as well represented in protected areas in the planning area. These include sagebrush shrublands, semi-desert shrublands and grasslands, deciduous riparian forests, and hanging gardens. For aquatic ecosystems, both lotic (running water) and lentic (standing water) ecosystems are well represented throughout the network of protected areas in the planning area. However, these waters are almost exclusively cold water systems. Warm water systems are not well represented within the SJNF and TRFO protected areas.

Ecosystem Management

Ecosystem management is an important integrating component of the sustainable ecosystems strategy. Ecosystem management uses an ecological approach to blend the social, economic, and ecological needs and values to assure productive, sustainable ecosystems, perpetuate natural disturbance regimes, and allow human uses that do not result in long-term ecological degradation (Kaufmann et al. 1994; Noss and Cooperrider 1994). Outside the designated protected areas described above, a wide range of public uses and management activities occur on TRFO and SJNF lands. For these lands, the application of sustainable ecosystem management principles is critical to maintaining ecosystems, providing for biological diversity, and maintaining populations of fish, wildlife, and plant populations. Ecosystem management on SJNF and TRFO lands, which uses the HRV for reference, will 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. Ecological assessments specific to the SJNF and TRFO are used to describe current ecological conditions in and adjacent to the planning area (Romme et al. 2009; USFS 2005a). The ecosystem management approach will be implemented at multiple scales using terrestrial, riparian area and wetland, and aquatic ecosystems as the primary analysis units. The approach is intended to protect and maintain these ecosystems and ensure the diversity and population viability of the majority of species within them.

Species Management Strategy

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, will be given special management considerations, including the development of LRMP components that contribute to the conservation of those species. This species conservation approach is analogous to TNC's fine-filter approach that protects species with known conservation concerns (Hunter et al. 1988; Noss 1987; TNC 1982). The species conservation approach may be needed for species at risk of extinction, species that are highly vulnerable to disturbances, species whose habitat includes rare ecological components (rare soil types or geologic types) that occur at a very small scale, and species with unique hydrologic conditions. This approach may also be needed

for special status species whose key habitat components are directly affected by agency management activities.

Special Status Species and Management Indicator Species

Special status species on TRFO and SJNF lands include federally listed species, species proposed for federal listing, candidate species for federal listing, Region 2 Regional Forester's sensitive species, and Colorado BLM State Director's sensitive species. Some of these species have immediate needs that may not be adequately recognized and addressed by the overall sustainable ecosystems strategy. As such, they are given special consideration, and additional LRMP components have been developed to address those special needs. In addition, current species-specific conservation plans and strategies are relied upon to address the needs of special status species. These plans and strategies are discussed within the applicable resource sections below and are analogous to TNC's fine-filter approach. LRMP components specific to special status species augment those components developed through the ecosystem management approach. A list of special status species can be found in Volume III, Appendix P.

USFS Management Indicator Species (MIS) serve several related functions in LRMP development and implementation. MIS are typically selected due to their responsiveness to land management activities and represent groups of species with similar needs. With these applications in mind, MIS are used to develop LRMP objectives for fish and wildlife populations and their habitats, analyze the degree to which LRMP alternatives meet those objectives, and ultimately monitor the effectiveness of LRMP implementation. Changes in MIS populations, or their habitats, may indicate how management has affected the composition, structure, or function of habitats and ecosystems, and help determine the need for change. The planning requirement to identify and address MIS is applicable only to NFS lands (36 CFR 219) and is not required by BLM planning regulations. The BLM does not identify MIS but instead monitors and reports on sensitive species populations as directed in BLM Manual 6840 (BLM 2008).

Species considered for inclusion as MIS on SJNF lands were developed using the following five categories:

- Endangered and threatened plant and animal species identified on state and federal lists;
- Species commonly hunted, fished, or trapped;
- Non-game species of special interest;
- Species with special habitat needs that may be influenced significantly by planned management programs; and
- Additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on water quality.

Biological Diversity and Population Viability

The maintenance of biological diversity and population viability on SJNF and TRFO lands are addressed directly or inferred under a variety of laws, regulations, and policies specific to each agency. These include the NFMA, the MUSY, the FLPMA, and the Endangered Species Act of 1973 (ESA). Some of the supporting federal regulations, departmental regulations, and departmental manual direction include 36 CFR 219.19, Forest Service Manual (FSM) 2620, FSM 2622.01, and U.S. Department of Agriculture (USDA) Departmental Regulation 9500-4.

For lands managed by the USFS, 36 CFR 219.19 specifically 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," and "[f]or planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure [sic] its continued existence is well distributed in the planning area." Regulation 36 CFR 219.26 requires that "[f]orest planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process." In addition, the FLPMA specifies that special uses granted by the Secretary of Agriculture or the Secretary of the Interior are subject to terms and conditions that "minimize damage to fish and wildlife habitat and otherwise protect the environment." Agency actions should avoid or minimize impacts to

species whose viability has been identified as a concern. USFS actions must not result in loss of population viability or create significant trends toward federal listing (FSM 2670.32).

BLM Colorado's Standards for Public Land Health (BLM Manual H-4180-1) describe the resource conditions and acceptable management practices for BLM lands. Standards of land health are expressions of levels of physical and biological condition or degree of function required for healthy lands and sustainable uses, and define minimum resource conditions that must be achieved and maintained. Standards are applied on a landscape scale and relate to the potential of the landscape. Standard 2 requires that riparian habitat associated with perennial streams functions properly, provides habitat, provides biodiversity, and meets water quality standards. Standard 3 specifies that wildlife and fish communities are maintained at viable population levels commensurate with habitat potential. Standard 4 requires that special status species and their habitats are maintained and enhanced.

In addition, the BLM's Special Status Species Management Manual requires that methods and procedures be identified in land use plans that ultimately bring sensitive species and their habitats to a condition in which management under sensitive species policies is no longer necessary (BLM Manual Section 6840.2B).

The SJNF and TRFO sustainable ecosystems and species management strategies combine to provide a foundation for addressing the legal, regulatory, and policy requirements described above. The underlying assumption is that implementing a management strategy that maintains sustainable ecosystems, along with a species strategy that addresses the specific needs of selected species, will provide for species diversity and long-term population viability, in as much as species diversity and population viability can be tied to the management of local federal lands. These two strategies are implemented through the LRMP components, which provide a framework for the management and protection of ecosystems, populations, and individual species occurring on SJNF and TRFO lands.

For each of the aforementioned ecosystem categories (riparian area and wetland ecosystems, aquatic ecosystems, and terrestrial ecosystems), specific management direction has been developed that is intended to address the legal, regulatory, and policy requirements for species diversity and population viability described above. The process applied was 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 have been developed 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 typically addressed through the application of guidelines.

APPENDIX J.B – APPLICABLE LRMP MANAGEMENT DIRECTION (DESIRED CONDITIONS, MANAGEMENT OBJECTIVES, STANDARDS, GUIDELINES, AND LEASE STIPULATIONS)

Desired Conditions

- 2.2.1 The composition, structure, and function of terrestrial ecosystems are influenced by natural ecological processes, including disturbance events such as fire, infestations by insects or disease, winds, and flooding.
- 2.2.2 Non-climate ecosystem stresses (e.g., high road densities, water depletions, air and water pollution) are reduced to improve the resilience and resistance of ecosystems to the future dynamics of a changing climate.
- 2.2.3 Key ecosystems that are not functioning properly are realigned/restored/renovated to survive the near-future dynamics of changing climate.
- 2.2.4 Future biodiversity, especially for endangered, rare, or dwindling species, is protected in the face of a changing climate by safeguarding habitats, preserving genetic diversity, and cooperating with seed banking efforts that provide secure, long-term storage of plant genetic resources.
- 2.2.5 Terrestrial ecosystems have a diverse composition of desirable native plants that are vigorous and self-perpetuating. Invasive plant species are absent or rare.
- 2.2.6 All development stages of the forested terrestrial ecosystems are well represented at the landscape scale and occur within the ranges identified in Tables 2.2.1 and 2.2.2.
- 2.2.7 Old growth ponderosa pine, old growth pinyon-juniper and old growth warm-dry mixed conifer forests are more abundant, occupy more acreage, and are well distributed on SJNF and TRFO lands.
- 2.2.8 Aspen forests display larger patches of the young-development stage.
- 2.2.9 Terrestrial ecosystems, including habitat for special status plant species, are productive, sustainable, and resilient, and provide goods and services over the long-term.
- 2.2.10 Forested terrestrial ecosystems display a Fire Regime Condition Class of 1.
- 2.2.11 Canyon escarpments, and the terrestrial ecosystems that occur on them, serve as refugia for native biota. These escarpments are associated with the following canyons: Lower Dolores River, Wild Steer, Coyote Wash Spring, McIntyre, Summit, Big Glade, Lake, Doe, Narraguinnep, Cabin, Ferris, Salter, Spruce Water, and Lost. They also include the Mesa Verde Escarpment.
- 2.2.15 Forested terrestrial ecosystems have stand structures and tree species composition that offer resistance and resilience to changes in climate, including extreme weather events, or epidemic insect and disease outbreaks.
- 2.2.16 Non-forested terrestrial ecosystems have community structure and species composition that offer resistance and resilience to changes in climate, including extreme weather events, or epidemic insect and disease outbreaks
- 2.2.17 Local seeds of desirable native plant species are available for revegetation and restoration efforts.

- 2.2.18 Suitable habitats for species vulnerable to climate change exist and serve as seed sources for revegetation and restoration efforts.
- 2.2.19 The SJNF and TRFO forested ecosystems provide net positive carbon storage.
- 2.2.20 Five-needle pine species (southwestern white pine [*Pinus strobiformus*], limber pine [*P. flexilis*], and bristlecone pine [*P. aristata*]) are maintained as a component of forested ecosystems.
- 2.2.21 High-elevation stands dominated by aspen (*Populus tremuloides*) will be maintained or increased over time to ensure the persistence of aspen on the landscape in light of declining aspen health and loss of aspen in lower elevations associated with a warmer and drier climate.
- 2.2.22 Ponderosa pine, warm-dry mixed conifer, and cool-moist mixed conifer forest stands that are in the old growth development stage and that have not been previously harvested are managed for their old growth values through active or passive management.
- 2.2.23 **Ponderosa Pine Forests** - Ponderosa pine forests display variable density and structure. Most stands reflect uneven-age structure comprising variable-sized, even-aged clumps of trees. Clumps vary in size, ranging from as few as three trees to as many as 20 or more trees. Tree clumps vary in density from widely spaced large trees to tightly spaced small trees. Collectively, these forests contain multiple canopy layers. Between or surrounding these clumps are shrub- and/or grass/forb-dominated openings. Ponderosa pine seedlings and saplings are present, as are large old, yellow-barked ponderosa pine trees. The presence of other tree species—e.g., Douglas-fir, white fir, blue spruce (*Picea pungens*), or Rocky Mountain juniper (*Juniperus scopulorum*)—is infrequent to rare. The abundance and distribution of Gambel oak (*Quercus gambelii*) and other native shrubs in the understory of these forests is variable and includes small and large patches of all size classes. Native grasses and forbs (including bunchgrasses, Arizona fescue, muttongrass [*Poa fendleriana*], and mountain muhly [*Muhlenbergia montana*]) are present and well distributed in most ponderosa pine forests. Forest litter is common, though highly variable in depth and extent due to fire. Invasive plant species are absent or rare. Presence of snags or large wood (on the ground) is also highly variable due to fire. Low-intensity, high-frequency surface fires are common in most ponderosa pine forests (with frequencies ranging from about 12 to 30 years).
- 2.2.24 **Warm-Dry Mixed Conifer Forests** - Warm-dry mixed conifer forests display variable density and structure, similar to ponderosa pine forests, with added complexity in species composition. Most stands reflect uneven-age structure composed of variable-sized, even-aged clumps of trees. Some have open canopies with widely spaced trees, especially on warmer aspects; some are dense with more closed canopies (e.g., on cooler aspects). Composition is dominated by ponderosa pine. Douglas-fir is a typical minor component. Trees range from young to old. White fir, blue spruce, or limber pine may be present, but infrequent. Shrub- and/or grass/forb-dominated openings are common. The abundance and distribution of Gambel oak and other native shrubs in the understory of these forests is variable, and includes small and large patches of all size classes. Native grasses and forb (including tall bunchgrasses) are common and well distributed in most warm-dry mixed-conifer forests. Invasive plant species are absent or rare. Forest litter is common, though variable in depth and extent due to fire. Presence of snags or large wood (on the ground) is also variable due to fire. Low-intensity, surface fires occur in most warm-dry mixed conifer forests (with frequencies ranging from about 18 to 28 years). Tree species composition is closely tied to fire frequency, with Douglas-fir and white fir (or blue spruce) increasing during longer fire-free periods, and ponderosa pine increasing during shorter fire-free periods.
- 2.2.25 **Cool-Moist Mixed Conifer Forests** - Cool-moist mixed conifer forests display variable stand structures and species composition. Most are dense with closed canopies and multiple canopy layers. Tree species composition includes an abundance of Douglas-fir trees (ranging from young to old); other species include white or subalpine fir (*Abies lasiocarpa*), blue or Engelmann spruce (*Picea engelmannii*), aspen, or limber pine. Patches of cool-moist mixed conifer forest, ranging

from small to large, are distributed across the landscape. The canopy cover of shrubs in the understory of these forests is highly variable. Native grasses and forbs are common and well distributed in most cool-moist mixed conifer forests. Forest litter is common and well distributed. Invasive plant species are absent or rare. Snags and large wood (on the ground) are abundant in late successional stages. Mixed-severity fires occur in most cool-moist mixed conifer forests (with frequencies of about 144 years). All development stages of these forests are well represented.

- 2.2.26 **Spruce-Fir Forests** - Spruce-fir forests display variable stand structures and species composition. Engelmann spruce is generally dominant; subalpine (or corkbark) fir makes up a lesser, but common, component. Bristlecone pine (*Pinus longaeva*), limber pine, aspen, white fir, or Douglas-fir are infrequent to rare and usually found on warmer, drier aspects. Most spruce-fir forests are dense with closed canopies and multiple canopy layers. Patches of spruce-fir forest, ranging from small to large, are distributed across the landscape. The canopy cover of shrubs in the understory of these forests is highly variable. High-elevation spruce-fir forest can have bristlecone pine, but is rare. Native grasses and forbs are common and well distributed in most spruce-fir forests. Forest litter is common and well distributed. Invasive plant species are absent or rare. Snags and large wood (on the ground) are abundant in most development stages. High-intensity, stand-replacement fires can occur in most spruce-fir forests (with frequencies longer than 200 years); most fires are of limited scale and variable intensity. All development stages of these forests are well-represented.
- 2.2.27 **Aspen Forests** - Aspen forests display simple to variable stand structures—generally simple where conifer is rare or absent or variable where conifer comprise a substantial portion (up to 49% of the canopy cover). Patches of aspen, ranging from small to large, are distributed across the landscape. Aspen is infrequent to rare in the lowest- and highest-elevation forests (ponderosa pine and spruce-fir, respectively), and common throughout mixed conifer forests. The canopy cover of shrubs in the understory of these forests is highly variable. Native grasses and forbs are abundant and well distributed in most aspen and aspen-conifer forests. Forest litter is common and well distributed. Invasive plant species are absent or rare. Snags and large wood (on the ground) are abundant in late successional stages. Fire frequency in aspen stands is about 140 years. All development stages of these forests are well-represented.
- 2.2.28 **Pinyon-Juniper Woodlands** - Pinyon-juniper woodlands display variable stand structures. Some have open structures with widely spaced trees; others are dense with high canopy covers. Most stands are uneven aged. Tree species composition varies in pinyon pine (*Pinus edulis*) and/or juniper (*Juniperus* sp.) abundance, ranging from young to old. The canopy cover and size of Gambel oak, sagebrush (*Atriplex* sp.), and other shrubs in the understory of these forests is variable. Native grasses and forbs are present and well distributed. Biological soil crusts and litter are common and well distributed on most sites. Invasive plant species are absent or rare. High-intensity, stand-replacement fires occur in most pinyon-juniper woodlands (with frequencies of 100 to 123 years).
- 2.2.29 **Mountain Shrublands** - Mountain shrublands display variable stand structures. Most are dense with high canopy cover; others are open with widely spaced shrubs. Gambel oak and other deciduous native shrubs (including mountain mahogany [*Cercocarpus montanus*], serviceberry [*Amelanchier* sp.], chokecherry [*Prunus virginiana*], fendlerbush [*Fendlera rupicola*], and squaw apple [*Peraphyllum ramosissimum*]) are abundant and well distributed. Native grasses and forbs are abundant and well distributed. Invasive plant species are absent or rare. Litter is common and well distributed. High-intensity, replacement fires occur in most mountain shrublands.
- 2.2.30 **Sagebrush Shrublands** - Sagebrush shrublands display variable stand structures. Some are open with widely spaced shrubs; others are dense. Some large patches are present. Sagebrush and other native shrubs are abundant and well distributed. Native perennial grasses (including Indian ricegrass [*Oryzopsis hymenoides*], galleta [*Pleuraphis* sp.], western wheatgrass [*Pascopyrum smithii*], and needle and thread [*Hesperostipa comata*]) are abundant and well distributed. Encroachment of pinyon and juniper trees is absent or rare. Invasive plant species

are absent or rare. Biological soil crusts are common and well distributed on many sites. High-intensity, replacement fires occur in most sagebrush shrublands.

- 2.2.31 **Semi-Desert Shrublands** - Semi-desert shrublands are dominated by native shrubs that could include shadscale saltbush (*Atriplex confertifolia*), winterfat (*Krascheninnikovia lanata*), fourwing saltbush (*Atriplex canescens*), plains pricklypear (*Opuntia polyacantha*), rubber rabbitbrush (*Ericameria nauseosa*), spiny hopsage (*Grayia spinosa*), greasewood (*Sarcobatus* sp.), and/or basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*). Stand structures display open or moderately dense shrubs with native perennial grasses and forbs in the openings between them. Native grasses (including Indian ricegrass, galleta, western wheatgrass, and needle and thread) are abundant and well distributed. Invasive plant species and/or undesirable native plant species that are currently abundant on most sites are absent or rare. Biological soil crusts and litter are common on most sites.
- 2.2.32 **Semi-Desert Grasslands** - Semi-desert grasslands are dominated by native perennial bunchgrasses (including Indian ricegrass, galleta, and needle and thread). Invasive plant species and/or undesirable native plant species that are currently abundant on most sites are absent or rare. Biological soil crusts and litter are common on most sites.
- 2.2.33 **Mountain Grasslands** - Mountain grasslands display moderate to high canopy cover of desirable native grasses and forbs (including Arizona fescue at mid elevations and Thurber fescue at higher elevations). Invasive plant species and undesirable native plant species that are currently abundant on many sites are absent or rare. Litter is common and well distributed.
- 2.2.34 **Alpine** - Alpine terrestrial ecosystems sustain their ecosystem diversity. They display a diverse composition of desirable native plant species and vegetation communities (including fellfield and turf types). Invasive plant species are absent or rare.
- 2.2.35 Soil productivity is maintained at site potential or is trending towards site potential.
- 2.2.36 Long-term levels of soil organic matter and soil nutrients (including soil carbon) are maintained at sustainable levels.
- 2.2.37 Ground cover (vegetation and litter) is adequate to protect soils and prevent erosion.
- 2.2.38 Management-induced soil erosion, soil compaction, soil displacement, puddling, and/or severely burned soils are rare on terrestrial ecosystems of the SJNF.
- 2.2.39 Upland soils exhibit infiltration and permeability rates that minimize surface runoff and allow for the accumulation of the soil moisture necessary for plant growth and ecosystem function.
- 2.2.40 Biological soil crusts are maintained or increased in pinyon-juniper woodlands, sagebrush shrublands, semi-desert shrublands, and semi-desert grasslands.
- 2.2.41 Fens, wetlands, and hanging gardens have the water sources and hydrologic systems necessary to support and sustain the special status plant species associated with them.
- 2.2.42 Shale and gypsum soils have the characteristics necessary to support and sustain the special status plant species associated with them.
- 2.2.43 Soils that provide habitat for all special status plant species maintain the soil conditions necessary to support and sustain those species.
- 2.2.44 Areas that are identified as critical habitat or proposed critical habitat for federally listed plant species have the characteristics necessary to provide for the growth and reproduction of the federally listed plant species for which they were designated.

Objectives

- 2.2.58 Over the life of the LRMP, collect seed from 20 local vulnerable grass, forb, and shrub species, including some alpine species, for long-term storage to protect genetic sources (10 species on the SJNF and 10 species on TRFO lands).

Standards

- 2.2.66 Projects or activities in habitat occupied by federally listed plant species, or in designated critical habitat, must be designed and conducted in a manner that preserves the primary constituent elements needed to sustain the life history processes of those federally listed plant species.
- 2.2.67 Projects or activities occurring in fens, wetlands, or hanging gardens that are occupied by special status plant species must be designed to maintain the hydrologic systems necessary to support and sustain those species.
- 2.2.68 Projects or activities that occur in shale and gypsum soils that are occupied by special status plant species must be designed to maintain the soil characteristics necessary to support and sustain those species.

Guidelines

- 2.2.69 Agency actions should not adversely affect the long-term soil productivity or carbon storage of terrestrial ecosystems.
- 2.2.71 Projects or activities occurring in suitable habitat for federally listed plant species should be managed to minimize long-term impacts to the suitable habitat.
- 2.2.75 Ground-disturbing projects on shale soils of the Mancos Shale, Lewis, Fruitland, and Morrison geologic formations, and other highly erosive soils, should be designed to include efforts that avoid or mitigate soil erosion or compaction (see Volume III, Appendix I).
- 2.2.77 Adequate slash (including tree tops and limbs), if deemed necessary for soil protection or nutrient cycling, should be left on-site following timber harvest and mechanical fuels treatments, and distributed as needed.
- 2.2.80 Ground disturbance should be limited or otherwise mitigated on gypsum soils and organic soils (histosols) in order to protect the ecological integrity of these rare and unique soils and the rare plants associated with these soils.
- 2.2.84 Certified, weed-free native seed mixes of local ecotypes should be used to revegetate terrestrial ecosystems where commercially available. Non-native, non-invasive plant material may be used in limited situations where considered necessary in order to protect resources and/or stabilize soils in a timely fashion. Persistent non-natives or invasive exotic plant species should be avoided.

LRMP 2.3 Terrestrial Wildlife

Desired Conditions

- 2.3.1 *Wildlife populations are viable on SJNF lands. Wildlife populations are self-sustaining, connected, and genetically diverse across SJNF and TRFO lands.*
- 2.3.2 *Big game severe winter range, winter concentration areas, and production areas are capable of supporting populations that meet state population objectives. These areas provide sustainable forage and habitat in areas with acceptable levels of human disturbance which do not reduce habitat effectiveness.*

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- 2.3.3 *Invasive exotic wildlife species and diseases do not become established within the planning area. Existing invasive exotic wildlife species and diseases do not spread.*
- 2.3.4 *Habitat components (e.g., snags and downed logs) are maintained. Unique habitat types (e.g., springs, seeps, willow carrs, caves, and cliffs) support associated flora and fauna (with abundance and distribution commensurate with the capability of the land).*
- 2.3.5 *Large predator species contribute to ecological diversity and ecosystem functioning.*
- 2.3.6 *Projects and activities occurring on USFS and BLM lands near state and federal highways are designed to provide for long-term connectivity and integrity of habitats to facilitate effective wildlife movement.*
- 2.3.7 *Snag and downed wood features occur in quantities that support self-sustaining populations of associated species.*
- 2.3.8 *Effective raptor nesting habitat occurs throughout the planning area with abundance and distribution commensurate with the capability of the land to sustain populations.*
- 2.3.9 *Ecosystems and habitat conditions for terrestrial wildlife species sensitive to human disturbance are maintained.*
- 2.3.11 *Habitat continuity and travel corridors exist and persist to facilitate species movement and establishment into newly suitable areas as a result of changing habitats.*
- 2.3.12 *Populations are conserved by maintaining or improving habitat availability and quality through the incorporation of conservation strategies and species' habitat needs during project development and implementation.*
- 2.3.13 *Riparian and aquatic habitat, including springs and fens, support well-distributed populations of invertebrate and vertebrate riparian and aquatic dependent wildlife special status species.*
- 2.3.14 *Disturbances from management activities occur at levels that support critical life functions and sustain key habitat characteristics for wildlife special status species.*
- 2.3.15 *Areas identified as critical habitat or proposed critical habitat for special status wildlife species have the characteristics to support sustainable populations, promoting recovery of the species.*
- 2.3.16 *The alpine and subalpine willow (*Salix* sp.) dominated riparian areas, providing crucial winter habitat for white-tailed ptarmigan (*Lagopus leucura*) and snowshoe hare (*Lepus americanus*), do not bioaccumulate heavy metals above historically occurring background levels which enter the food chain. Areas of contamination do not become limiting factors for wildlife population sustainability.*
- 2.3.17 *Management actions maintain or improve habitat conditions for special status species, contributing to the stability and/or recovery of these species.*
- 2.3.18 *Special status species are able to disperse within the planning area and into adjacent lands. This will allow for the interchange between populations and the maintenance of genetic diversity.*
- 2.3.19 *MIS are able to disperse freely across the planning area allowing for the interchange between populations and the maintenance of genetic diversity (SJNF only).*

Objectives

- 2.3.27 **Nokomis fritillary butterfly:** Over the life of the Plan, restore the hydrologic conditions and plant communities during project implementation at springs or seeps capable of supporting Nokomis fritillary while, at the same time, retaining the water development for livestock or other

uses.

- 2.3.28 **Bats:** Over the life of the LRMP, all mine closures for human safety at sites supporting bat populations include structures (such as bat gates) designed to provide for continued use as bat habitat.
- 2.3.30 **Invasives and disease:** Over the life of the plan, coordinate with CPW to prevent introductions or spread of fish or terrestrial wildlife species, as needed, where there is potential for negative impacts on Wildlife Special Status Species.

Standards

- 2.3.35 Standards for the Golden eagle, Bald eagle, and Peregrine falcon are listed in Table 2.3.2.
- 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 hibernaculum - 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 the risk for 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.
- 2.3.43 **Butterflies:** Management actions that could adversely impact reproductive habitat for occupied BLM and FS special status butterfly species must be designed to sustain host plant species.
- 2.3.44 **Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*):** New noise sources resulting from management activities must not contribute to noise levels that negatively impact sharp-tailed grouse leks during the active lek season (March 1 to June 30) based on best available science
- 2.3.45 **Gunnison Sage-grouse:** Management activities must not occur from March 1 to June 30 within occupied habitat suitable for nesting to allow for breeding and December 1 to March 15 for known winter habitat.
- 2.3.46 **Gunnison Sage-grouse:** New structural improvements or surface disturbance must not occur within known winter concentration area or within a 0.6-mile radius of known Gunnison sage-

grouse leks.

2.3.47 **Gunnison Sage-grouse:** In occupied habitat fuels treatments must be designed and implemented with an emphasis on protecting and enhancing existing sagebrush ecosystems

2.3.48 **Gunnison Sage-grouse:** Invasive vegetation must be monitored and controlled post-treatment.

Guidelines

2.3.49 Guidelines for the Golden eagle, Bald eagle, Osprey, Peregrine falcon, Northern Goshawk, Burrowing Owl and all other accipiter, Buteo, Falcon, Harrier, and Owls are listed in Table 2.3.2.

2.3.50 In order to determine site occupation, pre-implementation surveys may be required for projects occurring in habitats that may support populations of Sensitive Species and Species listed or proposed under the Endangered Species Act, as determined by an agency biologist.

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 of 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 for 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 or install mine safety closures.

2.3.55 **Migratory birds:** Projects or activities should consider and undertake proactive bird conservation actions as practicable particularly during breeding season, to maintain or improve habitat needs over the long-term for species identified by each agency as priority for conservation action.

2.3.56 The drainage of acid-mine run-off through alpine and sub-alpine willow-dominated riparian areas that provide crucial winter habitat for white-tailed ptarmigan and snowshoe hare should be avoided in order to prevent physiological impacts from the effects of bioaccumulation of heavy metals.

2.3.57 **Pollinators:** Pollinators should be considered during the application of pesticides to prevent population level impacts and maintain pollinator function in the ecosystem.

2.3.58 New structural improvements, reconstruction and operations should be designed to provide for wildlife movement to sustain populations.

2.3.59 *Projects or activities that adversely impact pronghorn (*Antilocapra americana*) and elk production areas should be limited or avoided. This will keep reproductive success from being negatively impacted from management activities by using access restrictions during the following periods:*

- Pronghorn: May 1–July 1
- Elk: May 15–June 30

- 2.3.60 Management activities and access should be limited or avoided in critical winter range, severe winter range, and winter concentration areas for pronghorn, elk, and mule deer during the following times to keep survival and reproduction from being negatively impacted (see Figures 2.3.1, 2.3.2, and 2.3.5):
- Pronghorn: Dec 1 – April 30
 - Elk: Dec 1 – April 30
 - Mule deer: Dec 1 – April 30
- 2.3.61 Severe and critical big game winter range and winter concentration areas: In Animas City Mountain and Grandview Ridge, conditions-based winter wildlife closures should be implemented in order to protect critical and severe winter range and winter concentrations areas for elk and mule deer. This includes Animas and Grandview recreation areas. These closures may be implemented at any time between December 1 and April 30. The closures should be based on existing snow conditions and/or the level of wildlife use for the given area. The specific conditions that will trigger a closure or that will allow the BLM to open the Cortez or Durango Special Recreation Management Areas (SRMA) will be based on snow conditions of 16 inches. Parameters for re-opening will be based on 1) general assessment of the north facing slope, such as absence of snow; 2) weather/snow condition in the general surrounding area; 3) presence of big game at higher elevations; and 4) coordination with CPW.
- 2.3.62 **Ungulates:** Projects or activities in big game critical winter range, winter concentration areas, severe winter range, production areas and important migration corridors should be designed and conducted in a manner which preserves and does not reduce habitat effectiveness within those mapped areas.
- 2.3.63 **Ungulates:** In order to provide for healthy ungulate populations capable of meeting State population objectives, anthropomorphic activity and improvements across the planning area should be designed to maintain and continue to provide effective habitat components that support critical life functions. This includes components of size and quality on the landscape providing connectivity to seasonal habitats (wildlife travel corridors), production areas, critical winter range, severe winter range and winter concentration areas, along with other habitat components necessary to support herd viability.
- 2.3.64 **Bighorn sheep:** Projects or activities that adversely impact bighorn sheep production areas by reducing habitat effectiveness should be limited or avoided, using access restrictions during the following periods (see Figure 2.3.3 of the LRMP):
- Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*): April 15–June 30
 - **Desert bighorn sheep (*O.c. nelsoni*): February 1–May 1**
- 2.3.65 **Bighorn sheep:** Projects or activities that adversely impact bighorn sheep severe winter range and winter concentration areas by reducing habitat effectiveness should be limited or avoided using access restrictions during the following periods:
- Rocky Mountain bighorn sheep: November 1–April 15
 - Desert bighorn sheep: December 1–April 15
- 2.3.66 **Wildlife corridors:** Public ownership of important wildlife movement corridors should be maintained. Priority areas are those adjacent to public highways or where public lands are identified as a key component in maintaining the integrity of seasonal movements by wildlife in an otherwise restricted landscape.
- 2.3.67 **Columbian sharp-tailed grouse:** Surveys for new/unknown Columbian sharp-tailed grouse leks within occupied.
- 2.3.68 **Columbian sharp-tailed grouse:** Management activities that adversely impact critical life functions should not occur from March 15 to July 30 within a 1.25-mile radius of mapped occupied Columbian sharp-tailed grouse leks to allow for breeding and December 1 to March 15

for known winter habitat to provide for effective winter habitat to support populations on the landscape.

- 2.3.69 **Columbian sharp-tailed grouse:** No new structural improvements or surface disturbance should occur within known winter habitat or within a 0.4-mile radius of known Columbian sharp-tailed grouse leks to maintain effective habitat for critical life functions.

Gunnison Sage-grouse

- 2.3.70 Structures in sage-grouse habitat should be constructed to limit risk of collision and predation.

2.3.71 New noise sources resulting from management activities should not contribute to noise levels that negatively impact sage-grouse leks during the active lek season (March 1 to June 30) based on best available science.

- 2.3.72 Projects in occupied GUSG habitat should be designed to mitigate or avoid the direct or indirect loss of habitat necessary for maintenance of the local population or reduce to acceptable levels the direct or indirect loss of important habitat necessary for sustainable local populations. Projects will incorporate special reclamation measures or design features that accelerate recovery and/or re-establishment of affected sage-grouse habitat as much as possible.

- 2.3.73 Applicable BMPs should be applied to all mineral proposals as Conditions of Approval within occupied sage-grouse habitat to provide for adequate effective habitat and breeding, nesting, and wintering habitat.

- 2.3.74 Remote methodologies for monitoring, transporting fluids to centralized collection tanks, etc., should be utilized to minimize human disturbance in GUSG habitat.

- 2.3.75 Fuels treatments should be designed to meet strategic protection of identified occupied sage-grouse habitat.

- 2.3.76 Use of native seeds should be used for revegetation following fuels management treatment based on availability, adaptation (site potential), and probability of success (Richards et al. 1998). Where probability of success or native seed availability is low, non-native seeds may be used as long as they meet sage-grouse habitat objectives

- 2.3.77 Within occupied Gunnison sage-grouse critical habitat the RCP grazing guidelines should be incorporated when appropriate.

- 2.3.78 Within occupied habitat, grazing in treatment areas should be deferred for 2 growing season after treatment, unless needed for seedbed preparation or desired understory and overstory are established.

- 2.3.79 When developing or modifying water developments, BMPs (see Appendix N) should be used to mitigate potential impacts from West Nile virus on sage-grouse within occupied habitat.

Table 2.3.2: Raptor Timing and Buffer Zone Distance Standards and Guidelines

Species	Impact/Risk	Time Frame	Buffer Distance****	Source
Golden eagle	Structural improvements*	Year-round	New structures must not occur within a 0.5-mile radius of an active nest. (S)***	CPW 2008
	Disturbance**	December 15–July 15	Human encroachment should not occur within 0.5 mile of an active nest during the nesting season. (G)***	CPW 2008
Bald eagle	Structural improvements*	Year round	New structures must not occur within a 0.5-mile radius of an active nest. (S)***	SJNF and TRFO

Species	Impact/Risk	Time Frame	Buffer Distance****	Source
	Disturbance**	November 15–July 15	Human encroachment should not occur within 0.5 mile of an active nest during the nesting season. (G)***	SJNF and TRFO
Bald eagle winter roost	Structural improvements*	Year round	New structures must not occur within 0.5 mile of a communal roost site. (S)	SJNF and TRFO
	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
Osprey	Disturbance**	April 1–August 31	Human encroachment should not occur within 0.25 mile of a nest during the nesting season. (G)	SJNF and TRFO
	Structural Improvements*	Year-round	New structures should not occur within a 0.25-mile radius of an active nest. (G)	CPW 2008
Peregrine falcon	Structural Improvements*	Year-round	New structures must not occur within a 0.5-mile radius of an active cliff nest complex. (S)	CPW 2008
	Disturbance**	March 15–July 31	Human encroachment should not occur within 0.5 mile of a nest during the nesting season. (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 and TRFO
	Structural Improvements*	Year-round	New structures should not occur within a 0.5-mile radius of an active nest. (G)	CPW 2008
Burrowing owl	Disturbance**	March 15–August 15	Human encroachment should not occur within 0.25 mile of nest burrows when owls may be present during the nesting season. (G)	Romin and Muck 2002
	Structural Improvements*	Year-round	New structures should not occur within a 0.25-mile radius of active nests or within occupied habitat. (G)	Romin and Muck 2002
All other raptors	Disturbance**	Varies by species	Determination of the application of these specific seasonal restrictions, timing limitations, and/or buffer distances should be made by the project biologist, guided by agency requirements, along with professional knowledge and experience. They will be considered on a case-by-case basis, taking into consideration site-specific factors such as topography, vegetation, species of raptor, historic patterns of human activity and infrastructure, and observed behaviors of individual birds. (G)	Romin and Muck 2002

Species	Impact/Risk	Time Frame	Buffer Distance ^{****}	Source
	Structural Improvements*	Varies by species	Determination of the application of these specific seasonal restrictions, timing limitations, and/or buffer distances should be made by the project biologist, guided by agency requirements, along with professional knowledge and experience. They will be considered on a case-by-case basis, taking into consideration site-specific factors such as topography, vegetation, species of raptor, historic patterns of human activity and infrastructure, and observed behaviors of individual birds. (G)	Romin and Muck 2002

*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), professional knowledge of local area conditions, Reynolds et al.'s (1992) recommendations specific to the SJNF, and Bald and Golden Eagle Protection Act conformance

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.

LRMP 2.4 Riparian Area and Wetland Ecosystems

Desired Conditions

- 2.4.1 Riparian area and wetland ecosystems have a diverse composition of desirable native hydrophytic plants that are vigorous and self-perpetuating. Invasive plant species are absent or rare.
- 2.4.2 Riparian area and wetland ecosystems have vegetation cover sufficient to catch sediment, dissipate energy, prevent erosion, stabilize stream banks, enhance aquatic and terrestrial wildlife habitat, and promote floodplain development.
- 2.4.3 Forest and shrubland types display hydrophytic trees and shrubs in a variety of size classes; they provide terrestrial and aquatic habitats, stream shading, woody channel debris, aesthetic values, and other ecosystem functions.
- 2.4.4 Woody debris in a variety of sizes is present in forest and shrubland riparian area and wetland ecosystem types.
- 2.4.5 Riparian area and wetland ecosystems are resilient to change from disturbances (including from floods, fire, and drought) and offer resistance and resilience to changes in climate.
- 2.4.6 Riparian area and wetland ecosystems have flow regimes and flooding processes that contribute to stream-channel and floodplain development, maintenance, and function, and facilitate the regeneration of native hydrophytic plants (including narrowleaf cottonwood [*Populus angustifolia*] and Rio Grande cottonwood [*P. deltoides* ssp. *wislizeni*]) that depend on flooding for regeneration.

- 2.4.7 The composition, structure, and function of fens and hanging gardens are intact (including their native plant species, organic soils, and hydrology).
- 2.4.8 Riparian area and wetland ecosystems that contain plant communities with G1, G2, S1, or S2 NatureServe Plant Community conservation status ranks are protected, have habitat to expand into, and have the water quantity and hydrologic systems necessary in order to support and sustain these communities.
- 2.4.9 Soil productivity is intact on all riparian area and wetland ecosystems on the SJNF and TRFO.
- 2.4.10 Long-term levels of soil organic matter and soil nutrients are maintained at acceptable levels on all riparian area and wetland ecosystems of the SJNF and TRFO.
- 2.4.11 Ground cover (vegetation and litter) is adequate to protect soils and prevent erosion on all riparian area and wetland ecosystems of the SJNF and TRFO.
- 2.4.12 Long term impacts to soils (e.g., soil erosion, soil compaction, soil displacement, puddling, and/or severely burned soils) from management actions are rare on all riparian area and wetland ecosystems of the SJNF and TRFO.

Objectives

- 2.4.13 Within 10 years, restore the ecological integrity of four deciduous riparian shrubland sites (two on SJNF and two on TRFO lands) that currently classify as riparian herbaceous lands by increasing the canopy cover of native hydrophytic shrubs by at least 10%.
- 2.4.14 Within 10 years, determine the functional condition of 40 miles (25 miles on TRFO and 15 miles on SJNF lands) of riparian area and wetland ecosystems using the Proper Functioning Condition assessment method (Prichard 1998).
- 2.4.15 Within 15 years, treat three fens on TRFO lands and two fens on SJNF lands with impaired functions.
- 2.4.16 Within 5 years, eradicate tamarisk and Russian olive (*Elaeagnus angustifolia*) on two stream reaches or two seeps/springs on TRFO lands, and if needed conduct follow-up treatment to prevent the establishment or spread of other invasive species.
- 2.4.17 Maintain native riparian and upland ecosystems that have been treated to control non-native species on a minimum of 50 miles of TRFO stream reaches over the next 20 years.
- 2.4.18 Maintain or restore native riparian ecosystems and connected uplands that have been treated to control non-native species on a minimum of 50 miles on the Dolores River and its tributaries on TRFO lands over the next 20 years.

Standards

- 2.4.19 Long term adverse effects to the hydrology, soils, and vegetation of fens and hanging gardens from management activities in or adjacent to them (including motorized travel, road construction, water pumping, and peat removal) must not occur.
- 2.4.20 Agency actions in protected areas must not adversely affect the long-term ecological integrity of the riparian area and wetland ecosystems within them.
- 2.4.21 Management actions must not cause long-term change away from desired conditions in riparian or wetland vegetation communities.

Guidelines

- 2.4.22 Agency actions should avoid or otherwise mitigate long-term adverse impacts to riparian areas and wetlands.
- 2.4.23 Agency actions should avoid or otherwise mitigate long-term adverse impacts in riparian area and wetland ecosystems that have plant communities with G1, G2, S1, or S2 NatureServe Plant Community conservation status ranks, including wild privet (*Forestiera pubescens*) shrublands and boxelder/river birch (*Acer negundo*/*Betula fontinalis*) woodlands, in order to maintain the ecological integrity of those rare plant communities.
- 2.4.24 Agency actions should avoid or otherwise mitigate damage to the long-term soil productivity of riparian area and wetland ecosystems.
- 2.4.25 Livestock browsing should not remove more than 25% of the annual leader growth of hydrophytic shrubs and trees.
- 2.4.26 Agency actions should avoid or otherwise mitigate adverse impacts to the abundance and distribution of willows to maintain or improve the ecological integrity of riparian area and wetland ecosystems.
- 2.4.27 Certified, weed-free native seed mixes of local ecotypes should be used to revegetate riparian area and wetland ecosystems where commercially available. Non-native, non-invasive plant material may be used in limited situations where considered necessary in order to protect resources and/or stabilize soils in a timely fashion. Persistent non-natives or invasive exotic plant species should be avoided.
- 2.4.28 Woody riparian vegetation along low-gradient ephemeral and permanent stream channels should be maintained or restored to ensure terrestrial food sources for invertebrates, fish, birds, and mammals, and to minimize water temperature changes.

LRMP 2.5 Aquatic Ecosystems and Fisheries

Desired Conditions

- 2.5.1 Long-term sustainability of aquatic ecosystems is maintained.
- 2.5.2 Streams, lakes, riparian vegetation, and adjacent uplands provide habitats adequate to maintain healthy aquatic ecosystems capable of supporting a variety of native and desired non-native aquatic communities.
- 2.5.3 The quantity and quality of aquatic habitats are maintained or enhanced to provide for the long-term sustainability of biological diversity and population viability of all native and/or desired non-native vertebrate species.
- 2.5.4 Channel characteristics, water quality, flow regimens, and physical habitat features are diverse and appropriately reflect the climate, geology, and natural biota of the area.
- 2.5.5 An adequate range of stream flow provides for the long-term maintenance of physical habitat features. Channel features, including bank stability, width-to-depth ratio, pool/riffle ratio, pool depth, slope, sinuosity, cover, and substrate composition, are commensurate with those expected to occur under natural ranges of stream flow.
- 2.5.6 Water flow conditions in streams, lakes, springs, seeps, wetlands, fens, and aquifers support functioning habitats for a variety of aquatic and semi-aquatic species and communities.
- 2.5.7 Macroinvertebrate diversity and abundance reflect high water quality.

- 2.5.8 Populations of aquatic species are adequately mobile, genetically diverse, and functionally diverse throughout the planning area.
- 2.5.9 Aquatic systems are connected in a manner that avoids fragmentation of aquatic habitats and isolation of aquatic species. Connectivity between water bodies provides for all life history functions of aquatic species except where barriers are beneficial and necessary to achieve conservation goals for certain aquatic species.
- 2.5.10 All native and desired non-native fish species are disease free and thrive in the vast majority of systems historically capable of supporting such species.
- 2.5.11 Abundant Colorado River cutthroat trout populations are maintained and other areas are managed for increased abundance.
- 2.5.12 Threats to Colorado River cutthroat trout and its habitat are eliminated or reduced to the greatest extent possible.
- 2.5.13 The distribution of Colorado River cutthroat trout is increased where ecologically, sociologically, and economically feasible.

Objectives

- 2.5.14 Annually evaluate seven streams (five streams on NFS lands and two on BLM lands) for adequacy of instream flows sufficient to maintain population viability and otherwise achieve LRMP direction.
- 2.5.15 Annually enhance or restore at least 4 miles of stream habitat (3 miles on NFS lands and 1 mile on BLM lands) to maintain or restore the structure, composition, and function of physical habitat for USFS and BLM sensitive species or USFS MIS species.
- 2.5.16 Over the life of the LRMP, connect at least 10 miles of fragmented stream habitat (8 miles on NFS lands and 2 miles on BLM lands) to provide for aquatic species movement.
- 2.5.17 Over the life of the LRMP, establish two self-sustaining meta-populations on NFS lands, each consisting of five separate but interconnected sub-populations. In addition, establish one new population in each Geographic Management Unit within the historic range (Colorado River Cutthroat Trout Task Force 2001).

Standards

- 2.5.18 Where native or desired non-native fish species occur, or should occur, a minimum level of aquatic habitat shall be maintained by identifying the minimum flow rates required to support that habitat using at least one of the following four options (2.5.19a–2.5.19d):

- 2.5.18a. From April 1 through September 30, an instantaneous minimum flow equal to 40% of the average annual flow; from October 1 through March 31, an instantaneous minimum flow equal to 20% of the average annual flow (Tennant 1972).
- 2.5.18b. Stream flow in riffle habitats shall be maintained at levels that maintain the minimum values for mean water depth, wetted perimeter, and mean velocity, as defined in Table 2.5.3, for each stream size category (e.g., bankfull width).
- 2.5.18c. Stream flow in each reach shall be sufficient to maintain a minimum of 50% of the weighted usable area, for each life stage of each target species (USFWS 1984). The weighted usable area baseline (100%) will be the amount of habitat that would occur under natural, unaltered flow conditions.
- 2.5.18d. Stream flow in each reach shall be maintained at levels that have been determined using alternate methods and where it can be clearly demonstrated, to the satisfaction of the USFS and/or BLM, that said flows will be adequate to achieve the LRMP's goals and objectives for population viability and sustainable aquatic ecosystems.

Table 2.5.3: Metrics Applicable to Standard 2.5.18b

Bankfull Width (feet)	Mean Depth (feet)	Wetted Perimeter (%)	Mean Velocity (feet/second)
1–2	≥ 0.2	50	1.0
21–40	0.2–0.4	50	1.0
41–60	0.4–0.6	50–60	1.0
> 60	> 0.6	> 60	1.0

- 2.5.19 Prior to use in other waters, all agency, partnering agency, and contractor field equipment having had contact with whirling disease waters must be decontaminated using current decontamination procedures.
- 2.5.20 To prevent the spread of chitrid disease, established decontamination protocols must be used when working in waters and water influence zones for current and historic breeding sites for all sensitive and listed aquatic and amphibious species.

Guidelines

- 2.5.21 Agency actions should maintain or improve all existing habitat for designated conservation populations of Colorado River cutthroat trout (Colorado River Cutthroat Trout Task Force 2001).
- 2.5.22 Minimum pool levels should be established for water storage facilities where aquatic USFS MIS and/or BLM or USFS sensitive species occur.
- 2.5.23 Except where barriers are beneficial and necessary to achieve conservation goals for certain aquatic species, fragmentation of aquatic habitats and isolation of aquatic species should be avoided.
- 2.5.24 Sediment delivery to streams occupied by MIS or threatened, endangered, or sensitive species should be avoided.
- 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 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.*

LRMP 2.6 Water Resources

Desired Conditions

Water Quality

- 2.6.1 State water quality standards and anti-degradation rules are met and state-classified water uses are supported for all water bodies.
- 2.6.2 Water quality for impaired water bodies on the State of Colorado's 303(d) list move toward fully supporting state-classified uses.
- 2.6.3 State "Outstanding Waters" within the planning area maintain the high levels of water quality necessary for this status.
- 2.6.4 Watersheds within the planning area containing saline soils exhibit stable upland, riparian, and channel conditions that produce water quality as close as possible to reference conditions (as defined in FSH 2509.25 for the USFS); they produce the lowest possible saline contributions to the upper Colorado River (per the Colorado River Basin Salinity Control Act for the BLM) (see Volume III, Appendix I for saline watersheds).
- 2.6.5 Water from SJNF and TRFO lands will meet applicable drinking water standards when given adequate and appropriate treatment. Management activities throughout the planning area protect and/or enhance the water quality of municipal supply watersheds (as defined in FSM 2542 for the USFS). Enhancement may be achieved by watershed restoration or other activities.

Stream Channels and Floodplains

- 2.6.6 Stream channel types that naturally build floodplains are connected to their floodplains and riparian areas, maintain the ability to transport overbank flows (which occur on the average every 1.5 years), and are capable of transporting moderate or high flow events.
- 2.6.7 Physical channel characteristics are in dynamic equilibrium and commensurate with the natural ranges of discharge and sediment load provided to a stream. Streams have the most probable form and the expected native riparian vegetation composition within the valley landforms that they occupy; they function correctly without management intervention.
- 2.6.8 Historically disturbed and degraded stream channels recover through floodplain development; establishment of riparian vegetation with correct structure, composition, and function; and stable channel geomorphic characteristics.

Groundwater Resources

- 2.6.9 Aquifers maintain natural conditions of recharge and discharge, especially where they are important to surface features dependent on groundwater for their existence (including caves, karst, springs, seeps, lakes, riparian areas, hanging gardens, wetland ecosystems, fens, and intermittent and perennial streams).
- 2.6.10 Potentially usable aquifers and water-bearing intervals possessing groundwater of quality and/or quantity that could provide multiple-use benefits and maintain water quality at natural conditions.
- 2.6.11 Administrative and permitted activities on the SJNF and TRFO do not contribute to the reduction of surface water or groundwater that supplies seasonal springs, seeps, small ponds, and small wetlands considered most vulnerable to a changing climate.

Watershed Conditions, Watershed Scale, and Water Uses

- 2.6.12 Upland areas function properly and do not contribute to stream-channel degradation.
- 2.6.13 The majority of undeveloped and unregulated or free-flowing streams within the planning area are retained in their current undeveloped condition; they provide potential reference conditions and offer unique opportunities for aquatic habitat, recreation, species conservation, and pleasing aesthetics.
- 2.6.14 The overall function and integrity of streams impacted by water developments are adequately protected for their baseline ecological and recreational values. This is accomplished by providing for adequate stream flows as part of water development planning for existing or new water development projects. This includes sustaining ecological processes dependent on flow within the impacted watersheds.
- 2.6.15 In unique cases where water is transferred from one catchment to another, water lost (i.e., there is no return flow) from watersheds as a result of water transfer does not adversely alter or impact the aquatic ecology of the watershed or the stream. Conversely, aquatic ecology and stability of the streams and watersheds receiving imported water are not adversely impacted.
- 2.6.16 All water developments for federal purposes have state water rights, if applicable. The beneficial use of water continues over the implementation life of the LRMP, when the water is available.
- 2.6.17 All approved water developments that involve the use of SJNF and TRFO lands are permitted pursuant to applicable federal authorizations.

Objectives**Water Quality**

- 2.6.18 Work with the selenium task force annually to reduce salt delivery to the upper Colorado River Basin.
- 2.6.19 Every 5 years rehabilitate 10 or more acres to reduce erosion and sedimentation delivery to water bodies on both TRFO and SJNF lands. For SJNF lands, conduct the work in priority watersheds, including those with water bodies listed for sediment impairment or that have total maximum daily loads (TMDLs) established for sediment.
- 2.6.20 Over the implementation life of the LRMP, actively participate in the development of all of the TMDL determinations and/or other appropriate options for the restoration of State of Colorado 303(d) listed impaired water bodies within the planning area (both TRFO and SJNF lands).
- 2.6.21 Over the life of the LRMP, implement BMPs to minimize management impacts to water quality on TRFO and SJNF lands. The effectiveness of BMPs will be improved if necessary through adaptive management.

Maintain or Improve Watershed Condition and Stream/Floodplain Function

- 2.6.22 Annually, treat approximately 20 acres or more in SJNF priority watersheds in order to improve poor watershed conditions or maintain good watershed conditions. The goal is to move a watershed from an impacted condition class to a better condition class or to maintain a good condition class.
- 2.6.23 Annually decommission 6 linear miles or more of unneeded routes that may consist of roads and/or trails on SJNF lands. Routes will be decommissioned on TRFO lands as identified through the travel management planning process. Watersheds listed in Volume III, Appendix I could be considered priority for decommissioning efforts. Watersheds designated as priority through the USFS Watershed Condition Framework should also be focus areas for route decommissioning.

Managing Water Uses

- 2.6.24 Annually acquire new appropriated water rights for 30 USFS water uses (including water rights for livestock, recreation, administrative, or other uses) within the planning area. For TRFO lands, pursue appropriated water rights for new or outstanding BLM water uses.
- 2.6.25 Over the implementation life of the LRMP, put all consumptive use water rights owned by the BLM and USFS to beneficial use and that use documented.
- 2.6.26 Based on review of monthly water court resumes, enter into any water court case necessary to protect BLM or USFS water rights and water-dependent resources.
- 2.6.27 Over the life of the LRMP, enforce compliance where the USFS or BLM place conditions and other requirements on special use authorizations related to water diversion or storage that are outside the jurisdiction of the Colorado Division of Water Resources.

Standards

- 2.6.29 Land use activities (new projects, or replacement/retrofitted/reconstructed/reauthorized projects) must not impact potentially useable groundwater quality or quantity to the extent that groundwater-dependent features are adversely affected. Examples of some groundwater-dependent features are springs, seeps, fens, and intermittent or perennial streams.
- 2.6.30 No activities must be allowed within aquatic management zones that will cause a long-term change from desired conditions. The protection or improvement of riparian values, water quality, aquatic community, and for long-term stream health in these areas must be emphasized. Aquatic management zones have a minimum horizontal width from the top of each bank of 100 feet or the mean height of the mature late-seral vegetation, whichever is greater.
- 2.6.31 In all places where technically feasible, pitless, self-contained drilling systems (e.g., closed loop drilling systems) must be used for all leasable fluid minerals wells.

Guidelines

- 2.6.32 Roads and trails that are removed from the SJNF transportation network, as well as maintenance level 1 roads (i.e., roads that have been closed to the public but may be used in the future principally for administrative purposes), should be treated sufficiently where no further management intervention would be necessary in order to sustain long-term natural processes. This will avoid future risks to watershed functions, water quality, and/or aquatic habitat. Sufficient treatments may include removal of unstable fills, effective and permanent breaching of drainage ditches, elimination of persistent in-sloped road surfaces; complete removal of stream-crossing structures and associated fills with restoration of floodplains, and the maintenance or restoration of fish passages.
- 2.6.33 Ditches authorized on the SJNF or TRFO should maintain a sufficient freeboard above the water line of the ditch to avoid or minimize damage to the ditch or from overtopping. Headgates and conveyance structures should be maintained in good functioning condition and should be clear of sediment and other debris in order to ensure proper operation. The operator should close the headgate at the end of the diversion (e.g., irrigation) season.

- 2.6.34 Water conveyance structures authorized on the SJNF or TRFO should be maintained to prevent and control soil erosion and gulying on adjacent lands resulting from operations and maintenance of the structure. Design criteria may include maintaining the ditch channel to prevent downcutting and ditch failure, removal of all obstructions from the channel, and prompt remediation of pipeline breaks and ditch failures, and rehabilitation of any erosion resulting from failure of a water conveyance structure.
- 2.6.34a Water conveyance structures authorized on the SJNF or TRFO should allow for the passage of aquatic organisms if there is the potential to obstruct such passage to potential or occupied habitat.
 - 2.6.34b Headgates should contain measurement devices that can be used to determine compliance with land use authorization permits.
- 2.6.35 As a general practice non-toxic fluid, additives, and other materials should be used for well drilling to protect surface water and groundwater quality.
- 2.6.36 Exploration and production waste should be disposed of using BMPs that meet state regulations and specific BLM or USFS requirements. Exploration and production waste should be disposed of in such a manner as to not to inhibit reclamation success of the site.
- 2.6.37 Operators should use proven technologies for the recycling of fresh water, drilling fluids, and produced water for reuse in drilling and completion operations or other beneficial purposes whenever possible.
- 2.6.38 As individual fields are developed, centralized liquid gathering systems should be used for the delivery and gathering of drilling, completion, and produced fluids such as fresh water, waste/produced water, and condensate.
- 2.6.39 Water Use and Disposal Management Plans should be included in Plans of Development for fluid minerals projects and solid minerals projects.
- 2.6.40 Ground disturbance, facilities construction, and incompatible land management activities (those activities that may pose a risk of impacting water quality) on SJNF lands should be prohibited on lands within 1,000 horizontal feet of either side of a classified surface water supply stream segment (as measured from the average high water mark of a water body) for a distance of 5 miles upstream of public water supply intakes for towns, cities, and municipalities. These activities should also be prohibited within a minimum distance of 1,000 horizontal feet for source water protection areas for towns, cities, and municipalities using a groundwater well or spring.

LRMP 2.7 Livestock and Rangeland Management

Desired Conditions

- 2.7.4 Rangelands provide healthy and sustainable habitat for wildlife populations that, in turn, support recreational hunting, fishing, and/or viewing (thereby contributing to the local and regional economy).

Standards

Livestock Management

- 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.

Guidelines

Livestock Management

- 2.7.17 Prior to allocating grazing privileges for a new grazing permittee on unallocated grazing allotments, the needs of existing rangeland management, as well as ecological diversity and species viability, should be considered.

LRMP 2.8 Invasive Species

Desired Conditions

- 2.8.1 Invasive species management is coordinated with adjacent land owners.
- 2.8.3 Invasive species, both terrestrial and aquatic, are absent or rare within the planning area, and are not influencing native populations or ecosystem function.
- 2.8.4 Invasive species are not introduced or spread within protected areas.
- 2.8.5 Management activities do not contribute to the spread of invasive annual plants or other invasive species.

Objectives

- 2.8.6 Within 15 years, contain priority Class B invasive species on TRFO and SJNF lands identified in the Invasive Species Action Plan.
- 2.8.7 Within 15 years, increase annual treated acres of noxious weeds to 10% of known acres infested on TRFO and SJNF lands.
- 2.8.8 Within 15 years, annual backcountry treatment (including wilderness areas and WSAs) is 10 to 15% of the total annual noxious weed treatment target on SJNF and TRFO lands.
- 2.8.9 Over the life of the LRMP eradicate newly established invasive species especially Colorado Class A noxious species on both SJNF and TRFO lands.

Standards

- 2.8.10 Projects or activities that would authorize the use of forage products must use certified “noxious weed seed-free” forage products.
- 2.8.11 Invasive species must be managed using integrated weed management principles.
- 2.8.12 The SJNF and TRFO must include provisions that are necessary to prevent the spread of and to control the introduction of invasive species in contracts and permits for use of SJNF and TRFO lands and resources.

Guidelines

- 2.8.13 Cleaning facilities and associated educational materials should be developed for boating areas in cooperation with CPW or other state and local regulatory agencies.
- 2.8.14 *Wildland fire operations should follow direction provided in Interagency Standards for Fire and Fire Aviation Operations (NFES 2724; USFS et al. 2013) under the Operational Guidelines for Aquatic Invasive Species section to prevent the introduction and spread of aquatic invasive species.*

- 2.8.15 Project planning and implementation should consider the need to prevent the introduction and spread of aquatic invasive species. The SJNF and TRFO Invasive Species Action Plan (USFS et al. 2012) provides a useful reference for appropriate management and mitigation measures.
- 2.8.16 High risk aquatic invasive species areas should be a priority for inventory and monitoring activities.
- 2.8.17 Proper equipment (e.g., vehicles, waders), cleaning techniques, and chemicals should be used as necessary to prevent the spread and establishment of aquatic invasive species.
- 2.8.18 For all proposed projects or activities, the risk of invasive aquatic and plant species introduction or spread should be determined and appropriate prevention and mitigation measures implemented.

LRMP 2.9 Timber and other Forest Products

Guidelines

- 2.9.18 *Regeneration harvests of even-aged timber stands (sites) on SJNF lands should not be undertaken until the stands have generally reached or surpassed 95% of the culmination of the mean annual increment measured in cubic feet. Exceptions may be made where resource management objectives or special resource considerations require earlier harvest, such as:*
- stands in imminent danger from insect or disease attack;
 - wildlife habitat improvement;
 - scenery resource enhancement or rehabilitation;
 - ecosystem restoration; and
 - areas managed for Christmas tree production.

LRMP 2.10 Insects and Diseases

Desired Conditions

- 2.10.1 Terrestrial Ecosystems have age- or size-class diversity, and compositional diversity that make them resistant to insect and disease outbreaks.
- 2.10.2 Insect and disease processes and cycles are similar to those that occurred during the reference period (HRV conditions) in MA 1.
- 2.10.3 Epidemic outbreaks are rare within management areas where active management is allowed.
- 2.10.4 Mortality of aspen trees in high value aspen forests due to sudden aspen decline is significantly reduced.

Objectives

- 2.10.5 Within 5 years, use coppice timber treatments or prescribed fire to regenerate 500-1000 acres of low-elevation aspen forests that are experiencing sudden aspen decline on SJNF lands.
- 2.10.6 Within the next 10 years, reduce the risk of mortality due to bark beetles by increasing the mature-open development stage of ponderosa pine forests by 20,000 to 40,000 acres by using timber harvest and prescribed fire in the mature-closed development stage of ponderosa pine forests on SJNF lands.
- 2.10.7 Within 10 years, continue with treatment of developed recreation facilities, ski areas, and administrative sites to reduce susceptibility and hazards from insect and disease incidence, and increase long-term forest health, vigor, and resiliency on SJNF and TRFO lands.

Standards & Guidelines

There are no Standards or guidelines for insects and disease.

LRMP 2.11 Fire and Fuels Management

Desired Conditions

- 2.11.6 Major veg types reflect little or no departure from historic range of variation of fire frequency and intensity (e.g., reflect fire regime condition class 1).
- 2.11.7 Planned and unplanned fire ignitions are used to increase resiliency and diversity across all forest and rangeland vegetation types.
- 2.11.8 Fire is reintroduced to increase the resistance and resiliency of the warm-dry mixed conifer and ponderosa pine forest types in landscape such as the Hermosa and Piedra areas.
- 2.11.9 The occurrence of low elevation fires burning upward into spruce fir forest will increase over time to promote the heterogeneity of spruce-fir forests.

Standards

- 2.11.13 Natural Fire ignitions will be used, when feasible, to reintroduce fire into fire-adapted and dependent ecosystems. Fire for ecological benefit will be used as a resource management tool where and when allowed.
- 2.11.14 Restoration and recovery in areas, when possible, must be provided where critical resource concerns merit rehabilitation for controlling the spread of invasive species, protecting areas of cultural concern, or protecting critical or endangered species habitat.

Guidelines

- 2.11.16 Seeding and other site-rehabilitation practices should be provided, as necessary, on wildland fire and managed wildland fire areas. Fire suppression support activities and facilities (including constructed firelines, fuel breaks and safety areas, fire camps, staging areas, heli-bases, and heli-spots); and mechanical and prescribed fire treatment areas should follow the same site-rehabilitation practices.
- 2.11.17 Aerial application of retardant in live water, wetlands and riparian areas should be avoided unless necessitated by human safety or property loss considerations.

LRMP 2.12 Air Quality

Objectives

- 2.12.8 For the Weminuche Wilderness Class 1 Area, improve air quality so that flora and fauna AQRVs that are at risk (including lichens, amphibians, and aquatic organisms) recover to a level that is within the limits of acceptable change (compared to natural conditions) by the next planning period so that there is no humanly perceptible change in visibility (visual range, contrast, coloration) from that which would have existed under natural conditions (conditions substantially unaltered by humans or human activities).

LRMP 2.13 Access And Travel Management

- 2.13.28 **Road Density Guideline for Water Quality and Watershed Health on TRFO Lands:** In order to protect water quality, watershed function, major surface source water protection areas for municipalities, and to ensure compliance with the Colorado River Basin Salinity Control Act, use

the best available information for determining the appropriate level of road density when analyzing and approving management actions that affect motorized routes.

- 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.

LRMP 2.14 Recreation

Desired Conditions

Developed Recreation

Winter Recreation:

- 2.14.36 Timing restrictions for motorized over-snow recreational use may be employed in wildlife habitat areas or due to ground conditions.

LRMP 2.18 Lands and Special Uses

Desired Conditions

- 2.18.3 The SJNF and TRFO retains and/or acquires river frontage, riparian areas and wetland ecosystems, and other lands that would enhance or protect recreation, open space, scenery, clean air and water, and key habitat for species.

Objectives

- 2.18.12 Annually, ensure that all relevant desired conditions are being met or trending toward being met in special use permit areas by inspecting at least 5% of existing special use permit areas.

Guidelines

2.18.16 *The SJNF and TRFO should acquire or retain lands, interest in lands, or ROWs or easements:*

- within designated wilderness areas, other Congressionally classified areas, such as the Piedra Area and wild and scenic rivers (WSR), and WSAs;
- that provide habitat for animal and plant species designated as threatened or endangered, and/or for other species identified for special protection;
- that contain wetlands and/or floodplains and associated riparian ecosystems, or enhance watershed protection;
- with historical or important heritage resources;
- where resource management or values are threatened by change of use or may be enhanced by public ownership;
- that enhance resource management and values, improve production of goods and services, or are needed to meet resource management goals and objectives;
- that contain resources or values of local importance such as water frontage, outstanding scenery, and outdoor recreation, or that maintain or stabilize local economies;
- that consolidate federal lands or reduce the miles of interior boundaries and number of interior corners;
- where the entire mineral estate is acquired with the surface estate or where acquisition will not include lands likely to go to patent under the 1872 Mining Law; and
- where needed to enhance public and administrative access to federal lands or to enhance recreation opportunities.

LRMP 2.21 Abandoned Mine Lands and Hazardous Materials

Desired Conditions

- 2.21.1 Abandoned mine reclamation within the planning area does not negatively impact water quality and historic resource protection.
- 2.21.2 Abandoned mines do not endanger the environment, wildlife, the public, or employees
- 2.21.5 Over the life of the LRMP, AML closures for human safety at sites supporting bat populations include structures (such as bat gates) designed to provide for continued use as bat habitat.

Objectives

- 2.21.7 Stabilize, rehabilitate, or restore AML on priority sites on an annual basis in order to improve water quality and watershed condition.
- 2.21.12 On all TRFO and SJNF lands, close or mitigate high-priority sites over the life of the LRMP. On SJNF lands, newly discovered sites will be prioritized for closure or mitigation based on hazard.

Standards and Guidelines

All applicable standards and guidelines are found within other sections of the Design Criteria, or are found in existing law, regulations, and policies.

STIPULATIONS RELATED TO LEASING FOR OIL AND GAS DEVELOPMENT

Mexican Spotted Owl

Lease Notice

A survey of the lease area may be required to determine if unsurveyed suitable habitat is present, and the agencies should prioritize completing surveys where expressions of interest have been made for leasable mineral development. A 2-year protocol survey to determine occupation by the species would be required prior to any development activity within the identified suitable habitat. Surveys would be completed by a qualified biologist as determined by USFWS and the managing agencies. No development activity would take place in resultant occupied habitat until a determination is made by the USFWS and the managing agencies for designation of a protected activity center.

No Surface Occupancy

No surface occupancy is allowed on the lands described below: In Mexican spotted owl habitat, as determined by biologist at the time, NSO would be allowed. Surveys of the lease area may be required to determine the presence of suitable habitat, occupation, and, if warranted, designation determination for a protected activity center.

If it is determined that suitable nesting and fledgling Mexican spotted owl habitat exists and surveys cannot be conducted, a TL would be placed from March 1 to August 31.

For the purpose of: Preventing actions which may result in take as defined under the Endangered Species Act.

Justification: The Mexican spotted owl is a threatened species with suitable habitat within portions of the SJNF and TRFO lands. NSO would be allowed in these habitat areas to maintain the utility of suitable

breeding and brood rearing habitat as defined in the Mexican Spotted Owl Recovery Plan to promote recovery.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: An exception can be granted if an environmental analysis of the Proposed Action and subsequent consultation indicates that the nature or conduct of the activity could be conditioned so as not to impair the utility of habitat for current or subsequent reproductive activity or occupancy. No exceptions would be granted within a protected activity center.

Modifications: The Authorized Officer may modify habitat configuration or extent based on new information. Modification of a protected activity center would be completed in consultation with the USFWS.

Waivers: A waiver of this stipulation maybe granted by the Authorized Officer only through a land use plan amendment. No waivers shall be granted within designated protected activity centers.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Lynx

Controlled Surface Use – Landscape Linkage, Denning and Winter Foraging Habitat

Surface occupancy or use is subject to the following special operating constraints: Limitations on surface use and/or operational activities may be required. TL (especially during winter and/or in lynx habitat) and restrictions on snow compaction activities may be applied in consultation with the USFWS as necessary to protect habitat and linkage area function and limit access by potential lynx competitors. Actions would be consistent with direction found in the Lynx Conservation Assessment and Strategy, best available science as determined by the managing agencies and the USFWS, and/or the Southern Rockies Lynx Amendment, each where applicable.

On the lands described below:

- Within identified current active denning locations
- Within identified landscape linkage areas
- Within identified lynx habitat in a Lynx Analysis Unit (LAU)

For the purpose of: Protection of lynx and lynx habitat in compliance with the Endangered Species Act.

Justification: The Canada lynx is a threatened species, with suitable habitat within portions of the SJNF and TRFO. CSU would apply in these habitat areas to protect the habitat and the species.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: The Authorized Officer, in consultation with the USFWS, may grant an exception to this stipulation if an environmental analysis and subsequent consultation indicates that the proposed or conditioned activities would not affect, current and subsequent, suitability or utility of established lynx linkage corridors or lynx habitat within the LAU.

Modifications: The Authorized Officer, in consultation with the USFWS, may modify the size of the stipulation area or time frames if an environmental analysis indicates that a portion of the area is non-essential to function and utility of established lynx linkage corridors and lynx habitat, and not impair the utility of the corridors and LAU for current or subsequent lynx use or occupation.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer in consultation with the USFWS, only through a land use plan amendment if site conditions have changed sufficient to preclude current and subsequent lynx occupation of the LAU or use of linkage corridors.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Timing Limitation –Denning Sites

No surface use is allowed during the following time period on the lands described below: March 1 to August 30 (this stipulation applies to all lease activities) within 1 mile of known, active den sites.

For the purpose of: Protection of denning habitat for Canada lynx in compliance with the Endangered Species Act.

Justification: The Canada lynx is a threatened species with suitable habitat within portions of the SJNF and TFRO. A TL would apply in these habitat areas to protect the habitat and the species.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: An exception can be granted if an environmental analysis of the Proposed Action and subsequent consultation indicates that the nature or conduct of the activity could be conditioned so as not to impair the utility of habitat for current or subsequent reproductive activity or occupation.

Modifications: The Authorized Officer, in consultation with the USFWS, may modify the size of the stipulation area or time frames if an environmental analysis shows that the modification would not impair the utility of the habitat and LAU for current or subsequent lynx reproductive activity or occupation.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer in consultation with the USFWS only through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Southwestern Willow Flycatcher

No Surface Occupancy

No surface occupancy is allowed on the lands described below: Within 325 feet of the ordinary high water mark in mapped habitat.

For the purpose of: Prevent disruption of reproductive activity in mapped habitat.

Justification: The southwestern willow flycatcher is a federally designated endangered species with suitable breeding habitat within the planning area. Oil and gas activities have the potential to adversely affect the species.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: The Authorized Officer in consultation with the USFWS, may grant an exception to this stipulation if an environmental analysis indicates that the proposed or conditioned activities would not affect current or subsequent suitability or utility of riparian habitat suitable for the southwestern willow flycatcher.

Modifications: The Authorized Officer in consultation with the USFWS, may modify the configuration of the stipulation area or time frames if an environmental analysis indicates that a portion of the area is currently and subsequently nonessential to the function and utility of riparian habitat, or that the Proposed Action could be conditioned so as not to impair the utility of habitat for the southwestern willow flycatcher.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer in consultation with the USFWS only through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Timing Limitation

No surface use is allowed during the following time period(s): May 1 to August 15 in mapped suitable nesting habitat.

For the purpose of: Prevent disruption of reproductive activity during the production period.

Justification: The southwestern willow flycatcher is a federally designated endangered species with suitable breeding habitat within the planning area. Oil and gas activities have the potential to adversely affect the species.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: The Authorized Officer, in consultation with the USFWS, may grant an exception if an environmental analysis indicates that the Proposed Action could be conditioned so as not to affect current or subsequent breeding behavior, nest attendance, egg/chick survival, or nesting success.

Modifications: The Authorized Officer, in consultation with the USFWS, may modify the size or dates of the TL area if an environmental analysis indicates that the Proposed Action could be conditioned so as not to affect current or subsequent nest attendance, egg/chick survival, or nesting success. Seasonal time frames may be modified if operations could be conditioned to not disrupt current or subsequent breeding behavior and bird distribution within suitable breeding habitat.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer in consultation with the USFWS only through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Gunnison Sage-grouse

Lease Notice

The lease may in part, or in total contain critical Gunnison sage-grouse habitat, as identified by the managing agencies, either currently or prospectively. The operator may be required to implement specific measures to reduce impacts of oil and gas or geothermal operations on Gunnison sage-grouse populations and habitat quality.

Sage-grouse habitat conservation measures may include timing restrictions, noise restrictions, distances or percentages of allowable surface-disturbing activities, and desired density levels or other development constraints consistent with the state or Gunnison Sage-grouse Rangewide Conservation Plan (including subsequent updates), current peer reviewed sage-grouse research, or as developed in conjunction with CPW to meet local population objectives.

Such measures shall be developed during the Application for Permit to Drill on-site and environmental review process for sundry notices and associated rights-of-way, and would be consistent with lease rights granted.

No Surface Occupancy –Occupied Habitat

No surface occupancy is allowed on the lands described below: as mapped for occupied critical Gunnison sage-grouse habitat.

For the purpose of: Protecting priority habitat such as lek sites and nesting habitat for Gunnison sage-grouse.

Justification: Development and human activity are known to be limiting to occupation and successful reproduction of this species within its complex of suitable habitat. NSO may be used in these habitat areas to protect the habitat and the species.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: Exceptions may be considered.

Modifications: A modification may be granted by the Authorized Officer if the occupied habitat boundaries change.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer only through a land use plan amendment.

Any changed may be in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Controlled Surface Use –Occupied Habitat

Surface occupancy or use is subject to the following special operating constraints: The Field Manager may require the proponent/applicant to submit a plan of development that would demonstrate:

- Avoidance of direct or indirect loss of important Gunnison sage-grouse habitat necessary for maintenance of the local population or reduce to acceptable levels the direct or indirect loss of important Gunnison sage-grouse habitat necessary for sustainable local populations.
- Special reclamation measures or design features are incorporated that would accelerate recovery and/or re-establishment of affected sage-grouse habitat;
- The current/future utility of such habitat for sage-grouse use would not be impaired.

Additional conservation measures may be imposed as necessary to maintain high-quality sage-grouse habitat, reduce fragmentation or loss of habitat within or between population areas, reduce cumulative effects within population areas, and reduce disturbance to sage-grouse use in the area. Conservation measures may be identified in state or local conservation plans or through appropriate science or research for the species.

Justification: Loss of habitat is known to be among the factors limiting successful breeding, reproduction, and recruitment of this species within otherwise suitable habitat. The BLM and USFS, signatories to the Gunnison Sage-grouse Range-wide Conservation Plan (2005), have made commitments to limit noise associated with anthropogenic sources within priority habitats consistent with the LRMP.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: The Authorized Officer, in coordination with CPW, may grant an exception to this stipulation if an environmental analysis indicates that the proposed or conditioned activities would not affect the long term suitability or utility of habitat for sage-grouse.

Modifications: May be considered

Waivers: The Authorized Officer, in coordination with CPW, may grant a waiver to this stipulation if site conditions have changed sufficient to permanently preclude sage-grouse occupation of the lease area.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Controlled Surface Use –Unoccupied Habitat

Surface occupancy or use is subject to the following special operating constraints: In unoccupied Gunnison sage-grouse habitat, NSO would be allowed within a 0.6-mile radius of a newly identified lek site. A TL may be applied to lease activities if surface occupancy is allowed. A TL may apply to construction, drilling, and workovers within 4.0 miles of an identified lek site from March 1 through June 30, dependent on the distribution of suitable nesting habitat and line of sight from the activity to the lek (potential habitat as identified in the Gunnison Sage Grouse Rangewide Plan, 2005). These are areas where Gunnison sage-grouse use is suspected or the habitat is deemed suitable but no grouse have been documented there. An agency approved survey of the lease acreage within “potential” habitat may be required to verify occupancy status.

For the purpose of: Protecting crucial habitat such as lek sites and nesting habitat for Gunnison sage-grouse.

Justification: The Gunnison sage-grouse is a BLM and USFS sensitive species, with suitable habitat and populations within portions of the SJNF and TRFO lands. Development and human activity are known to be limiting to occupation and successful reproduction of this species within its complex of suitable habitat. NSO may be used in these habitat areas to protect the habitat and the species.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: The Authorized Officer may grant an exception if an environmental analysis and coordination with CPW indicate that the Proposed Action could be conditioned so as not to affect current or subsequent breeding behavior, nest attendance, egg/chick survival, or nesting success. Actions designed to enhance the long-term utility or availability of nest habitat may be excepted.

Modifications: A modification may be granted by the Authorized Officer if the suitable habitat boundaries change. The Authorized Officer may modify the size or dates of the TL area if an environmental analysis indicates that the Proposed Action could be conditioned so as not to affect current or subsequent nest attendance, egg/chick survival, or nesting success. Seasonal or daily time frames may be modified if operations to not disrupt current or subsequent lek attendance, breeding behavior, and bird distribution within a 0.6-mile radius of the lek during the breeding period (March 1–June 30).

Waivers: A waiver of this stipulation may be granted by the Authorized Officer only through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Controlled Surface Use – Noise Restriction Occupied and Unoccupied Habitat

Surface occupancy or use is subject to the following special operating constraints: New noise sources resulting from management activities must not contribute to noise levels exceeding 34 A-weighted decibels (dBA) (10 dBA above ambient measures, typically 20 to 24 dBA) from 6 p.m. until 9 a.m. at the perimeter of a lek during active lek season.

In occupied habitat the BLM would not authorize vehicular traffic between the hours of 6 p.m. and 9 a.m. within 1.9 miles of a lek from March 15 through May 15 annually. This stipulation applies to vehicles that may create noise levels that exceed recommended guidance.

For the purpose of: Protecting priority habitats such as lek sites, nesting, brood rearing, and winter habitat for Gunnison sage-grouse in order to prevent abandonment of display grounds and to maintain reproductive success, recruitment, and survival.

Justification: Noise associated with oil and gas operations and other similar development activity is known to be among the factors limiting successful breeding, reproduction and recruitment of this species within otherwise suitable habitat. The BLM and USFS, signatories to the Gunnison Sage-grouse Range-wide Conservation Plan (2005), have made commitments to limit noise associated with anthropogenic sources within priority habitats consistent with the Plan.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: The Authorized Officer, in consultation with the agency wildlife biologist and CPW, may grant an exception to this stipulation if other measures have been implemented sufficient to reduce the noise levels at the edge of the 0.6-mile lek buffer to a maximum of 10 dBA above ambient noise levels (measured at dawn) in an undeveloped area with no other anthropogenic sources of noise.

Modifications: A modification may be granted by the Authorized Officer if the lek and associated habitat boundaries change for this species.

Waivers: A waiver of this stipulation may be granted by the Authorized Officer only through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Colorado River Cutthroat Trout

No Surface Occupancy

No surface occupancy or use is allowed on the lands described below: 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.

For the purpose of: Protection of existing Colorado River cutthroat trout populations and habitat.

Justification: To assist in the recovery and conservation of Colorado River cutthroat trout populations in accordance with the 2001 Conservation Agreement and Strategy for the States of Colorado, Utah, and Wyoming. This species is both a USFS and BLM sensitive species. The Colorado River cutthroat trout is the only salmonid species native to western Colorado. Populations of cutthroat have declined over the past 100 years to where they now occur less than 5% of the area once occupied. The introduction of non-native trout species is the primary cause of the decline of endemic cutthroats. However, a variety of land management activities, resulting in the loss or degradation of their habitat, have also contributed to

the declines. The declines have been so severe that this subspecies of cutthroat has been petitioned for listing under the Endangered Species Act. The above stipulation would help promote the long-term recovery of the species and help reduce the trend towards federal listing.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: Exceptions to this stipulation may be authorized if the affected area is determined not to be suitable habitat. Exceptions may also be granted when surface occupancy within the 0.25-mile distance of the Colorado River cutthroat trout conservation population or reintroduction sites would have no potential for adverse impacts on the habitat or population. Although these situations would be very rare, the Authorized Officer shall consider topography, hydrology, timing of surface activities, and all other relevant factors when evaluating an exception request.

Modifications: No circumstances have been identified under which a modification would be allowed. A 30-day public notice and comment period is required before modification of a stipulation.

Waivers: No waivers would be authorized unless the areas mapped as possessing the attributes are verified by USFS staff to not possess those attributes. A waiver of stipulations may only be granted through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Greenback Cutthroat Trout

No Surface Occupancy

No surface occupancy or use is allowed on the lands described below: Within 0.25 mile of streams occupied by existing populations of greenback cutthroat trout.

For the purpose of: Protection of existing greenback cutthroat trout populations in compliance with the Endangered Species Act.

Justification: To assist in the protection of greenback cutthroat trout populations.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: Exceptions can also be granted when surface occupancy within the 0.25-mile distance of the greenback cutthroat trout populations would have no potential for adverse impacts on the population. Although these situations would be very rare, the Authorized Officer shall consider topography, hydrology, timing of surface activities, and all other relevant factors when evaluating an exception request.

Modifications: No circumstances have been identified under which a modification would be allowed. A 30-day public notice and comment period is required before modification of a stipulation.

Waivers: No waivers would be authorized unless the areas mapped as possessing the attributes are verified by USFS staff to not possess those attributes. A waiver of stipulations may only be granted through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Perennial Streams, Water Bodies, Riparian Areas, and Fens

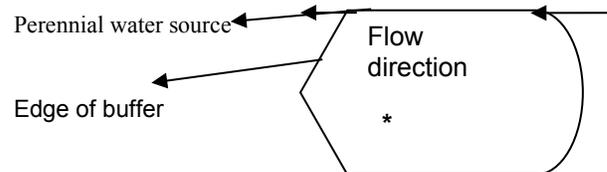
No Surface Occupancy

No surface occupancy or use is allowed on the lands described below: Prohibit surface occupancy and surface-disturbing activities within a minimum buffer distance of 325 horizontal feet for all perennial waters. For perennial streams, the buffer would be measured from the ordinary high water mark (bankfull stage), whereas for wetland features, the buffer would be measured from the edge of the mapped extent (Table H.1). For unmapped wetlands, the vegetative boundary (from which the buffer originates) would be determined in the field. Where the riparian zone extends beyond 325 feet, the NSO stipulation would be extended to include the entire riparian zone.

Table J.B.1: No Surface Occupancy Buffers for Perennial Waters

Water Body Type	Buffer Width (feet)
Fens and wetlands	325*
Perennial streams (with or without fish)	325 (as measured from ordinary high water mark)
Lotic or lentic springs and seeps	325 (as measured from wetland vegetation edge)
Riparian	325 (or greater if riparian area is wider than 325 feet)

*See Modification.



Wetland buffer dimensions may be averaged to accommodate variability in terrain or development plans. Up-gradient distances should be maintained (i.e., up-gradient buffer distances of 325 feet), while down-gradient buffers may be reduced to no less than 100 feet. The buffer averaging must, however, not adversely affect wetland functions and values, and a minimum buffer distance of 100 feet from the wetland edge is maintained. The buffer's intent is to protect the water source area of the wetland, which is more important than the down-gradient portion of the wetland.

For the purpose of: Maintaining the proper functioning condition, including the vegetative, hydrologic and geomorphic functionality of the perennial water body. Protect water quality, fish habitat, aquatic habitat, and provide a clean, reliable source of water for downstream users. Buffers are expected to indirectly benefit migratory birds, wildlife habitat, amphibians, and other species.

Justification: Wetlands, floodplains, riparian areas, water influence zones, and fens represent important ecological components and functions, such as storing water, stabilizing valley floors, enhancing water quality, and providing recreation and aesthetic values, biological diversity, and wildlife species with habitat, water, food, cover, and travel routes. They are easily disturbed by ground-disturbing activities that can cause soil erosion, soil compaction, and adverse changes to the hydrologic function that is important to maintaining the hydrologic and ecological integrity of these lands.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: An exception may be allowed if the agency determines that project design or mitigation measures can be used to prevent impacts to reservoirs. Consideration must include the degree of slope, soils, importance of the amount and type of wildlife and fish use, water quality, riparian vegetation, and other related resource values. If wetlands are present around the reservoir, no exceptions would be granted unless compliance can be demonstrated with Executive Order 11990. In addition, an exception may be granted for stream crossings where no other alternative exists, such as another route, and must be approved by the Authorized Officer.

Modifications: Wetland buffer dimensions may be averaged to accommodate variability in terrain or development plans. Up-gradient distances should be maintained (i.e., up-gradient buffer distances of 325 feet), while down-gradient buffers may be reduced to no less than 100 feet. The buffer averaging must, however, not adversely affect wetland functions and values, and a minimum buffer distance of 100 feet from the wetland edge is maintained. The buffer's intent is to protect the water source area of the wetland, which is more important than the down-gradient portion of the wetland.

Waivers: No waivers would be authorized unless the areas mapped as possessing the attributes are verified by USFS staff to not possess those attributes. A waiver of stipulations may only be granted through a land use plan amendment.

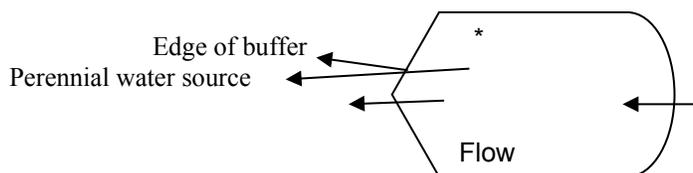
Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Controlled Surface Use

Surface occupancy or use is subject to the following special operating constraints: From 325 to 500 horizontal feet from the perennial water body, CSU restrictions would apply. Surface-disturbing activities may require special engineering design, construction and implementation measures, including re-location of operations beyond 656 feet (200 meters) to protect water resources within the 325 foot NSO buffer. For perennial streams, the buffer would be measured from ordinary high water mark (bankfull stage), whereas for wetland features, the buffer would be measured from the edge of the mapped extent (Table H.2). For unmapped wetlands, the vegetative boundary (from which the buffer originates) would be determined in the field.

Table J.B.2: Controlled Surface Use buffers for perennial waters.

Water Body Type	Buffer Width (feet)
Fens and wetlands	325–500*
Perennial streams (with or without fish)	325–500 (as measured from ordinary high water mark)
Lotic or lentic springs and seeps	325–500 (as measured from wetland vegetation edge)



For the purpose of: Maintaining the proper functioning condition, including the vegetative, hydrologic, and geomorphic functionality of the perennial water body, to protect water quality, fish habitat, and aquatic habitat and provide a clean, reliable source of water for downstream users. Buffers are expected to indirectly benefit migratory birds, wildlife habitat, amphibians, and other species.

Justification: Minimizing potential deterioration of water quality; maintaining natural hydrologic function and condition of stream channels, banks, floodplains, and riparian communities; and preserving wildlife habitat. The buffers are sized to accommodate the rivers' larger floodplains and wider riparian zones.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: Exceptions may apply if a professionally engineered design is implemented and a construction, maintenance, and reclamation plan can mitigate to the fullest extent all potential resource damage associated with the Proposed Action.

Modifications: No circumstances have been identified under which a modification would be allowed. A 30-day public notice and comment period is required before modification of a stipulation.

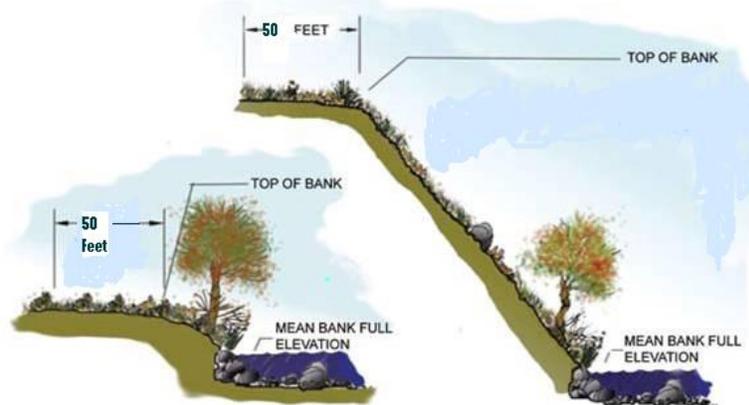
Waivers: No waivers would be authorized unless the areas mapped as possessing the attributes are verified by USFS staff to not possess those attributes. A waiver of stipulations may only be granted through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Intermittent and Ephemeral Streams

No Surface Occupancy

No surface occupancy or use is allowed in the lands described below: NSO of 50 horizontal feet as measured from the top of the stream bank for all intermittent or ephemeral streams (see diagram). If riparian vegetation extends beyond the top of the stream bank, the buffer would be measured from the extent of the riparian vegetation.



For the purpose of: Maintaining and protecting water quality, stream stability, aquatic health, seasonal use and downstream fisheries, and sediment processes downstream.

Justification: Minimizing potential deterioration of water quality and maintaining natural hydrologic function and condition of stream channels, banks, floodplains, and riparian communities.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: Exceptions may apply if a professionally engineered design is implemented and a construction, maintenance, and reclamation plan can mitigate to the fullest extent all potential resource damage associated with the Proposed Action.

Modifications: No circumstances have been identified under which a modification would be allowed. A 30-day public notice and comment period is required before modification of a stipulation.

Waivers: No waivers would be authorized unless the areas mapped as possessing the attributes are verified by USFS staff to not possess those attributes. A waiver of stipulations may only be granted through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

Controlled Surface Use

Surface occupancy or use is subject to the following special operating constraints: CSU from the edge of the NSO buffer to 100 horizontal feet. Avoid locating roads, stream crossings, and facilities within this zone, because activities within this area can potentially affect streams and water quality. Adequate professional design and engineering of activities in this zone is necessary to prevent stormwater runoff and sedimentation. Measurement is from the top of the stream bank, although if wetland vegetation exists, then the measurement is from the vegetation's edge.

For the purpose of: Minimizing the risk of sedimentation, spills, and other contaminants reaching intermittent and/or ephemeral streams to protect water quality, stream function, and aquatic habitat.

Justification: CSU in this zone would minimize potential deterioration of water quality, maintain natural hydrologic function and condition of stream channels, banks, floodplains, and riparian communities.

Exceptions, modifications, and waivers would be considered for BLM leases. On NFS lands, the following exceptions, modifications, and waivers apply:

Exceptions: An exception may be granted by the Authorized Officer if it can be demonstrated that the surface-disturbing activity would cause only negligible impacts to the resource or resource use that the stipulation was designated to protect or would improve the protected resource or resource use as defined by LRMP objectives, standards, or conditions.

Modifications: No circumstances have been identified under which a modification would be allowed. A 30-day public notice and comment period is required before modification of a stipulation.

Waivers: No waivers would be authorized unless the areas mapped as possessing the attributes are verified by USFS staff to not possess those attributes. A waiver of stipulations may only be granted through a land use plan amendment.

Any changes to this stipulation would be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FSM 1950 and 2820.)

APPENDIX J.C – WATER DEPLETION ANALYSIS

Water Depletions Associated with Livestock Grazing

The primary impact to fisheries and aquatic species would be mainly due to degraded habitat resulting from erosion and sedimentation and increased stream temperatures caused by long-term concentrated grazing in riparian areas where stream bank trampling and trailing, stream widening, and stream-side vegetation removal are occurring. Use of LRMP design criteria and referenced documents and manuals should ensure proper rangeland management and reduce the effects to fisheries and aquatic ecosystems.

The impacts related to livestock grazing on the bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker would generally be minor because these fish species do not occur within the planning area. With the exception of associated water-depleting activities, livestock grazing would not impact their habitats. The development of new stock watering features (stock ponds and springs) will result in minor water depletions to the San Juan and Dolores River Basins. It is unknown exactly how many facilities might be constructed over the life of the LRMP, but it is expected that the associated cumulative net depletion amount will be less than 5 acre-feet per year.

Water Depletions Associated with Road Maintenance and Construction

Impacts related to roads and trails on stream flow and sediment production are more specifically described in the Water Resources Section of the LRMP.

Small amounts of water are used in road construction and reconstruction, road maintenance, and dust abatement, resulting in short-term water depletions to the San Juan and Dolores River Basins. This water would be obtained from federal and private sources and will include contracted actions (e.g., Schedule A maintenance by counties to apply magnesium chloride, etc.). Since this water is connected to a federal action, it is considered a discretionary federal action subject to ESA Section 7 consultation requirements. It is estimated that these actions will use approximately 9 acre-feet from the San Juan River Basin and 6 acre-feet from the Dolores River Basin over a 15-year period, excluding road-related activities with gas well drilling and completion.

Water Depletions Associated Oil and Gas Leasing and Development

The impacts related to oil and gas leasing and development on water quantity and water quality are discussed in the Water Resources Section in the LRMP. 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 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 (see Fluid Minerals Section). 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 and NFS lands, respectively.

The potential impacts to aquatic ecosystems and fish species 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. The major river basins affected by the projected development in the Paradox Leasing Analysis Area are the Dolores and San Juan River Basins.

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 J.19). 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.

Table J.C.1: 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

	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 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 (Table J.20 and Table J.21).

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 Table J.20 and Table J.216), the amount of produced water removed may reduce some stream flows in stream systems with warm water sensitive fisheries or tributary to downstream threatened and endangered and 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.

Table J.C.2. Projected Number of Gas Wells and 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 by Major River Basin for National Forest System and Bureau of Land Management Lands under Alternative A

	Future Leases	Future Leases	Existing Leases	Existing Leases
	Dolores River Basin	San Juan River Basin	Dolores River Basin	San Juan River Basin
USFS				
Number of wells	562	24	101	–
Water used (acre-feet)	4,262	216	832	–
BLM				
Number of wells	229	34	326	25
Water used (acre-feet)	1,490	296	2,256	224
Total of water used (acre-feet)	5,752	512	3,088	224

Table J.C.3: Projected Number of Gas Wells and 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 by Major River Basin for National Forest System and Bureau of Land Management Lands under Alternative C

	Future Leases	Future Leases	Existing Leases	Existing Leases
	Dolores River Basin	San Juan River Basin	Dolores River Basin	San Juan River Basin
USFS				
Number of wells	460	20	101	–
Water used (acre-feet)	3,539	185	832	–
BLM				
Number of wells	147	20	326	25
Water used (acre-feet)	928	185	2,256	224
Total of water used (acre-feet)	4,467	370	3,088	224

Decreased stream flows may impact aquatic habitat and fish populations by reducing or eliminating both the extent and quality of suitable habitat by increasing stream temperatures and, subsequently, by 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 J.22). 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 warm water sensitive fisheries or threatened and endangered species (Table 3.2 and Table 3.4 in the Water Section). 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. Elevated salinity levels, over extended periods of time, may become toxic for aquatic ecosystems and fish species.

Table J.C.4: 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

	Alternative A	Alternative B	Alternative C	Alternative D	No Lease 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, 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 below (Table J.23).

Table J.23: Lease Stipulations that Pertain to the Aquatic Ecosystem and Fish Species as Applied by Alternative

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. See Appendix H for full description of distances where NSO applies.	NSO	NSO	NSO	CSU
Perennial streams, water bodies, riparian areas, and fens : From 325 to 500 horizontal feet from the perennial water body, controlled surface use restrictions would apply. See stipulations for full description of distances where CSU applies.	CSU	CSU	CSU	SLT
Reservoirs and lakes For reservoirs and lakes 1 acre or larger as measured by the high water mark,	NSO	NSO	NSO	CSU

Fisheries	Alt A	Alt B	Alt C	Alt D
NSO would be allowed within 0.25 mile of the high water shoreline.				
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 0.25 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 impact has been addressed previously in the Water Resources section of this chapter and is mitigated through the use of BMPs that apply to well drilling operation maintenance and material handling.

In regard to air quality (see Section 1), the effects on aquatic ecosystems and fish species 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 Reasonable Foreseeable Development (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.

Cumulative Impacts

The cumulative impacts to aquatic ecosystems of ongoing basin-wide water development activities have played a major role in the decline of the bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker. The primary cumulative impacts to these species would occur as the result of LRMP and project-level decisions that lead to further water depletions. These activities would primarily be due to the reauthorization of existing uses, authorization of new water development projects, and to gas development and production from current and private mineral estate leases. 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 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 national forest 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 acre-feet and 14 acre-feet of water, respectively, for BLM lands, and 487 acre-feet and 42 acre-feet of water, respectively for national forest 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:

1. Applied Hydrology Associates, Inc. 2000. **3M Project, San Juan Basin, Colorado and New Mexico, Hydrologic Modeling Report**. Prepared for the Southern Ute Indian Tribe, Colorado Oil

- and Gas Conservation Commission, and the Bureau of Land Management.
2. Cox, D., P. Onsager, J. Thomson, R. Reinke, G. Gianinny, C. Vliss, J. Hughes, and M. Janowiak. 2001. ***San Juan Basin Ground Water Modeling Study: Ground Water – Surface Water Interactions between Fruitland CBM Development and Rivers***. Sponsored by the Ground Water Protection Research Foundation.
 3. S.S. Papadopoulos and Associates Inc. in conjunction with Colorado Geological Survey. 2006. ***Coalbed Methane Stream Depletion Assessment Study – Northern San Juan Basin, Colorado***. Sponsored by State of Colorado.
 4. Norwest Corporation. 2009. ***Northern San Juan Basin Groundwater Modeling Project -Final Report***. Sponsored by BP American Production Company, Chevron U.S.A. Inc., Conoco Phillips Company, the Southern Ute Indian Tribe, and XTO Energy Inc.

The 3M model (Applied Hydrology Associates) (**study 1**) simulated the primary streams that cross the Fruitland-Pictured Cliffs aquifer outcrop as receiving discharge water from the Fruitland-Pictured Cliffs aquifer. Estimated total discharge to the rivers crossing the outcrop in Colorado—which includes the Animas, Florida, Los Pinos, Piedra, and the San Juan Rivers—were estimated to equal approximately 200 acre-feet/year. CBM development could deplete all or some portion of this total.

The Cox et al. study (**study 2**) estimated CBM development depletions from the Animas, Florida, and Los Pinos Rivers. The model first simulated pre-CBM development discharge from the Fruitland-Pictured Cliffs aquifer into the three rivers as approximately 145 acre-feet/year. Cox et al. then calculated that the depletion to the three rivers due to CBM water production projected to 2005 would be up to 95 to 100 acre-feet/year. Data did not permit a model to be constructed to evaluate depletion from the Piedra River and Stollsteimer Creek, but projection of results from the area west were used to provide an estimate of 15 to 60 acre-feet/year of depletion from the Piedra-Stollsteimer system by 2050.

According to the S.S. Papadopoulos and Associates 2006 modeling (**study 3**), the riverine depletion as of August 2005 from the CBM wells producing within the Basin in Colorado was modeled to be about 155 acre-feet/year. This quantity does not differ greatly from the above depletions calculated in the 2001 Cox et al. study for the Animas, Florida, and Los Pinos Rivers. Stated differently, riverine depletions are approximately four to 5% of CBM well water produced. The current CBM water production rate from wells operating in the San Juan Basin in Colorado is approximately 3,000 acre-feet/year.

The Norwest report (**study 4**) applied a more conceptually complex treatment to the various layers of the Fruitland and Pictured Cliff Sandstone Formations, while also incorporating 12 perennial streams that have outcrop contact. The study found that in 2007 discharges to surrounding streams were approximately 100 acre-feet/year, which is consistent with the values from studies 1, 2, and 3.

To evaluate future depletions, S.S. Papadopoulos and Associates projected further development of CBM resources beyond 2005 based on information provided in well spacing orders for the Fruitland Formation, on the selected alternative for the FEIS for the Northern San Juan Basin (USFS and BLM, 2006), and on the basis of information provided by Colorado Oil and Gas Conservation Commission (COGCC) personnel. COGCC spacing orders included 80-acre infill development within portions of the Southern Ute Reservation. Two related scenarios were modeled: in the first scenario, all potential future wells were included in the analysis, for a total of 1,516 wells; in the second scenario, wells within a 1.5 mile buffer along the outcrop were omitted. This second scenario recognizes current COGCC prohibitions on drilling within 1.5 miles of the outcrop; under it, 1,155 future wells were installed. Using these assumptions, depletion curves for currently operating wells and under both buffered and unbuffered future well scenarios were determined. These curves indicate that the depletion rate for existing wells would peak in about 2020 at 164 acre-feet/year and that by 2070 depletions would drop below 100 acre-feet/year. Under the buffered future well scenario (i.e., no wells within 1.5 miles of the outcrop), depletions would peak in approximately 2035 at 171 acre-feet/year, and would drop below 100 acre-feet/year by 2150. These depletion estimates are relatively low compared to flows in the rivers. The combined base flows for the Animas, Florida, and Pine Rivers average nearly 200,000 acre-feet/year (Cox et al. 2001).

Our RFD scenario for CBM in the Northern San Juan Basin includes 450 wells to be developed at 80-acre spacing on existing leases. Relying on the above study parameters, to estimate the effects of the RFD,

we assumed 50 barrels/day of produced water per well, or 2 acre-feet/well/year, depletions are approximately 4% of water produced, and that approximately, 40% of projected development would occur on federal mineral estate.

Consequently 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 an indirect impact and addressed in cumulative effects analysis.

Due to heightened concerns about sediment and salinity inputs and subsequent downstream impacts to fishery habitat quality, ground-disturbing activities (including new road construction and well pads) in the Dolores River watershed may also adversely impact these endangered species. Stipulations and BMPs for oil and gas development, as described previously and in the Water and Soils sections of the FEIS, should reduce the potential for measurable sedimentation. Since the exact details for these projects and activities are presently unknown, the impacts continue to be speculative. In addition, water used in road construction and reconstruction, road maintenance, and dust abatement may also impact these endangered species.

