Rio Grande National Forest- Draft Assessment 5
Identifying and Assessing At-risk Species

Contents

Tables

Figures

Introduction

The Rio Grande National Forest surrounds the San Luis Valley and supports a variety of habitat types that extend from the foothill zone at approximately 7,800 feet to a high of 14,345 feet in elevation in the alpine zone. Eleven different habitat types associated with the Southern Rockies Physiographic Region support the vast majority of the approximately 260 species of vertebrate wildlife that occur on the forest. However, the Rio Grande National Forest is unique in that it also interfaces with the Central Shortgrass Prairie Region that extends north from New Mexico and encompasses much of the floor of the San Luis Valley. This intermix of physiographic regions supports some plains and grassland species that may reside in select locations on the forest and/or occur as peripheral populations. The fact that approximately 50 percent of the Rio Grande National Forest occurs as wilderness and/or backcountry designations contributes to the unique remote character and solitude habitat conditions that some rare or large-ranging species prefer.

Wetlands and water bodies comprise aquatic habitats that occupy 42,862 acres or approximately 2.3 percent of the total land area on the Rio Grande National Forest. The water bodies are represented by approximately 2,000 miles of rivers and streams highlighted by the headwaters of the third-largest river in the United States – the Rio Grande. Two other major tributaries are the Conejos and Alamosa Rivers. The water bodies are also represented by hundreds of high mountain lakes, reservoirs and ponds that, along with rivers and streams, account for 4,687 acres or 11 percent of the total. These aquatic habitats contribute significantly to the diversity of species that occur across the landscape. In developing a Forest Plan Revision, the Forest Service planning rule requires the Forest Service to assess the Rio Grande National Forest's at-risk species. The purpose of identifying at-risk species is to help develop forest plans that maintain the diversity of plant and animal communities and provide for the persistence of native species in the plan area. Most species will be maintained by plan components (desired conditions, objective, standards, guidelines, and suitability of lands) that provide for broad ecosystem integrity and ecosystem diversity.

Some species may require additional species-specific plan components, particularly to help in recovering federally recognized species or where it may not be possible to maintain a viable population of some at-risk species within the plan area due to circumstances beyond the authority of the Forest Service or due to limitation in the inherent capability of the land. Examples might be migratory species where viability is primarily affected in other locations, temperature-sensitive species affected by warming temperatures, or where the plan has limited capacity to provide sufficient habitat to sustain the species.

As defined by the 2012 Planning Rule, at-risk species include:

1. Federally recognized threatened, endangered, proposed, and candidate species (FSH 1909.12_10 sec. 12.51).
2. Potential species of conservation concern (FSH 1909.12_10 sec. 12.52).

The planning rule further defines species of conservation concern:

> "A species of conservation concern is a species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species capability to persist over the long-tern in the plan area."

Based on the information, we (the USDA Forest Service Rio Grande National Forest) identified and documented a draft set of at-risk species and assessed plan area ecological conditions for these species.

For this assessment, we follow direction outlined in Forest Service Handbook (FSH) 1909.12 Land Management Planning Handbook, Chapter 10 – The Assessment; Section 12.5 – Identifying and Assessing At-risk Species. The assessment is in progress, and, with this document, we provide the general rationale and overall process being used.

Information Sources and Gaps

Sources of data for this assessment include various published and unpublished reports and data. Key sources include information compiled as part of the Rocky Mountain Region's Species Conservation Project (http://www.fs.usda.gov/detail/r2/landmanagement/?cid=stelprdb5177128), subsequent peer-reviewed literature and other scientific reports, information on species distribution and abundance provided by the Colorado Natural Heritage Program, the Intermountain Herbarium Consortium, and local information. In addition, we also collected information from the public during forest plan revision public engagement efforts beginning in 2014, as well as from Forest Service staff.

Existing Forest Plan Direction

Direction is described in terms of: goals, desired conditions, and standards and guidelines. The goals and desired conditions of a forest plan are broad aspirational desires for the life of the plan. Desired conditions are essentially the same as goals and are a fundamental part of the forestwide management direction. The desired condition statements are a description of the mosaic of land and resource conditions that forest personnel are managing for, on the entire forest.

The standards and guidelines are more specific and can be characterized as "must do" and "should do" respectively.

The existing forestwide desired conditions and goals are:

Goal

Protect, conserve, and restore important terrestrial and aquatic habitats. These include riparian areas, wetlands, and the lands immediately next to them, and representative examples of native plant and animal communities.

- Cooperate with state agencies in improving aquatic ecosystems to meet mutually agreed-upon objectives.
- Protect, conserve, and improve habitat for threatened, endangered, and sensitive species.

Desired Conditions:

Habitats for federally listed threatened, endangered, and proposed endangered species and regionally listed sensitive species are protected, restored, and enhanced. Habitat on National Forest System lands is managed to help assure that those species whose viability is a concern survive throughout their range, and that habitat conditions improve or stabilize. (Ecological Resources, Biological Diversity, Page I-1)

Human influences on aquatic life and riparian areas are unnoticeable. The composition, structure, and function of aquatic ecosystems are undisturbed by human use. Stocking is used as a tool to enhance threatened, endangered, proposed, or sensitive species, and acts to enhance recreation. Wilderness managers work with the Colorado Division of Wildlife on stocking of non-indigenous species. Wildlife species are buffered from human influence. No additional non-indigenous species have been introduced. (MA 1.1-DC2, page IV-3)

Human influence on aquatic life and riparian areas and processes is minimal in most areas. The composition, structure, and function of aquatic ecosystems are minimally disturbed by human influence. Stocking is used as a tool to enhance threatened and endangered species. (MA 1.13-DC2, page IV-7)

Standards

Activities will be managed to avoid loss of population viability to management indicator species. The protection will vary depending on the species, potential for impact, topography, location of important habitat components, and other pertinent factors. Special attention will be given during breeding, young rearing, and other times that are critical to survival. Where appropriate, measures to mitigate adverse effects shall be applied. (Biological Resources: Wildlife S20, added after III-24)

Where newly discovered threatened, endangered, proposed, or sensitive species habitat is identified, an analysis shall be conducted to determine if any adjustments in the Forest Plan are needed. (Biological Resources: Wildlife S6, III-22)

As new recovery plans, conservation agreements, conservation strategies, designations of critical habitat, or Regional documents that contain accepted management direction for threatened, endangered, proposed, or sensitive species are developed, the Forest Plan will be reviewed to determine consistency with the new documents. Where appropriate, the Plan will be amended to incorporate the new direction. (Biological Resources: Wildlife S10, III-23)

Activities will be managed to avoid disturbance of Sensitive species that might result in federal listing or loss of population viability. The protection will vary depending on the species, potential for disturbance, topography, location of important habitat components, and other pertinent factors. Special attention will be given during breeding, young rearing, and other times which are critical to survival. (Biological Resources: Wildlife S7, page II-23)

Areas should be closed to activities to avoid disturbing threatened, endangered, and proposed species during breeding, young rearing, or at other times critical to survival. Exceptions may occur when individuals are adapted to human activity, or the activities are not considered a threat. (Biological Resources: Wildlife S8, page III-23)

The following nine species are management indicator species for forestwide monitoring considerations and any or all may be selected for project analysis purposes. For projects where significant species or habitat concerns or issues are identified, we will address effects on management indicator species accordingly in project National Environmental Policy Act (NEPA) analysis., A biological evaluation/biological assessment will be prepared for threatened, endangered, and proposed species or Forest Service sensitive species: Brown creeper (*Certhia familiaris*, Hermit thrush (*Catharus guttatus*), Pygmy nuthatch (*Sitta pygmaea*), Lincoln's sparrow (*Melospiza lincolnii*), Vesper sparrow (*Poocetes gramineus*), Mule deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus nelsonii*), and Rio Grande cutthroat trout; brook trout or rainbow trout would serve as proxies if cutthroat are not present. (Biological Resources: Wildlife S19, page III-24).

(Specific to MA 1.1) Allow habitat manipulation only for the protection of threatened, endangered, and sensitive species, or where it is necessary to perpetuate or restore natural conditions. (MA 1.1-DC2, page IV-3)

Guidelines

“Some old-growth/late-successional forest stands may be preserved or deferred from harvesting to maintain biotic diversity within the landscape/watershed. Size, distribution, abundance, and degree of

habitat variation between old growth stands will be assessed. The following will be considered in selecting old-growth stands that may be retained:

- Older stands that have not been manipulated are more desirable than younger ones.
- Stands with limited uses and access by humans are better to maintain old-growth characteristics.
- Stands that are habitat for species listed as threatened, endangered, and sensitive species or Colorado Natural Heritage Program Species of Special Concern.
- Stands exhibiting a greater variety of attributes, such as diverse canopy layers, decadence in live trees, standing and/or downed dead, patchiness, etc. (see Mehl 1992)." (Biological Resources: Biodiversity, page III-13)

"Opportunities to convey lands should be considered when involving:

- Important or unique resources (such as wetlands, floodplains, essential big-game winter range, Threatened or Endangered species habitat, and important historical or heritage resources) that may be conveyed when resource loss is mitigated or offset by acquisition of resource values on nonfederal lands.
- Lands in developed areas that have lost or are losing their National Forest character.
- Lands that would contribute to community growth, development, and economic prosperity." (Land Ownership and Special Uses: Real Estate-Land Adjustments G11, page III-32)

Scale of Analysis (Area of Influence)

- For most species, the scale of analysis for assessments and planning process is the plan area. For select wide-ranging species (e.g., Canada lynx), the scale of analysis may be larger than the plan area.
- The Forest Service used the U.S. Fish and Wildlife Service's Information and Planning Conservation system (http://ecos.fws.gov/ipac/project/6KO3S5BV2REVHGTHTQMSSC27PA/resources) to identify federally listed threatened and endangered species, species proposed for Federal listing, and candidate species in the plan area. (FSH1909.12 (10)(12.51))

Assessment 5 Development Process

Forest Service Handbook direction for Identifying and Assessing At-risk Species is found at 1909.12 – Land Management Planning – Chapter 10 – section 12.5 – 12.55. The Rio Grande National Forest is the first forest in the Rocky Mountain Region to undergo plan revision using direction from the 2012 Planning Rule. In an effort to develop an effective and efficient process for meeting the intent of the 2012 Planning Rule, we took the following approach to completing Assessment 5.

1. Staff at the Rio Grande National Forest and the Forest Service Region 2 office used the direction at FSH 1909.10 to develop and refine the list of at-risk species, which include mammals, birds, invertebrates, fish and plants that are known to occur in the plan area. The list of at-risk species includes:
    a. Species federally recognized under the Endangered Species Act as endangered, threatened, proposed or candidates.
    b. Potential species of conservation concern. The existing Regional Forester's sensitive species list provided the initial starting point, and was complemented by species that 'must' be considered (NatureServe rankings G/T1, G/T2, G/T3 or S1 or S2) and those that should be considered from various other sources (e.g., State Wildlife Action Plans), as specified in FSH 1909.10 section 12.52.

2. We developed a "species overview" template based on details in FSH 1909.12. This overview is designed to capture the best available science information following current manual and handbook direction. These overviews highlight key elements of life history, distribution, risk factors and ecological conditions necessary for recovery, conservation and viability of at-risk species. Species overviews include key information gaps and uncertainties, as well as distribution or occurrence maps and, when available, envirograms.
3. Resource specialists reviewed and refined species overviews.
4. We eliminated species not known to occur within the planning area from further consideration in assessing the at-risk species. Rationale for this is documented in Table 3.
5. For at-risk species known to occur in the planning area, we used the species overviews to populate a species database that includes ecological conditions required by each species as well as risk factors that influence recovery, conservation, and viability. In developing the ecological conditions database, we captured information directly as it is reported in the scientific literature rather than develop an *a priori* list of ecological conditions and risk factors. As we populated the database, we aggregated information into common terminology across species as appropriate.
6. After the species database was initially completed, we further reviewed information for a subset of species to assure the process of developing species overviews from the best available science information. Using these species overviews to populate the species database captures the key ecological conditions and risk factors for each species.
7. We analyzed the species database to identify the select set of ecological conditions for subsequent assessment. This process reveals ecological conditions that are important to multiple species as well those that are critical to individual species. This approach is consistent with the concept of grouping species for assessment as described in FSH1909.12 Chapter 10.12.54, but emphasizes ecological conditions and risk factors rather than species groups per se.
8. For the select set of ecological conditions and risk factors, we will identify approaches to assess their current status and likely future trends on the forest.
    a. Some of the select set of ecological conditions may be direct outputs from other assessments completed as part of the plan revision process (e.g., key ecosystem characteristics identified and assessed for Assessments 1 and 3) while others may require establishing relationships between the ecological condition and outputs from other assessments. We will not include some ecological conditions in other assessments; for these conditions, other readily available sources of information will be incorporated into this assessment as appropriate.
    b. Assessments of ecological conditions and risk factors may be quantitative or qualitative and may be spatial or non-spatial.
9. Staff at the Forest Service Region 2 office prepared the draft of Assessment 5, which highlights the overall approach, and status and trend of the ecological conditions and risk factors associated with the at-risk species.
    a. Assessment 5 includes rationale for proposed at-risk species that are to be carried into revision.
    b. Species overviews and similar information are available as supporting information.
    c. The assessment focuses on the trends of the select set of ecological conditions and risk factors.
    d. Based on the results of public engagement, we will finalize the list of at-risk species for regional office approval. It is possible that information summarized in this assessment will provide rationale for dropping a potential species of conservation concern, though this is expected to be rare.

Federally Recognized Species

We assessed the following eight species for the ecological conditions needed to recover viable populations. This includes species listed by the U.S. Fish and Wildlife Service as threatened, endangered, candidate, or proposed (Table 1). Some of these species may not be documented on the Rio Grande National Forest, but have potential for recolonization or reintroduction, or else they may be indirectly influenced by the management practices of the forest. We generated this list using the Fish and Wildlife Service's online Information for Planning and Conservation system.

Table 1. Federally recognized species

Common Name	Scientific Name	Status
Uncompahgre fritillary butterfly	*Boloria acrocnema*	Endangered
Black-footed ferret	*Mustela nigripes*	Endangered Nearby population is experimental, non-essential.
Canada lynx	*Lynx canadensis*	Threatened
New Mexico meadow jumping mouse	*Zapus hudsonius luteus*	Endangered
Gunnison sage grouse	*Centrocercus minimus*	Threatened
Mexican spotted owl	*Strix occidentalis lucida*	Threatened
Southwest willow flycatcher	*Empidonax traillii extimus*	Endangered
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened

Uncompahgre Fritillary Butterfly

Distribution, Abundance, Demographics and Population Trends on the Rio Grande National Forest

Uncompahgre fritillary butterfly is narrow endemic, restricted to isolated alpine habitats in the San Juan Mountains of southwestern Colorado (NatureServe 2015). Mt. Uncompahgre and Redcloud Peak were the only two colonies known at the time of listing and recovery planning. Shortly after completion of the recovery plan, an additional colony was discovered. Eight other colonies were discovered in subsequent years (USDI Fish and Wildlife Service 2009).

Currently, 11 known colonies exist – 3 are quantitatively monitored with line transects, and the remaining 8 are monitored only for presence. Three of the colonies have been monitored for population status for more than 10 years, but the data are not sufficient to determine that the population has been stable or increasing during this time. Much of the data collected before 2003 were unreliable because of changes in transect methodology and missing data (USDI Fish and Wildlife Service 2009).

Five of the known 11 colonies occur within the Rio Grande National Forest. Quantitative population data is not recorded for these sites; therefore, abundance and trend information for populations within the planning area has not been identified.

Based on the monitoring report for the 2014 field season (Alexander and Keck 2015). The ongoing qualitative monitoring of the 11 confirmed populations documented population persistence at only 9 of the 11 known colonies. Persistence has not been documented at Rio Grande Pyramid colony for 2 years and likewise for 7 years at the Machin Lake colony of the Canyon Diablo population. The lack of confirmation of Uncompahgre fritillary butterflies at the Machin Lake colony for 7 years and the Cinnamon Pass colony for over a decade may indicate that some populations may be extirpated.

Ecological Requirements, Current Condition and Trends

All known Uncompahgre fritillary butterfly populations are associated with large patches of snow willow (*Salix nivalis*) above 12,000 feet, which provide food and cover. The species is found primarily on northeast-facing slopes, which are the coolest and wettest microhabitat available in the San Juan Mountains.

Females lay their eggs on snow willow, which is also the larval food plant, while adults take nectar from a wide range of flowering alpine plants (USDI Fish and Wildlife Service 2015). Adults fly about late July into August. Flight is possible only in warm sunny weather. The species is biennial (requiring 2 years to complete the life cycle), but flies in both odd and even years (NatureServe 2015).

Threats and Risk Factors

Illegal collecting has taken place in the past at some well-known locations. Therefore, the ongoing, recommended strategy is to prevent the locations of populations from becoming public knowledge. However, the likelihood and consequences of this collecting have been reduced in relationship to other factors associated with the long-term persistence of this species (R. Ghormley, pers. comm., July 2015)

Recognizing the potential threat from livestock grazing, the Forest Service avoids sheep grazing within Uncompahgre fritillary butterfly colonies altogether, or allows only trailing through the colonies and suitable habitat, but not bedding or long-term grazing. The only colony with sheep trailing through the colony on a reoccurring (but inconsistent) basis has been Mt. Uncompahgre, which is located outside the planning area (USDI Fish and Wildlife Service 2009).

Evidence of cattle grazing on the Machin Lake colony on the Rio Grande National Forest occurred in 2007, but has not been noted since that time. Persistence of Uncompahgre fritillary butterflies at this colony was documented the year after livestock grazing (in 2008), but has not been noted since that time. Also, the lack of evidence for persistence at some subpopulations may indicate that these populations are not always stable or that population numbers are relatively low and that the emergence period is relatively short. (Alexander and Keck 2015).

Climate change remains a concern because of the relatively limited habitat size and high elevation of this species. Climate change may be affecting the developmental timing of Uncompahgre fritillary butterflies, which may account for some shifts in persistence. Events such as the early emergence date in 2012 may be additional anecdotal evidence (Alexander and Keck 2015). Existing and predicted climate trends may also present implications for other alpine system pollinators. Future monitoring and assessment is needed to evaluate the threat of climate change on this federally endangered species (Alexander and Keck 2015).

Threats listed in the final listing rule and the recovery plan include trampling of the Uncompahgre fritillary butterfly and its habitat by humans and livestock, collecting, lack of regulatory mechanisms, adverse climatic changes, small population size, and low genetic variability (USDI Fish and Wildlife Service 2009). While most known populations are in remote areas, potential threats to the species' persistence still exist. Increasing recreational traffic, including extensive off-trail use, domestic livestock grazing, grazing by wild ungulates, and the potential for global climate change all pose problems to habitat necessary for the species' recovery. Illegal collecting may also continue at some colonies, although none has been documented recently (Alexander and Keck 2015).

Black-footed Ferret

Distribution, Abundance, Demographics and Population Trends on the Rio Grande National Forest

Historical range covered much of western North America's intermountain and prairie grasslands coinciding with black-tailed, white-tailed, and Gunnison's prairie dog distributions, including the San Luis Valley (USDI Fish and Wildlife Service 2013a). Current distribution consists of 16 sites in 8 states, Canada, and Mexico (USDI Fish and Wildlife Service 2010). Only one reintroduction site exists within Colorado (Wolf Creek, northwestern Colorado).

Two historical observations, dated 1900 and 1930, occurred within the planning area (Table 2, NRIS database; Figure 1); however, the Rio Grande National Forest contains no known occurrences of the species in the last 20 years and no existing or proposed reintroduction sites. The nearest known population is located at Vermejo Park Ranch, northern New Mexico, approximately 43 miles from the planning area (USDI Fish and Wildlife Service 2013a). The ferrets at Vermejo Ranch are classified as an experimental, non-essential population.

Ecological Requirements, Current Condition and Trends

Suitable habitat consists of grasslands and prairies containing prairie dog towns. Ferrets use existing prairie dog burrows for shelter and feed predominately on prairie dogs.

Mating season occurs from March to April. Gestation lasts about 41 to 43 days with kits born May to June. Kits stay below ground until they are approximately 2 months old, after which the mother moves them to different burrows within the home range (USDI Fish and Wildlife Service 2010).

Home range of females occupying high-density prairie dog habitat averages approximately 148 acres, whereas males average about 321 acres. Female and male territories average 32 acres and 89 acres, respectively (USDI Fish and Wildlife Service 2013a).

The following actions are identified to address threats to black-footed ferret and promote recovery of the species (USDI Fish and Wildlife Service 2013a):

1. Conserve and manage a captive ferret population of sufficient size and structure to support genetic management and reintroduction efforts.
2. Identify prairie dog habitats with the highest biological potential for supporting future free-ranging populations of ferrets.
3. Establish free-ranging populations of ferrets to meet downlisting and delisting criteria.
4. Ensure sufficient habitat to support a wide distribution of ferret populations over the long term considering social, political, and economic concerns of local residents.
5. Reduce disease-related threats in wild populations of ferrets and associated species.
6. Support partner involvement and conduct adaptive management through cooperative interchange.

Threats and Risk Factors

Black-footed ferret population declines are attributed primarily to three factors: conversion of native grassland to cropland, poisoning of prairie dogs to reduce competition with domestic livestock, and introduction of the exotic disease – sylvatic plague. Each of these factors resulted in substantial loss of prairie dogs, leading to an even greater decline in ferret populations because of the species' dependency

on large expanses of habitat occupied by prairie dogs (Lockhart et al. 2006 cited in USDI Fish and Wildlife Service 2013a).

Currently, the primary threat to the black-footed ferret is disease (i.e., sylvatic plague and canine distemper). Other risk factors include ongoing habitat loss due to conversion, recreational shooting, predation, poisoning of prairie dogs, and climate change (USDI Fish and Wildlife Service 2013a).

Map of Known Occurrences and Suitable Habitat

Black-footed ferret habitat modeled for the Rio Grande National Forest coincides with habitats modeled as suitable for Gunnison's prairie dog. Gunnison's prairie dog habitat was modeled for the planning area using elevation, slope, soils, and vegetation characteristics. Areas below 10,500 feet on slopes less than 15 percent, with suitable soils for excavating (e.g., loamy, outwash, limy, and sandy) that coincide with grass or riparian cover types generally lacking tree cover (less than10 percent) were selected. A total of 90,320 acres is modeled as suitable within the planning area (Figure 1).

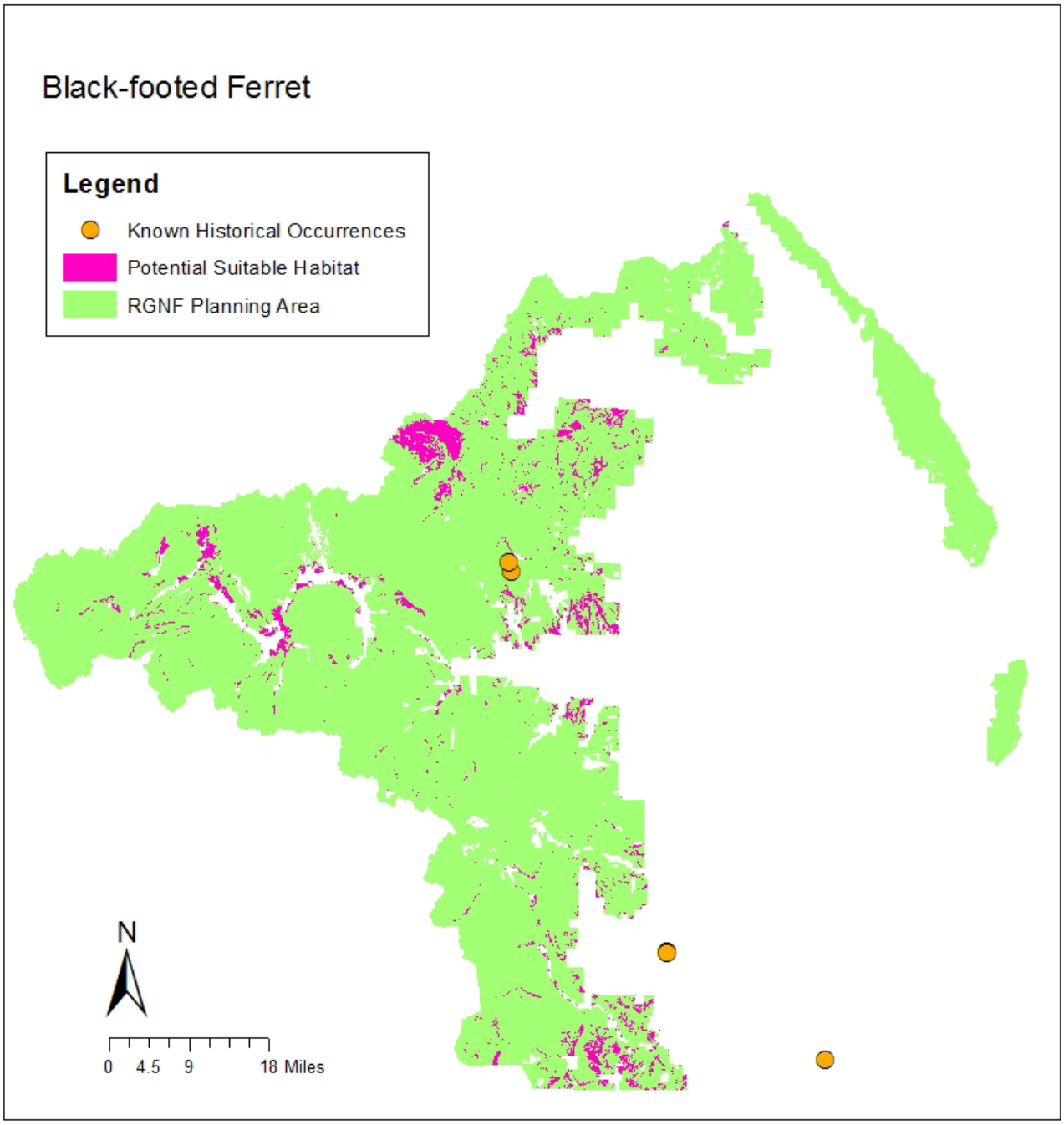

Figure 1. Black-footed ferret occurrences and habitat on the Rio Grande National Forest (RGNF)

Canada Lynx

Distribution, Abundance, Demographics and Population Trends on the Rio Grande National Forest

In 1999, the Colorado Parks and Wildlife initiated a lynx recovery program intended to augment any existing populations in the southern Rockies with transplants from Canada and Alaska to re-establish a self-sustaining breeding population. The augmentation program resulted in a total of 218 lynx being transplanted into the San Juan Mountains between 1999 and 2006.

Lynx reproductive rates in Colorado have varied greatly since kittens were first documented in 2003. Recent kittens produced by two female lynx on the Rio Grande National Forest during the 2015 breeding season represent the first documented reproduction since 2010 (R. Ghormley, pers. comm. 2015).

The Rio Grande National Forest represents a large portion of the core area for lynx reintroduced to Colorado, with approximately 85 percent of the 218 lynx reintroduced to Colorado from 1999 to 2006 being released on the planning area. The vast majority of lynx within Colorado remains and reproduces in the high-elevation spruce-fir zone in the southwestern portion of the state, including the Rio Grande National Forest. Currently, lynx continue to use and reproduce on local spruce-fir habitats and the riparian areas within that habitat remain essential to their eventual recovery and delisting (USDA Forest Service 2014).

Lynx habitat within the planning area was most recently modeled and mapped in 2011. Approximately 867,241 acres are classified as lynx primary habitat, 170,847 acres are delineated as secondary habitat (Figure 1), and 6,299 acres are identified as unsuitable habitat (USDA Forest Service 2011). Four linkage areas have also been delineated. Lynx habitat on the Rio Grande National Forest extends across administrative boundaries within the greater San Juan Mountains area and includes the San Juan and Grand Mesa, Uncompahgre, and Gunnison National Forests. Individual lynx are known to have used all or any one of these Rio Grande National Forest units in the greater San Juan Mountains area (Theobald 2011). Connective habitat between administrative units in the San Juan Mountains and beyond is essential for facilitating Canada lynx movement across the landscape.

Data from flights conducted from 2010 to 2014 show that spruce beetle mortality affected approximately 782,137 acres of suitable lynx habitat, while mountain pine beetle mortality affected about 221 acres (Figure 2). Severity of mortality varies across the landscape, ranging from less than one tree per acre to over 100 trees per acre in some areas.

In 2013, a study to investigate how lynx respond to forests heavily influenced by spruce bark beetles in the San Juan Mountains of southern Colorado began. Preliminary results suggest that bark beetle mortality does not appear to be currently influencing lynx distribution or reproduction (R. Ghormley, pers. comm. 2015).

Ecological Requirements, Current Condition and Trends

Canada lynx habitat primarily occurs in the subalpine and upper montane forest zones. Recent data indicate that the majority of the habitat used on the Rio Grande National Forest occurs between 9,900 to 11,620 feet (Theobald and Shenk 2011). Forests in these zones typically contain deep winter snows and are dominated by subalpine fir, Engelmann spruce, aspen, and lodgepole pine. Radio-telemetry and tracking have documented a preference for these forest types, particularly spruce-fir associations (Theobald and Shenk 2011). Reintroduced lynx use other habitats including spruce-fir/aspen associations and various riparian and riparian-associated areas dominated by dense willow (Shenk 2009).

Lynx distribution is closely tied to habitats that support an abundant population of snowshoe hare (Koehler 1990, Aubry et al. 2000). These habitats are generally regenerating stands that contain dense, small-diameter stems that provide both food and horizontal cover (Koehler 1990, Aubry et al. 2000). In Colorado, both small-diameter lodgepole stands and mature spruce-fir stands support the highest density of snowshoe hares, although the latter may be of more importance on a year-round basis due to the long-term persistence and distribution of mature spruce-fir stands (Ivan 2011). Reintroduced lynx in Colorado also use red squirrels, cottontails, and other alternate prey items. Red squirrels are closely associated with mature forest conditions, and would occur sympatrically with snowshoe hare as an important alternate prey species (Buskirk et al. 2000). The increased use of riparian-willow systems by reintroduced lynx during late summer and fall is also considered to be associated with alternate prey sources (Shenk 2009).

Births by reintroduced lynx on the Rio Grande National Forest occurred in late May to mid-June (Shenk 2009. All den sites found in the forest have occurred within the spruce-fir zone on steep, north-facing slopes and are most often associated with a substantial amount of large-diameter woody debris (Merrill 2005, Shenk 2009). Average elevation is 11,004 feet (Shenk 2009). Disturbances such as insects and disease and windthrow contribute to the downed log component, and are therefore, important for reproduction and protection for the kittens (Aubry et al. 2000). For denning habitat to be functional, however, it must be in or adjacent to quality foraging habitat. Because lynx may frequently move their kittens in the first few months, multiple nursery sites are needed that provide kittens with downed logs, overhead cover, and protection from predators and the elements (Ruediger et al. 2000) throughout the home range.

Lynx are known to move long distances, but open areas, whether man-made or natural, may not be used as extensively (Mowat et al. 2000). In north-central Washington, lynx typically avoided openings greater than about 300 feet wide (Koehler and Brittell 1990). However, the southern Rockies consist of more heterogeneous forest types and their response to natural or created openings may differ (Ruggiero et al. 2000). Habitat use information for lynx in Colorado indicates that canopy closures of at least 40 percent are important at the site scale, regardless of the type of cover involved (Shenk 2006). Additional analysis of radio-collared data for reintroduced lynx in Colorado indicates that the average proportion of forest (upper montane) in lynx habitat was 0.65, with the majority occurring in areas with at least 20 percent forested (upper montane) cover. Habitat use was also associated with distance from large patches (over 50 hectares, 124 acres) of forest (upper montane) cover, with the majority of habitat within 3.35 kilometers (2.1 miles), and the average at 0.36 kilometers (0.2 mile). The average proportion of grasslands was 0.16. There was little association of lynx habitat use areas with other land cover types (Theobald and Shenk 2011). These data indicate that most lynx use in Colorado is associated with larger contiguous blocks of forest primarily dominated by spruce-fir forest cover types.

Forested conditions between foraging and denning habitat has also been shown to facilitate movement within the home range, particularly along ridgelines where lynx commonly travel (Ruggiero et al. 1994). Linkage areas may be provided by forest stringers that connect large forested areas, or by low, forested passes that connect subalpine forests on opposite sides of a mountain range (Ruediger et al. 2000).

Specific ecological conditions for recovery, conservation, and viability of Canada lynx on the Rio Grande National Forest are best described in the Southern Rockies Lynx Amendment (SRLA 2008). All key criteria in the Southern Rockies Lynx Amendment management direction (objectives, standards, and guidelines) should be considered for local conservation and recovery efforts, but are too numerous to mention here. However, some key ecological conditions considered important on the forest include:

- Recognition that lynx conservation and recovery is a multi-unit landscape-scale issue that involves cross-boundary coordination and consistency.

- A conservation focus on late-successional spruce-fir cover types in combination with aspen and cool-moist mixed conifer stand components represent the majority of the high-quality lynx habitat locally. High-elevation willow-riparian systems also represent high value for summer foraging use. In the post-spruce beetle environment, a focus on stands that previously were mapped as 4c structural class still contain the structural legacies, green cohorts, and understory components that most likely provide for the key life history requirements of lynx and key prey species.
- High-quality lynx analysis units that are well-connected within and between lynx analysis units.

  Connectivity attributes that facilitate movement should be further defined and mapped across the Unit and adjoining unit landscapes.
- Recognition of high-value movement and dispersal areas that may require a management focus even when outside of existing lynx analysis units or known occupied reproductive habitat. A local example is the North Pass area on the Saguache Ranger District that may provide for dispersal and ingress of lynx in and out of the local core area.
- Protection, maintenance, and restoration of dense understory conditions that support primary prey species (snowshoe hare), particularly when associated with late-successional spruce-fir cover types or post-bark beetle conditions in former late-successional green forests.
- In the post spruce-beetle outbreak condition, a refocus on what constitutes high-quality habitat for key prey species, lynx, and reproduction.
- Uncompacted snow conditions and management of over-the-snow vehicle route densities.

Threats and Risk Factors

The Southern Rockies Lynx Amendment (USDA Forest Service 2008b) incorporated and addressed the following risk factors for lynx:

The Canada lynx conservation assessment and strategy (Ruediger et al. 2000) identified several specific management activities and practices termed “risk factors” for the Southern Rockies geographic area. Risk factors affecting lynx productivity included fire exclusion, grazing, and winter recreational uses that create compacted snow conditions.

- Unmanaged grazing by domestic and wild ungulates in aspen and high elevation willow stands can degrade snowshoe hare habitat. Grazing influences on riparian willow is not considered a broadscale factor influencing high-elevation riparian willow habitat on the Rio Grande National Forest; however, it can be a localized issue in certain areas, particularly those with a meadow or grassland park interface.

- Road, trail, and recreational activities that result in snow compaction may facilitate increased access into lynx habitat and competition for food resources by competitors (primarily coyotes). Over-the-snow vehicle use is noted as a local concern on the Rio Grande National Forest with use demand on the increase.

- Risk factors affecting lynx mortality include trapping, predator control activities, predation by mountain lions, and being hit by vehicles on major highways. Illegal trapping methods for legal take species in lynx habitat have been noted as a concern on one occasion on the Rio Grande National Forest.

- Risk factors affecting lynx movement include barriers to movements such as major highways and associated development within rights-of-way. Private land development, especially along road corridors in mountain valleys, may also fragment habitat and impede movement of lynx. Urban

expansion and development on private land has further fragmented an already patchy distribution of lynx habitat, many times in response to development or expansion of a developed recreational facility on NFS lands within lynx habitats. Currently, the Rio Grande National Forest supports four key linkage areas that highlight highway crossing and/or movement concerns. As elsewhere, traffic volume is expected to increase in the future and this concern remains valid locally. Fragmentation of habitat and additional movement impairment is also a concern locally as evidenced by the approved land exchange and proposed development at Wolf Creek Pass.

The threats and risk factors identified in the Southern Rockies Lynx Amendment and the management direction to address them remain valid on the Rio Grande National Forest. However, a focused analysis and reevaluation on the significance of these threats and potential adjustments in management direction is warranted in the post-spruce beetle landscape. Specifically, a reevaluation of what constitutes high-quality habitat in the post-spruce beetle environment is needed. Specific threats and risk factors in the post spruce beetle environment include:

- Inability to map suitable habitat across lynx analysis units and adjacent national forest units due to rapid changes from spruce beetle outbreak.
- Uncertainties associated with baseline habitat condition changes due to significant natural events such as spruce beetles, and the relationship of these changes to ongoing management activities that further influence baseline conditions. Uncertainty in management activity thresholds.
- Uncertainty in what constitutes high-quality habitat in the post spruce beetle landscape, and revised management direction to address these conditions in association with vegetation management.
- A significant increase in over-the-snow vehicles, potential snow compaction and disturbance.

Lynx in the contiguous United States were listed as threatened under the Endangered Species Act in 2000, primarily because regulations governing forest management activities on Federal lands were deemed inadequate, at that time, to conserve lynx and their habitats. Since listing, most Federal land managers throughout the lynx's range, including national forests in USFS Region 2 have formally amended management plans to conserve lynx and hare habitats (USDI Fish and Wildlife Service 2013b; USDA Forest Service 2008a).

Recent modeling suggests that climate change is likely to impact lynx in the distinct population segment. Although the timing, magnitude, and consequences of climate-related impacts are difficult to predict, lynx habitats and populations in the contiguous U.S. are likely to be smaller and more isolated in the future and, therefore, more vulnerable to other threats (USDI Fish and Wildlife Service 2013b).

Map of Suitable Habitats within the Planning Area

Mapped suitable habitats and linkage areas (described above) as well as insect and wildfire disturbances within the planning area (discussed above) are displayed in Figure 2.

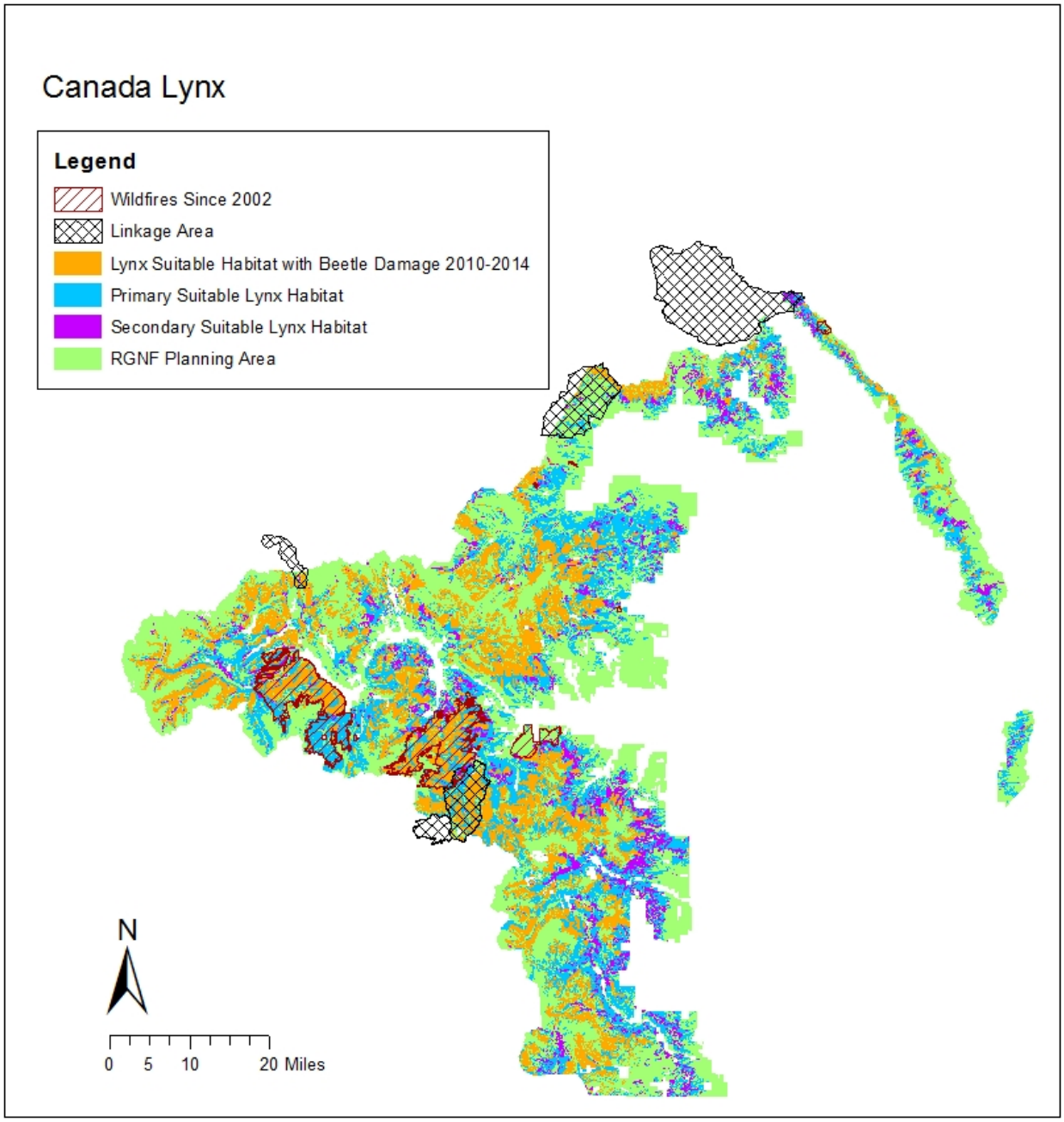

Figure 2. Canada lynx mapped suitable habitat, linkage areas, and recent forest beetle and wildfire disturbances

New Mexico Meadow Jumping Mouse

Distribution, Abundance, Demographics and Population Trends on the Rio Grande National Forest

The New Mexico meadow jumping mouse (jumping mouse) is endemic to New Mexico, Arizona, and a small area of southern Colorado (Hafner et al. 1981, pp. 501-502; Jones 1999, p. 1).

There are currently no known occurrences of New Mexico meadow jumping mouse in the planning area (Table 2); therefore, no trend information is available.

Ecological Requirements, Current Condition and Trends.

The jumping mouse is a habitat specialist (Frey 2006, p. 3). It nests in dry soils, but uses moist, streamside, dense riparian/wetland vegetation up to an elevation of about 8,000 feet (Frey 2006, pp. 34-45). The species appears to only utilize two riparian community types: (1) persistent emergent herbaceous wetlands and (2) scrub-shrub wetlands (Frey 2005, p. 53). It especially uses microhabitats of patches or stringers of tall dense sedges on moist soil along the edge of permanent water.

It is active only during the growing season of the grasses and forbs on which it depends. During the growing season, the jumping mouse accumulates fat reserves by consuming seeds. Preparation for hibernation (weight gain, nest building) seems to be triggered by day length. The jumping mouse hibernates about 9 months out of the year, longer than most other mammals (Morrison 1990, p. 141; VanPelt 1993, p. 1; Frey 2005, p. 59).

Habitat Requirements

Riparian communities along rivers and streams, springs and wetlands, or canals and ditches that contain:

- Persistent emergent herbaceous wetlands especially characterized by presence of primarily forbs and sedges (*Carex* spp. or *Schoenoplectus pungens*); or
- Scrub-shrub riparian areas that are composed of willows (*Salix* spp.) or alders (*Alnus* spp.) with an understory of primarily forbs and sedges;
- Flowing water that provides saturated soils throughout the New Mexico meadow jumping mouse's active season that supports tall (average stubble height of herbaceous vegetation of at least 61 cm (24 inches) and dense herbaceous riparian vegetation composed primarily of sedges (*Carex* spp. or *Schoenoplectus pungens*) and forbs, including, but not limited to one or more of the following associated species: spikerush (*Eleocharis macrostachya*), beaked sedge (*Carex rostrata*), rushes (*Juncus* spp. and *Scirpus* spp.), and numerous species of grasses such as bluegrass (*Poa* spp.), slender wheatgrass (*Elymus trachycaulus*), brome (*Bromus* spp.), foxtail barley (*Hordeum jubatum*), or Japanese brome (*Bromus japonicas*), and forbs such as water hemlock (*Circuta douglasii*), field mint (*Mentha arvense*), asters (*Aster* spp.), or cutleaf coneflower (*Rudbeckia laciniata*);
- Sufficient areas of 9 to 24 kilometers (5.6 to 15 miles) along a stream, ditch, or canal that contains suitable or restorable habitat to support movements of individual New Mexico meadow jumping mice; and
- Include adjacent floodplain and upland areas extending approximately 100 meters (330 feet) outward from the boundary between the active water channel and the floodplain (as defined by the bankfull stage of streams) or from the top edge of the ditch or canal.

Food Habits

Based on studies of other species, jumping mice (*Zapus* spp.) diets are varied, consisting of seeds, insects, fruits, and fungi (Quimby 1951, pp. 85–86; Hoffmeister 1986, p. 455; Morrison 1990, p. 141). Morrison (1990, p. 141) reported that jumping mice feed primarily on seeds of grasses and forbs, with seeds of sedges, bulrush (*Scirpus* spp.), and cattail (*Typha latifolia*) infrequently eaten.

Movement / Home Range

New Mexico meadow jumping mice are generally believed to have limited vagility (ability to move) and possibly dispersal capabilities (Morrison 1988, p. 13; Frey and Wright 2012, pp. 43, 109).

Reproductive Strategy

Although little is known about the reproductive needs of the jumping mouse, the breeding season probably begins in July or August, with one litter produced each year (Morrison 1987, pp. 14–15; 1989, 22; Frey and Wright 2011, p. 69; 2012b, p. 5). Jumping mice (*Zapus* spp.) breed shortly after emerging from hibernation and may give birth to 2 to 7 young after an average 17- to 21-day gestation (Quimby 1951, p. 63; Frey and Wright 2011, p. 69).

Ecological conditions for recovery, conservation, and viability

Species Requirements

INDIVIDUAL NEEDS

- Dense herbaceous vegetation of sedges and forbs (24 inches or taller) along flowing streams to support feeding and sheltering.
- Adjacent uplands to support breeding and hibernation.

POPULATION NEEDS:

- Nearly continuous suitable habitat along at least 5.6 miles with 68 or more acres of streams, ditches, or canals to support large, resilient populations.

RANGEWIDE SPECIES NEEDS:

- Multiple (two or more) resilient populations are needed (for redundancy) in each of eight geographic management areas across the range (for representation).

Existing Condition

INDIVIDUAL CONDITIONS:

- Existing habitat condition is unknown, but presumed suitable.

POPULATION CONDITIONS:

- All 29 locations found since 2005 have insufficient habitat conditions with high potential for extirpation.
- At least 11 populations have been significantly compromised since 2011.

RANGEWIDE CONDITIONS:

- Four geographic management areas currently have two or more locations occupied by the mouse, but are too small and isolated to be resilient.

- Four geographic management areas currently have only one recent location occupied by the mouse, but are too small to be resilient.
- Some diversity is maintained across the eight geographic management areas, but no adequate resilient populations exist.

OVERALL SPECIES VIABILITY IS LOW.

Future Condition (Viability)

NO RESILIENCY

- Without active conservation (grazing management; water and vegetation management) each of the populations will continue to be too small to be resilient and are highly vulnerable to future extirpation.
- Climate change and high impact wildfire will continue to threaten many current locations with extirpation.

REDUNDANCY IS LOW

- With no current resilient populations, the species has no redundancy (populations are too small and isolated and have a low probability of persistence).

REPRESENTATION IS LOW

- Only four of eight geographic management areas have multiple populations, but none are resilient.
- Some diversity is maintained

Threats and Risk Factors

MAIN STRESSOR: Habitat Loss

MAIN SOURCES:

- Grazing eliminates herbaceous vegetation.
- Lack of water (from low precipitation or diversion) results in loss of saturated soils and loss of herbaceous vegetation.
- Future climate change may make water less available to support habitat.
- Secondary sources of habitat loss include high intensity wildfire; flooding; development; road construction; recreation; and vegetation mowing.

Key information needs include routine survey and monitoring in historic and known population areas to determine presence absence of species.

Gunnison Sage Grouse

Distribution, Abundance, Demographics and Population Trends on the Rio Grande National Forest

Historically, the range of the Gunnison sage-grouse included parts of central and southwestern Colorado, southeastern Utah, northwestern New Mexico and northeastern Arizona. Gunnison sage-grouse currently

occur in seven populations in southwestern Colorado and southeastern Utah (USDI Fish and Wildlife Service 2014c).

The Poncha Pass population is the only Gunnison sage-grouse population associated with the planning area. Delineated occupied distribution of this population covers approximately 27,747 acres, of which approximately 5,060 acres coincides with lands managed by the Rio Grande National Forest. Approximately 725 acres of sagebrush habitat occur on Rio Grande National Forest lands within or near the Poncha Pass population delineation.

Status of the Poncha Pass population is described by the Fish and Wildlife Service (USDI Fish and Wildlife Service 2014c). Poncha Pass is thought to have been part of the historical distribution of Gunnison sage-grouse. However, there were no grouse there when a population was established via transplant from 30 Gunnison Basin birds in 1971 and 1972. No population's trend information was available until 1999, when the population was estimated at roughly 25 birds. In one year, the population declined to less than 5 grouse, when more grouse were brought in, again from the Gunnison Basin, in 2000 and 2001. In 2002, the population increased to just over 40 grouse, but began declining in 2006, until no grouse were detected in lek surveys in the spring of 2013. Grouse were again brought in in the fall of 2013 and 2014, and 6 birds were counted in the Poncha Pass population during the spring 2014 lek count (CPW 2014d, cited in USDI Fish and Wildlife Service 2014c); however, no subsequent evidence of reproduction was found. Therefore, the Fish and Wildlife Service concluded in 2014 that the Poncha Pass area is not a landscape capable of supporting Gunnison sage-grouse, and subsequently removed critical habitat proposed for this area from the final critical habitat determination (USDI Fish and Wildlife Service 2014c).

Ecological Requirements, Current Condition and Trends

Sage-grouse are considered obligate users of sagebrush and require large, contiguous areas of sagebrush across the landscape for long-term survival. Several species of sagebrush provide the specific food, cover, and reproduction habitats critical for sage-grouse survival (USDI Fish and Wildlife Service 2014d).

In Colorado, strutting occurs from mid-March through late May, depending on elevation (Rogers 1964 cited in GSRSC 2005). Males establish territories on leks in early March, but the timing can vary annually by 1 to 2 weeks depending on weather condition, snow melt, and day-length. Males are present on leks approximately 1 hour before dawn, and strut until approximately 1 hour after sunrise each day for about 6 weeks (Scott 1942, Eng 1963, Lumsden 1968, Wiley 1970, Hartzler 1972, Gibson and Bradbury 1985, Gibson et al. 1991, all cited in GSRSC 2005).

Approximately 85 percent of nests occur within 4 miles of lek sites. Nests typically occur on the ground at the base of live sagebrush. Hatching begins around mid-May and usually ends by July. Most eggs hatch in June, with a peak between June 10 and 20. Incubation typically lasts 27 to 28 days (Patterson 1952 cited in GSRSC 2005).

Intermixing of broods and flocks of adult birds is common with the advent of fall, and birds move from riparian areas to sagebrush-dominated landscapes that continue to provide green forbs. Fringed sagebrush is often a transitional food as grouse shift from summer to winter diets (Schroeder et al. 1999 cited in GSRSC 2005).

Gunnison sage-grouse winter range in Colorado varies according to snowfall, wind conditions, and suitable habitat (Rogers 1964 cited in GSRSC 2005). Sage-grouse may travel short distances or many miles between seasonal ranges. Movements in fall and early winter (September to December) can be extensive with some movements exceeding 20 miles. During severe winters, sage-grouse depend on very tall sagebrush, which is exposed even above deep snow, providing a consistently available food source.

Gunnison sage-grouse are capable of making long movements (over 18 miles) to find appropriate habitat. The extent of movement varies with severity of winter weather, topography, and vegetation cover (GSRSC 2005).

The Gunnison Sage-grouse Rangewide Steering Committee (GSRSC 2005) identified the following conservation strategy elements specific to Forest Service management of lands within the Poncha Pass population (page and section references below are applicable to Gunnison Sage-grouse Rangewide Conservation Plan (GSRSC 2005)):

- Incorporate grazing management practices (such as those presented on page 212) for both cattle and sheep that are compatible with, or enhance, Gunnison sage-grouse habitat (see Appendix H) on federal and state lands during the permit renewal process, or when monitoring indicates need.
- Implement recommendations from rangewide strategy on "Human Infrastructure: Powerlines, Other Utility Corridors, Wind Turbines, Communication Towers, Fences, and Roads" (pg. 225).
- Implement recommendations from rangewide strategy on "Noxious and Invasive Weeds" (pg. 232).
- Implement recommendations from rangewide strategy on "Recreational Activity" (pg. 245).
- Evaluate suitability of vacant/unknown habitat classification and determine if habitat improvement techniques may enhance suitability.
- Implement timing restrictions provided in rangewide "Human Infrastructure: Powerlines, Other Utility Corridors, Wind Turbines, Communication Towers, Fences, and Roads" strategy (pg. 225), and "Oil & Gas and Mining" strategy (pg. 233).
- Implement recommendations from rangewide strategy on "Predation" (pg. 243).
- Conduct inventory of vacant/unknown habitat areas using inventory technique developed at a rangewide level ("Habitat Monitoring" strategy, pg. 220).
- Search for new or unknown existing leks utilizing survey methodology developed at rangewide level ("Habitat Monitoring" strategy, pg. 220).
- Map Gunnison sage-grouse seasonal habitats in a GIS as defined per "Habitat Monitoring" rangewide strategy, Objective 1, Strategy #7 (see pg. 220).

Threats and Risk Factors

The most substantial current and future threats are habitat loss and decline due to human development and associated infrastructure (USDI Fish and Wildlife Service 2014d). Other threats impacting Gunnison sage-grouse to a lesser extent include overgrazing, mineral development, pinyon-juniper encroachment, fences, invasive plants, wildfire, large-scale water development, predation (primarily associated with human disturbance and habitat decline) and recreation. The fragmented nature of existing habitat amplifies the negative effects of these other threats (USDI Fish and Wildlife Service 2014d).

The Gunnison Sage-grouse Rangewide Steering Committee (GSRSC 2005) identified residential development on private land is a threat specific to Gunnison sage-grouse at Poncha Pass because the area is scenic, easily accessed via Highway 285, and some interior parcels of land are in small tracts and currently for sale. There is some threat from cumulative physical disturbances associated with recreation in the area. In addition, a mica mine was recently proposed near Poncha Pass, and although the

application has been withdrawn, the possibility of a mine (and potential negative impacts on Gunnison sage-grouse and their habitat) remains (GSRSC 2005).

Map of Known Distribution and Modeled Suitable Habitat

Gunnison sage-grouse known distribution and modeled suitable habitat are shown in Figure 3. Modeled habitat totals 976 acres, of which 725 acres occur on Rio Grande National Forest lands within or near the Poncha Pass population delineation.

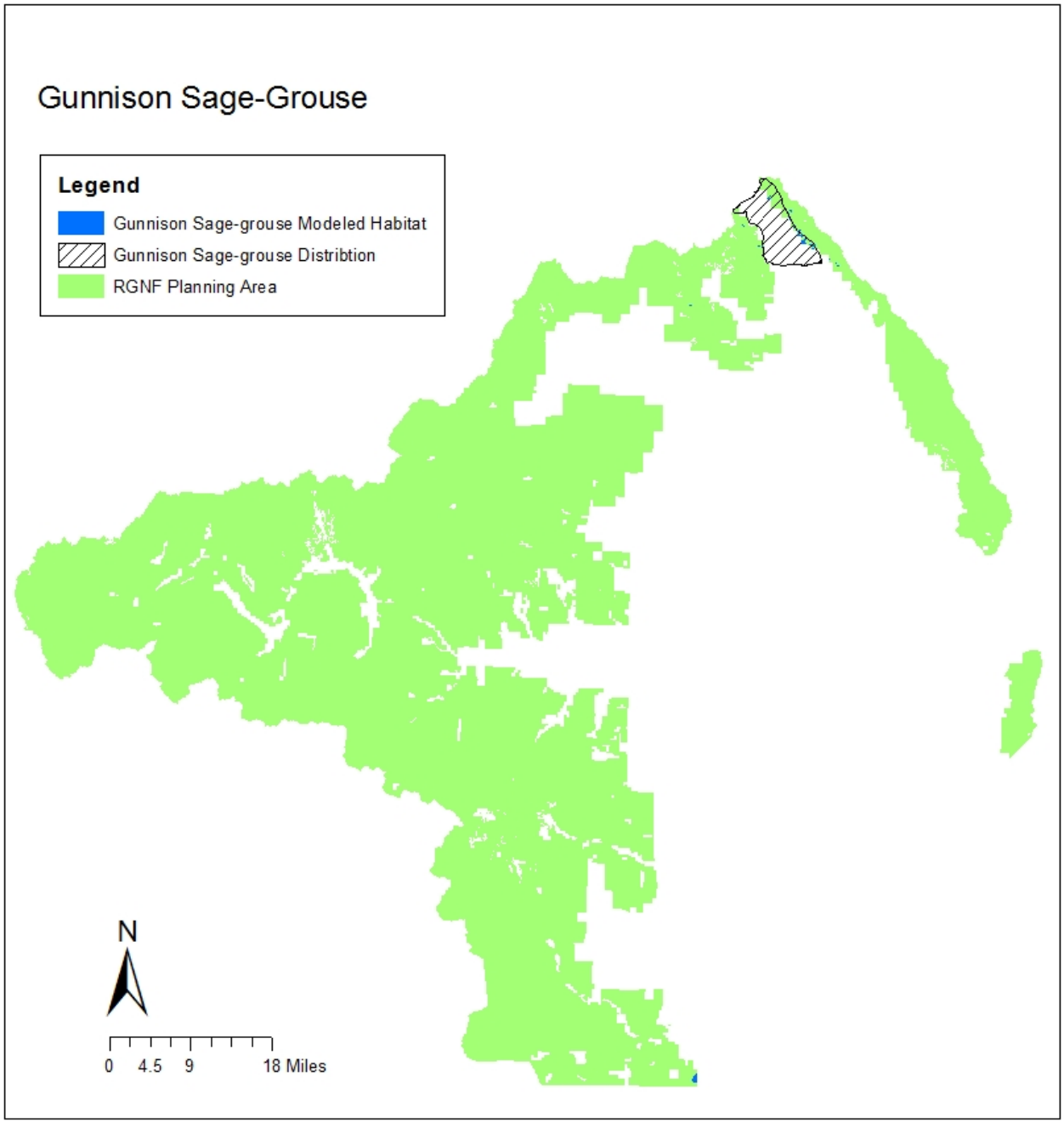

Figure 3. Gunnison sage-grouse distribution and modeled habitat on the Rio Grande National Forest

Mexican Spotted Owl

Distribution, Abundance, Demographics and Population Trends on the Rio Grande National Forest

The Mexican spotted owl occurs from southern Utah and Colorado south through the mountains of Arizona, New Mexico, and west Texas into the mountains of central Mexico (McDonald et al. 1991 cited in USDI Fish and Wildlife Service 2013c). Mexican spotted owl is widely but patchily distributed throughout its range in the United States, with distribution reflecting the availability of forested mountains and canyons, and in some cases rocky canyonlands.

The Rio Grande NF has completed habitat and presence/absence surveys for the Mexican spotted owl since the late 1980s. Repeat surveys with current personnel have been completed in areas considered to offer the "best potential habitat" on the Forest. The Bureau of Land Management (BLM) has also completed several years of surveys (2004 to 2009) in their best potential habitat. To date, no individuals have been detected on Forest or BLM lands in the San Luis Valley. Based on survey efforts, it is becoming increasingly unlikely that suitable nesting habitat for the Mexican spotted owl occurs on the Rio Grande National Forest. In the southern portion of the planning area, some canyons do occur that contain suitable forest vegetation types such as Douglas-fir, white fir, and ponderosa pine. However, the canyons are not typically as steep, sheer or narrow as those described for the Wet Mountains of Colorado where Mexican spotted owls do occur (Johnson 1997 cited in Ghormley 2015). Elevation may also be a limiting factor on the Rio Grande National Forest. Although some mixed-conifer and ponderosa pine cover types on the forest do overlap with the elevation range of owls studied in the Wet Mountains, these quickly give way to spruce-fir forest as the elevation increases (Ghormley 2015).

The species is not known to occur on the Rio Grande National Forest or within the greater San Luis Valley area; therefore, no trends are identified for the planning area.

Ecological Requirements, Current Condition and Trends.

Mexican spotted owls throughout their range nest, roost, forage, and disperse most commonly in mixed-conifer forests may include Douglas-fir and/or white fir, with codominant species including southwestern white pine, limber pine, and ponderosa pine. The understory often contains the above coniferous species as well as broadleaved species such as Gambel oak, maples, box elder, and/or New Mexico locust. In the northern part of the range, including southern Utah, southern Colorado, and far northern Arizona and New Mexico, owls occur primarily in rocky canyons and use caves and cliff ledges for nesting (Kertell 1977, Reynolds 1990, Rinkevich 1991, Willey 1993, cited in USDI Fish and Wildlife Service 2013c).

Mexican spotted owls in the Southern Rocky Mountains Ecological Management Unit are found primarily in canyons, but the owls also occupy forest habitat types. The canyon habitat often has mature Douglas-fir, white fir, and ponderosa pine in canyon bottoms and on the north- and east-facing slopes. Ponderosa pine grows on the more xeric south- and west-facing slopes, with pinyon-juniper growing on the mesa tops (USDI Fish and Wildlife Service 2012).

Foraging occurs in a variety of habitats including managed and unmanaged forests, pinyon-juniper woodlands, mixed-conifer and ponderosa pine forests, cliff faces and terraces between cliffs, and riparian zones (Ganey and Balda 1994, Willey 1998a, b; Ganey et al. 2003, Willey and Van Riper 2007, all cited in USDI Fish and Wildlife Service 2012). Reported prey items include woodrats, mice, voles, rabbits, gophers, bats, birds, reptiles, and arthropods.

Key habitat variables required to fulfill Mexican spotted owl life history requirements include nesting, roosting, and foraging habitat patches with structural, compositional, and successional diversity, as well

as connectivity among suitable patches. Management recommendations for three categories of Mexican spotted owl habitat (i.e., protected activity centers, recovery habitat, and other forest and woodland types) are provided within the Mexican Spotted Owl Recovery Plan (USDI Fish and Wildlife Service 2012).

Threats and Risk Factors

Two primary reasons cited for the original Federal listing of Mexican spotted owl in 1993 were (1) historical alteration of its habitat as the result of timber-management practices, and (2) the threat of these practices continuing as evidenced in existing national forest plans. The danger of stand-replacing wildland fire was also cited as a threat at that time. With recent forest management now emphasizing sustainable ecological function and a return toward pre-settlement fire regimes, the primary threats to the Mexican spotted owl population in the United States have since transitioned from timber harvest to an increased risk of stand-replacing wildland fire. Climate variability combined with current forest conditions may also synergistically result in increased loss of habitat from fire. More intense natural drought cycles and the ensuing stress placed upon forested habitats could result in even larger and more severe wildland fires in owl habitat (USDI Fish and Wildlife Service 2012).

Map of Known Occurrences and Suitable Habitat

There are no known occurrences within the planning area. The Rio Grande National Forest modeled habitat in 2006 in an attempt to describe potential habitat and focus survey efforts as needed (Figure 4). Based on the query developed, this model identified 14,103 acres of potential Mexican spotted owl habitat. Given the extensive surveys conducted throughout this habitat with no positive Mexican spotted owl occurrences resulting, this model likely substantially over-estimates potential Mexican spotted owl habitat in the planning area.

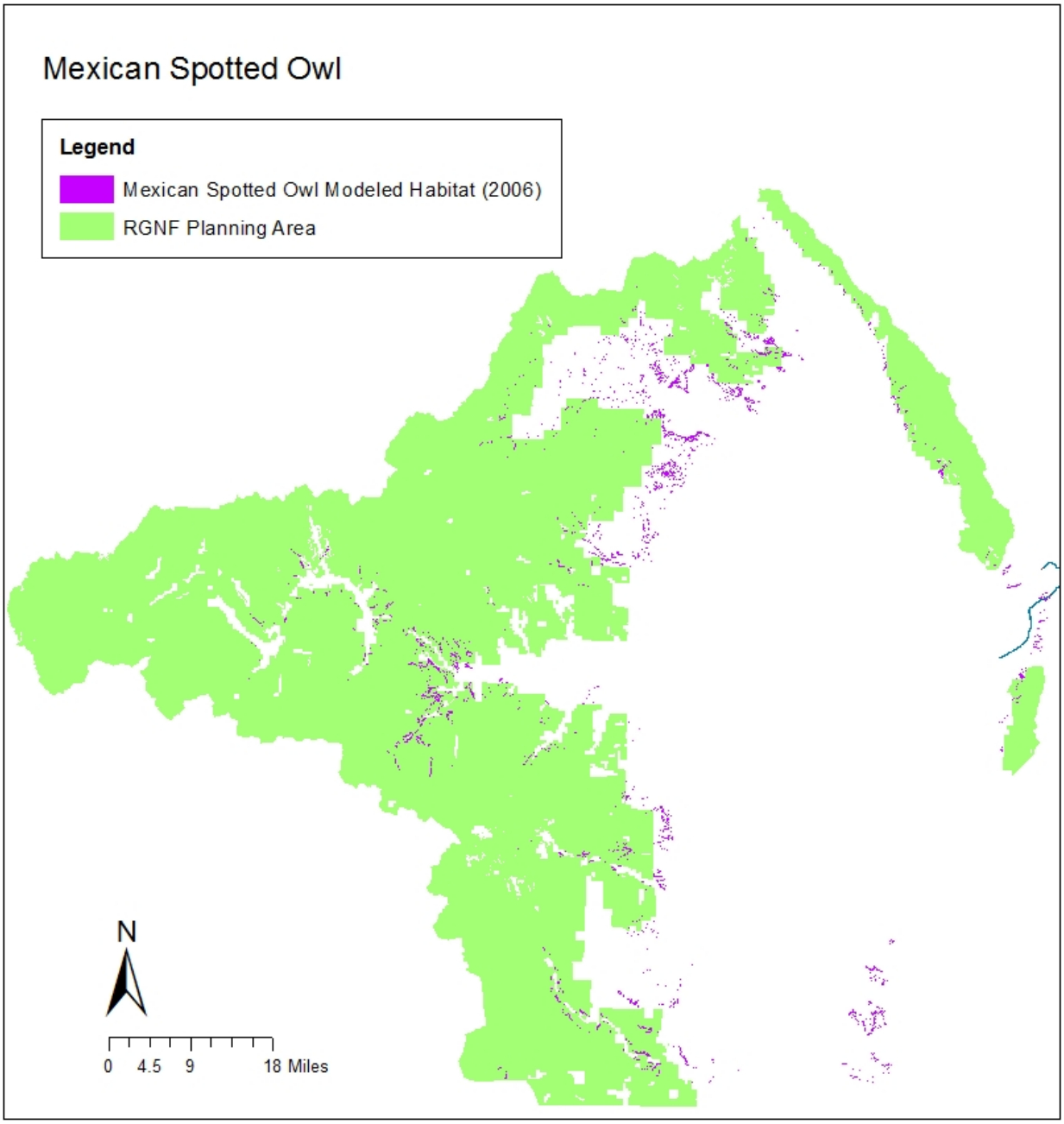

Figure 4. Mexican spotted owl habitat on the Rio Grande National Forest (RGNF)

Southwest Willow Flycatcher

Distribution, Abundance, Demographics and Population Trends on the Rio Grande National Forest

The breeding range of the southwestern willow flycatcher includes southern California, Arizona, New Mexico, southwestern Colorado, and extreme southern portions of Nevada and Utah: specific range boundaries are delineated in the subspecies' recovery plan (USDI Fish and Wildlife Service 2002).

Current information suggests that important flycatcher habitat does occur in certain locations in the San Luis Valley in association with willow-dominated riparian and wetland communities on the valley floor. Although it is recognized that the San Luis Valley occurs within a gradation zone between the *E. t. adastus* and *E. t. extimus* subspecies (Paxton et al. 2008), the Fish and Wildlife Service currently considers all willow flycatchers in the San Luis Valley to be the *E. t. extimus* subspecies.

In 2008, biologists made the first (and only) detection of an individual willow flycatcher on the Rio Grande National Forest. This detection occurred during the early survey period (June 9, 2008) approximately 5 meters from the boundary of adjacent Colorado State Land Board property. No willow flycatchers have been noted in this area or in any other location on forest lands since that time despite additional surveys. Biologists have identified approximately 1,762 acres of suitable and 947 acres of potential willow flycatcher habitat on the forest to date (2,709 acres total, Figure 5). Approximately 1,428 acres (81 percent) of the suitable habitat and 93 acres (10 percent) of the potential habitat has received species protocol surveys for at least two consecutive years. As of the end of the 2014 field season, mapping efforts indicate that approximately 81 to 85 percent of the potential habitat on the forest has been evaluated (Ghormley 2015).

Due to a general lack of observations and breeding occurrence, no trend in the planning area is reported.

Ecological Requirements, Current Condition and Trends

Southwestern willow flycatchers are strongly territorial. Flycatcher territories are often clumped together, rather than spread evenly throughout a habitat patch. Territory size varies greatly, probably due to differences in population density, habitat quality, and nesting stage. Estimated breeding territory sizes generally range from approximately 0.25 to 5.7 acres, with most in the range of approximately 0.5 to 1.2 acres (USDI Fish and Wildlife Service 2002).

The flycatcher builds a small open cup nest. Typical nest placement is in the fork of small-diameter (e.g., 0.4 inch), vertical or nearly vertical branches. Occasionally, nests are placed in down-curving branches. Nest height varies considerably, from 1.6 to 60 feet, and may be related to the height of the nest plant, overall canopy height, and/or the height of the vegetation strata that contain small twigs and live growth. Most typically, nests are relatively low, e.g., 6.5 to 23 feet above ground (USDI Fish and Wildlife Service 2002).

The San Luis Valley encompasses the northernmost recovery unit identified by Fish and Wildlife Service for the southwestern willow flycatcher (USDI Fish and Wildlife Service 2002). In the Final Rule, critical habitat was designated on five separate portions of the Rio Grande and Conejos River in the southern portion of the San Luis Valley on BLM and Federal refuge lands (USDI Fish and Wildlife Service 2013d). None of the designated critical habitat occurs on the Rio Grande National Forest land. The designation of critical habitat has relevance to land that is not designated as critical habitat because the Final Rule uses primary constituent elements to describe what constitutes the most valuable habitat. Non-designated habitat may still contain some of those primary constituent elements and the management of those elements is relevant to the recovery of the species.

(1) Primary Constituent Element 1—Riparian vegetation. Riparian habitat along a dynamic river or lakeside, in a natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs (that can include Gooddings willow, coyote willow, Geyer's willow, arroyo willow, red willow, yewleaf willow, pacific willow, boxelder, tamarisk, Russian olive, buttonbush, cottonwood, stinging nettle, alder, velvet ash, poison hemlock, blackberry, seep willow, oak, rose, sycamore, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut) and some combination of:

(a) Dense riparian vegetation with thickets of trees and shrubs that can range in height from about 6 to 98 feet. Lower-stature thickets (6 to 13 feet tall) are found at higher elevation riparian forests and tall-stature thickets are found at middle and lower-elevation riparian forests;

(b) Areas of dense riparian foliage at least from the ground level up to approximately 13 feet above ground or dense foliage only at the shrub or tree level as a low, dense canopy;

(c) Sites for nesting that contain a dense (about 50 percent to 100 percent) tree or shrub (or both) canopy (the amount of cover provided by tree and shrub branches measured from the ground);

(d) Dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.1 hectare (0.25 acre) or as large as 70 hectare (175 acres).

(2) Primary Constituent Element 2— Insect prey populations. A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, which can include: flying ants, wasps, and bees (*Hymenoptera*); dragonflies (*Odonata*); flies (*Diptera*); true bugs (*Hemiptera*); beetles (*Coleoptera*); butterflies, moths, and caterpillars (*Lepidoptera*); and spittlebugs (*Homoptera*).

Habitat Definitions: During habitat surveys, we have ground-truthed and classified habitat as "Suitable," "Potential," or "Unsuitable" (i.e., non-habitat) based on the descriptions in the Southwestern Willow Flycatcher Recovery Plan (USDI Fish and Wildlife Service 2002) and an agreement with the Fish and Wildlife Service regarding the minimum habitat characteristics to consider during southwestern willow flycatcher surveys (Ghormley 2015). Habitat descriptions before 2011 are as follows:

Suitable: River channels are wide and shallow with a well-defined floodplain and a broad valley. Streams are slightly entrenched with well-defined meanders and riffle/pool bed features. Gradients are less than 1 percent. Quiet water dominates, as in backwaters, pools, beaver ponds or non-riffle stream stretches. Vegetative communities can be dominated by several willow species, young cottonwood, alder or introduced species such as salt cedar and Russian olive. Associated woody species may be present. The minimum patch size requiring surveys for Section 7 consultation is 30 feet x 30 feet x 5 feet high. Above 8,500 feet, only patches 5 acres are considered suitable. The largest patches of willow will have the greatest likelihood of attracting willow flycatchers.

The patches may be floristically diverse or homogeneous. The common theme among the sites is sufficient width to the patch to provide "interior" or non-edge habitat. Patches form dense thickets of shrubs and trees with contiguous cover except over water. The height of the patch must be sufficient to provide stem widths adequate for secure nest placement.

Potential: Potential habitat includes riparian that does not currently provide the characteristics of suitable habitat but has the potential of attaining them in the foreseeable future. Potential sites may include habitat

such as a stand of young willow that currently lacks the density or size needed for suitable habitat. Potential habitat can be previously suitable habitat rendered unsuitable by events such as a severe flood, or human activities such as unmanaged livestock grazing.

Unsuitable (i.e., Non-Habitat): Unsuitable habitat includes riparian that does not meet the criteria listed above as suitable or does not have the potential to become suitable habitat. Examples of unsuitable habitat are narrow riparian vegetation confined by canyon walls, absent or inadequate stream flows, lack of standing water, high gradient streams, natural absence of woody shrub species and stands lacking appropriate vegetative cover and structure.

Threats and Risk Factors

The greatest historical factor in the decline of the southwestern willow flycatcher is the extensive loss, fragmentation, and modification of riparian breeding habitat (U.S. Fish and Wildlife Service, 2002 summarized in Sogge et al. 2010). Large-scale losses of southwestern wetlands have occurred, particularly the cottonwood-willow riparian habitats historically occupied by this subspecies. Factors causing habitat loss and/or change include urban, recreational, and agricultural development; water diversion and impoundment; channelization; livestock grazing; and replacement of native habitats by introduced plant species (Marshall and Stoleson 2000; USDI Fish and Wildlife Service 2002 summarized in Sogge et al. 2002).

While nest parasitism by brown-headed cowbirds has been documented to negatively impact some southwestern willow flycatcher populations, especially at small and isolated breeding sites, it is highly variable and no longer considered among the primary rangewide threats to flycatcher conservation (USDI Fish and Wildlife Service 2002). Additional investigation is needed to identify the level of impact this is causing at a more localized level.

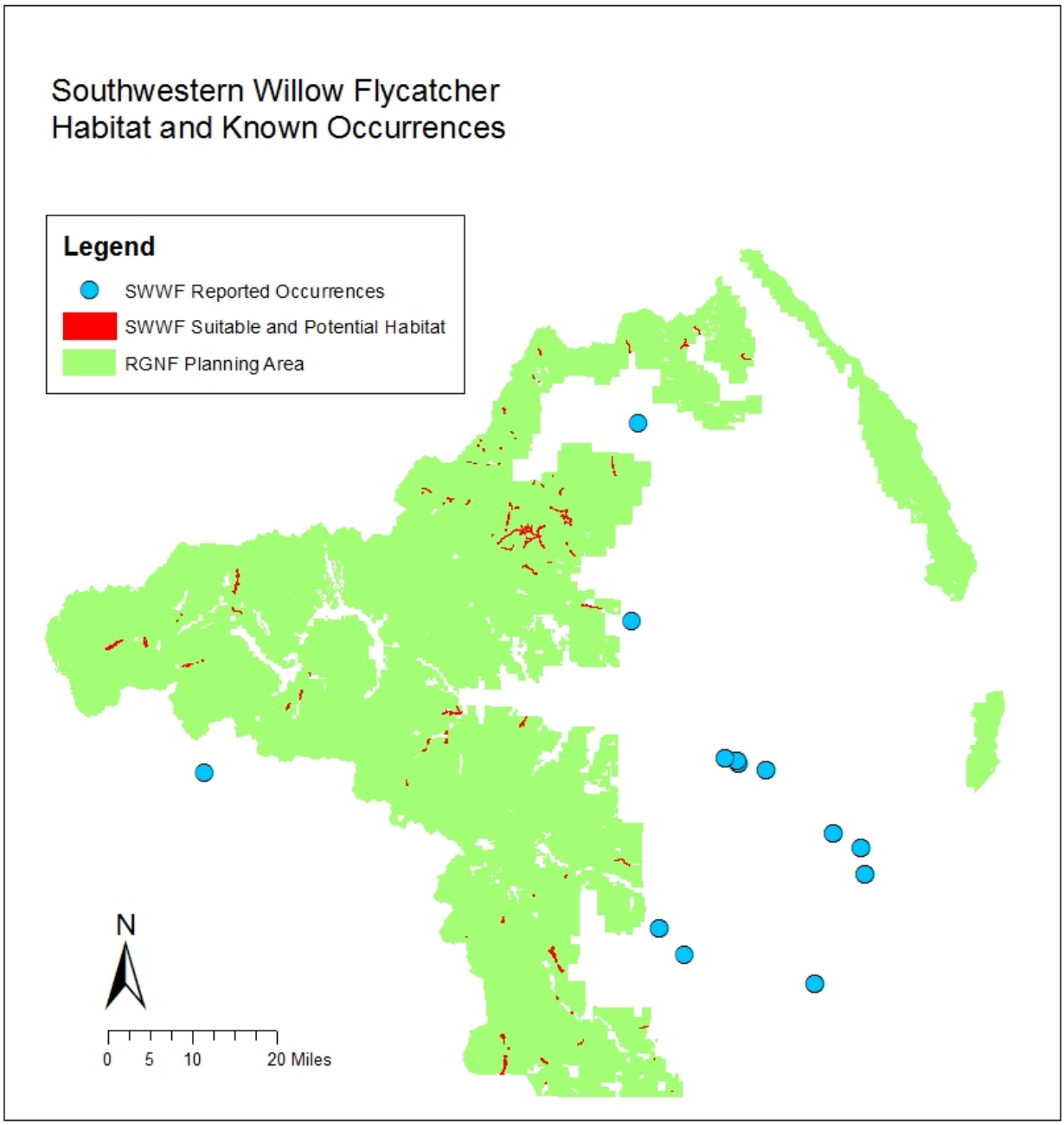

Figure 5. Southwestern willow flycatcher (SWWF) modeled potential/suitable habitats and known occurrences

Yellow-billed Cuckoo

Distribution, Abundance, Demographics and Population Trends on the Rio Grande National Forest

In the United States, the range of the western yellow-billed cuckoo includes the area west of the Continental Divide, south through Montana, Wyoming, Colorado, and along the watershed divide between the upper and middle Rio Grande and Pecos Rivers in New Mexico and Texas, south to Big Bend in southwestern Texas, and extending to the states of the West Coast (USDI Fish and Wildlife Service 2014e).

In Colorado, yellow-billed cuckoos were historically noted as rare summer visitors, primarily on the eastern plains, but also in Middle Park and on the western slope at Grand Junction (Sclater 1912). The few historical records suggest that the species apparently has always been rare in western Colorado, an opinion shared by Andrews and Righter (1992). Recent breeding bird atlas work in Colorado (Carter 1998) revealed only a single likely nesting record west of the Continental Divide over the five years of fieldwork (summarized from Wiggins 2005).

The Rio Grande National Forest planning area is located almost completely east of the Continental Divide, but includes the San Luis Valley where yellow-billed cuckoo occurrence has been documented. The Rocky Mountain Bird Observatory received reports of yellow-billed cuckoos from two locations in the San Luis Valley in the summer of 2008. These occurred along the Conejos River in Conejos County and along the Rio Grande River near Del Norte in Rio Grande County (Beason 2009). The species has not been documented within the planning area (Table 2).

Ecological Requirements, Current Condition and Trends.

The western yellow-billed cuckoo currently nests almost exclusively in low- to moderate-elevation riparian woodlands that cover 50 acres (20 hectares) or more within arid to semiarid landscapes (Hughes 1999 cited in USDI Fish and Wildlife Service 2013e). Cuckoo nests are typically placed in dense patches of broad-leaved deciduous trees, usually with a relatively thick understory (Hughes 1999). Western cuckoos (including those in the western Great Plains) prefer to nest in willow (*Salix* spp.), cottonwood (*Populus* spp.), and mesquite (*Prosopis* spp.), but they will also use orchards (Laymon 1980, Walters 1983, summarized in Wiggins 2005).

The western yellow-billed cuckoo generally arrives on its breeding grounds in mid-June. The birds begin their southbound migration in mid-August, and most have left the breeding grounds by mid-September (USDI Fish and Wildlife Service 2013e).

Nesting peaks later (mid-June through August) than in most co-occurring bird species, and may be triggered by an abundance of cicadas (*Cicadidae* sp.), katydids (*Tettigoniidae* sp.), caterpillars (*Lepidoptera* sp.), or other large prey items that form the bulk of their diet (Hamilton and Hamilton 1965, Rosenberg et al. 1982, cited in USDI Fish and Wildlife Service 2013e). Nesting in western North America continues through August, and up to three broods can be raised in a season if the prey base is sufficient (USDI Fish and Wildlife Service 2013e). Yellow-billed cuckoos build an open cup nest with a loose saucer-shaped stick construction. Clutch size varies from two to five eggs depending on the available food supply. The incubation and nestling periods are short, with the eggs hatching in 11 to 12 days, and young fledging in 5 to 7 days (Hughes 1999 cited in USDI Fish and Wildlife Service 2013e).

Western yellow-billed cuckoos rarely nest at sites less than 50 acres (20 hectares) in size, and sites less than 37 acres (15 hectares) are considered unsuitable habitat. Habitat patches from 50 to 100 acres (20 to 40 hectares) in size are considered marginal habitat. Habitat between 100 acres (40 hectares) and 200

acres (81 hectares), although considered suitable, are not consistently used by the species. The optimal size of habitat patches for the species are generally greater than 200 acres (81 hectares) in extent and have dense canopy closure and high foliage volume of willows (*Salix* sp.) and cottonwoods (*Populus* sp.), and thus, provide adequate space for foraging and nesting. (Laymon and Halterman 1989 cited in USDI Fish and Wildlife Service 2014e).

The Fish and Wildlife Service (USDI Fish and Wildlife Service 2014e) considers the following habitat elements as features that provide for this species' life-history processes and are essential to the conservation of the species:

Riparian woodlands. Riparian woodlands with mixed willow-cottonwood vegetation, mesquite-thorn-forest vegetation, or a combination of these that contain habitat for nesting and foraging in contiguous or nearly contiguous patches that are greater than 325 feet (100 meters) in width and 200 acres (81 hectares) or more in extent. These habitat patches contain one or more nesting groves, which are generally willow-dominated, have above average canopy closure (greater than 70 percent), and have a cooler, more humid environment than the surrounding riparian and upland habitats.

Adequate prey base. Presence of a prey base consisting of large insect fauna (for example, cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies) and tree frogs for adults and young in breeding areas during the nesting season and in post-breeding dispersal areas.

Dynamic riverine processes. River systems that are dynamic and provide hydrologic processes that encourage sediment movement and deposits that allow seedling germination and promote plant growth, maintenance, health, and vigor (e.g., lower gradient streams and broad floodplains, elevated subsurface groundwater table, and perennial rivers and streams). This allows habitat to regenerate at regular intervals, leading to riparian vegetation with variously aged patches from young to old.

Wiggins (2005) outlines the following elements conducive to yellow-billed cuckoo habitat restoration: (1) restoring more natural flow regimes to rivers and creeks, (2) restricting or eliminating livestock grazing along riparian areas, and (3) restricting or eliminating the use of pesticides near cuckoo breeding areas. The latter point is especially important in areas where orchards are adjacent to riparian areas, as cuckoos often forage at such sites.

Restoration elements described above can be addressed by including the following components in a yellow-billed cuckoo habitat management plan (Wiggins 2005):

- restoring riparian woodlands by restoring natural flow regimes to watercourses and by restricting or eliminating livestock grazing
- evaluating pesticide use in riparian woodlands and nearby areas
- censusing riparian woodlands for before and after effects of any habitat manipulations
- monitoring reproductive success in managed and unmanaged plots, as well as comparing reproductive success before and after habitat manipulations.

Threats and Risk Factors

Yellow-billed cuckoo abundance has declined in most areas within Forest Service Region 2, especially in western Colorado and Wyoming. The threats to yellow-billed cuckoos likely vary according to region, with habitat loss and fragmentation being particularly important in the western (arid) portions of the region (Wiggins 2005). Many studies in the western United States have assessed habitat availability for yellow-billed cuckoos, and without exception, they have shown drastic declines in riparian habitat extent

and/or quality. Alteration of hydrology, due to dam construction or irrigation schemes, may both positively and negatively affect yellow-billed cuckoos. Other risk factors include livestock grazing and pesticides (Wiggins 2005).

Map of Known Occurrences and Suitable Habitat

Yellow-billed cuckoo suitable habitat has not been modeled for the planning area. In addition, there are no known occurrences on Rio Grande National Forest lands.

Plants

No threatened, endangered, proposed or candidate plant species have been documented in the planning area

Species of Conservation Concern

A total of 118 species were considered in-depth for “At-Risk” status on the Rio Grande National Forest. This includes the 9 species analyzed under the federally listed section (previous) and 106 species considered for species of conservation concern. We used the following criteria to determine which species to consider for the species of conservation concern for the Rio Grande National Forest:

a) Species with status ranks of G/T3 or S1 or S2 on the NatureServe ranking system.

b) Species listed as threatened or endangered by relevant states, federally recognized tribes, or Alaska Native Corporations.

c) Species identified by Federal, State, federally recognized tribes, or Alaska Native Corporations as a high priority for conservation.

d) Species identified as species of conservation concern in adjoining National Forest System plan areas (including plan areas across regional boundaries).

e) Species that have been petitioned for Federal listing and for which a positive “90-day finding” has been made.

f) Species for which the best available scientific information indicates there is local conservation concern about the species' capability to persist over the long term in the plan area due to:

    1) Significant threats, caused by stressors on and off the plan area, to populations or the ecological conditions they depend upon (habitat). These threats include climate change.

    2) Declining trends in populations or habitat in the plan area.

    3) Restricted ranges (with corresponding narrow endemics, disjunct populations, or species at the edge of their range).

    4) Low population numbers or restricted ecological conditions (habitat) within the plan area.

Not all species initially considered for the species of conservation concern list were carried forward. The Forest Service Land Management Planning Handbook has guidance on which species to include or exclude from the species of conservation concern list:

1. The species is native to, and known to occur in, the plan area.

A species is known to occur in a plan area if, at the time of plan development, the best available scientific information indicates that a species is established or is becoming

established in the plan area. A species with individual occurrences in a plan area that are merely "accidental" or "transient," or are well outside the species' existing range at the time of plan development, is not established or becoming established in the plan area. If the range of a species is changing so that what is becoming its "normal" range includes the plan area, an individual occurrence should not be considered transient or accidental.

2. The best available scientific information about the species indicates substantial concern about the species' capability to persist over the long term in the plan area. See FSH 1909.12, zero code, section 07, for guidance on best available scientific information.

If insufficient scientific information is available to conclude there is substantial concern about a species' capability to persist in the plan area over the long term, that species cannot be identified as a species of conservation concern.

If the species is secure and its continued long-term persistence in the plan area is not at risk based on knowledge of its abundance, distribution, lack of threats to persistence, trends in habitat, or responses to management, that species cannot be identified as a species of conservation concern.

Many species occur near the Rio Grande National Forest but have not been documented on the forest itself. Others were considered due to NatureServe rankings, but were found to have stable populations on the forest. Species that are not known to occur in the planning area or for which we could not document substantial concern about that species' capability to persist over the long term in the planning area were not included in the species of conservation concern list. Of that initial list of 119 species considered for inclusion in the species of conservation concern list, the 37 species in Table 2 were not carried forward:

Table 2. Species not carried forward for analysis as species of conservation concern on the Rio Grande National Forest

Species	Basis for not being carried forward as a species of conservation concern
Invertebrates	
Monarch butterfly *Danaus plexippus*	Not documented on Rio Grande National Forest. Lack of sufficient scientific information regarding the species status in the general area.
Theano alpine *Erebia pawlosskii*	Not documented on Rio Grande National Forest. No known substantial conservation concern. Lack of sufficient scientific information regarding the species status in the general area.
Colorado blue (butterfly) *Euphilotes rita coloradensis*	Not documented on Rio Grande National Forest. Very little suitable habitat on Rio Grande National Forest.
Alberta Arctic *Oeneis alberta*	Not documented on Rio Grande National Forest since 1972. No known substantial conservation concern. Lack of sufficient scientific information regarding the species status in the general area.
White-veined Arctic *Oeneis bore*	No known substantial conservation concern. Lack of sufficient scientific information regarding the species status in the general area.
Gold-edge gem moth *Schinia avemensis*	Not documented on Rio Grande National Forest. Lack of sufficient scientific information regarding the species status in the general area.

Species	Basis for not being carried forward as a species of conservation concern
Great Basin silverspot *Speyeria nakomis*	Not documented on the Rio Grande National Forest. The element occurrence record for the closest known population is “fair,” suggesting that there is no substantial concern regarding the viability of the local population.
Birds	
Grasshopper sparrow *Ammodramus savannarum*	Not documented on Rio Grande National Forest.
Sage sparrow *Amphispiza belli*	Occurrence is peripheral. Only one documented occurrence on Rio Grande National Forest. Very little suitable habitat on Rio Grande National Forest. Moderate Conservation Concern. Very Limited ability to influence species through management actions of Rio Grande National Forest.
Burrowing owl *Athene cunicularia*	Not documented on Rio Grande National Forest. Very little suitable habitat on Rio Grande National Forest.
Juniper titmouse *Baeolophus griseus*	No known substantial conservation concern on Rio Grande National Forest.
Ferruginous hawk *Buteo regalis*	Not documented on Rio Grande National Forest. Very little suitable habitat on Rio Grande National Forest.
Cassin’s finch *Carpodacus cassinii*	No known substantial conservation concern on Rio Grande National Forest.
Mountain plover *Charadrius montanus*	Not documented on Rio Grande National Forest. Very little suitable habitat on the Rio Grande National Forest
Northern harrier *Circus cyaneus*	Not documented on Rio Grande National Forest. Very little suitable habitat on Rio Grande National Forest.
Prairie falcon *Falco mexicanus*	No known substantial conservation concern on Rio Grande National Forest.
Pinyon jay *Gymnorhinus cyanocephalus*	Occurrence is very limited on Rio Grande National Forest. No known substantial conservation Rio Grande National Forest.
Loggerhead shrike *Lanius ludovicianus*	Occurrence is peripheral. Very few documented occurrence on Rio Grande National Forest. Very little suitable habitat on Rio Grande National Forest.
Virginia’s warbler *Leiothlypis virginiae*	No known substantial conservation concern on Rio Grande National Forest.
Brown-capped rosy finch *Leucosticte australis*	Species is fairly common on Rio Grande National Forest. No known substantial conservation concern on Rio Grande National Forest.
Band-tailed pigeon *Pategionenas fasciata*	Occurrence is peripheral on Rio Grande National Forest.
Lewis' woodpecker *Melanerpes lewis*	Occurrence is peripheral. Very few documented occurrence on Rio Grande National Forest Very little suitable habitat on Rio Grande National Forest.

Species	Basis for not being carried forward as a species of conservation concern
Mammals	
American pika *Ochotona princeps*	No known substantial conservation concern on Rio Grande National Forest.
Little brown bat *Myotis lucifugus*	No known substantial conservation concern on Rio Grande National Forest.
Southern red-backed vole *Myodes gapperi*	No known substantial conservation concern on Rio Grande National Forest.
Big free-tailed bat *Nyctinomops macrotis*	Occurrence is peripheral. Very few documented occurrence on Rio Grande National Forest, no known breeding or roosting areas on Rio Grande National Forest. Very little suitable habitat on Rio Grande National Forest.
Abert's squirrel *Sciurus aberti*	No known substantial conservation concern on Rio Grande National Forest.
Dwarf shrew *Sorex nanus*	Not documented on Rio Grande National Forest.
Botta's pocket gopher *Thomomys bottae pervagus*	Not documented on Rio Grande National Forest. Very little suitable habitat on Rio Grande National Forest.
Plants (Due to taxonomic uncertainties, authors and common synonyms are included)	
Violet milkvetch *Astragalus iodopetalus*	Not documented, not likely to occur on Rio Grande National Forest
Missouri milkvetch *Astragalus missouriensis* Nutt. var. *humistratus* Isely	Not documented on the Rio Grande National Forest, but occurrence is possible Probability of occurrence on the forest is uncertain
Narrowleaf grapefern *Botrychium lineare* W.H. Wagner	Not documented on the Rio Grande National Forest, but occurrence is possible Suitable habitat exists on the Rio Grande National Forest but closest occurrence is 60 miles from the Rio Grande National Forest
Winding mariposa lily *Calochortus flexuosus*	Not documented on the Rio Grande National Forest Unlikely to occur as suitable habitat is not present on the Rio Grande National Forest
Brandegee's buckwheat *Eriogonum brandegeei*	Not documented, suitable habitat probably not present on Rio Grande National Forest.
Whitebristle cottongrass *Eriophorum altaicum* var. *neogaeum*	Removed from R2 Sensitive Species list due to taxonomic lumping. Good viability on Rio Grande National Forest
Manyflowered ipomopsis, many-flowered gilia, many-flower standing cypress *Ipomopsis multiflora* (Nutt.) V.E. Grant Synonym: *Gilia multiflora* Nutt	Not documented on Rio Grande National Forest. One plant was collected very close to the forest in 1986, but none have been documented on the forest itself.
Ice cold buttercup *Ranunculus gelidus* Kar. & Kir. Synonym: *R. karelinii* Czerep., *R. gelidus* ssp. *grayi* (Britton) Hulten., *R. grayi* Britton	Not documented on Rio Grande National Forest Taxonomy issues make it difficult to judge the rarity of the species, as taxonomists are uncertain if this is a distinct species or part of a large, more common species. Even with the narrowly defined species, it is still widespread.

Species included in the species of conservation concern list are present on the forest and for which there is substantial concern about the species' ability to persist over the long term in the planning area. Criteria for determining "substantial concern" include:

> Species for which the best available scientific information indicates there is local conservation concern about the species' capability to persist over the long term in the plan area due to:
>
> 1) Significant threats, caused by stressors on and off the plan area, to populations or the ecological conditions they depend upon (habitat). These threats include climate change.
>
> 2) Declining trends in populations or habitat in the plan area.
>
> 3) Restricted ranges (with corresponding narrow endemics, disjunct populations, or species at the edge of their range).
>
> 4) Low population numbers or restricted ecological conditions (habitat) within the plan area.

The following 82 species (Table 3) meet the criteria developed in the 2012 Planning Rule and will be retained for further consideration as species of conservation concern for the Rio Grande National Forest. The list will be further refined and finalized through the National Environmental Policy Act phase of the Forest Plan development process.

Table 3. Rio Grande National Forest DRAFT species of conservation concern

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Species name FS: Federal Status, including Forest Service Region 2 sensitive species and status from other Federal agencies NSR: Nature Serve Ranking CSR: Colorado State Rankings CNHP: Colorado Natural Heritage Program rankings			
Fish			
Rio Grande cutthroat trout *Oncorhynchus clarkia virginalis* FS: USFS R2 Sensitive, Conservation Agreement NSR: G4T3 CSR: S3, SGCN Tier 1	documented; established in planning area	Substantial Concern exists about the species' capability to persist over the long term in the plan area due to population declines and loss of habitat. Interagency Conservation Agreement is in place.	
Rio Grande chub *Gila pandora* FS: USFS R2 Sensitive NSR: G3 S1 CSR: Tier 1	documented; established in planning area	Substantial Concern exists about the species' capability to persist over the long term in the plan area. Interagency Conservation Agreement Team being formed. Petitioned for Federal listing.	
Rio Grande sucker *Catostomus plebeuis* FS: USFS R2 Sensitive NSR: G3 G4 S1 CSR: Tier 1	documented; established in planning area	Substantial Concern exists about the species' capability to persist over the long term in the plan area. Petitioned for Federal listing.	
Amphibians			
Boreal toad *Anaxyrus boreas* FS: USFS R2 Sensitive NSR: G4 CSR: S1, State Endangered	Recently documented in the planning area	Listed as State Endangered. Species has experienced significant population decline and has limited habitat.	
Northern leopard frog *Rana pipiens* FS: USFS R2 Sensitive NRS: G5S3 CSR: Tier 1 SC	Historic	Uncertainty exists about the species' capability to persist over the long term in the plan area. Limited but possible potential habitat; retain as possible due to inadequate survey effort. Conejos River system may still hold some potential.	No known extant populations – not currently known from the planning unit

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Invertebrates			
Western bumblebee *Bombus occidentalis* FS: USFS R2 Sensitive NSR: G4 CSR: Tier 2	documented; established in planning area	Substantial concern regarding the species capability to persist over the long run in the planning area due to broad scale species decline.	
White-veined Arctic *Oeneis bore* NSR: G5 CSR: S3	One record from forest boundary	Substantial concern regarding the species capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Only four known occurrences in Colorado.	
Birds			
Bald eagle *Haliaeetus leucocephalus* FS: USFS R2 Sensitive, Birds of Conservation Concern NRS: G5 S1B S3N CSR:Tier 2 SC	documented; established in planning area (primarily winter use)	Use restricted to minor winter use areas. Limited habitat. One historic nest adjacent to Forest; potential nesting habitat present. Compliance also mandatory with Bald and Golden Eagle Act.	
Black swift *Cypseloides niger* FS: USFS R2 Sensitive NRS: G4 S3B CSR:Tier 2 SC	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term in the plan area. Extremely unique and narrow reproductive niche; declining population trend; susceptible to climate related stressors.	Warrants further evaluation if that concern is "substantial."
Boreal owl *Aegolius funereus* FS: USFS R2 Sensitive, Birds of Conservation Concern NSR:G5S2 CSR:Tier 2	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term due to dramatic change (90 percent) in spruce-fir landscape conditions which suggests a potential declining habitat trend with unknown future response to viability in the plan area.	Warrants further evaluation if that concern is "substantial."
Flammulated owl *Otus flamineolus* FS: USFS R2 Sensitive, BCC NSR: G4S4 CSR:Tier 2	Documented	Uncertainty regarding the species' capability to persist over the long term in the plan area due to potentially restricted ecological condition; may be susceptible to habitat stressors and management influences. Investigations are underway in Research Natural Areas on the forest to identify species range and habitat conditions...	Warrants further evaluation if that concern is "substantial."

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Golden eagle *Aquila chrysactos* FS: USFS R2 Sensitive, BCC NSR: G5 S3S4B S4N CSR: Tier 1 SGCN	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term in the plan area due to local conservation concern. Compliance also mandatory with Bald and Golden Eagle Act.	
Brewer's sparrow *Spizella breweri* FS: USFS R2 Sensitive, BCC NSR:G5 S4B CSR:Tier 2	documented; limited/restricted range in planning area	Uncommon; peripheral range on unit but does nest in a few locations. Uncertainty regarding the species' capability to persist over the long term in the plan area due to limited range on plan area (2,000 acres); uncommon but sporadic occurrence.	
Northern goshawk *Accipter gentiles* FS: USFS R2 Sensitive NSR: G5 S3B CSR: Tier 2	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term in the plan area due to conservation concern across multiple boundaries; natural and anthropogenic stressors. Anecdotal information suggests declining populations locally, perhaps in response to bark beetle outbreak.	
Olive-sided flycatcher *Contopus cooperi* FS: USFS R2 Sensitive NSR: G2 S3B S4B CSR: Tier 2	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term in the plan area due to dramatic change (90 percent) in spruce-fir landscape conditions indicate potential declining habitat trend and declining population trend with unknown implications regarding future viability.	
Peregrine falcon *Falco peregrinus anatum* FS: USFS R2 Sensitive, BCC NSR: G4 T4 S2B CSR: Tier 2	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term in the plan area due to conservation concern across multiple boundaries; local eyrie occupancy declining. Species continues to be monitored by Colorado Parks and Wildlife for post-delisting status.	
Southern white-tailed ptarmigan *Lagopus leucerus altipetens* FS: USFS R2 Sensitive NSR: G5 CSR: S4, SGCN Tier 1	Documented, established in the planning area.	Species continues to be monitored by Colorado Parks and Wildlife for post-delisting status. Conservation concern across multiple boundaries; natural and anthropogenic stressors.	Local population and habitat appear to be stable.
Veery *Catharus fuscescens* NSR: G5 S3B	Documented (once) in the planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	Occurrence on the Rio Grande National Forest may only be peripheral and anecdotal.

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Mammals			
American marten *Martes americana* FS: USFS R2 Sensitive NSR: G5S4B CSR:	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term in the plan area due to dramatic change (90 percent) in spruce-fir landscape conditions which indicate potential declining habitat trend	Preliminary results (CPW 2015) indicate minor response to bark beetles
Fringed myotis bat *Myotis thysanodes* FS: USFS R2 Sensitive NSR: G4 S3 CSR: Tier 1	documented; established in planning area	Substantial Concern regarding the species' capability to persist over the long term in the plan area due to limited and restricted ecological conditions for reproduction (caves/mines). White-nose syndrome is not yet present on the RGNF, but is rapidly expanding westward. High local conservation concern.	
Gunnison prairie dog *Cynomys gunnisoni* FS: USFS R2 Sensitive NSR: CSR: G5 T3	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term in the plan area due to the presence of plague in the population. This species is also a key prey species for multiple at-risk predators. Montane Population recently evaluated (denied) for listing under the Endangered Species Act.	Montane population recently evaluated (denied) for listing under the Endangered Species Act.
Hoary bat *Lasiurus cinereus* FS: USFS R2 Sensitive NSR: G5 S5B CSR: Tier 2	documented; established in planning area	Substantial Concern regarding the species' capability to persist over the long term in the plan area due to loss of 90 percent of roosting habitat in live trees on Rio Grande National Forest due to beetle kill and timber harvesting. White-nose syndrome is not yet present on the Rio Grande National Forest but is rapidly expanding westward.	
Wolverine *Gulo gulo luscus* FS: USFS R2 Sensitive NSR: G4 S1 CSR: Endangered	One unconfirmed sighting in 1997	Substantial Concern regarding the species' capability to persist over the long term in the plan area due to conservation concern across multiple boundaries; natural and anthropogenic stressors. Plan unit may serve as a core reintroduction area providing resiliency from stressors such as climate change.	Uncertainty regarding whether or not the species is currently present on the planning area.
River otter *Lontra canadensis* FS: USFS R2 Sensitive NSR: G5 S3 S4 CSR: Threatened	documented; established in planning area	Species recently re-colonized upper Rio Grande system on its own. Limited population with substantial concern regarding ability to persist in the plan area in the long term.	

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Rocky Mountain bighorn sheep *Ovis canadensis canadensis* FS: USFS R2 Sensitive NSR: G4 T4 CSR: Tier 2	documented; established in planning area	Uncertainty regarding the species' capability to persist over the long term in the plan area due to unique anthropogenic stressors with substantial conservation concern across multiple landownership boundaries. Potential disease epizootics the primary limiting factor. Only 3 to 4 of 11 herds considered "secure" from potential contact with domestic sheep or goats.	
Townsend's big-eared bat *Corynorhinus townsendii townsendii* FS: USFS R2 Sensitive NSR: G3G4 T3T4 S2 CSR: Tier 1	documented; established in planning area	Substantial Concern regarding the species' capability to persist over the long term in the plan area due to limited and restricted ecological conditions (caves/mines). White-nose syndrome is not yet present on the Rio Grande National Forest but is rapidly expanding westward. substantial local conservation concern	
Plains pocket mouse *Perognathus flavescens* FS: NSR: G5 T2 CSR: Tier 2	documented; established in planning area	Substantial Concern regarding the species' capability to persist over the long term in the plan area due to rarity and limited habitat. Limited survey efforts indicate narrow range adjacent to Sand Dunes	
Northern pocket gopher *Thomomys talpoides agrestis* FS: NSR: G5 T1 S1 CSR: Tier 1	documented; established in planning area on Baca Mountain Tract.	Substantial Concern regarding the species' capability to persist over the long term in the plan area due to limited occurrence on plan area (limited survey effort). Unique subspecies endemic to the San Luis Valley.	
Plants			
Black Canyon gilia *Aliciella penstemonoides* (M.E. Jones) J.M. Porter Synonym: *Gilia penstemonoides* M.E. Jones NSR: G3 CNHP: S3	Six occurrences in the planning area	Substantial Concern regarding the species capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Stonecrop gilia *Aliciella sedifolia* (Brandegee) J.M. Porter Synonym: *Gilia sedifolia* Brandeg.) FS: USFS R2 Sensitive NSR:G1 CNHP:G1S1	Documented in planning area	Substantial Concern regarding the species capability to persist over the long run in the planning area due to extreme rarity. There are only two known occurrences (worldwide), both on Rio Grande National Forest.	
Rydberg's golden columbine *Aquilegia chrysantha* (A. Gray) var. *rydbergii* (Munz) FS: USFS Sensitive, BLM Sensitive NSR: G4T1Q CNHP: S1	May be present but is not documented in the planning area. Suitable habitat is present and the species occurs 30 miles from Rio Grande National Forest boundary	Concern regarding the species capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	Not currently known from the planning area, but the Rio Grande National Forest sits midway between known populations.
Vierhapper's aster, alpine aster *Aster alpinus* L. var. *vierhapperi* (Onno) Cronquist NSR: G5T5 CNHP: S1	Documented in planning area	Substantial concern regarding the species capability to persist over the long run in the planning area due to extreme rarity. This is the southernmost observation of this species.	
Brandgee's milkvetch *Astragalus brandegeei* Porter FS: NSR: G3G4 CNHP: S1S2	Documented in planning area, two specimens collected in 1986.	Substantial concern regarding the species capability to persist over the long run in the planning area due to extreme rarity and restricted range. Only four specimens of this species have ever been collected on Colorado.	
Aztec milkvetch *Astragalus proximus* (Rydb.) Wooton & Standl. FS: NSR: G4 CNHP: S2	Not documented on forest, but very likely to occur	Substantial concern regarding the species capability to persist over the long run in the planning area due to extreme rarity and restricted range. One location known from outside the San Juan Basin just south of Canon, 1.7 miles from the Rio Grande National Forest boundary.	Not documented on the forest, but likely to occur.

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Ripley's milkvetch *Astragalus ripleyi* Barneby FS: USFS R2 Sensitive NSR:G3 CNHP: G3S2	Documented on the planning unit near Conejos river and Terrace Reservoir	Doubt regarding the species capability to persist over the long run in the planning area due to rarity.	
Crandall's rockcress *Boechera crandallii* (B.L. Rob) W.A. Weber Synonym: *Arabis crandallii* B.L. Rob. FS: BLM Sensitive NSR:G2 CNHP:S2	May be present but is not documented in the planning area. Suitable habitat is present	Known from within 2 miles of Rio Grande National Forest Boundary. Suitable habitat and elevation are present.	Not documented on Rio Grande National Forest, but likely to occur. Surveys for this species have not been carried out.
Northern moonwort *Botrychium pinnatum* H. St. John Synonyms: *B. boreale* Milde subsp. *obtusilobum* (Rupr.) R.T. Clausen, *B. boreale* Milde var. *obtusilobum* (Rupr.) Broun NSR: G4 CNHP: S2	Three records from RGNF	Doubt regarding the species capability to persist over the long run in the planning area due to rarity in the planning area. Limited viability on Rio Grande National Forest due to being on southern edge of the species range.	Rarity on the planning unit may be due to restrictions in the species range rather than overall rarity of the species.
Little grapefern, least moonwort *Botrychium simplex* E. Hitchcock Synonyms: *B. tenebrosum* A.A. Eaton NSR: G5 CNHP: S2	One record of 12 individuals in 1995.	Doubt regarding the species capability to persist over the long run in the planning area due to rarity and limited habitat in the planning area.	
Lesser tussock sedge *Carex diandra* Schrank FS: USFS R2 Sensitive NSR: G5 CNHP: S1	Likely to occur on forest.	Doubt regarding the species' capability to persist over the long run in the planning area due to rarity. Suitable habitat is present on the forest and a viable population exists seven miles from the Rio Grande National Forest boundary. This is a fen species, the status of this species will be clarified in the fen report.	Not yet documented on the Rio Grande National Forest, but likely to occur. The status of this species will be re-assessed when the fen report is available.

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Mud sedge *Carex limosa* L. NSR: G5 CNHP: S2	Two records from 1945	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Species is fen-obligate.	
Shortflower Indian paintbrush *Castilleja puberula* Rydb. NSR:G2G3 CNHP:S2S3	Three records on RGNF	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Species is edaphic.	
Slender spiderflower *Cleome multicaulis* DC Synonyms: *Peritoma multicaulis* (DC.) Iltis, *Cleome sonorae* A. Gray NSR: G2G3 CNHP: S2S3	Likely to occur on the RGNF	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity. This species is not documented on the Rio Grande National Forest, but suitable habitat exists and the species has not been specifically surveyed for on this forest.	Not yet documented on the Rio Grande National Forest, but likely to occur.
James' cryptantha; catseye; San Juan cryptantha *Cryptantha cinerea* (Greene) Cronquist var. *pustulosa* (Rydb.) Higgins Synonyms: *Cryptantha jamesii* Payson var. *pustulosa* (Rydb.) Harrington; *Cryptantha pustulosa* (Rydb.) Payson; *Oreocarya pustulosa* Rydb. NSR: G5TNR CNHP: S1	At least one record on forest	Doubt regarding the species' capability to persist over the long run in the planning area due to rarity. Habitat needs are not known.	Taxonomy is very uncertain
Weber's catseye *Cryptantha weberi* I.M Johnst. Synonym: *Oreocarya weberi* (I.M. Johnst.) W.A. Weber NSR:G3 CNHP: S3	Three records from RGNF	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Colorado endemic known from the Rio Grande National Forest. There are approximately 50 total occurrences of this species, 3 of which are from the Rio Grande National Forest	

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Slender cliffbreak *Cryptogramma stelleri* (S.G. Gmel.) Prantl NSR: G5 CNHP: S2	One historic occurrence	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	
Lesser yellow lady's-slipper *Cypripedium parviflorum* Salisb. FS: USFS Sensitive NSR:G5 CNHP:S2	May be present but is not documented in the planning area. Suitable habitat is present.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity The habitat and elevation range of this species occurs on the Rio Grande National Forest. Documented 5 and 15 miles away on San Isabel National Forest.	Not currently known from the planning area
Mountain bladderfern *Cystopteris montana* (Lam.) Bernh. Ex Desv. Synonym: *Filix montana* (Lam). Underw. NSR: G5 CNHP: S1	One historic occurrence	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	
Colorado larkspur *Delphinium alpestre* Rydb. Synonym: *Delphinium ramosum* var. *alpestre* (Rydb.) W.A. Weber NSR: G2 CNHP: S2	Three occurrences on the RGNF	Edaphic factors. Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	
Wahatoya Creek larkspur *Delphinium robustum* Rydb. NSR: G2? CNHP: S2?	Very likely to present but is not documented in the planning area	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Viable habitat is present on Rio Grande National Forest. Has been documented within 300 feet of Rio Grande National Forest boundary.	Not currently known from the planning area
Heil's tansy mustard *Descurainia kenheilii* NSR: G1 CNHP: S1	Very likely to present but is not documented in the planning area	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. This species have only been documented once. That record was made 800 feet from the Rio Grande National Forest boundary at Stony Pass.	

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Rocky Mountain draba, San Juan whitlow-grass *Draba graminea* Greene NSR: G2N2 CNHP: S2	Seven occurrences on RGNF.	Edaphic factors. Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	
Gray's draba *Draba grayana* (Rydb.) C.L. Hitchc. FS: USFS Sensitive NSR: G2 CNHP: S2	At least three sightings on the RGNF	Species identified by a regional forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.	
Smith's draba, Smith's whitlow-grass *Draba smithii* Gilg ex O.E. Schulz FS: USFS Sensitive Species NSR: G2 CNHP: S2	12 known occurrences on RGNF.	Species identified by a regional forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.	
Alpine tundra draba, Colorado Divide whitlow-grass *Draba streptobrachia* R.A. Price Synonym: *D. spectabilis* Greene var. *dasycarpa* (O.E. Schulz) C.L. Hitchc. NSR: G3 CNHP: S3	Five known occurrences on RGNF – two historic and thee more current.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity.	Natureserve describes threats to the species on the planning unit as "low and manageable."
Stream orchid, giant helleborine *Epipactis gigantea* Douglas ex Hook. FS: USFS Sensitive NSR: G4 CNHP: S1S2	Likely to be present.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat Often occurs near geothermal seeps and springs, which are present on Rio Grande National Forest. Species has been documented within 1 mile of Rio Grande National Forest boundary. Suitable habitat is present.	Not currently documented in the planning area
Philadelphia fleabane, Philadelphia daisy *Erigeron philadelphicus* L. NSR: G5 CNHP: S1	Present in the planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Colorado wild buckwheat *Eriogonum coloradense* FS: BLM Sensitive NSR: G2 CNHP: S2	Likely to be present.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity. This species has been documented within 2.7 miles of the Rio Grande National Forest and can use a variety of habitats, many of which are found are Rio Grande National Forest. Colorado endemic.	Not currently documented in the planning area
Chamisso's cottongrass, russet cottonsedge *Eriophorum chamissonis* C.A. Mey FS: USFS Sensitive NSR: G5 CNHP: S1	Likely to be in the planning area.	Concern regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. This species needs saturated alpine soils and fens, which are present on the Rio Grande National Forest. Species has been documented within 11 miles of Rio Grande National Forest boundary. Due to precise habitat needs, this species is inherently rare.	Not currently documented in the planning area The status of this species will be re-assessed when the fen report is available.
Slender cottongrass *Eriophorum gracile* W.D.J. Koch FS: USFS R2 Sensitive NSR: G5 CNHP: S2	One record on RGNF	Concern regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Very limited information exists regarding this species.	
Spiny-spore quillwort *Isoetes tenella* Léman Synonym: *Isoetes setacea* ssp. *muricata,* other synonyms, see notes NSR: G5 CNHP: S2	Four reports, none since 1988.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Many synonyms: *Isoetes braunii* Durieu; *Isoetes echinospora* Durieu; *Isoetes echinospora* Durieu subsp. *asiatica* (Makino) Á. Löve; *Isoetes echinospora* Durieu subsp. *muricata* (Durieu) Á. Löve & D. Löve; *Isoetes echinospora* Durieu var. *asiatica* Makino; *Isoetes echinospora* Durieu var. *braunii* (Durieu) Engelm.; *Isoetes echinospora* Durieu var. *hesperia* (C.F. Reed) Á. Löve; *Isoetes echinospora* Durieu var. *muricata* (Durieu) Engelm.; *Isoetes echinospora* Durieu var. *robusta* Engelm.; *Isoetes echinospora* Durieu var. *savilei* B. Boivin; *Isoetes muricata* Durieu; *Isoetes muricata* Durieu var. *braunii* (Durieu) C.F. Reed; *Isoetes muricata* Durieu var. *hesperia* C.F. Reed; *Isoetes setacea* Lam. p.p.; *Isoetes setacea* Lam. subsp. *muricata* (Durieu) Holub;(USDA NRCS 2015)	There is very little information regarding this species.

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Colorado woodrush *Luzula subcapitata* (Rydb.) Harrington NSR: G3 CNHP: S3	One report in 1972	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Fen species One sighting from 1972, none since.	The status of this species will be re-assessed when the fen report is available.
Colrado tansy-aster *Machaeranthera coloradoensis* (Gray) Osterhout FS: USFS R2 Sensitive NSR: G3 CNHP: S3	Present on the forest	Doubt regarding the species' capability to persist over the long run in the planning area due to rarity in the planning area.	
House's stitchwort, House's sandwort *Minuartia macrantha* (Rydb.) House Synonym: *Alsinanthe macrantha*(Rydb.) W.A. Weber, *Arenaria macrantha* (Rydb) A. Nelson ex J.M Coult. & A. Nelson NSR: G3 CNHP: S3	Documented in planning area. Herbarium specimens of this species collected on the RGNF in 1945, 1981, and 2003	Doubt regarding the species' capability to persist over the long run in the planning area due to rarity in the planning area. Restricted to alpine habitats	
Bill's neoparrya; rock-loving aletes *Neoparrya lithophila* Mathias Synonym: *Aletes lithophila* (Mathias) W.A. Weber*; Aletes lithophilus* (Mathias) Weber] FS: Sensitive NSR: G3 CNHP: S3	Four known populations on RGNF	Doubt regarding the species' capability to persist over the long run in the planning area due to rarity in the planning area.	Four populations are rated excellent, with population size, size of occupied area, condition of habitat and landscape context
Parry's oxytrope; Parry's crazy-weed *Oxytropis parryi* A. Gray NSR: G5 CNHP: S1	One sighting on the forest	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Kotzebue's grass of Parnassus *Parnassia kotzebuei* Cham. Ex. Spreng. Synonym: *Parnassia kotzebuei* Cham. Ex Spreng. Var. *pumila* Hitchc. & Ownbey FS: USFS Sensitive NSR: G5 CNHP: S2	Likely to be present in the planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Species grows in wet alpine meadows and forest openings both of which are present on the Rio Grande National Forest. This species has been documented within 4 miles of the Rio Grande National Forest boundary.	Not currently documented in the planning area.
Degener's beardtongue *Penstemon degeneri* Crosswh. FS: BLM and USFS Sensitive NSR: G2 CNHP: S2	Very likely to be planning area.	Concern regarding the species' capability to persist over the long run in the planning area due to extreme rarity. Species uses pinyon-juniper woodlands, ponderosa park lands, oak brushlands and mountain meadows, all of which occur on the Rio Grande National Forest. This species has been documented within 10 miles of the Rio Grande National Forest boundary. The Rio Grande National Forest sits midway between two known populations.	Not currently documented on the planning area.
Silkyleaf cinquefoil, Southern Rocky Mountain cinquefoil *Potentilla ambigens* Greene NSR: G3 CNHP:S2	Three known occurrences on the RGNF	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	
Arizona willow *Salix arizonica* Dorn FS: Sensitive NSR: G2G3 CNHP: S1	One record from RGNF	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	
Sage willow *Salix candida* Flüggé ex Willd FS: USFS Sensitive NSR: G5 CNHP: S2	Very likely to be planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. This species used permanently saturated peatlands in rich or extremely rich fens with basic pH. Habitat of that sort is present on the Rio Grande National Forest. There is one record of this species occurring on the Rio Grande National Forest, but that record appears to have been a misidentification of the species.	Not currently documented on the planning area. The status of this species will be re-assessed when the fen report is available.

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Autumn willow *Salix serissima*(L.H. Bailey) Fernald FS: USFS Sensitive NSR: G4 CNHP: S1	Very likely to be planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. This species used permanently saturated peatlands in rich or extremely rich fens with basic pH. Habitat of that sort is present on the Rio Grande National Forest. This species has been documented within 2.5 miles of the forest boundary.	Not currently documented on the planning area The status of this species will be re-assessed when the fen report is available.
Webers saw-wort *Saussurea weberi* Hultén NSR: G2G3 CNHP: S2	Likely to be present in the planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. One specimen of this species was collected in 2009 1.3 miles away from the boundary, but 50 miles south of any other sighting. Regional endemic species, the occurrences near the Rio Grande are the southern-most for the species. Suitable habitat for this species is present on the Rio Grande National Forest.	Not currently documented on the planning area. No surveys for this species have yet occurred on the RGNF.
Tufted alpine saxifrage, tundra saxifrage *Saxifraga caespitosa* L. subsp. *monticola* (Small) A.E. Porsild Synonym: *Muscaria monticola* Small, many other synonyms NSR: G5T5 CNHP: S2*	One sighting in 1998	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity More synonyms – *Muscaria micropetala* Small; *Muscaria monticola* Small; *Saxifraga caespitosa* L. var. *minima* Blank.; *Saxifraga cespitosa* L. subsp. *monticola* (Small) A.E. Porsild, orth. var.; *Saxifraga cespitosa* L. var. *minima* Blank., orth.; *Saxifraga micropetala* (Small) Fedde var. *Saxifraga monticola* (Small) Á. Löve & D. Löve	Evaluated for inclusion on R2 Sensitive list and excluded due to stable population trend. Also, occurrence on Rio Grande National Forest may be peripheral to species habitat.
King's campion *Silene kingie* (S. Watson) Bocquet Synonym: *Gastrolychnis kingie* (S. Watson) W.A. Weber NSR: G2G4Q CNHP: S1	One record from RGNF, in 1995	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. More synonyms: *Lychnis kingii* S. Watson *Melandrium kingii* (S. Watson) Tolm. *Wahlbergella kingii* (S. Watson) Rydb. *Lychnis apetala* var. *kingii* (S. Watson) S.L. Welsh	But this may be a peripheral occurrence.

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Pale blue-eyed grass *Sisyrinchium pallidum* Cholewa & Douglass M Hend. FS: BLM Sensitive NSR: G3 CNHP: S2	Likely to be present in the planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. This species is known from 3.3 and 10 air miles away, the wetland habitat of this species is known from the Rio Grande National Forest.	Not currently documented in the planning area. Surveys for this species have not occurred. The status of this species will be re-assessed when the fen report is available.
Sphagnum bog-moss *Sphagnum angustifolium* (C. Jens. ex Russ.) C. Jens. in Tolf Multiple synonyms, see notes. FS: NSR: CNHP:	One record from RGNF	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat (iron fens). More synonyms: *Sphagnum recurvum* var. *tenue* Klinggr. *Sphagnum parvifolium* (Sendtn.) Warnst. *Sphagnum recurvum* ssp. *angustifolium* C. Jens. ex Russ. *Sphagnum fallax* var. *angustifolium* (C. Jens. ex Russ.) Nyh. *Sphagnum flexuosum* var. *tenue* (Klinggr.) Pilous, *Sphagnum recurvum* var. *parvifolium* Sendtn. ex Warnst.	Rio Grande National Forest may be peripheral to this species range.
Baltic sphagnum, Baltic bog-moss *Sphagnum balticum* (Russ.) C. Jens. FS: NSR: CNHP:	Likely present in the planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat (iron fens). This species is known from less than 10 miles away, the iron fen habitat of this species is known from the Rio Grande National Forest	Not currently documented in the planning area The status of this species will be re-assessed when the fen report is available.
Smooth Easter daisy *Townsendia glabella* A. Gray ex Rothr. NSR: G2 CNHP: S2	Likely to be present but is not documented in the planning area.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. This species is not known from the Rio Grande National Forest but is known from less than a mile from the boundary. The habitat of this species is present on the Rio Grande National Forest making it likely that this species is present	Not currently documented in the planning area
Rothrock's Townsend daisy *Townsendia rothrockii* A. Gray ex Rothr. NSR: G2G3 CNHP: S2S3	Three records from RGNF	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat.	Natureserve does not consider any of the populations known from the Rio Grande National Forest to be at risk.

Species	Occurrence on Planning Unit	Rationale for inclusion on species of conservation concern list	Uncertainty
Lesser bladderwort *Utricularia minor* FS: USFS Sensitive NSR: G5 CNHP: S2	Likely to occur. Suitable habitat is present.	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. This species is not documented on the Rio Grande National Forest, but is known from 8.0 air miles away. The fen and wetland habitat of this species is known from the Rio Grande National Forest making it likely that this species is present.	Not documented on planning area, but likely to occur. The status of this species will be re-assessed when the fen report is available.
New Mexico cliff fern *Woodsia neomexicana* Windham NSR: G4 CNHP: S2	Three records from Rio Grande National Forest	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Rarity, limited habitat (epipectric)	
Plummer's cliff fern *Woodsia plummerae* Lemmon NSR: G5 CNHP: S1	Two records from Rio Grande National Forest	Doubt regarding the species' capability to persist over the long run in the planning area due to extreme rarity and limited habitat. Rarity, limited habitat (epipectric)	

At-risk Species Ecosystem Conditions, Features and Risk Factors

The “At-Risk” list includes all species in the planning area determined and listed as threatened, endangered, candidate, or proposed by the Fish and Wildlife Service, as well as species of conservation concern documented by the Forest Service. The 2012 Planning Rule requires the Forest Service to identify the status of at-risk species by considering existing plan direction (mentioned previously in this document) as well as the ecological conditions needed to support the species and the status of the ecological conditions in the plan area.

To this end, staff from the Rio Grande National Forest and the Forest Service Rocky Mountain Regional Office (Region 2) compiled a database of ecological conditions used and needed by at-risk species, including habitats, ecological conditions and features used or needed by the species, as well as risk factors faced by those species. This database was compiled from information consolidated for each species in Species Overviews, including current status and distribution within the plan area.

Species listed as threatened, endangered, candidate, or proposed by the Fish and Wildlife Service are listed in bold print.

Table 4. Ecosystem conditions, features, and risk factors for at-risk species on the Rio Grande National Forest

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Fish and Amphibians			
Boreal toad *Anazyrus boreas boreas*	Wetlands above 7,500 feet Forests, woodlands, sagebrush and meadows within 0.56 mile of wetlands	Shallow wetlands for breeding Terrestrial habitat with vegetative cover for foraging Burrows for winter hibernation	Chytrid fungus Decreased water and air quality. Timber harvest *Livestock grazing* *Habitat fragmentation* *Non-native species and management of non-native species* *Climate change*
Northern leopard frog *Rana pipiens*	Palustrine wetlands	Small lakes (less than 20 acres) within palustrine wetlands Vegetated shorelines on those lakes Ponds separated from each other, but not too far apart Unconsolidated pond bottom Very low salinity	Chytrid fungus Ranavirus Water pollution Water development (dewatering) Development/Habitat loss/fragmentation Presence of fish in the ponds. Non-native fish Bullfrogs *Climate change*
Rio Grande cutthroat trout *Oncorhynchus clarki virginalis*	Lacustrine Lakes Rivers and Streams	Pools (within streams) with vegetated shorelines	Non-native trout Whirling disease
Rio Grande chub *Gila pandora*	Lacustrine lakes Rivers	Cool, fast flowing reaches with coarse substrate for breeding Riffles for breeding Overhanding vegetation around pools in creeks and streams	Sedimentation Presence of non-native fish: trout, northern pike, common carp, white sucker. Habitat loss or fragmentation due to urbanization (or other development) or dewatering

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Rio Grande sucker *Catostomus plebeuis*	Rivers	Clear cold streams Cobble to boulder substrate with particle size of 2.5 to 19.7 inches Glides Low-velocity stream margins as shelter for Young-of-year. Riffles Shaded by willow of other shrubs Stream depth 3.9 to 15.7 inches Low stream gradient Stream velocity below 3.7 fps, preferably below 0.7	Development: dewatering or reduced stream flow Habitat fragmentation due to development or dewatering Sedimentation Wildland fire as a source of sedimentation. Presence of non-native fish: trout, northern pike, white sucker
Invertebrates			
Uncompahgre fritillary butterfly *Boloria acrocnema*	Alpine tundra	Large patches of snow willow	*Sheep grazing* *Recreational use* *Overzealous collection of this species by hobbyists and scientists.*
Western bumblebee *Bombus occidentalis*	General	Cavities for breeding and wintering Nectar producing plant species Appropriate post-disturbance seed mixes	Habitat fragmentation *Livestock grazing* *Vegetation management*
White-veined Arctic *Oeneis bore*	Alpine tundra	Gravelly and shale areas Bogs Wet hummocky areas	
Birds			
Gunnison sage-grouse *Centrocercus minimus*	Sagebrush Semi-desert shrubland Riparian habitats adjacent to sagebrush and semi-desert shubland (occasionally)		Destruction of habitat due to development: urbanization, roads, agriculture. Habitat loss due to wildland fire Pinyon-Juniper Encroachment *High intensity livestock grazing*

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Southwestern willow flycatcher *Empidonax traillii extimus*	Riparian habitat with dense "messy" thickets of willow and/or salt cedar.	Thickets two meters or taller, greater than 50 percent cover and complex enough to disguise nests.	High intensity livestock grazing *Invasive Plants* *Invasive Plant Management* Recreational use of riparian areas *Brown-headed cowbirds??* Loss of cover and complexity due to wildland fire.
White-tailed ptarmigan *Lagopus leucura*	Alpine	Krummholz Rocky areas Alpine willow patches	High intensity grazing Recreational use *Climate change* *Mining*
Mexican spotted owl *Strix occidentalis lucida*	Mixed Conifer/Aspen forests Ponderosa Pine Woodlands Canyonlands Pinyon-Juniper Woodlands Riparian Areas	Canyons Caves Cliffs	Vegetation Management Wildland Fire
Yellow-billed cuckoo *Coccyzus americanus*	Riparian areas Cottonwood galleries	Large patches of willow and cottonwood Thick understory Canopy closure greater than 70 percent	Water development Development - Habitat loss Livestock Grazing (High intensity) Pesticide use
Bald eagle *Haliaeetus leucocephalus*	Riparian habitat Lacustrine Lakes Cottonwood galleries Agricultural lands (occasional) Semi-desert shrubland (occasional) Montane shrubland (occasional) Low-Mid Elevation Woodlands (occasional)	Mature old-growth trees with strong structure near water. Snags (structurally sound) Water bodies – large lakes and rivers Rock outcrops	Illegal shooting Habitat loss due to vegetation management *Recreational use* Biocide use Decreasing food supply.
Black swift *Cypseloides niger*	Riparian habitats, from alpine treeline down through the Pinyon-Juniper forest. Alpine tundra	Rock crevices and mossy shaded areas very close to waterfalls	Drought *Vegetation management* *Development of roads and water diversion facilities* *Climate change*

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Boreal owl *Aegolius funereus*	Subalpine Spruce-Fir forests Stands of large aspen trees within Subalpine Spruce-Fir forests Mature conifers forests in general	Large diameter aspen or conifer trees in late seral stands. Northern flicker cavities Cool, high altitude micro-sites Prey: Voles, shrews, squirrels and passerine birds.	Timber harvesting Wildland Fire Beetle mortality Vegetation management
Flammulated owl *Otus flamineolus*	Mature Ponderosa Pine Woodlands Mature Mixed Conifer/Aspen stands	Northern flicker cavities in large Aspen trees and large snags	Timber harvesting Wildland Fire Vegetation management
Golden eagle *Aquila chrysactos*	Grasslands Arid landscapes Shrublands Semi-desert shrublands Pinyon-Juniper woodlands	Rock crevices in cliffs Prey: Hares, rabbits, ground squirrels, prairie dogs, marmots Carrion Rock outcrops	Illegal shooting Loss of prey due to extermination of prairie dogs and other wild rodents Electrocution from power lines Wind energy development Agricultural conversion Habitat loss due to wildland fire
Brewer's sparrow *Spizella breweri*	Desert Scrub Semi-desert shrubland Sagebrush shrubland	Large patches of sagebrush High Sagebrush cover	*Habitat loss due to livestock grazing, urbanization, agricultural conversion, and wildland fire.* *Herbicide use.*
Northern goshawk *Accipter gentiles*	Late seral forested landscapes Aspen woodlands Mixed conifer woodlands Ponderosa pine woodlands Subalpine Spruce-Fir forests Engelmann Spruce	Large trees, especially Aspen and Ponderosa pine Open understory Canopy closure over 40 percent	Timber harvest Wildland Fire Suppression
Olive-sided flycatcher *Contopus cooperi*	Aspen woodlands Mixed conifer woodlands Ponderosa pine woodlands Subalpine Spruce-Fir forests Riparian habitats Low-elevation woodlands	Early successional post-fire areas Edge/opening areas Short needled conifers	Homogenous fuel treatments Habitat loss due to wildland fire suppression.

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Peregrine falcon *Falco peregrine's anatum*	Low-elevation woodlands Conifer-dominated forests Grasslands Shurblands Arid to semi-arid landscapes Forested landscapes.	South-facing cliffs that are greater than 100 feet tall. Prey: Birds	*Poisoning (Pesticide use)* Disturbance from recreational use (rock climbing) Illegal take. Vegetation management
Veery *Catharus fuscescens*	Montane riparian corridors	Dense thickets Occasional disturbance	*High intensity livestock* *Habitat loss due to development* *Timber harvesting* *Brown-headed cowbird nest parasitism*
Mammals			
Black-footed ferret *Mustela nigripes*	Grasslands	Prairie dog towns Prey: Prairie dogs and other small mammals Prairie dog burrows	Development – habitat loss Poisoning Disease – Sylvatic plague (kills prairie dogs, leaving ferrets with no prey) Hunting/Shooting/Trapping
Canada lynx *Lynx canadensis*	Subalpine spruce-fir forests	Hunting and foraging areas: mid to early seral subalpine spruce-fir forests, willow and cottonwood thickets North-facing slopes with large woody debris in later seral spruce-fir forests Prey: snowshoe hare and small mammals	
New Mexico meadow jumping mouse *Zapus hudsonius luteus*	Riparian habitats Wetlands	Persistent emergent vegetation. Tall dense sedges Contiguous habitat/Connectivity Soil moisture	Livestock grazing Drought Climate change Wildland fire Development Vegetation management (mowing)

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
American marten *Martes americana*	Subalpine spruce-fir forests (mature) Lodgepole pine forests (mature) Alpine tundra	Coarse woody debris (large logs greater than 18 inches diameter) for subnivean rest sites Prey: Voles, shrews, squirrels and small mammals Snags for rest sites Squirrel middens Spruce/Fir size greater than 8 inches dbh. Snags greater than 8 inches dbh., snags greater than 16 inches dbh are even better	Timber harvest Hunting Beetle mortality.
Fringed myotis bat *Myotis thysanodes*	Ponderosa pine woodlands Pinyon-Juniper woodlands Arid areas – deserts, arid grasslands, semi-desert shrubland and desert scrub. Montane shrubland Low-elevation conifer	Mines, Caves, and rock crevices Cavities in large conifer snags Prey: Beetles and moths Cavities in structures	White-nose syndrome Recreational caving Timber harvesting Urbanization *Agricultural conversion* *Water development* *Building and bridge modification* Wildland fire
Gunnison prairie dog *Cynomys gunnisoni*	Grasslands Gambel Oak/Mixed Montane shrub Semi-desert shrubland	Food: grasses, forbs, sedges and shrubs	*Habitat loss due to agricultural conversion, oil and gas development, urbanization* Direct human-caused mortality: Hunting and shooting and poisoning. Disease: Sylvatic plague Habitat alteration due to livestock grazing, vegetation management, invasive plants, wildland fire, and wildland fire suppression.
Hoary bat *Lasiurus cinereus*	Conifer forests: Subalpine Spruce-Fir, Ponderosa Pine, and Pinyon-Juniper	Tree branches with foliage	Timber harvest Vegetation management: pesticide use *Wind energy development* Beetle mortality
Wolverine *Gulo gulo luscus*	Alpine Subalpine Spruce-Fir forests	Avalanche chutes with coarse woody debris piles at base Persistent snow over 5 feet	Climate change

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
River otter *Lontra canadensis*	Riparian habitats	In-stream cover Prey: Fish Riparian vegetation greater than 50 percent cover Stream flow over 50 cfs.	Poor water quality Vegetation management (loss of riparian vegetation) Livestock grazing (Degradation of Vegetation) *Hunting* *Water development and depletion* *Mining (pollution)* *Urbanization*
Rocky Mountain bighorn sheep *Ovis canadensis canadensis*	Alpine areas	Adequate forage Rock outcrops, cliffs and ledges to provide vertical relief from predators and visibility. Migration corridors	Disease issues Proximity to domestic sheep or goats Recreational use, unintentional harassment Recreational use, consumption of human food and food wrappers Lack of migration routes (staying year-round in same location can result in parasites).
Townsend's big-eared bat *Corynorhinus townsendii townsendii*	Caves and mines	Caves and mines: Stable interior temperature for wintering and breeding Smaller caves and mines (without stable temp) for short-term summer sheltering locations	*Recreational caving* *Renewed mining* *Human use, including over-zealous scientific collecting*
Plains pocket mouse *Perognathus flavescens*	Pinyon-Juniper woodlands Arid landscapes	Sand dunes Rocky gravel soils within Pinyon Juniper woodlands Livestock grazing to maintain disturbance regime	
Northern pocket gopher *Thomomys talpoides agrestis*	Alpine tundra Hedgerows in Agricultural areas Grasslands Semi-desert shrublands Montane shrublands Grassy openings in conifer dominated forests, including Pinyon-Juniper and Ponderosa Pine woodlands.	Deep soils in grass/forb openings Clay soils or rocky/gravel soils in grassy openings	Vegetation management (herbicide use) Roads

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Plants			
Black Canyon gilia *Aliciella penstemonoides*	Engelmann Spruce forests Arizona Fescue grasslands	Rock outcrops and cliffs Volcanic substrates: Rhyolite	*Livestock grazing* *Recreational use* *Air pollution* *Genetic isolation* *Inadequate pollination Non-native species* *Climate change*
Stonecrop gilia *Aliciella sedifolia*	Alpine tundra	Sparse forb cover Talus slopes Volcanic substrates: Ash-tuffs and andesitic	Presence of *Acomastylis rossi* Recreational use Sheep grazing
Rydberg's golden columbine *Aquilegia chrysantha*	Riparian corridors in Spruce-Fir/Subalpine areas	Bases of boulders, seeps, and other cool microsites Granitic soils Organic soils	Development
Vierhapper's aster, alpine aster *Aster alpinus* var. *vierhapperi*	Alpine tundra	Alpine saddles Aspen stands	Climate change Lack of information regarding species Habitat loss or fragmentation.
Brandgee's milkvetch *Astragalus brandegeei*	Arizona fescue grasslands	unknown	Development Lack of information regarding species
Aztec milkvetch *Astragalus proximus*	Pinyon-Juniper	Shale derived soils	Development Lack of information regarding species
Barneby Ripley's milkvetch *Astragalus ripleyi*	Arizona fescue grasslands Ponderosa Pine woodlands Pinyon-Juniper woodlands	Mesic sites in otherwise dry locations Occasional disturbance Shaded by willow or other shrubs Slopes up to 30 percent Volcanic substrates: San Juan volcanic field (tuffaceous ash-flow sheets, basaltic flows, reworked volcanic materials	Recreational use – trampling, ATV big game retrieval, illegal off-road vehicle use Livestock grazing (sheep and cattle) Non-native plant species (sweet clover) Wildfire suppression Firewood collection (trampling)
Crandall's rockcress *Boechera crandallii*		Open areas within woodlands, shrublands, and forests	

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Narrowleaf grapefern *Botrychium lineare*	Montane forests Aspen woodlands	Occasional disturbance Small open areas	Lack of information regarding species.
Northern moonwort *Botrychium pinnatum*	Alpine tundra Subalpine Spruce-fir forests (closed canopy) Wet meadows within spruce-fir forests	High soil moisture	Development Lack of information regarding species
Little grapefern *Botrychium simplex*	Open habitat	High soil moisture for at least part of year Fens	Development Lack of information regarding species
Lesser tussock sedge *Carex diandra*	Fens Wetlands	Fens Wetlands, especially peat-accumulating wetlands Lake and pond margins	Dewatering Cattle or wildlife herbivory Habitat destruction due to logging, development, or recreation
Mud sedge *Carex limosa*	Subalpine Spruce-Fir forests	Fens Hydrologic stability Floating mats on small lake basins or depressions	Lack of information regarding species
Shortflower Indian paintbrush *Castilleja puberula*	Alpine tundra Bristlecone/Krummholz	Dry areas within tundra Fell-field community Slopes 0 to 30 percent	Wildlife grazing/browsing Recreational use
Slender spiderflower *Cleome multicaulis*	Grasslands Alkaline of saline playas	Moist but not saturated soils Alkaline soils	Dewatering Creation of artificial wetlands
James' cryptantha *Cryptantha cinerea* var. *pustulosa*	Ponderosa Pine woodlands Arid landscapes Desert Scrub Pinyon Juniper Woodlands Non-vegetated areas	unknown	Taxonomic uncertainty Lack of information regarding the species
Weber's catseye *Cryptantha weberi*	Sparsely vegetation mountain areas.	Rock crevices Volcanic substrates: andesitic substrates Occasional disturbances	Recreational use trampling

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Slender cliffbreak *Cryptogramma stelleri*	Conifer-dominated forests	Outcrops, cliffs and crevices made of calcareous rocks Moss and duff in moist shaded areas. Seeps and dripping water in areas with calcareous substrates	Climate change
Lesser yellow lady's-slipper *Cypripedium parviflorum*	Aspen and mixed conifer communities	Part of the forb community. Ephemeral seeps and springs	Unmanaged recreation High intensity grazing Flower collection Dewatering
Mountain bladderfern *Cystopteris montana*	Subalpine Spruce-Fir Forests Engelmann Spruce forests	Moist rich soils	Development Timber harvesting
Colorado larkspur *Delphinium alpestre*	Alpine meadows	Meadows Seasonal seeps Rocky and exposed conditions Species is likely edaphic but the specific substrate needed has not been identified.	Recreational use (trampling) Mining Climate change
Wahatoya Creek larkspur *Delphinium robustum*	Alpine tundra Talus slopes	Seasonal seeps Rocky and exposed soil conditions Species is likely edaphic but the specific substrate needed has not been identified.	Recreational use (trampling) Mining Climate change
Heil's tansy mustard *Descurainia kenheilii*	Alpine tundra	Unknown	Lack of information regarding species. *Recreation: trampling* *Grazing* *Mining* *Climate change*

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Rocky Mountain draba, *Draba graminea*	Alpine tundra	Talus slopes Alpine dwarf shrubland Alpine tundra dry meadow Alpine fell-field community Late snowmelt areas Rock crevices and outcrops Volcanic substrates: Ash-tuffs and andesitic substrates	unknown
Gray's draba *Draba grayana*	Alpine Subalpine Talus slopes	Talus slopes Fell field community Rock outcrops, and crevices Rocky gravel soils Steep slopes	*Recreational use (trampling)* *Livestock grazing and trampling* Air pollution Presence of non-native species (noxious weeds) Wildlife grazing/browsing
Smith's draba, *Draba smithii*	Subalpine Spruce-Fir forests Aspen woodlands Montane riparian corridors Arizona fescue grasslands	Rock outcrops Talus slopes	Lack of information regarding this species
Alpine tundra draba, *Draba streptobrachia*	Alpine	Finely weathered rock and loose soil Ridges and slopes Scree margins Talus slope margins	*Climate change*
Stream orchid, giant helleborine *Epipactis gigantea*	Montane riparian corridors Wetlands	Willow and cottonwood thickets Fens Seeps and springs Saturated soils	Water development – dewatering Non-native plant species Climate change
Philadelphia fleabane, Philadelphia daisy *Erigeron philadelphicus*	Wetlands Grasslands	Seasonal seeps Wet meadows High soil moisture	Lack of information regarding this species

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Colorado wild buckwheat *Eriogonum coloradense*	Open and xeric areas Pinyon-Juniper woodlands Grasslands Ponderosa Pine woodlands Alpine cushion plant communities		
Chamisso's cottongrass, russet cottonsedge *Eriophorum chamissonis*	Alpine tundra Wetlands	Saturated soils (year-round) Fens Wet meadows	Dewatering
Slender cottongrass *Eriophorum gracile*	Subalpine	Wet meadows Fens Standing water Floating mats Low gradients Soils saturated for entire growing season	Water development (dewatering) Illegal off-road vehicle use (wheel ruts can act as drains and change hydrology over small areas) Climate change
Spiny-spore quillwort *Isoetes tenella*	Palustrine wetlands Lacustrine lakes Alpine Subalpine	Shallow water Ponds within wetlands Ponds in alpine and subalpine ecosystems Lightly acidic oligotrophic	Livestock grazing Wildfire suppression Presence of non-native species (invasive plants) Water development/dewatering Wildfire suppression – retardant and foaming agents Lack of information regarding the species.
Colorado woodrush *Luzula subcapitata*	Alpine Subalpine Lacustrine lakes	Bogs Willow cars Riparian corridors Tundra Subalpine lake shores Subalpine meadows fens	Water development – dewatering Lack of information regarding this species Climate change

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Colrado tansy-aster *Machaeranthera coloradoensis*	Grasslands Talus slopes Subalpine Spruce-Fir Forests Lodgepole Pine forests Ponderosa Pine forests Pinyon-Juniper forests Alpine ecosystems	Edaphic: volcanic calcerous substrates. Open areas, not closed canopy	*Livestock trampling* *Recreational trampling* *ATV retrieval of big game*
House's stitchwort *Minuartia macrantha*	Alpine tundra	Cushion plant communities Rocky gravel soils	High intensity sheep grazing Illegal off-road vehicle use Non-native plant species
Bill's neoparrya *Neoparrya lithophila*	General	Rock outcrops and cliffs Proximity to volcanic calcerous substrates Edaphic: Latitic lava and ash-tuffs substrates	*Recreational use* *Livestock grazing*
Parry's oxytrope *Oxytropis parryi*	Alpine Montane	Alpine meadows Rocky slopes and saddles	Presence of non-native species (invasive plants) Climate change
Kotzebue's grass of Parnassus *Parnassia kotzebuei*	Alpine tundra Grassy openings in subalpine areas Wetlands	Wet meadows Seeps and Springs Alpine meadows Saturated soil, year round	Lack of information regarding species dewatering
Degener's beardtongue *Penstemon degeneri*	Pinyon-Juniper Woodlands Montane Meadows Ponderosa Pine Woodlands	Ecotones – meadow edges, canyon rims Igneous substrates that are poorly developed and dry Rock crevices	Livestock grazing Recreational use Development Infrastructure Lack of information regarding species.
Silkyleaf cinquefoil, *Potentilla ambigens*	Montane Subalpine	Riparian corridors Wet meadows Arizona fescue grasslands Willow cars Occasional disturbance	Climate change Illegal off-road use Recreational use (trampling)

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Arizona willow *Salix arizonica*	Subalpine Spruce-Fir Montane	Wet meadows Riparian corridors Low gradient Rocky gravel soils Volcanic substrates	Livestock grazing Air pollution Recreational use trampling ATV retrieval of big game
Sage willow *Salix candida*	Wetlands	Iron Fens Soil moisture rich in nutrients Alkaline pH.	Dewatering
Autumn willow *Salix serissima*	Wetlands	Iron Fens Soil moisture rich in nutrients Alkaline pH.	Dewatering
Webers Saw-wort *Saussurea weberi*	Alpine tundra	Tundra Wet ledges at high elevation	Climate change Recreation
Tufted alpine saxifrage *Saxifraga caespitosa* subsp. *monticola*	Alpine	Alpine cushion communities	*Small size and isolation of population segments* *Non-native species (invasive plants)*
King's campion *Silene kingie*	Subalpine Spruce-Fir Alpine	Tundra Alpine cushion plan communities Edaphic – calcerous substrates	Lack of information regarding species.
Pale blue-eyed grass *Sisyrinchium pallidum*	Wetlands Montane riparian corridors Lake margins	Fens Wetlands Lake margins Above permanent inundation level but below upland species. May need or prefer calcerous soils	Dewatering Climate change Changes in precipitation regime Grazing Recreation
Sphagnum bog-moss *Sphagnum angustifolium*	Subalpine Spruce-Fir	pH acidic – below 5.8, often below 4.8.	*Recreational use*
Baltic sphagnum, Baltic bog-moss *Sphagnum balticum*	Subalpine Spruce-Fir	pH acidic	*Recreational use*

Species	Ecosystems used by this species	Conditions and Features needed by this species	Risk Factors for this species *(factors listed in italics are uncertain on the Rio Grande National Forest)*
Smooth Easter daisy *Townsendia glabella*	Ponderosa pine woodlands	Oak brush understory Substrate: Smoky hills members of the Mancos Bay Oyster Beds Substrate: Shale-derived substrates Species is edaphic	Development Recreational Use Livestock grazing
Rothrock's Townsend daisy *Townsendia rothrockii*	Alpine Subalpine Talus slopes	Tundra Fell-field community Krummholtz Talus slopes Subalpine meadows Cushion plant communities Edaphic – igneous/volcanic calcerous substrates Occasional disturbance Open herbaceous understory	Recreational use – trampling Roads ATV big game retrieval Livestock grazing (intensity(Mining renewal
Lesser bladderwort *Utricularia minor*	Palustrine Wetlands	Fens Seeps and Springs Beaver Ponds Marshes Low energy waterflow	Recreational Use Wildland Fire Timber harvesting
New Mexico cliff fern *Woodsia neomexicana*	Pinyon Pine habitats Open, sparsely vegetated areas Talus slopes Bare rocky areas	Southwest- to west-facing aspects Cliffs and rock outcrops Rocky, gravelly soils	Recreational use Mining Genetic isolation Climate change
Plummer's cliff fern *Woodsia plummerae*	Pinyon Pine habitats Douglas fir habitats Open, sparsely vegetated areas Talus slopes Bare rocky areas	Rock outcrops West-facing aspect Volcanic substrates	Climate change Lack of information regarding species.

Grouping of Species and Select Set of Ecological Conditions

The "Monitoring" section of the 2012 Planning Rule (§219.12) includes the optional grouping of species and the development of a "select set of ecological conditions," which is tied to "Key Ecosystem Characteristics" developed in Assessments 1 and 3. Species may be grouped based upon shared ecological conditions. These are to be used in monitoring key characteristics of terrestrial and aquatic conditions. Development of the select set of ecological conditions is technically part of the monitoring phase of Forest Plan development, which would occur separately from the assessment phase (this document is part of the Assessment phase, §219.6(b)(5)). However, the two issues are clearly related, and we decided to develop a draft select set, as these conditions relate to the inclusion of species on the species of conservation concern list.

The Forest Service Planning Handbook emphasizes that the select set should include conditions that can be monitored in a direct and efficient way. This includes conditions identified in Assessments 1 and 3 (Terrestrial Ecosystems and System Drivers), as well as those more narrow conditions that apply to at-risk species, which were not identified in the more general assessments.

These are ecosystem characteristics, conditions and features needed to recover federally threatened and endangered species, conserve proposed and candidate species, and to maintain viable populations of species of conservation concern. The selected characteristics, conditions, and features are listed in Table 5 along with the at-risk species that need or use them.

Table 5. Select set of ecological conditions for at-risk species on the Rio Grande National Forest

Ecological Condition or Feature	Description	Associated Species
Volcanic Substrates: Ash-tuffs, lattitic lava flows, rhyolite, andesitic substrates	These are specific soil types that many plant species are dependent upon.	Black Canyon gilia Stonecrop gilia Barneby Ripley's milkvetch Rocky Mountain draba Colorado tansy aster Bill's neoparrya Arizona willow Kings campion Rothrock's Townsend daisy Plummer's cliff fern Weber's catseye Arizona willow
Sedimentary calcerous substrates	These are specific soil types that many plant species are dependent upon. Mostly shale or limestone.	Slender cliffbreak Missouri milkvetch Colorado tansy-aster Bill's neoparrya King's campion Pale blue-eyed grass Smooth Easter Daisy

Ecological Condition or Feature	Description	Associated Species
Fens (general)	Wetlands fed by mineral rich groundwater. In the RGNF, many are in alpine areas.	Little grapefern Mud sedge Stream orchid Chamisso's cottongrass Whitebristle cottongrass Slender cottongrass Colorado woodrush Spiny-spore quillwort (unconfirmed) Colorado woodrush Pale blue-eyed grass Lesser bladderwort
Iron fens	Fens rich in iron	Sage willow Autumn willow
Water quality	Low sediment load Low pollution from roads, agriculture, pesticide use, fire retardant and foaming agents Very low salinity	Boreal toad Northern leopard frog Rio Grande chub Rio Grande sucker River otter Whitebristle cottongrass Slender cottongrass Spiny-spore quillwort Colorado woodrush Sphagnum
Presence of non-native fish and amphibians	Risk factor: Compete with, predate, or outbreed native species	Boreal toad Northern leopard frog Rio Grande cutthroat trout Rio Grande chub Rio Grande sucker
Large trees and snags, late seral forests	Large enough for cavities and stable enough to support large birds	Bald eagle Boreal Owl Flammulated owl Northern goshawk American marten Fringed myotis bat Western bumblebee
Large patches of snow willow		White-tailed ptarmigan Uncompahgre fritillary butterfly Rocky Mountain draba Colorado woodrush

Ecological Condition or Feature	Description	Associated Species
Willow thickets and Cottonwood galleries	Riparian vegetation dominated by mature cottonwood trees and dense willow.	Rio Grande sucker Southwestern willow flycatcher Yellow-billed cuckoo Bald eagle Canada lynx Western bumblebee Colorado woodrush Silkyleaf cinquefoil Veery Stream orchid Colorado woodrush
Sagebrush		Gunnison sage-grouse Brewer's sparrow
Vegetation that overhangs water	Trees and shrubs that overhang the banks ponds, lakes, or slow moving pools in rivers and creeks.	Northern leopard frog Rio Grande cutthroat trout Rio Grande sucker River otter
Prey: Small mammal population (prairie dogs, shrews, voles, squirrels, hares, rabbits)		Mexican spotted owl Boreal owl Flammulated owl Golden eagle Black footed-ferret Canada lynx American marten
Prey: Insects		Boreal toad Southwest willow flycatcher Black swift Fringed myotis bat Hoary bat Townsend's big-eared bat
Large caves and mines (stable interior temperature)	Needed for maternity colonies and hibernacula	Fringed myotis bat Hoary bat Townsend's big-eared bat
Large Aspen trees	Large enough to contain cavities and/or to support the weight of large birds.	Boreal owl Flammulated owl Northern goshawk
Alpine cushion plant communities		House's stitchwort King's campion
Snags		Flammulated owl American marten Boreal owl Bald eagle
Coarse substrate (aquatic)		Rio Grande chub Rio Grande sucker
Occasional disturbance	Natural, such as root wads from trees falling down, or artificial, such as trail maintenance.	Rothrock's Townsend daisy Silkyleaf cinquefoil Barneby Ripley's milkvetch

Ecological Condition or Feature	Description	Associated Species
Northern flicker cavities		Western bumblebee Fringed myotis Boreal owl Flammulated owl
Talus slopes		Gray's draba Rocky Mountain draba Rothrock's Townsend daisy Colorado tansy-aster Colorado larkspur New Mexico cliff fern Alpine tundra draba Stonecrop gilia Smith's draba
Alpine Fellfields		Gray's draba Rothrock's Townsend daisy Alpine tundra draba Rocky Mountain draba Shortflower Indian paintbrush Colorado tansy-aster
Floating vegetation mats		Mud sedge Slender cottongrass

Many of the features and conditions listed here are not suitable for any sort of predictive or trend analysis. Some features, such as the presence of non-native fish and amphibian species are too responsive to human management to be usefully modeled. Others, such as volcanic soils, are not subject to trends in the same sense that biological or climate factors are. These areas can be managed and protected, but predictive modeling of them would lead to little benefit given that changes to mineral resources occur very slowly relative to human lifespans.

We compared the conditions and features identified in Table 5 with conditions and trends developed in Assessments 1 and 3 (Ecosystems and Ecosystem Drivers). The following items from the select set are those conditions and features that do not overlap with the ecosystem and ecosystem drivers described and analyzed in Assessments 1 and 3.

- Volcanic substrates: Ash-tuffs, lattitic lava flows, rhyolite, andesitic substrates
- Sedimentary calcerous substrates
- Fens
- Presence of non-native fish and amphibians
- Large patches of snow willow
- Vegetation that overhangs water
- Prey: Small mammal population (prairie dogs, shrews, voles, squirrels, hares, rabbits)
- Prey: Insects
- Large caves and mines (stable interior temperature)
- Coarse substrate (aquatic)

- Occasional disturbance
- Northern flicker cavities
- Floating vegetation mats

Those conditions and characteristics from the select set that have been described in Assessments 1 and 3 are summarized below.

Large trees and snags, late-seral forests

Currently, only about 13 percent of the forest is in late-successional habitats. This is projected to increase under current plan direction to 19 to 27 percent in the next 20 to 50 years. Even so, this is less than the amount (35 percent) thought to be in late-successional habitat under historic conditions. If, as predicted, disturbances such as large fires and insect outbreaks increase in frequency due to climate change (Vose et al. 2012), the forest may have even less late-successional habitat than model predictions suggest.

Willow thickets and cottonwood galleries

Modern human activities in the area resulted in the removal of trees and the construction of dams and diversions. These dams regulate water flow, block aquatic organisms and alter erosional processes. A drop in water tables and the elimination of flooding dramatically altered plant composition and structure, notably causing the decline of cottonwoods and willow systems.

The introduction of non-native species like salt cedar (tamarisk) and Russian olive trees has dramatically altered plant composition, structure and altered water table dynamics (Dick-Peddie 1993).

Model simulations indicate that, historically, 63 percent of the ecosystem had open to mid canopy cover, with the remaining 37 percent in closed cover conditions. However, we have lower confidence in the projections for this ecosystem and the underlying models used.

Current conditions contain 30 percent of the riparian vegetation in open to mid canopy cover, substantially less than under the natural range of variation. Future projections indicate a gradual decline of mid cover areas over time. This trend away from the natural range of variation is due to the much longer fire return interval under contemporary conditions.

Management data indicates that less than 20 acres per year is treated in this ecosystem.

This system can be somewhat responsive to management. Removal of invasive plants and replanting with native species can have a mixed benefit, allowing native species an environment with reduced competition, but potentially making the habitat less complex or “messy,” which is a critical feature for southwestern willow flycatcher.

Actions to restore natural flooding conditions or to raise the water table can, if maintained, be more effective at restoring native riparian vegetation than invasive plant control. However, actions of that magnitude may be beyond the scope of Forest Service management actions, as it would require significant water rights, changes in management of reservoirs, and have downstream impacts.

Sagebrush

If the fire return interval estimates are correct, than the sagebrush shrublands are not likely very departed from their historic fire intervals. A reduction in fire occurrence in this type may allow conifer encroachment into shrublands.

A qualitative assessment of model results show that much of the sagebrush shrubland ecosystem was historically comprised of mid- and late-successional classes, with roughly 20 percent containing some juniper cover.

The portion of this ecosystem within the national forest boundary is mostly in late-successional classes and is slightly departed from natural range of variability.

Under future projections, exotic annual grass species and juniper expansion displace much of the native sagebrush. Projections also show an increase in early-seral shrubs such as rabbitbrush (*Chrysothamnus* and *Ericameria* species).

Under historic conditions, wildfire was the dominant driver of vegetation dynamics, whereas under projected future conditions, livestock grazing is the dominant driver in this system, affecting almost 7 percent of the ecosystem on average each year. Exotic invasion also impacted 0.6 percent of the ecosystem annually, and tends to increase the frequency of wildfire where it occurs.

No management treatments were modeled in this ecosystem, as it occurs mostly outside of the Rio Grande National Forest.

Large aspen trees

Currently, there is less aspen than under historic conditions. However, high levels of disturbance are allowing regeneration of aspen and an increasing trend in aspen forests over the next 50 years.

Over the long term (many decades to hundreds of years), models project the recovery of most forested ecosystems toward the natural range. However, due to fire suppression, we may expect to see somewhat less aspen in the future than would likely exist naturally, as well as other changes in the structural composition of forests.

Alpine ecosystem, including cushion plan communities, Alpine fell-fields, and talus slopes

As with other non-woody ecosystems, reference conditions for alpine systems are not well-known. Given the heavy sheep grazing that occurred in many of these alpine communities, it is likely that plant composition is altered, that water runoff patterns are different and that erosion has been increased. Mining is another anthropogenic activity that has likely heavily influenced these systems where it has occurred. Roads and development associated with mining have reduced vegetation cover, provided pathways for non-native species, altered water run-off patterns and erosion (Somers and Floyd-Hanna 1996, Paulson and Baker 2006). Additionally, mine tailings from mining activities have caused water pollution problems and increased soil toxicity. Finally, in more recent years, the more popular alpine systems have suffered impacts from heavy recreation uses.

Current conditions show a high proportion of late-seral conditions, similar to those under the natural range of variation. Future projections also maintain most of the ecosystem in late-seral conditions, with disturbances even more rare in future projections. The South Central Highlands Guide (Romme et al. 2009) describes heavy sheep grazing in this type and speculates that historically, the vegetation structure and distribution is similar to today, but with different species composition in the areas with heavy grazing.

Snags

As a result of the recent spruce beetle epidemic, the Rio Grande National Forest has a large amount of snags and down woody material, particularly in the spruce-fir forest type. From stand exam data and forest inventory and analysis data collected on the Rio Grande National Forest, the average number of

large snags (12 inches in diameter and larger) has increased over time, especially due to the spruce beetle outbreak. There has been a dramatic increase in the number of large snags on the forest, from about 5 per acre to about 15 to 25 per acre.

Minimum requirements for retained snags in the 1996 Rio Grande Forest Plan are the minimum requirements for adequate wildlife habitat and ecosystem function.

In general, data suggest that the forest is well above the minimum amount of snags recommended for the various forest types. The only exception is in the ponderosa pine forest type, where both the stand exam and forest inventory and analysis data suggest that there are less than the desired 3 14-inch snags per acre.

As snags fall and down woody material decays, these values will most likely decrease. How fast this happens will depend on the forest type and a variety of other factors. Still, given the slow nature of these processes, a large amount of snags and down woody material will persist on the forest, especially in the spruce-fir forests, into the foreseeable future. Long term, it is hard to predict how snag and down woody amounts may change. Disturbances such as large fires and insect outbreaks are predicted to increase in frequency in the Southwest due to climate change (Vose et al. 2012), in which case, this high level of snags and down woody material may be maintained long into the future.

Conclusion

Assessment 5, Identifying and Assessing At-risk Species, is a work in progress. The process described above is intended to meet the intent of the 2012 Planning Rule and Forest Service Handbook direction at 1909.12_10. Rio Grande National Forest planners continue to seek public feedback in an effort to streamline the assessment process while maintaining an adequate level of rigor. The final draft of Assessment 5 is scheduled to be completed in early 2016.

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