# THREATENED, ENDANGERED, AND FOREST SERVICE SENSITIVE SPECIES ON THE PIKE AND SAN ISABEL NATIONAL FORESTS

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# 1.0 INTRODUCTION

## 1.1 PURPOSE OF THIS DOCUMENT

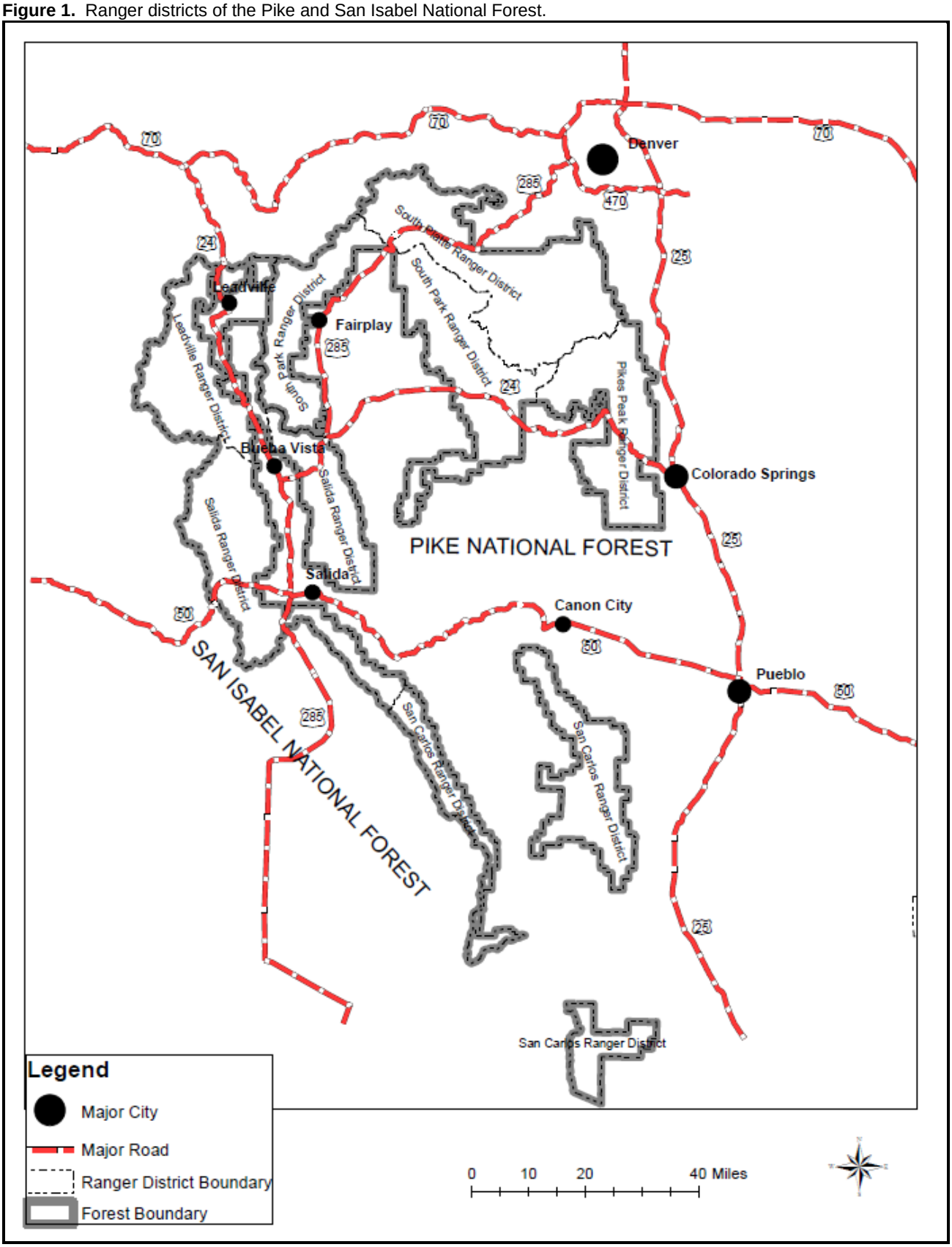
This document focuses only on the Pike and San Isabel National Forests (PSI or Forest). It provides background information that supplements future biological evaluations and biological assessments (BE/BAs) on the PSI. The PSI consists of three ranger districts on the San Isabel (Leadville, Salida, and San Carlos) and three ranger districts on the Pike National Forests (South Park, South Platte, and Pike's Peak) in Colorado. Collectively, they together with the Cimarron and Comanche National Grasslands form the Pike and San Isabel National Forests and the Cimarron, and Comanche National Grasslands (PSICC) or "Planning Area". This document is intended to be a "*living document*" and will be updated as necessary. We reviewed the current U.S. Fish and Wildlife Service (FWS) county list of federally listed, proposed, and candidate species (in effect at the time of this writing) (Appendix A) and Forest Service (FS) Region 2 (R2) Regional Forester's sensitive species list (Appendix B) and determined whether each species may be present or affected by the Forest's management actions.

Literature reviews, species location data, state databases, and Ranger District files were checked to determine which species have a reasonable likelihood to occur on the Forest-managed lands due to elevation, geography, vegetation, or special habitat limitations. This document provides the rationale for the exclusion of some species included on the FWS and R2 lists from further analysis in future BE/BAs and project analysis. Because many of these species are not expected to occur or be affected by management actions, a ***no effect*** determination for federally listed, proposed, and candidate species shown in Table 1and a ***no impact*** determination for R2 species has been assigned shown in Table 2. All threatened, endangered, proposed, and candidate, and sensitive (TEPS) species that may occur or may be affected by management actions on the Forest are identified in Tables 1 and 2 of this document. This list has been further refined for the San Isabel National Forest in Appendix C and the Pike National Forest in Appendix D. These species will be addressed in future BE/BA documents, with further analysis on a project- specific basis. Lastly, this document includes a general discussion of the environmental baseline on the Forest of past and current land management activities for all federal, state, private, and tribal lands within and adjacent to the Forest boundaries that may have an effect on these TEPS species. This may also be referenced as part of the Environmental Baseline section in future BE/BAs.

### 1.1.1 Background

In 2007, a previous document *Threatened, endangered, and Forest Service sensitive species on the San Isabel National Forests (updated 2007)* (Wrigley et al. 2007) was prepared and submitted to the FWS for concurrence as our species list for federally listed and proposed species. This document only covered TEPS species and environmental baseline activities on the San Isabel National Forest. On November 7, 2007 the FWS provided us with their written concurrence of our species list. We now desire to not only update that document based on current FWS and R2 Regional Forester's sensitive species lists and incorporate new information for the San Isabel National Forest, but we also desire to include this same information for the Pike National Forest as well. In this document, we utilize the most current FWS's listed, proposed, and candidate species county list, R2 Regional Forester's sensitive species list, and we update changes in the environmental baseline and other changes. This updated document may be used to supplement future BE/BAs on the PSI. This document will also be submitted to the FWS for their concurrence.

**Figure 1.** Ranger districts of the Pike and San Isabel National Forest.



## 1.2 REGULATORY FRAMEWORK

Current management direction for federally listed threatened, endangered, proposed, candidate, and FS sensitive species on each district of the PSI can be found in the following documents, filed at each district office:

- FS Manual (FSM 2670)
- National Forest Management Act (NFMA)
- Endangered Species Act of 1973, as amended (ESA)
- Migratory Bird Treaty Act (MBTA)
- Executive Order (EO) 13186 (regarding MBTA)
- Memorandum of Understanding (MOU) (08-MU-1113-2400-264) 2008 (regarding MBTA)
- National Environmental Policy Act (NEPA)
- *Pike and San Isabel National Forests and Comanche and Cimarron National Grasslands (PSICC) Land Resource Management Plan (LRMP),* as amended (Forest Service 1984)
- Various Federally listed species-specific Recovery Plans which establish population goals for recovery
- Various species management plans
- Various species management guides or conservation strategies
- *Southern Rockies Lynx Amendment* (SRLA) (Forest Service 2008) and Implementation Guide (Forest Service 2009)
- *Conservation Plan and Agreement for the Boreal Toad* (Loeffler 2001)

The LRMP provides management guidelines, which incorporate regional direction for some species addressed in this assessment.

## 1.3 THREATENED, ENDANGERED, AND PROPOSED/CANDIDATE SPECIES

A list of threatened, endangered, proposed, and candidate species and designated critical habitat was requested and received on May 3, 2012 from the FWS (tracking number 06E24000-2012-SLI-0466) for all counties containing the PSI (FWS 2012) (Appendix A). We utilized this list for our review of which species are included or excluded from further analysis in future impact analysis.

Section 7(a)(1) of the ESA requires federal agencies to use their authorities to carry out programs to conserve (recover) endangered and threatened species, and in (2) insure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of their critical habitats. Consistent with this direction our BE/BA address actions that are at the discretion of the federal agency (in this case the Forest Service), and would depend on the nature of the federal action (50 CFR 402.12(f)).

The FS has established direction in FSM 2670 to guide habitat management for threatened, endangered, proposed, and sensitive species. Preparation of a biological evaluation as part of the NEPA process ensures that these species receive full consideration in the decision-making process. FSM 2600, Section 2671.44 (Supplement 2600-2005-1), provides direction on the review of actions and programs authorized, funded or implemented by the FS relative to the requirements of the ESA.

FSM 2670.31 further defines FS policy for federally listed threatened and endangered species:

- place top priority on conservation and recovery of endangered, threatened, and proposed species and their habitats through relevant National Forest System, state and private forestry, and research activities and programs;
- establish through the Forest planning process objectives for habitat management and/or recovery of populations, in cooperation with states, the FWS and other federal agencies;
- through the BE process, review actions and programs authorized, funded, or carried out by the FS to determine their potential for effect on threatened and endangered species and species proposed for listing;
- avoid all adverse impacts on threatened and endangered species and their habitat except when it is possible to compensate for adverse impacts through reasonable and prudent measures identified in a biological opinion rendered by the FWS; when an exemption has been granted under the Act, or when the FWS biological opinion recognizes an incidental taking;
- avoid adverse impacts on species proposed for listing during the conference period and while their federal status is being determined;
- initiate consultation or conference with the FWS when the FS determines that proposed activities may have an effect on TEP species or when FS projects are for the specific benefit of a threatened or endangered species are likely to jeopardize the continued existence of a proposed species; or result in the destruction or adverse modification of critical or proposed critical habitat;
- identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species; and
- protect individual organisms or populations from harm or harassment as appropriate.

## 1.4 REGIONAL FORESTER'S SENSITIVE SPECIES

Forest Service sensitive species are those plants and animals identified by the R2 Regional Forester (Forest Service 2011) for which population viability is a concern. Concern is warranted by a downward trend in population numbers, density, or habitat conditions that would reduce a species' existing distribution (FSM 2670.5). Sensitive species are managed so that FS actions ensure that these species do not become threatened or endangered (FSM 2670.22).

The FS is required to "*Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands*" (FSM 2670.22). FSM 2670.12 summarizes U.S. Department of Agriculture (USDA) Regulation 9500-004 as it existed from 1983 until it was revised in 2008. The 2008 version states: "*A goal of the Department is to improve, where needed, fish and wildlife habitats, and to ensure the presence of diverse, native and desired nonnative populations of wildlife, fish, and plant species, while fully considering other Department missions, resources, and services.*" It also states that "C*onsideration will be given to fish and wildlife and their habitats in developing programs for these lands. Alternatives that maintain or enhance fish and wildlife habitat should be promoted. When compatible with use objectives for the area, management alternatives which improve habitat will be selected.*"

Current management direction is to manage FS system habitats for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the ESA are no longer necessary (FSM 2670.21).

R2 of the FS has developed policy regarding the designation of sensitive species (Forest Service 2011). The following eight criteria are used to determine whether a species should be designated as sensitive:

- geographic distribution – species with limited habitat are given priority;
- geographic distribution outside of the Rocky Mountain Region – species endemic to the Rocky Mountains are given priority;
- capability of the species to disperse – species with limited dispersal capability are given priority;
- abundance in R2 – species that are less abundant species are given priority;
- population trend in Region 2 – species with a downward population trend are given priority;
- habitat trend in R2 – species with declining habitat quality are given priority;
- vulnerability of habitats in R2 – species in impacted habitats are given priority;
- life history and demographic characteristics of the species with low reproduction or high mortality rates are given priority.

Under FSM 2672.41, the objectives for completing biological evaluations for proposed FS programs or activities:

- to ensure that FS actions do not contribute to loss of viability of any native or desired non-native plant or contribute to animal species or trends toward federal listing of any species;
- to comply with the requirements of the ESA that actions of federal agencies not jeopardize or adversely modify critical habitat of federally listed species; and
- to provide a process and standard by which to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision making process.

The LRMP provides management guidelines, which incorporate regional direction for sensitive status species. General FS direction for sensitive species is summarized below (FSM 2670.32):

- assist states in achieving their goals for conservation of endemic species;
- as part of the NEPA process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species;
- avoid or minimize impacts to species whose viability has been identified as a concern;
- if impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole;
- establish management objectives in cooperation with states when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for federal candidate species, in cooperation with the FWS and the states.

# 2.0 TEPS SPECIES REVIEW

## 2.1 U.S. FISH AND WILDLIFE SERVICE COUNTY SPECIES LIST

The FWS county list (FWS 2012) (Appendix A – dated May 3, 2012) of threatened, endangered, proposed, and candidate species for the following PSI counties: Alamosa, Chaffee, Clear Creek, Custer, Douglas, Fremont, Huerfano, Jefferson, Lake, Las Animas, Park, Pueblo, Saguache, and Teller counties in Colorado was reviewed. Not all species listed or proposed are expected to occur on the Forest or be affected by FS management within these counties. Reviews of the best available information were made to determine if TEPS may occur on or be affected by Forest-managed lands. In this section, determinations are made regarding whether TEPS distributional ranges that occur within the Forest boundary, and if so, if there is suitable habitat present. With these criteria, rationale(s) are discussed below for their inclusion or exclusion from future analysis and BE/BAs.

**Table 1**. Federally listed, proposed, and candidate species for the counties on the six ranger districts of the PSI (FWS 2012) and whether they are known, expected to occur and/or be potentially affected by potential management activities. District abbreviations: LD=Leadville, SA=Salida, SC=San Carlos, SK=South Park, SP=South Platte, and PI=Pike's Peak.

**** Species do not occur on the PSI although they MAY be affected if a project results in water depletions in the Platte River Basin.***

| COMMON NAME | SCIENTIFIC NAME | FEDERAL STATUS | POTENTIAL TO OCCUR ON PSI NF (DISTRICT) |
|---|---|---|---|
| ***PLANTS*** | | | |
| Colorado butterfly plant | *Gaura neomexicana* ssp. *coloradensis* | Threatened | |
| Penland's eutrema | *Eutrema penlandii* | Threatened | **SK** |
| Skiff milkvetch | *Astragalus microcymbus* | Candidate | |
| Ute ladies'-tresses | *Spiranthes diluvialis* | Threatened | **SP, PI** |
| Western prairie fringed orchid * | *Platanthera praeclara* | Threatened | **SK*, SP*, PI*** |
| ***INVERTEBRATES*** | | | |
| Pawnee montane skipper | *Hesperia leonardus montana* | Threatened | **SP** |
| Uncompahgre fritillary butterfly | *Boloria acrocnema* | Endangered | **LD, SA, SK** |
| ***FISH*** | | | |
| Arkansas darter | *Etheostoma cragini* | Candidate | |
| Bonytail chub | *Gila elegans* | Endangered | |
| Colorado pikeminnow | *Ptychocheilus lucius* | Endangered | |
| Greenback cutthroat trout | *Oncorhynchus clarki stomias* | Threatened | **LD, SA, SC, SK, PI** |
| Humpback chub | *Gila cypha* | Endangered | |
| Pallid sturgeon * | *Scaphirhynchus albus* | Endangered | **SK*, SP*, PI*** |
| Razorback sucker | *Xyrauchen texanus* | Endangered | |
| Rio Grande cutthroat trout | *Oncorhynchus clarki virginalis* | Candidate | |
| ***AMPHIBIANS AND REPTILES*** | | | |
| Desert massasauga rattlesnake | *Sistrurus catenatus edwardii* | Candidate | |
| ***BIRDS*** | | | |
| Gunnison's sage-grouse | *Centrocercus minimus* | Candidate | **SA** |
| Least tern * | *Sternula antillarum* | Endangered | **SK*, SP*, PI*** |
| Mexican spotted owl | *Strix occidentalis lucida* | Threatened | **SA, SC, SK, SP, PI** |

| COMMON NAME | SCIENTIFIC NAME | FEDERAL STATUS | POTENTIAL TO OCCUR ON PSI NF (DISTRICT) |
|---|---|---|---|
| Piping plover * | *Charadrius melodus* | Threatened | **SK*, SP*, PI*** |
| Southwestern willow flycatcher | *Empidonax traillii extimus* | Endangered | |
| Whooping crane * | *Grus americana* | Endangered | **SK*, SP*, PI*** |
| Yellow-billed cuckoo (western subspecies) | *Coccyzus americanus* | Candidate | **SC** |
| ***MAMMALS*** | | | |
| Black-footed ferret | *Mustela nigripes* | Endangered (Experimental population, Non-Essential) | |
| Canada lynx | *Lynx canadensis* | Threatened | **LD. SA, SC, SK, SP, PI** |
| Gunnison's prairie dog | *Cynomys gunnisoni* | Candidate | **SA, SK, SP, PI** |
| New Mexico meadow jumping mouse | *Zapus hudsonius luteus* | Candidate | |
| North American wolverine | *Gulo gulo luscus* | Candidate | **LD, SA, SC, SK, SP, PI** |
| Preble's meadow jumping mouse | *Zapus hudsonius preblei* | Threatened | **SP, PI** |

### 2.1.1 FWS LISTED, PROPOSED, AND CANDIDATE SPECIES NOT EXPECTED ON THE FOREST

Federally listed, proposed, and candidate species in the following section will **not** be considered in further detail in future Forest BE/BAs because potential habitat for these species is not present, the Forest is outside the species' elevation or distributional range, and/or management activities will not affect or impact them. Natural history information and specific rationale for exclusion is described for each species in the following section. A determination of ***no effect*** has been made for these species.

### PLANTS EXCLUDED

#### Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradoensis*)

Colorado butterfly plant is federally listed as threatened under the ESA. It is found in sub-irrigated, alluvial soils of drainage bottoms surrounded by mixed grass prairie at elevations of 5,800 to 6,200 ft. It is endemic to southeast Wyoming, western Nebraska, and northeast Colorado, including Boulder, Broomfield, Douglas, Jefferson, Larimer and Weld counties (FWS 2005a). The Forest lies outside the known range of the species. Forest activities will not affect Colorado butterfly plant.

#### Skiff milkvetch (*Astragalus microcymbus*)

Skiff milkvetch is a candidate species for listing under the ESA. It is found in sagebrush steppes at elevations of 7,800 to 8,520 feet. It is endemic to a small area near Gunnison, Colorado (FWS 2011a). The Forest lies outside the known range of the species. Forest activities will not affect skiff milkvetch.

## INVERTEBRATES EXCLUDED

No invertebrates listed in Table 1 are excluded.

## FISH EXCLUDED

### Arkansas darter (*Etheostoma cragini*)

The Arkansas darter is a candidate species for federal listing under the ESA and is classified as a threatened species in the State of Colorado by the Colorado Wildlife Commission. Preferred habitat of the Arkansas darter is spring-fed creeks with cool, clear water, sandy bottoms, slow currents and abundant rooted aquatic vegetation (Pflieger 1975). The species is restricted to tributaries of Arkansas River drainage in southeastern Colorado, southern Kansas, northeastern Oklahoma, southwestern Missouri, and in northwestern Arkansas. In Colorado, it occurs within three drainages in the southeastern part of the state: Fountain Creek, Rush Creek, and Big Sandy Creek (Loeffler and Krieger 1994) (from FWS species assessment and priority assignment form). It also occurs south of Colorado Springs (mainly inhabits spring-fed seeps and springs adjacent to Fountain Creek) (Miller 1984). These stream habitats are more similar to prairie stream habitats of the central U.S. (low gradient, sandy bottoms and aquatic vegetation) rather than the high gradient, high elevation, cold water, mountainous streams of the Forest nearby. Because of the contrast in habitat types between streams in the Cañon City area and adjacent streams on the Forest, and the lack of suitable habitat, we do not expect *E. cragini* to occupy streams on the Forest.

### Bonytail chub (*Gila elegans*)

The bonytail is federally listed as endangered under the ESA. Preferred habitat of *G. elegans* includes turbid eddies and pools in mid-sized to large rivers. Found historically throughout the Colorado River basin; now only known from a few remnant populations in the Green River (Utah and Colorado), Gunnison River near Delta, and the Black Rocks area of the Colorado River west of Grand Junction (Woodling 1985, NatureServe 2011). Because *G. elegans* is restricted to the Colorado River basin, it is geographically and topographically isolated from Arkansas and Platte River Basins and the Forest. Therefore, Forest activities will not affect the status of *G. elegans*.

### Colorado pikeminnow (*Ptychocheilus lucius*)

The Colorado pikeminnow is federally listed as endangered under the ESA. Preferred habitat is eddies, pools, and other areas adjacent to the main current flow in mid-sized to large rivers of the Colorado basin. Found historically throughout the Colorado River basin in main stem channels extending into Colorado in the Green, Yampa, White, Colorado, Gunnison, Dolores, and Animas rivers. Current distribution in Colorado is restricted to the lower reaches of the Green, Yampa, White, Colorado, and Gunnison Rivers (Woodling 1985, NatureServe 2011). Because *P. lucius* is restricted to the Colorado River basin, it is geographically and topographically isolated from the Arkansas and Platte River Basins and the Forest. Therefore, Forest activities will not affect the status of *P. lucius*.

### Humpback chub (*Gila cypha*)

The humpback chub is federally listed as endangered under the ESA. Preferred habitat of *G. cypha* is slow moving eddies and pools of big rivers. Adults use various habitats, including deep turbulent currents, shaded canyon pools, areas under shaded ledges in moderate current, riffles, and eddies.

*G. cypha* was found historically in the mainstem of the Colorado River downstream to below the Hoover dam site. Currently, *G. cypha* is restricted to areas in and upstream of the Grand Canyon. In Colorado, the chub occurs in the Yampa, Gunnison, Green and Colorado rivers with highest concentrations located at the Black Rocks area of the Colorado River downstream of Grand Junction (Woodling 1985, NatureServe 2011). Because *G. cypha* is restricted to the Colorado River basin, it is geographically and topographically isolated from the Arkansas River Basin and the Forest. Therefore, Forest activities will not affect the status of *G. cypha*.

### Razorback sucker (*Xyrauchen texanus*)

The razorback sucker is federally listed as endangered under the ESA. A preferred habitat is slow areas, backwaters, and eddies of medium to large rivers. *X. texanus* was found historically throughout the Colorado River Drainage. Current distribution is limited to the lower main stem Colorado, Gunnison, Lower Yampa and Green Rivers (Woodling 1985, NatureServe 2011). Because *X. texanus* is restricted to the Colorado River basin, it is geographically and topographically isolated from the Arkansas and Platte River Basins and the Forest. Therefore, Forest activities will not affect the status of *X. texanus*.

### Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*)

Prior to the arrival of Europeans in the American West, Rio Grande cutthroat trout likely occupied a variety of fluvial habitats ranging from first-order streams to the Rio Grande mainstem (Pritchard and Cowley 2006). Today however, the presence of non-native trout has excluded *O. clarki virginalis* from most suitable habitat, restricting them to small, high elevation streams (Behnke 1992). Rio Grande cutthroat trout are known to be native to the Rio Grande and Pecos River drainages of northern New Mexico and southern Colorado. Because there are no hydrologic connections between the Rio Grande and Pecos River drainages and the Arkansas and Platte River Basins, Rio Grande cutthroat trout are not expected on the Forest. Therefore, Forest activities will not affect their status.

## AMPHIBIANS AND REPTILES EXCLUDED

### Desert massasauga rattlesnake (*Sistrurus catenatus edwardii*)

This candidate species occurs in southeastern Colorado at elevations below 5,500 ft and inhabits plains grassland and sandhill areas (Hammerson 1999). The Forest is well outside the known range of the species and it is outside of the elevation range of this species.

## BIRDS EXCLUDED

### Southwestern willow flycatcher (*Empidonax traillii extimus*)

Southwestern willow flycatcher is federally listed as threatened under the ESA. This flycatcher inhabits thickets, scrubby and brushy areas, open second growth, swamps, and open woodland in the southwestern U.S. The flycatcher exists in small, fragmented populations. They are restricted to riparian habitats and nest primarily in swampy thickets, especially of willow, sometimes buttonbush tamarisk vines, or other plants. They occur in the southwestern portion of Colorado (NatureServe 2011). Additional natural history and distribution information can be found in the *Southwestern Willow Flycatcher Recovery Plan* (FWS 2002a). The Forest is outside of the flycatcher's known distributional range. Use is not expected on or adjacent to lands on the Forest. As a result, Forest activities will not affect this species.

## MAMMALS EXCLUDED

### Black-footed ferret (*Mustela nigripes*)

Black-footed ferret is federally listed as endangered under the ESA. The ferret is assumed to be extinct in Colorado; however, reintroduction programs have been started in the northwestern part of the state. Suitable habitat occurs in plains grasslands with large prairie dog complexes (NatureServe 2011). Additional natural history and distribution information can be found in the *Black-footed Ferret Recovery Plan* (FWS 1988). The Cimarron and Comanche National Grasslands may provide suitable habitat; however, on the Forest there is no suitable habitat, and use is not expected on or adjacent to Forest-managed lands. As a result, Forest activities will not affect black-footed ferret.

### New Mexico meadow jumping mouse (*Zapus hudsonius luteus*)

The New Mexico meadow jumping mouse (jumping mouse) is endemic to New Mexico, Arizona, and a small area of southern Colorado. The jumping mouse is a habitat specialist. It nests in dry soils, but uses moist, streamside, dense riparian/wetland vegetation up to an elevation of about 8,000 feet (FWS 2009a). The closest known occurrence of the jumping mouse to the San Isabel National Forest is along the Colorado-New Mexico border in areas managed by the New Mexico State Parks, with one area contiguous with a Colorado State Wildlife Area (FWS 2009b), which is approximately 15 miles south of the closest Forest lands. There is some suitable habitat in the Sangre de Cristo Mountains of New Mexico, however, due to the geographical location of, and elevations present on the Forest, there is no suitable habitat present, and use is not expected on or adjacent to Forest lands (i.e., the Forest is outside of the jumping mouse's distributional range and above its elevational range).

## 2.1.2 FWS LISTED, PROPOSED, AND CANDIDATE SPECIES POTENTIALLY OCCURRING ON THE FOREST (SPECIES THAT ARE CARRIED FORWARD FOR ANALYSIS)

The following narratives provide a brief overview of the natural history, habitat requirements, status, and background information on federally listed, proposed, and candidate species and their designated critical habitats with the potential to occur on the Forest or be affected by potential activities. Additional species information is on file at each of the district offices on the PSI.

## PLANTS INCLUDED

### Penland's eutrema (*Eutrema penlandii*)

Penland's eutrema is federally listed as threatened under the ESA. This plant is a perennial herb of the mustard family that grows in alpine wetlands. It is generally habitat-specific, typically being found in alpine fens on the lee side of mountain crests where deep wind-deposited snow accumulates (Roy et al. 1993). It is endemic to Colorado and only found in the Mosquito Range from Hoosier Ridge to Weston Pass in Park and Summit counties at elevations of 10,500 to 13,000 ft (FWS 1993a, CNHP 2011). It is considered critically imperiled or imperiled both globally and in Colorado. This species occurs in the alpine areas of the Mosquito-Gore Range on the South Park District, with a few plants known on the adjacent portions of the White River National Forest.

### Ute lady's tresses (*Spiranthes diluvialis*)

Ute ladies' tresses is listed as a threatened species under the ESA (FWS 1992). It is a perennial herb in the orchid family, found in low elevation riparian wetlands. It occurs in herbaceous dominated meadows in the floodplains of perennial streams (NatureServe 2011). It appears to require occasional fluvial disturbances, such as flooding (FWS 1992). It ranges from Washington and Montana south to Nevada, Colorado, and Nebraska. On the PSI, habitat may occur along the South Platte River, below 6,500 ft elevation on the South Platte Ranger District (FWS 1992). A petition to delist was published in 69FR60605-60607 (FWS 2004b). It is ranked G2G3 by NatureServe (2011). It is tracked by CNHP and is ranked S2. It is listed in CITES Appendix II. Threats include development, changes in hydrology, and invasive species.

### Western prairie fringed orchid (*Platanthera praeclara*)

This plant species is federally listed as threatened under the ESA. It is found in mesic areas of the tallgrass prairie and wet meadows in the Great Plains west of the Mississippi River. This species is not found in Colorado, but water depletions upstream of populations of western prairie fringed orchid have the potential to impact habitat downstream in the Platte River Basin. This orchid is not known to occur on the Forest; however, some management actions occurring on the Pike National Forest may result in water depletions that might affect this species. Therefore this species is included as a potential species that may be further analyzed in a project-specific BE/BA and consultation with the FWS as necessary.

## INVERTEBRATES INCLUDED

### Pawnee montane skipper (*Hesperia leonardus montana*)

Pawnee montane skipper is federally listed as threatened under the ESA. It occurs only on the Pike Peak Granite Formation in the South Platte drainage system in Colorado, involving portions of Jefferson, Douglas, Park and Teller counties on the South Platte District. It occurs at an elevation range of 6,000 to 7,500 ft, though it has been recorded as high as 8,000 ft (Forest Service 1991). The total known habitat is estimated to be 24,256 ac. Based on field studies by ERT (1986) the general characteristics of Pawnee montane skipper habitat include: tree canopy cover of 30%, ponderosa pine crown cover of 25%, Douglas-fir crown cover of 5%, tree density of less than 120 trees/acre in the smallest size class; overall tree density of less than 200 trees/acre, shrub and grass cover generally less than 10%, *Liatris* flower stem density ranging from 50 to 500/acre, and blue grama cover 5% or less, present nearly everywhere. Skippers are dependent upon prairie gayfeather (*Liatris punctata)* and blue grama (*Bouteloua gracilis)* for nectar and reproduction, respectively. In late summer, adult females deposit their eggs singly on leaves of blue grama. Skippers overwinter on blue grama either as an egg or larva. The larvae feed on blue grama in spring and summer. After a short pupation in July, the adult skippers emerge to breed and forage for nectar on prairie gayfeather flowers during a flight period that lasts until the first frost. Additional natural history and distribution information can be found in the *Pawnee Montane Skipper Butterfly Recovery Plan* (FWS 1998b).

### Uncompahgre fritillary butterfly (*Boloria acrocnema*)

Uncompahgre fritillary butterfly was listed on June 24, 1991 as an endangered species by the FWS (1991a). The FWS (1994) approved a recovery plan for this species on March 17, 1994. This species has the smallest total range of any North American butterfly species (FWS 1994). At present, this species is known to occur only at two verified areas (inhabited by three colonies) and possibly an additional two small colonies in the San Juan Mountains and Sawatch Range in Gunnison, Hinsdale, and Chaffee counties (Mt. Uncompahgre and Redcloud Peak) within Colorado. Documented populations were estimated at 1,400 individuals in 1992 and 3,284 in 1993 (FWS 1994). A population trend for this species is difficult to establish due to insufficient data. This butterfly is known to occur only above timberline in patches of its larval host plant, the snow willow (*Salix nivalis*) above approximately 12,000 ft. Females lay their eggs on the snow willow, which provides larval food and cover. This butterfly is most often found on north and east facing slopes, which provide a moist, cool, microclimate. The adults can be found flying in late July to mid-August. Uncompahgre fritillary butterflies require two years to complete its entire life cycle.

Increased specimen collection is considered the most significant threat to its long-term survival. Climate change, disease, parasitism, predation, and trampling of larvae by humans and livestock are additional threats to this species (FWS 1994). Potential habitat for this species has been identified on the Pike and San Isabel National Forest (District/Forest files). Areas of potential habitat in the Sawatch Range were surveyed in 2002 – 2003, with no population or individuals being documented (Ellingson 2003). The FWS species occurrence list (2012) shows this species as potentially occurring in portions of Chaffee, Lake, Park, and Saguache counties in Colorado.

## FISH INCLUDED

### Greenback cutthroat trout (*Oncorhynchus clarki stomias*)

Greenback cutthroat trout were federally listed under the ESA as “endangered” in 1973 and later down listed to “threatened” in 1978. They are native to the South Platte and Arkansas River basins in central Colorado, and perhaps southeastern Wyoming (FWS 1998a). They are similar ecologically to other cutthroat trout species inhabiting streams of the western U.S. Greenbacks favor relatively clear, cold waters preying primarily on aquatic and terrestrial invertebrates. Existing greenback populations are restricted to small, remote, high elevation streams and lakes where populations often have been protected by natural and man-made fish movement barriers. Many of these habitats are in colder, less productive habitats that undergo significant water flow fluctuations, leading to smaller and slow-growing greenback populations.

Greenback cutthroat trout populations declined rapidly following immigration and settlement of the Front Range of Colorado in the mid- to late 1800’s. Pollution from mining, stream dewatering for agriculture, commercial harvest and introduction of non-native salmonids significantly reduced their populations. Greenbacks also readily interbreed with rainbow trout (*Oncorhynchus mykiss*) and cannot coexist with the other introduced fishes brook trout (*Salvelinus fontinalis*) or brown trout (*Salmo trutta*). Introductions and subsequent habitat invasions by these non-native trout eliminated greenbacks from most of their known habitat range (Young and Harig 2001). Their decline occurred so rapidly; however, that their complete historic distribution is not well documented (FWS 1998a).

The objective of the *Greenback Cutthroat Trout Recovery Plan* (Recovery Plan) is to recover sufficient habitat and populations for their removal from the list of threatened and endangered species (FWS 1998a). Greenback cutthroat trout will be considered "recovered" in the Recovery Plan when a minimum of 20 *stable* populations is documented to exist. At least five of these populations must exist in the Arkansas River basin. For delisting purposes, the Recovery Plan defines a stable self-sustaining population as maintaining 22 kilograms of greenbacks per hectare of habitat through natural reproduction. The population should contain a minimum of 500 adults (>120 mm) and represent a minimum of two year classes within a five-year period that are established through natural reproduction. A minimum of 120 breeding pairs was considered necessary to maintain genetic diversity within a population and the plan has set a minimum of 500 adults as necessary to insure maximum genetic diversity for each wild greenback population. Twenty stable reproducing populations, along with the above population criteria, are needed to qualify as an adequate population to meet the necessary recovery objectives.

Intensive efforts to locate existing populations of greenback cutthroat trout have been conducted by the Colorado Parks and Wildlife (CPW), FWS, FS, and others. However, many high elevation streams have, as yet, not been surveyed. Greenback cutthroat trout have been documented from several locations across the PSI, occurring on five ranger districts on the Forest.

Intensive reintroduction efforts by the FS, CPW, FWS, and other stakeholders are currently underway, but have met with limited success. Reintroduction projects typically involve identification of sites with suitable habitat and a high likelihood of success. Once a stream has been identified, in most cases, a barrier to upstream fish migration is constructed, followed by chemical removal of non-native salmonids and stocking of pure strain greenback cutthroat trout. Several streams have been identified as future reintroduction sites. It is important, however, to realize that more streams will be identified in the future. Furthermore, the efforts to find and document existing populations will continue on the PSI.

### Pallid sturgeon (*Scaphirhynchus albus*)

The pallid sturgeon is federally listed as endangered under the ESA. It requires large, turbid, free-flowing riverine habitat; it generally occurs in strong current over firm gravel or sandy substrate. It also occurs in reservoirs. The distribution of *S. albus* is restricted to larger channels of the Mississippi-Missouri river system, where the species is uncommon and rare (NatureServe 2011). The pallid sturgeon is not known to occur on the Forest; however, some management actions occurring on the Pike National Forest may result in water depletions that might affect this species. Therefore this species is included as a potential species that may be further analyzed in a project-specific BE/BA and consultation with the FWS as necessary.

## AMPHIBIANS AND REPTILES INCLUDED

There are no amphibians or reptiles currently listed, proposed, or candidates for listing (FWS 2012) that are known or suspected to occur on the Forest or may be affected by management at this time.

## BIRDS INCLUDED

### Gunnison sage-grouse (*Centrocercus minimus*)

The FWS determined in its 12-month finding that the Gunnison sage-grouse warrants protection under ESA, but that proposing the species for protection is precluded by the need to address other higher priority species (FWS 2002b). As a result, the FWS added this species to its list of candidate species and will review its status annually.

The Gunnison sage-grouse uses a variety of habitats throughout the year, but the primary component necessary is a species of sagebrush (*Artemisia* spp.). The most important species is the subspecies big sagebrush (*A. tridentata*), which is used for hiding, thermal cover, as well as a major source of food in the winter (Hupp and Braun 1989). From mid-March to early June males will display on leks (i.e., strutting grounds) that are open areas with good visibility (for predator detection) and acoustics (for male display sounds) (FWS 2002b). Nest sites are typically in tall and dense stands of sagebrush and sagebrush near wet meadows with tall grasses for hiding. From mid-September into November sage grouse use upland areas with 20% or greater sagebrush cover with some forbs. During deep winter snows, they typically forage in taller sagebrush and roost in shorter sagebrush along ridge tops, and roosting on south or west facing slopes.

The historic range for this species is southwestern Colorado, southwestern Kansas, northwestern Oklahoma, northern New Mexico, northeastern Arizona, and southeastern Utah. Currently there are eight populations in Colorado, with the largest in the Gunnison Basin. In 1999, CPW began a population supplement release program in the Poncha Pass Area, located in the northern portion of the San Luis Valley, in Saguache County, near the Salida Ranger District. Adults have been observed in the Marshall Pass and Starvation Creek vicinity on the Salida Ranger District (P. Canterbery, CPW pers. com 2002). It is unknown if historic populations in northern Chaffee and Lake Counties were Greater or Gunnison's sage-grouse. There are no known or suspected leks on the Forest; however, summer and fall habitats are likely present in the Poncha Pass vicinity on the Salida Ranger District. Building and town development has caused direct loss and fragmentation of habitat as well as indirect losses through degradation of surrounding habitat by human activities (FWS 2002b). For more information about this species see the *Gunnison Sage-Grouse Rangewide Conservation Plan* (GSRSC 2005).

### Least tern (*Sternula antillarum*)

Least terns are federally listed as endangered under the ESA. This bird is an uncommon summer resident on the southeastern plains in the Arkansas River Valley. Breeding habitat consists of bare, sandy shorelines of islands in reservoirs (e g, Horse Creek, Neeshone and Adobe reservoirs on the plains of eastern Colorado) and river sandbars (Kingery 1998). The Forest lacks water bodies with sandy beaches, flats, and shores required by this species. Least terns are not known to occur on the Forest; however, some management actions occurring on the Pike National Forest <u>may</u> result in water depletions that might affect this species. Therefore this species is included as a potential species that may be further analyzed in a project-specific BE/BA and consultation with the FWS as necessary.

### Mexican spotted owl (*Strix occidentalis lucida*)

Mexican spotted owl (MSO or spotted owl) is federally listed as threatened under the ESA. The following is a summary of the status, life history, and other biological information from the *Federal Register* and (FWS 1991b, 1993b) the Final Recovery Plan (FWS 1995). The MSO is one of three subspecies of spotted owls. It is separated geographically from both the northern (*S. o. caurina*) and California (*S. o. occidentalis*) spotted owls on the West Coast and has been genetically isolated from them for thousands of years (Barrowclough et al. 1999). Their distribution is fragmented throughout the Southwestern U.S., primarily occurring in Arizona, New Mexico, Utah, and Colorado, corresponding to the availability of forested mountains, plateaus, and rocky canyon lands. The MSO was listed as threatened by the FWS (1993b), primarily because of the following two listing factors: (1) historical alteration of its habitat (primarily even-aged timber harvest) and the threat of its continued use, and (2) danger of catastrophic wildfire.

Most breeding MSO pairs occur in mature mixed-conifer forest. It is believed that historical forest conditions of many southwestern ponderosa pine forests were relatively open before the onset of large-scale logging, livestock grazing, and fire exclusion (Covington and Moore 1994, Covington 2003). MSO nested and roosted in relatively dense stands of mixed conifer, pine-oak, and riparian forests embedded within a matrix of more open-structured pine forest (Ganey and Dick 1995, Ganey et al. 1999, Beir and Maschinski 2003). Many of these areas, such as north-facing slopes and moist canyons, may not have had the frequent surface fires that maintained open stands of ponderosa pine, developing into closed-canopy forests subject to stand-replacement, under a highly infrequent fire regime. Other habitats once used by MSO, in particular lower-elevation riparian areas, have been lost to the species because of human development and associated habitat alterations (Ganey and Dick 1995).

Spotted owls nest, roost, forage, and disperse in a diverse array of biotic communities. Nesting habitat is typically in areas with complex forest structure or rocky canyons, and contains uneven-aged, multi-storied mature or old-growth stands that have high (>70%) canopy closure (Ganey and Balda 1989a, FWS 1991b). In the northern portion of the range (Utah and Colorado), most nests are in caves or on cliff ledges in steep-walled canyons. Elsewhere, the majority of nests appear to be in Douglas-fir trees (Fletcher and Hollis 1994, Seamans and Gutierrez 1995). Various tree species are used for roosting; however, Douglas-fir is the most commonly used species in mixed conifer forests (Ganey 1988, Fletcher and Hollis 1994, Young et al. 1998). MSOs generally use a wider variety of forest conditions for foraging than they use for nesting or roosting.

Seasonal movement patterns of MSO are variable. Some individuals are year-round residents within an area, some remain in the same general area but show shifts in habitat use patterns, and some migrate considerable distances (12 to 31 mi) during the winter, generally migrating to more open habitat at lower elevations (Ganey and Balda 1989b, Willey 1993, Ganey et al.1998). As a year-round resident, they often use larger ranges during the non-breeding season than during the breeding season. Home-range sizes appear to vary considerably among habitats and/or geographic areas (FWS 1995), ranging from 647 to 3,688 ac for individuals birds, and 945 to 3,846 ac for pairs (Ganey and Balda 1989b, Ganey et al. 1999). Little information is known about habitat use by juveniles dispersing after fledging. Ganey et al. (1998) found dispersing juveniles in a variety of habitats ranging from high elevation forests to piñon/juniper woodlands and riparian areas surrounded by desert grasslands.

Ecology of the MSO is not well understood. Spotted owls do not nest every year and their reproductive pattern varies somewhat across its range. Little is known about the reproductive output (production) for the spotted owl. In Colorado, breeding season is estimated to be March 1 through August 31. Eggs can hatch in May, owlets generally fledge in June, and depend on their parents through August or September (FWS 1995). Little research has been conducted on the causes of their mortality, but predation by great horned owls (*Bubo virginianus*), northern goshawks, red-tailed hawks (*Buteo jamaicensis*), and golden eagles (*Aquila chrysaetos*), as well as starvation, and collisions (e.g., with cars, powerlines), may all be mortality factors. They consume a variety of prey throughout their range, but commonly eat small and medium-sized rodents such as woodrats (*Neotoma* spp.), peromyscid mice (*Peromyscus* spp.), and microtine voles (*Microtus* spp.). They may opportunistically prey on bats, birds, reptiles, and arthropods (Ward and Block 1995).

Most of the habitat areas that support MSOs in the U.S. are on federal lands, primarily administered by the Forest Service, and to a lesser degree, the BLM, most of which are within the FS Region 3 (including 11 National Forests in Arizona and New Mexico). Fewer owls are documented to occur in R2 (including 2 National Forests in Colorado [including the PSI]), and Region 4 (Utah). According to the Recovery Plan (FWS 1995), 91% of MSOs documented in the U.S. between 1990 and 1993 occurred on National Forests.

The range of the MSO has been divided into six Recovery Units (RUs) by the FWS in the Recovery Plan (FWS 1995). The Forest is within the Southern Rocky Mountains–Colorado RU. The Recovery Plan recommends three levels of habitat protection: (1) Protected Areas [Protected Activity Centers (PACs)], steep sloped areas (greater than 40%) with no timber harvest in the last 20 years, and reserved lands]; (2) Restricted Areas; and (3) Other Forest and Woodland Types. The Forest currently contains several PACs. Restricted MSO habitat areas are generally defined as: uneven-aged (mature/old growth characteristics) mixed conifer stands with crown cover greater than 40 percent. (Note: The recently released Draft Revised Recovery Plan for the Mexican Spotted Owl [FWS 2011b] revises these definitions and classifications to (1) PACs, (2) Recovery Habitat, and (3) other forest woodland types); however, at the time of this writing it has not been formally adopted by the FWS.

On the PSI, several PACs were established on the South Platte, Pike's Peak, and San Carlos Ranger Districts at current and historic sites where owls were known or suspected to breed. Using Rocky Mountain Region spatial vegetation and topography data, the two forests also created a very conservative model of forested stands that meet the general description of restricted and protected owl habitat. A subset of restricted stands was identified to be managed for nesting and roosting target conditions (FWS 1995, Part IIIB, pp. 91-95). Because the model was so conservative, some identified stands may not actually be capable of providing habitat for owls (e.g., inadequate tree size and/or density). Therefore, stands must be field-verified to determine if they might have the capacity to provide suitable owl habitat.

Many forested areas where fires have been suppressed are at increased risk of severe wildfire. This is due to increased tree densities and because of the greatly increased severity of fires that originate in the surrounding ponderosa pine matrix and burn into mixed conifer or pine-oak MSO habitat as

crown fires (Jenness 2000). Reduction of the fire risk both within and outside MSO habitat is considered important to its viability.

This species is present or has a potential to occur on every district of the PSI except for the Leadville Ranger District. Critical habitat has been designated by the FWS for this species on the San Carlos and Pike's Peak Ranger Districts (Section 2.2).

### Piping plover (*Charadrius melodus*)

Piping plover is federally listed as threatened under the ESA. This species is rare spring and fall migrant in eastern Colorado, breeding in the southeast portion of the state. Plovers are only known to nest at four reservoirs located in the plains of eastern Colorado. The plovers commonly use mud flats and shorelines of reservoirs and lakes (Kingery 1998). The Forest lacks reservoirs and lakes with sandy shores or islands required by this species. Piping plovers are not known to occur on the Forest; however, some management actions occurring on the Pike National Forest may result in water depletions that might affect this species. Therefore this species is included as a potential species that may be further analyzed in a project-specific BE/BA and consultation with the FWS as necessary.

### Whooping crane (*Grus americana*)

Whooping crane is federally listed as endangered under the ESA. They occur as a migrant during the spring and fall in eastern Colorado. They migrate annually, from the northern fresh-water breeding grounds to the southern winter grounds along the coastal prairies and salt marshes of the Gulf Coast in Texas. Whooping cranes are generally found in shallow wetlands, which have wide-range visibility and are free from human disturbance (NatureServe 2011). Additional natural history and distribution information can be found in the *Whooping Crane Recovery Plan* (FWS 2005b). The crane migrates through eastern Colorado outside of Forest-managed lands. Whooping cranes are not known to occur on the Forest; however, some management actions occurring on the Pike National Forest may result in water depletions that might affect this species. Therefore this species is included as a potential species that may be further analyzed in a project-specific BE/BA and consultation with the FWS as necessary.

### Yellow-billed cuckoo (*Coccyzus americanus*)

The western subspecies of yellow-billed cuckoo is a candidate for federal listing under the ESA. Cuckoos have undergone dramatic declines due to habitat loss and degradation since approximately 1980, though declines are noted as being more prevalent in the western portion of its range (Wiggins 2005) The Rocky Mountains is thought to separate two subspecies of yellow billed cuckoo; western (*C. a occidentalis*) and eastern (*C. a. americanus*) (Kingery 1998), though, the systematic status of the two subspecies is controversial (Wiggins 2005). The western subspecies known primarily to occur on the Western Slope of Colorado is a candidate for listing under ESA in the U.S. The FWS determined that the petition to list the yellow-billed cuckoo as endangered was warranted, but that listing was precluded by higher priority listing actions. The western subspecies depend primarily on old-growth riparian woodlands with dense understories. Only three records of potentially breeding birds were found on the Western Slope of Colorado during the Colorado Breeding Bird Atlas effort. These occurrences were on the Yampa, Colorado, and Uncompahgre rivers (Kingery 1998). The cuckoo is tied strongly to cottonwood riparian and woodlands; however, the eastern subspecies, found primarily on the eastern plains of Colorado, also occurs in

more open woodlands with thick undergrowth (Kingery 1998). They prefer to nest and forage in open woodlands with an understory of thick vegetation, especially riparian. Historically cuckoos were noted as rare summer visitors, primarily on the Eastern Plains and also in Middle Park on the Western Slope near Grand Junction. It is likely that they used to nest more frequently in Colorado than they do today (Kingery 1998). For more information about this species see the *Yellow-billed cuckoo (Coccyzus americanus): A Technical Conservation Assessment* prepared for the Region 2 Species Conservation Project (Wiggins 2005).

The Forest is centrally located in Colorado with the Continental Divide bordering the Forest to the west. The Forest is located far from the known occurrence areas for the western subspecies (Kingery 1998) and is therefore not expected to occur on the Forest. There is however, potential for the eastern subspecies (FS Sensitive status) to occur on the San Carlos Ranger District at the eastern portion of the Forest.

## MAMMALS INCLUDED

### Canada lynx (*Lynx canadensis*)

The lynx was listed as a distinct population segment (DPS) threatened species in portions of the lower 48 states by the FWS on April 24, 2000 (FWS 2000). Lynx in the Southern Rockies occur at relatively low densities and are found almost exclusively in cool, moist, coniferous forest types where their winter diet is dominated by snowshoe hare (*Lepus americanus*) and to a lesser degree red squirrel (*Tamiasciurus hudsonicus*) and ground squirrels (*Spermophilus* spp.). Lynx in this region are found primarily within the subalpine and upper montane forests zones typically from 8,000 to 12,000 ft in elevation, depending on latitude or moisture gradients (McKelvey et al. 1999, Ruediger et al. 2000). Forage and denning habitats are most often spruce (*Picea spp.*), fir (*Abies spp*), early seral and moist lodgepole pine *(Pinus contorta),* white fir (*Abies concolor*), aspen *(Populus tremuloides),* and moist Douglas-*fir (Pseudotsuga menziesii),* with developing understory of spruce-fir and aspen in the subalpine zone and timberline. Recently translocated lynx in Colorado have also frequently been observed foraging in well-developed riparian and valley wetland shrub habitats (Ruediger et al. 2000). The lynx is a secretive, nocturnal cat of dense forests with large home ranges.

Fire exclusion may have altered the historic pattern and composition of vegetation in subalpine forests. In the southern portion of the Northern Rocky Mountains Geographic Area and in the Southern Rocky Mountains Geographic Area (including the Forest), fire exclusion is one of the primary factors contributing to the decline or loss of aspen. Aspen communities occupy a small percentage of the total forested area, but they provide important habitat diversity. Aspen/tall forb community types, especially those that include snowberry, serviceberry and chokecherry shrubs in the understory, are very productive and increase the quality of lynx foraging habitat.

Lynx Analysis Units (LAUs) have been developed for the Forest (Forest Service 2001). Potential lynx habitat has been modeled based on vegetation type, precipitation, winter precipitation, topography, and snowshoe hare habitat. In Colorado, vegetation types representative of suitable habitat include dense spruce-fir and mixed conifer with spruce, Douglas-fir, early seral lodgepole pine, mature lodgepole pine with a developing understory of spruce-fir and aspen (Ruediger et al. 2000). Potential habitat is defined as having the capability to provide necessary habitat

components. Dry forest types (i.e., high incidence of ponderosa pine [*Pinus ponderosa*]) were mapped as nonhabitat.

The following summary is from CPW (2009a) outlining reintroduction efforts carried out by CPW and preliminary results from their research.

> ***Reintroduction Efforts****: From 1999 through 2006, 218 lynx were reintroduced into southwestern Colorado. Lynx released were captured in Alaska, British Columbia, Manitoba, Quebec and Yukon. All lynx were released in the Core Release Area of southwestern Colorado. Lynx were released with dual VHF/satellite radio collars so they could be monitored for movement, reproduction and survival. The CPW did not release any additional lynx in 2007, 2008 or 2009 and there are no plans to release any additional animals in the near future.*
>
> ***Mortality Factors:*** *Of the total 218 adult lynx released, there have been 115 known mortalities as of May 25, 2009. Starvation was a significant cause of mortality in the first year of releases only. Mortalities occurred throughout the areas through which lynx moved. The primary known causes of death included 30.4% human-induced deaths which were confirmed or probably caused by collisions with vehicles or gunshot. Malnutrition and disease/illness accounted for 18.3% of the deaths. Other mortality factors included predation or probable predation by mountain lions, bobcat and lynx as well as other trauma-caused deaths. An additional 37.4% of known mortalities were from unknown causes.*
>
> ***Reproduction:*** *Reproduction was first documented in 2003 when six dens and a total of 16 kittens were found in the lynx Core Release Area in southwestern Colorado. Reproduction was also documented in 2004, 2005, 2006, and most recently in 2009 (CPW 2009b). No dens were found in 2007 or 2008. Thus-far in 2009, 10 lynx kittens have been found and more are likely since not all adult lynx are radio telemetered. Of significance is that for the first time two dens documented housed kittens from Colorado-born parents. This is the first documented case where both parents are native to Colorado since the reintroduction effort began in 1999 (CPW 2009b).*
>
> *A total of 37 dens were found from 2003-2006 and results of the 2009 season are not available at this time. All of the dens except one were scattered throughout the high elevation areas of Colorado, south of I-70. In 2004, one den was found in southeastern Wyoming, near the Colorado border. Dens were located on steep (30°), north-facing, high elevation (3354 m [11,000 ft]) slopes. The dens were typically in Engelmann spruce/subalpine fir forests in areas of extensive downfall of coarse woody debris. All dens were located within the winter use areas used by the females.*
>
> ***Distribution and Movement Patterns:*** *The majority of surviving lynx from the entire reintroduction effort continue to use high elevation (> 2900 m [9,500 ft]), forested areas from New Mexico north to Independence Pass, west as far as Taylor Mesa and east to Monarch Pass. Most movements away from the Core Release Area (San Juan Mountains) were to the north. Numerous travel corridors have been used repeatedly by more than one lynx. These travel corridors include the Cochetopa Hills area for northerly movements, the Rio Grande Reservoir-Silverton-Lizardhead Pass for movements to the west, and southerly movements down the east side of Wolf Creek Pass to the southeast through the Conejos River Valley. Lynx appear to remain faithful to an area during winter months, and exhibit more extensive movements away from these areas in the summer. Such movement patterns have also been documented by native lynx in Wyoming and Montana.*
>
> ***Home Range:*** *Reproductive females had the smallest 90% utilization distribution annual home ranges ($x$ = 75.2 km² [29 mi²], $n$ = 19), followed by attending males (102.5 km² [39.6 mi²], $n$ = 4). Non-reproductive females had the largest annual home ranges (703.9 km², [271.7 mi², $n$ = 32) followed by*

*non-reproductive males (387 km², 149.4 mi², n = 6). Combining all non-reproductive animals yielded a mean annual home range of 653.8 km² (252.4 mi², n = 38).*

***Habitat Use:*** *Landscape-scale daytime habitat use was documented from 10,935 aerial locations of lynx by CPW collected from February 1999-August 27, 2008. Throughout the year Engelmann spruce / subalpine fir was the dominant cover used by lynx. A mix of Engelmann spruce, subalpine fir and aspen (Populus tremuloides) was the second most common cover type used throughout the year. Various riparian and riparian-mix areas were the third most common cover type where lynx were found during the daytime flights. Use of Engelmann spruce-subalpine fir forests and Engelmann spruce-subalpine fir-aspen forests was similar throughout the year. There was a trend in increased use of riparian areas beginning in July, peaking in November, and dropping off December through June.*

*Site-scale habitat data collected from snow-tracking efforts indicate Engelmann spruce and subalpine fir were also the most common forest stands used by lynx for all activities during winter in southwestern Colorado. Comparisons were made among sites used for long beds, dens, travel and where they made kills. Little difference in aspect, mean slope and mean elevation were detected for 3 of the 4 site types including long beds, travel and kills where lynx typically use gentler slopes (15.7º) at an mean elevation of 3,173 m (10,410 ft), and varying aspects with a slight preference for north-facing slopes.*

*Mean percent total overstory was higher for long bed and kill sites than travel or den sites. Engelmann spruce provided a mean of 35.87% overstory for kills and long beds, with travel sites averaging 28% and den sites having the lowest mean percent overstory of 23%. Mean percent subalpine fir or aspen overstory did not vary across use sites. Willow overstory was highly variable and no dens were located in willow overstory.*

*A total of 1,841 site-scale habitat plots were completed in winter from December 2002 through April 2005. The most common understory species at all 3 height categories above the snow (low = 0-0.5 m [1.6 ft], medium = 0.51 - 1.0 m [1.6 – 3.3 ft], high = 1.1 - 1.5 m [3.6 – 4.9 ft) was Engelmann spruce, subalpine fir, willow (Salix spp.) and aspen. Various other species such as Ponderosa pine (Pinus ponderosa), lodgepole pine (Pinus contorta), cottonwood (Populus sargentii), birch (Betula spp.) and others were also found in less than 5% of the habitat plots. If present, willow provided the greatest percent cover within a plot followed by Engelmann spruce, subalpine fir, aspen and coarse woody debris for long beds, kills and travel sites. Areas documented in willow used by lynx are typically on the edge of willow thickets as tracks are quickly lost within the thicket. Den sites had significantly higher percent understory cover for all three height categories. Understory at den sites was primarily made up of coarse woody debris.*

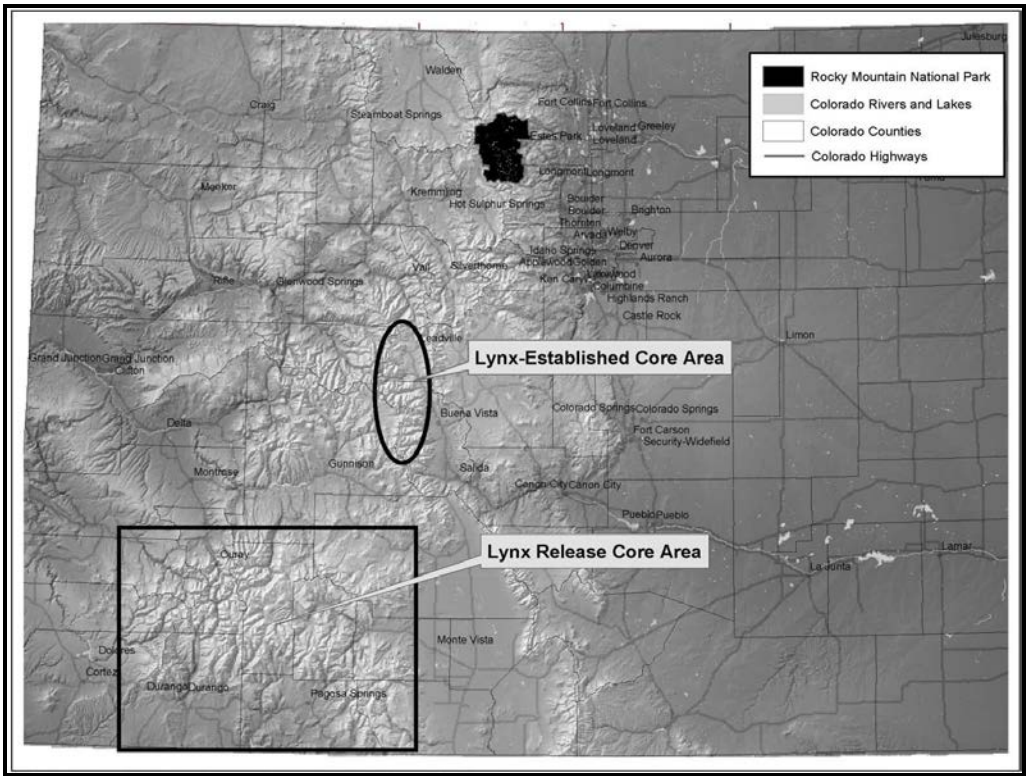
*The most common tree species documented in the site-scale habitat plots was Engelmann spruce. Subalpine fir and aspen were also present in >35% of the plots. Most habitat plots were vegetated with trees of DBH < 6". As DBH increased, percent occurrence decreased within the plot. Although decreasing in abundance as size increased, most lynx use sites had trees in each of the DBH categories; indicating mature forest stands except for dens. Den sites had a broad spectrum of Engelmann spruce tree sizes, including > 18" but no large subalpine fir or aspen trees. While Engelmann spruce and subalpine fir occurred in similar densities for kills, long beds and travel sites, den sites had twice the density of subalpine firs found at all other sites.*

***Diet and Hunting Behavior:*** *In each winter from 1999- 2008 the most common prey item was snowshoe hare, followed by red squirrel. During these years, the percent of snowshoe hare kills found however, varied annually from a low of 55.56% in 1999 to a high of 90.77% in winter 2002-2003. During the 2008-09 winter, the percent of red squirrel kills found (66%, n = 56 kills) exceeded the percent snowshoe hare kills found (30%). A comparison of percent overstory for successful and unsuccessful snowshoe hare chases indicated*

*lynx were more successful at sites with slightly higher percent overstory, if the overstory species were Engelmann spruce, subalpine fir or willow. Lynx were slightly less successful in areas of greater aspen overstory. This trend was repeated for percent understory at all 3 height categories except that higher aspen understory improved hunting success. Higher density of Engelmann spruce and subalpine fir increased hunting success while increased aspen density decreased hunting success.*

As per the SRLA, we assume lynx use is occurring where suitable denning, foraging, winter, and other lynx habitats are present. Suitable habitat occurs on each district on the PSI. Denning has been documented in the Colligate Peaks and this area has been identified as a core area of lynx use by CPW as shown in Figure 2 below.

**Figure 2.** A portion of the Salida and Leadville Ranger Districts are within the state's established two "core areas" as identified by state lynx researches (CPW 2009a).




## Gunnison's prairie dog (*Cynomys gunnisoni*)

The FWS (2010a) determined in their 12-month finding that populations of Gunnison's prairie dog located in central and south-central Colorado and north-central New Mexico are warranted for protection under the ESA: however, listing these populations at this time is precluded by the need to address other higher priority species. Their "*warranted but precluded*" finding classified this species as a candidate for listing and its status will be reviewed annually.

This species of prairie dog is found in mesic plateaus, higher mountain valleys, and lowlands. They are colonial rodents that inhabit grasslands and semi-desert and montane shrublands. Their diet consists mostly of grasses and sedges. Grasses and forbs are gathered for nesting materials, especially in late summer. They do not require free water. The animals are diurnal, with bimodal peaks of activity common during the warmer parts of the year. They hibernate during the winter

months. In central Colorado, around 10,000 ft, individuals entered burrows by October and emerged in mid-April. Hibernation periods are shorter at lower elevations and some individuals may even appear above ground in the winter months. Predators include golden eagles (*Aquila chrysaetos*), badgers (*Taxidea taxus*), coyotes (*Canis latrans*), bobcats (*Lynx rufus*), and red-tailed hawks (*Buteo jamaicensis*). They range in elevation from 6,000-12,000 ft (Fitzgerald et al. 1994).

The Forest contains marginal Gunnison's prairie dog habitat due to the isolated and fragmented nature of its grasslands, although a sizable population occurs off Forest in the Arkansas River Valley in Chaffee County near the Salida District (Knowles 2002). South Park, in Park County, Colorado provides a large amount of continuous habitat for this species, which prior to the sylvatic plague outbreak in 1947, contained over 900,000 acres of occupied colonies; however, the acreage of colonies has been nearly eliminated from South Park since that time, with less than 100 acres remaining (Ecke and Johnson 1952 *in* Knowles 2002). Although the range and potential habitat for Gunnison's prairie dog overlaps with land managed by the Forest, currently the known populations are on non-Forest land or State- and privately-owned land in the southern end of South Park (Lance Carpenter, pers. comm. October 27, 2011) and it occurs at three sites on National Forest System lands within the Pike's Peak Ranger District.

### North American wolverine (*Gulo gulo luscus*)

The FWS determined that wolverines found in the contiguous U.S. were a Distinct Population Segment (DPS) and warranted for ESA protection, but listing was precluded by the need to address other higher priority species (FWS 2010b). The wolverine was subsequently added to the candidate list where its status will be reviewed annually.

The distribution of wolverines is circumpolar and they occupy tundra, taiga, and forest zones of North America and Eurasia (Kvam et al. 1988, Wilson 1982). The wolverine's historic range in the conterminous U.S. encompasses the northwest, west coast, interior Rocky Mountain region, the Dakotas, extreme western and northern Wyoming, and possibly New Mexico and Arizona. The historical range of wolverines in the West was limited to discontinuous, high elevation areas of the Rocky Mountains, Cascade Range, and the Sierra Nevada, primarily in areas of alpine habitat and snow cover that persists until mid-May (Parks 2009). According to Parks (2009), there have been numerous historical wolverine locations in Colorado (1827-1960). Wolverines were extirpated from their historical range in California, Colorado, and Utah by 1930. Despite the historical sightings in Colorado, the status and distribution of wolverine populations is not known, although they are considered rare (Nead et al. 1985). It is not known whether the Colorado Rocky Mountains historically supported a self-sustaining wolverine population (Banci 1994). Recently, a wolverine was documented in Colorado (a radio-collared animal used Rocky Mountain National Park, portions of the Pike National Forest [2009-2010], and near Fairplay, Colorado [2010]). This animal stayed in Colorado for well over a year, demonstrating that it could make a livelihood in the state and was not merely traveling through.

The Southern Rockies Ecoprovince is isolated from the north by the Central Rocky Mountain and Wyoming Basins. Investigations by the state of Colorado in 1997 indicated the possible presence of wolverines in some parts of the state; however, this effort was not able to verify or confirm suspected observations. Recent credible, but unverified reports of wolverines have been received from the several National Forest-managed lands in Colorado. Information on wolverine abundance is not available; therefore estimating population trends cannot be done at this time. It is believed

that populations in the Southern Rocky Mountains are extremely low and are not sustainable at current levels. In Colorado, National Forest System lands may contain the best potential habitat for wolverine because of the large core wilderness areas that are found there (CPW 1998).

Little is known about the habitat requirements or preferences for the wolverine in Colorado; therefore, studies from other portions of their range must be used to provide information on their habitat requirements. Researchers have generally described their habitat as best defined in terms of adequate year-round food supplies in large, sparsely inhabitant wilderness areas, rather than in terms of particular types of topography or plant associations (Kelsall 1981). More recent research has determined that wolverines have demonstrated a preference for high-elevation cool sites that maintain deep snow depths into late winter/early spring. This research has concluded that wolverines (males, non-reproductive females, and juveniles, as well as denning females) continue to use (95% of the time) the same areas during the snow-free months that they used during the winter (persistent snow-covered terrain) due to an upper limit of thermal tolerance. This behavior even applies to when they are dispersing to new locales, avoiding areas with warmer temperatures (Parks 2009). According to Keith Aubrey (Parks 2009), "*Spring snow cover was the only habitat feature that fully accounted for the historical distribution of wolverines*" and "*Virtually all those records were within or near areas with alpine vegetation and climatic conditions*." Researchers found further proof that spring snow cover is critical to wolverines and that females are tied to snow-covered terrain for reproduction (Parks 2009). The wolverine is a solitary, secretive species that inhabits remote habitats of tundra, open and barren rock laden alpine zones, and dense high mountain subalpine coniferous forests (Fitzgerald et al. 1994). Wolverines are found in a variety of habitats and do not appear to avoid open areas in some portions of their range; although use in open areas may be limited. In Montana, they occasionally cross clearcuts in a straight line and running gait, as compared to a more leisurely and meandering pattern as in forested areas (Banci 1994).

Wolverine dens consist of natural cavities, including uprooted trees or hollow logs, under accumulation of CWD, or any other protected place such as rocky areas (e.g., talus slopes, boulder fields) (Palmer 1954). Den sites are generally located in remote glacial cirques that maintain snow cover throughout late winter. Wolverines require large areas of undisturbed habitat because of their large home range and sensitivity to disturbance (CPW 1998). Wolverine densities are naturally low even in the most pristine habitats. Home ranges are extremely large and densities are low, and may be anywhere from 25-250 square miles for a single animal, with the largest being 770 square miles (Krott 1960, Quick 1953, Banci and Harestad 1990, Hornocker and Hash 1981). Adult wolverines do not defend territories, and home ranges may overlap between individuals of the same and opposite sex (Banci and Harestad 1990, Hornocker and Hash 1981). They are solitary except during the breeding season when males and females remaining together for 2-3 days (Magoun 1985). The wolverine is both a scavenger and hunter that may travel many miles a day (up to 18 mi, or more) to feed on carcasses, small and large mammals, and roots and berries, depending on the season (Haglund 1966, Krott 1960). Wolverine predation on big game has not been documented in North America (Hornocker and Hash 1981). Dispersing young have been recorded traveling 186 mi in Alaska (Magoun 1985). While deep and powdery snow hinders the movements of ungulates, the large paws of wolverines enable them to travel easily under the same conditions. They remain active throughout the year and are agile swimmers and tree climbers (Grinnell 1926, Reed 1956, Krott 1960, Murie 1963). They are generally nocturnal, although some activity can occur during the day (Haglund 1966, Pulliainen and Ovaskainen 1975, Wilson 1982).

Activities that increase availability of foods (e.g., large mammals) generally will affect wolverines positively; whereas those that reduce prey populations will do so negatively. However, land use activities may exclude wolverines from areas that ungulates still use if these habitats do not provide for wolverine's other life needs (Banci 1994). Human presence alone is not deterrence to the presence of wolverines; there are likely combinations of factors that underlie the presence or absence of self-sustaining populations of wolverines (Banci 1994). Habitat loss and predation by humans (e.g., trapping and road kill) are the most important factors affecting wolverine numbers (Hornocker and Hash 1981, Macdonald 1985). Low population densities combined with the requirement of vast undisturbed wilderness areas make this species highly sensitivity to human intrusion into its habitat, particularly at natal den sites (Hayward and Garton 1989). Backcountry activity in the region is increasing dramatically in denning habitat during denning season, and may threaten reproductive success. Hornocker and Hash (1981) suggested that human access on snowmobiles and ORVs in winter and early spring could cause behavioral disturbance. They seem to have been most affected by activities that fragment and supplant habitat, such as human settlement, excessive logging, oil and gas development, mining, recreation development, and accompanying access (Banci 1994). Habitat blocks and interconnectivity may be degraded and even severed by highway expansions and development. Females have been known to move their young several miles from a den site due to disturbance caused by a single human intruder to the denning territory. These factors, in combination with very large home ranges, naturally low densities of individuals, low reproductive rates, and delayed sexual maturity, all play important roles in their numbers and distribution. Suitable habitat is present in each ranger district on the PSI.

### Preble's meadow jumping mouse (*Zapus hudsonius preblei*)

The Preble's meadow jumping mouse (PMJM) is a subspecies of the meadow jumping mouse (*Zapus hudsonius*). The PMJM was federally listed as a threatened species in 1998, and a Draft Recovery Plan was prepared in 2003 (FWS 2003). This species occurs only in a few watersheds along Colorado's Front Range and in southeastern Wyoming within an elevation range of 4,650 - 7,600 ft. In Colorado, the PMJM is found in the South Platte River basin to the headwaters of the Arkansas River Basin near Colorado Springs (FWS 2003). Along the Colorado Front Range, the distribution of the PMJM overlaps with that of the western jumping mouse (*Zapus princeps*). These species are very similar in appearance. *Z. princeps* generally occurs within a higher elevation range than the PMJM, but many areas are occupied by both of these species.

They are closely associated with riparian ecosystems that are linear in nature and represent a small percentage of the landscape. Hydrologic regimes that support this species range from large perennial rivers to small ephemeral drainages (FWS 2003). This species primarily inhabits well-developed riparian areas with adjacent, relatively undisturbed grassland communities (Bakeman 1997 *in* FWS 2003). Riparian vegetation typically includes a dense combination of grasses, forbs, and shrubs in open wet meadows and riparian corridors, or where shrubs and low trees provide adequate cover. When present, the shrub canopy is often willow, although other shrub species may also occur. Proximity to water is an important factor influencing habitat selection and utilization. Individuals use upland habitat at night for foraging, and they rest in day beds in shrubs or bunch grasses during the day in the riparian zone. Uplands habitats are extremely variable, ranging from open grasslands to forested woodlands. The montane woodlands where this species has been found

are dominated by ponderosa pine, Douglas-fir, spruce, and occasionally quaking aspen, with a lush and diverse understory of shrubs and forbs.

This species is a true hibernator, usually entering hibernation in September or October and emerging the following May, after a period of seven or eight months (FWS 2003). They hibernate near riparian zones. Hibernacula (i.e., hibernation nests) have been located both within and outside the 100-year floodplain of streams. During the active season, this species constructs day nests composed of grasses, forbs, sedges, rushes, and other available plant materials (FWS 2003). These nests are typically found under debris at the base of shrubs and trees, or in open grasslands.

The PMJM has rarely been trapped in uplands adjacent to riparian areas (Dharman 2001 *in* FWS 2003). However, this species regularly uses upland areas for feeding and resting. Use of upland areas extends at least as far as 330 ft beyond the 100-year floodplain. They can also move considerable distances along streams, including as far as one mile in single evening (FWS 2003).

The decline in the extent and quality of their habitat is considered the main factor threatening this subspecies. Habitat alteration, degradation, loss, and fragmentation resulting from urban development, flood control, water development and management, intensive agricultural practices, and other human land uses have adversely affected their populations. Habitat destruction may impact individuals directly or by destroying nest sites, food resources, and hibernation sites, by disrupting behavior, or by forming a barrier to movement (FWS 2003). This species' range includes areas on both the South Platte and Pike's Peak Ranger Districts. Critical habitat for this species has been designated by the FWS on both ranger districts (discussed below in Section 2.2).

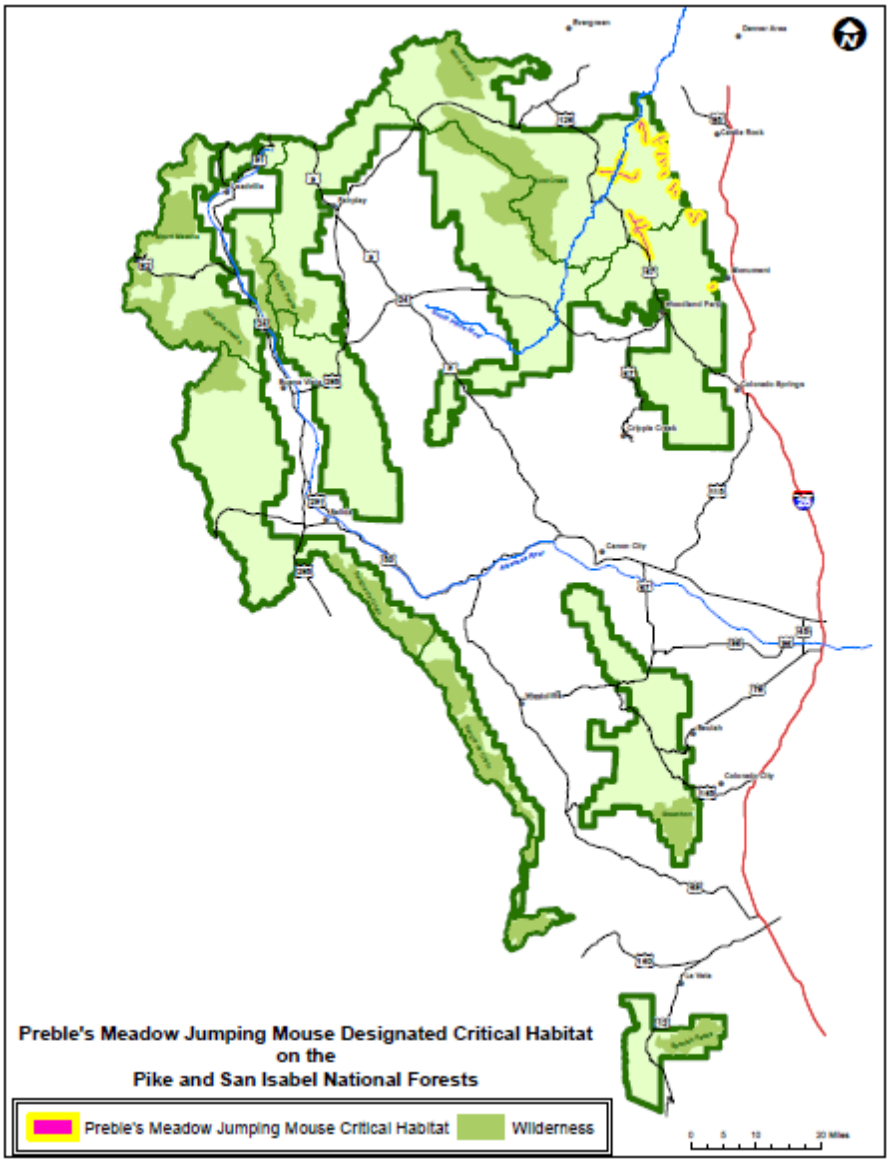
## 2.2 Federally Designated and Proposed Critical Habitat

Critical habitat that has been designated by the FWS is defined as "*areas containing primary constituent elements, or landscape features that fulfill biological and physical attributes that are essential to the species' conservation (recovery) such as: space; food; water, and nutrition; cover or shelter; reproduction; and special habitats*". Critical habitat has been designated for two species on the PSI.

### Preble's meadow jumping mouse (*Zapus hudsonius preblei*)

Critical habitat was designated for the PMJM by the FWS in 2003 and revised for Colorado in 2010 (FWS 2010c) on both the Pike's Peak and South Platte Ranger Districts. The Pike's Peak Ranger District contains about 700 ac and South Platte Ranger District 3,057 ac of designated critical habitat. Figure 3 below shows the location of designated critical habitat on the PSI.

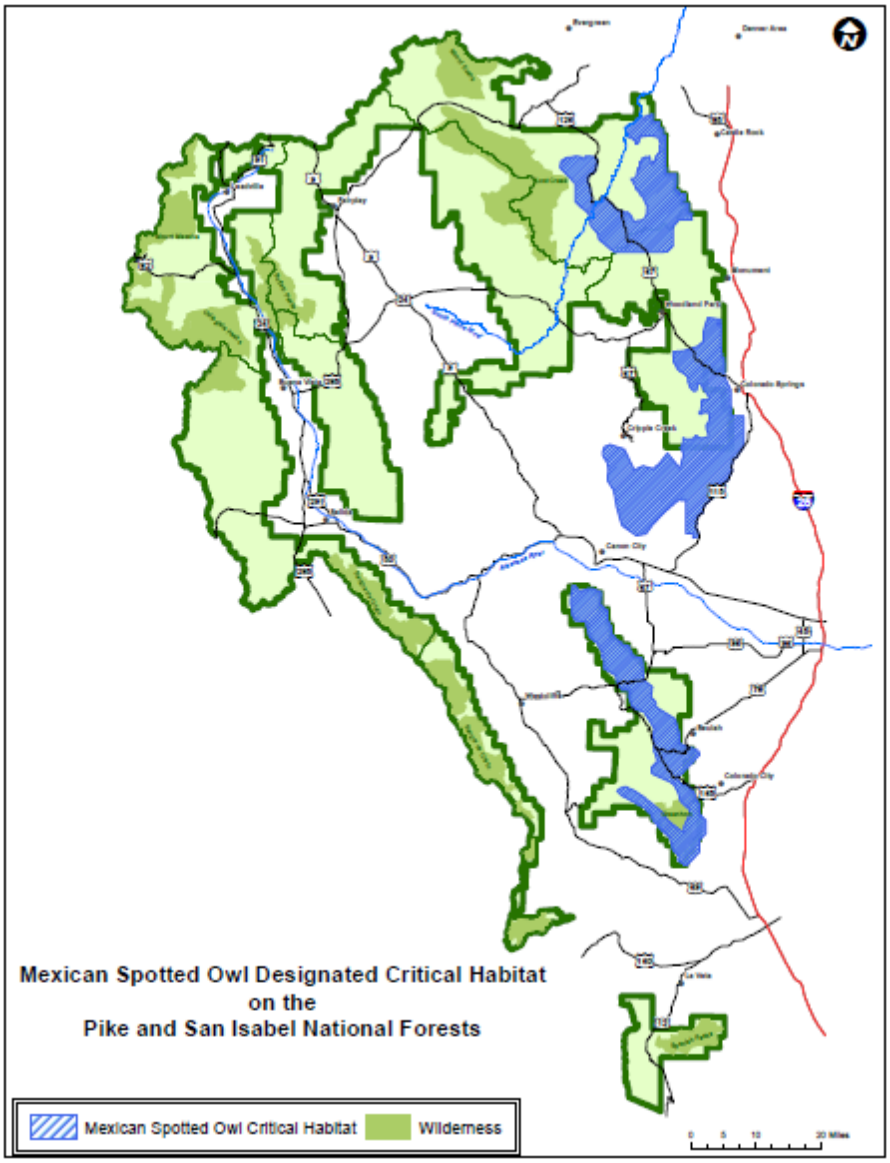
**Figure 3.** Preble's meadow jumping mouse designated critical habitat (shown in yellow) on the Pike National Forest.




## Mexican spotted owl (*Strix occidentalis lucida*)

The FWS (2004a) revised its previous designation of critical habitat (FWS 2001) in 2004, to include approximately 8.6 million ac for the MSO in portions of its range in the Southwest. Important habitat considerations for MSO are nesting, roosting, foraging, and/or dispersal. Both habitat structure and prey availability were defined for both forest and canyon areas. The Pike's Peak Ranger District contains about 68,526 ac, San Carlos Ranger District 110,148 ac, and South Platte Ranger District 90,574 ac of critical habitat. Figure 4 below shows designated critical habitat on the PSI.

**Figure 4.** Mexican spotted owl designated critical habitat (shown in blue) on the Pike and San Isabel National Forests.




## 2.3 FOREST SERVICE SENSITIVE LIST

Using the Regional Forester's Sensitive Species List (Forest Service 2011, Appendix B), we identified all FS sensitive species with the potential to occur (within their known distributional range and/or if suitable habitat occurs) on the Forest or be affected by our management actions (e.g., such as water depletions). Table 2 below lists each species on the R2 Regional Forester's List and those with a potential to occur or be affected by management on the PSI.

**Table 2.** Forest Service Sensitive Species in Region 2 (Forest Service 2011) and whether they have a potential to occur or be affected by management on the PSI. Ranger district abbreviations: LD=Leadville, SA=Salida, SC=San Carlos, SK=South Park, SP=South Platte, and PI=Pike's Peak.

| COMMON NAME | SCIENTIFIC NAME | POTENTIAL TO OCCUR ON PSI (RANGER DISTRICT) |
|---|---|---|
| ***PLANTS*** | | |
| Absaroka range beardtongue | *Penstemon absarokensis* | |
| Altai (Whitebristle) cottongrass | *Eriophorum altaicum var. neogaeum* | **LD, SK** |
| American cranberry bush | *Viburnum opulus* var. *americanum* | |
| Arizona willow | *Salix arizonica* | |
| Autumn willow | *Salix serissima* | **SK, SP** |
| Aztec milkvetch | *Astragalus proximus* | |
| Baltic sphagnum | *Sphagnum balticum* | |
| Barratt's willow | *Salix barrattiana* | |
| Barr's milkvetch | *Astragalus barrii* | |
| Bill's neoparrya | *Neoparrya lithophila* | **SA, SC, SK** |
| Bloodroot | *Sanguinaria canadensis* | |
| Blueberry willow | *Salix myrtillifolia* | **SK** |
| Brandegee's buckwheat | *Eriogonum brandegeei* | |
| Cary's beardtongue | *Penstemon caryi* | |
| Cathedral Bluff meadow-rue | *Thalictrum heliophilum* | |
| Chamisso's cottongrass | *Eriophorum chamissonis* | **LD, SK** |
| Clawless draba | *Draba exunguiculata* | **LD, SA, SK, SP, PI** |
| Club spikemoss | *Selaginella selaginoides* | |
| Colorado tansy-aster | *Machaeranthera coloradoensis* | **LD, SA, SK** |
| Common twinpod | *Physaria didymocarpa* var. *lanata* | |
| Cushion bladder-pod | *Physaria pulvinata* | |
| Cushion Townsend daisy | *Townsendia condensata* var. *anomala* | |
| Degener's beardtongue | *Penstemon degeneri* | **SC** |
| Dropleaf buckwheat | *Eriogonum exilifolium* | |
| Dwarf raspberry | *Rubus arcticus ssp. acaulis* | **SP** |
| Elliptic spikerush | *Eleocharis elliptica* | |
| English sundew | *Drosera anglica* | |
| Foxtail sedge | *Carex alopecoidea* | |
| Fremont's bladderpod | *Lesquerella fremontii* | |
| Giant helleborine, | *Epipactis gigantea* | |
| Gray's draba | *Draba grayana* | **LD, SA, SC, SK, SP** |
| Greenland primrose | *Primula egaliksensis* | **SK** |
| Groundcedar | *Lycopodium complanatum* | |
| Hall's bulrush | *Schoenoplectus hallii* | |

| COMMON NAME | SCIENTIFIC NAME | POTENTIAL TO OCCUR ON PSI (RANGER DISTRICT) |
|---|---|---|
| Harrington's beardtongue | *Penstemon harringtonii* | |
| Ice cold buttercup | *Ranunculus karelinii* | **LD, SA, SK, SP** |
| Iowa moonwort | *Botrychium campestre* | |
| Kotzebue's grass of parnassus | *Parnassia kotzebuei* | **SK, SP** |
| Laramie columbine | *Aquilegia laramiensis* | |
| Largeflower goldenweed | *Pyrrocoma carthamoides* var. *subsquarrosa* | |
| Largeflower triteleia | *Triteleia grandiflora* | |
| Lesser bladderwort | *Utricularia minor* | |
| Lesser panicled sedge | *Carex diandra* | **LD, SA, SK, SP** |
| Lesser roundleaved orchid | *Platanthera orbiculata* | |
| Lesser yellow lady's slipper | *Cypripedium parviflorum* | **SC, SP, PI** |
| Livid sedge | *Carex livida* | **SK, SP, PI** |
| Lone Mesa snakeweed | *Gutierrezia elegans* | |
| Many-stemmed goldenweed | *Pyrrocoma integrifolia* | |
| Missouri milkvetch | *Astragalus missouriensis* var. *humistratus* | |
| Mountain lady's slipper | *Cypripedium montanum* | |
| Mountain tansymustard | *Descurainia torulosa* | |
| Narrowleaf moonwort | *Botrychium lineare* | **LD, SA, SK, SP, PI** |
| Narrowleaf peatmoss | *Sphagnum angustifolium* | **SP** |
| Pagosa Springs bladderpod | *Lesquerella pruinosa* | |
| Park milkvetch | *Astragalus leptaleus* | **SC, SK** |
| Peculiar moonwort | *Botrychium paradoxum* | |
| Plains rough (Hall) fescue | *Festuca hallii* | **SC, SK, SP** |
| Porter false needlegrass | *Ptilagrostis porteri* | **SC, SK, SP, PI** |
| Prairie dodder | *Cuscuta plattensis* | |
| Ripley's milkvetch | *Astragalus ripleyi* | |
| Rock cinquefoil | *Potentilla rupincola* | **SP, PI** |
| Rocky Mountain alpine parsley | *Oreoxis humilis* | **PI** |
| Rocky Mountain monkeyflower | *Mimulus gemmiparus* | **SP, PI** |
| Roundleaf orchid | *Amerorchis rotundifolia* | |
| Roundleaf sundew | *Drosera rotundifolia* | |
| Rydberg's golden columbine | *Aquilegia chrysantha var. rydbergii* | **SC, PI** |
| Sageleaf willow | *Salix candida* | **LD, SA, SK, SP** |
| Sandhill goosefoot | *Chenopodium cycloides* | |
| Scarlet gilia | *Ipomopsis aggregata ssp. weberi* | |
| Selkirk's violet | *Viola selkirkii* | **LD, SC, SP, PI** |
| Shoshone carrot | *Shoshonea pulvinata* | |
| Siberian sea thrift | *Armeria maritima ssp. sibirica* | **LD, SK, SP** |

| COMMON NAME | SCIENTIFIC NAME | POTENTIAL TO OCCUR ON PSI (RANGER DISTRICT) |
|---|---|---|
| Simple bog sedge | *Kobresia simpliciuscula* | **SK, SP** |
| Slender cottongrass | *Eriophorum gracile* | **LD, SA, SK, SP** |
| Smith's draba | *Draba smithii* | **SC** |
| Smooth northern-rockcress | *Braya glabella* | **SK** |
| Stonecrop gilia | *Aliciella sedifolia* | |
| Tranquil goldenweed | *Pyrrocoma clementis var. villosa* | |
| Trianglelobe moonwort | *Botrychium ascendens* | **LD, SA, SK** |
| Visher's buckwheat | *Eriogonum visheri* | |
| Weber's draba | *Draba weberi* | **LD, SK** |
| West silver bladderpod | *Physaria scrotiformis* | |
| Wheel milkweed | *Asclepias uncialis* | **SC** |
| White adder's-mouth orchid | *Malaxis brachypoda* | **SP, PI** |
| Winding mariposa lily | *Calochortus flexuosus* | |
| Yellow widelip orchid | *Liparis loeselii* | |
| ***INVERTEBRATES*** | | |
| Cooper's Rocky Mountain snail | *Oreohelix strigosa cooperi* | |
| Hudsonian emerald | *Somatochlora hudsonica* | **LD, SA, SC, SK, SP, PI** |
| Nokomis fritillary | *Speyeria nokomis nokomis* | |
| Ottoe skipper | *Hesperia ottoe* | |
| Pygmy mountain snail | *Oreohelix pygmaea* | |
| Regal fritillary | *Speyeria idalia* | |
| Rocky Mountain capshell snail | *Acroloxus coloradensis* | **LD, SA, SC, SK, SP, PI** |
| Susan's purse-making caddisfly | *Ochrotrichia susanae* | **SA, SK, SP, PI** |
| ***FISH*** | | |
| Bluehead sucker | *Catostomus discobolus* | |
| Colorado River cutthroat trout | *Oncorhynchus clarki pleuriticus* | |
| Finescale dace | *Phoxinus neogaeus* | |
| Flannelmouth sucker | *Catostomus latipinnis* | |
| Flathead chub | *Platygobio gracilis* | |
| Hornyhead chub | *Nocomis biguttatus* | |
| Lake chub | *Couesius plumbeus* | |
| Mountain sucker | *Catostomus platyrhynchus* | |
| Northern redbelly dace | *Phoxinus eos* | |
| Pearl dace | *Margariscus margarita* | |
| Plains minnow | *Hybognathus placitus* | |
| Rio Grande chub | *Gila pandora* | |

| COMMON NAME | SCIENTIFIC NAME | POTENTIAL TO OCCUR ON PSI (RANGER DISTRICT) |
|---|---|---|
| Rio Grande cutthroat trout | *Oncorhynchus clarki virginalis* | |
| Rio Grande sucker | *Catostomus plebeius* | |
| Roundtail chub | *Gila robusta* | |
| Southern redbelly dace | *Phoxinus erythrogaster* | |
| Sturgeon chub | *Macrhybopsis gelida* | |
| Yellowstone cutthroat trout | *Oncorhynchus clarki bouvieri* | |
| ***AMPHIBIANS AND REPTILES*** | | |
| Black Hills red-bellied snake | *Storeria occipitomaculata pahasapae* | |
| Boreal toad | *Anaxyrus boreas boreas* | **LD, SA, SK, SP, PI** |
| Columbia spotted frog | *Lithobaties luteiventris* | |
| Desert massasauga rattlesnake | *Sistrurus catenatus edwardii* | |
| Northern leopard frog | *Lithobaties pipiens* | **LD, SA, SC, SK, SP, PI** |
| Plains leopard frog | *Lithobaties blairi* | **SC** |
| Wood frog | *Lithobaties sylvatica* | |
| ***BIRDS*** | | |
| American bittern | *Botaurus lentiginosus* | |
| American peregrine falcon | *Falco peregrinus anatum* | **LD, SA, SC, SK, SP, PI** |
| Bald eagle | *Haliaeetus leucocephalus* | **LD, SA, SC, SK, SP, PI** |
| Black swift | *Cypseloides niger* | **LD, SA, SC, SK, PI** |
| Black tern | *Chlidonias niger* | |
| Black-backed woodpecker | *Picoides arcticus* | |
| Boreal owl | *Aegolius funereus* | **LD, SA, SC, SK, SP, PI** |
| Brewer's sparrow | *Spizella breweri* | **LD, SA, SC, SK, SP, PI** |
| Burrowing owl | *Athene cunicularia* | **SK, PI** |
| Cassin's sparrow | *Peucaea cassinii* | |
| Chestnut-collared longspur | *Calcarius ornatus* | |
| Columbia sharp-tailed grouse | *Tympanuchus phasianellus columbianus* | |
| Ferruginous hawk | *Buteo regalis* | **SK** |
| Flammulated owl | *Otus flammeolus* | **LD, SA, SC, SK, SP, PI** |
| Grasshopper sparrow | *Ammodramus savannarum* | |
| Greater prairie chicken | *Tympanuchus cupido* | |
| Greater sage-grouse | *Centrocercus urophasianus* | |
| Gunnison sage-grouse | *Centrocercus minimus* | **SA** |
| Harlequin duck | *Histrionicus histrionicus* | |
| Lesser prairie chicken | *Tympanuchus pallidicinctus* | |
| Lewis's woodpecker | *Melanerpes lewis* | **SA, SC, SP, PI** |
| Loggerhead shrike | *Lanius ludovicianus* | **LD, SA, SC, SK, SP, PI** |
| Long-billed curlew | *Numenius americanus* | |

| COMMON NAME | SCIENTIFIC NAME | POTENTIAL TO OCCUR ON PSI (RANGER DISTRICT) |
|---|---|---|
| McCown's longspur | *Rhynchophanes mccownii* | |
| Mountain plover | *Charadrius montanus* | **SK** |
| Northern goshawk | *Accipiter gentilis* | **LD, SA, SC, SK, SP,PI** |
| Northern harrier | *Circus cyaneus* | **LD, SA, SC, SK, SP, PI** |
| Olive-sided flycatcher | *Contopus cooperi* | **LD, SA, SC, SK, SP, PI** |
| Purple martin | *Progne subis* | |
| Sage sparrow | *Amphispiza belli* | |
| Short-eared owl | *Asio flammeus* | |
| Trumpeter swan | *Cygnus buccinator* | |
| White-tailed ptarmigan | *Lagopus leucura* | **LD, SA, SC, SK, SP, PI** |
| Yellow-billed cuckoo (eastern subspecies) | *Coccyzus americanus* | **SC** |
| ***MAMMALS*** | | |
| American hog-nosed skunk | *Conepatus leuconotus* | **SA, SC, PI** |
| American marten | *Martes americana* | **LD, SA, SC, SK, SP, PI** |
| Black-tailed prairie dog | *Cynomys ludovicianus* | |
| Desert bighorn sheep | *Ovis canadensis nelsoni* | |
| Fringed myotis | *Myotis thysanodes* | **LD, SA, SC, SK, SP, PI** |
| Gunnison's prairie dog | *Cynomys gunnisoni* | **SA, SK, SP, PI** |
| Hoary bat | *Lasiurus cinereus* | **LD, SA, SC, SK, SP, PI** |
| Kit fox | *Vulpes macrotis* | |
| New Mexico meadow jumping mouse | *Zapus hudsonicus luteus* | |
| North American wolverine | *Gulo gulo luscus* | **LD, SA, SC, SK, SP, PI** |
| Pygmy shrew | *Sorex hoyi* | **LD, SA, SC** |
| River otter | *Lontra canadensis* | **LD, SA, SC** |
| Rocky Mt. bighorn sheep | *Ovis canadensis canadensis* | **LD, SA, SC, SK, SP, PI** |
| Spotted bat | *Euderma maculatum* | |
| Swift fox | *Vulpes velox* | |
| Townsend's big-eared bat | *Corynorhinus townsendii* | **LD, SA, SC, SK, SP, PI** |
| Water vole | *Microtus richardsoni* | |
| White-tailed prairie dog | *Cynomys leucurus* | |
| Wyoming pocket gopher | *Thomomys clusius* | |

### 2.3.1 R2 SENSITIVE SPECIES NOT EXPECTED ON THE FOREST

The following R2 sensitive species will **not** be considered in further detail in BE/BAs for management action on the PSI or adjacent lands because potential habitat for the species is not present, it is outside the species' elevation or distributional range, or management actions on the PSI will not impact them.

## PLANTS EXCLUDED

### Absaroka Range beardtongue (*Penstemon absarokensis*)

Absaroka Range beardtongue is endemic to the Absaroka Range of northwestern Wyoming. It grows on volcanic scree derived from parent material of the Wapiti Formation and Quaternary landslide deposits (Beatty et al. 2003). No appropriate geological formations exist on the Forest and the species is not known from Colorado.

### American cranberrybush (*Viburnum opulus* var. *americanum*)

American cranberry bush ranges across southern Canada and the northern U.S., reaching its southernmost Rocky Mountain distribution in Wyoming where it is ranked S1 or critically imperiled (NatureServe 2011). Both of these sources also show the plant in New Mexico but Nelleson (2006b) demonstrates that New Mexico records arise from horticultural plantings in the state and that the range of the plant does not naturally include New Mexico. The species is generally found in moist soils near a reliable water source (Nelleson 2006b). The species is not known from Colorado which is likely south of its natural distribution.

### Arizona willow (*Salix arizonica*)

Arizona willow is a shrub documented in New Mexico, eastern Arizona, southern Utah, and southern Colorado (Conejos County). The known range of the species and habitat characteristics make it unlikely that this species would occur on the PSI. The limited amount of potential habitat has been reviewed over several years, and no individuals of Arizona willow have been found.

### Aztec milkvetch (*Astragalus proximus*)

Aztec milkvetch is a local endemic known from the San Juan Basin of southwestern Colorado and northwestern New Mexico. Although *Astragalus proximus* is not a strict substrate specialist, it favors substrates of "*late Cretaceous to early Tertiary origin and it is primarily found on sites underlain by the San Jose Formation, Nacimiento Formation, Pictured Cliffs Sandstone-Lewis Shale, and Animas Formation*" (Decker 2005). These substrates are not found on the Forest and the known sites are all west of the San Juan Mountains.

### Baltic sphagnum (*Sphagnum balticum*)

Baltic sphagnum is a moss found in iron-rich fens. Habitat on the PSI is extremely limited. Incidental surveys have been done in some of these iron fens, and no populations of Baltic sphagnum have been found. Activities on the PSI are not likely to impact this habitat.

### Barratt's willow (*Salix barrattiana*)

Barratt's willow occurs in Alaska and western Canada with three disjunct populations in Montana and Wyoming (Ladyman 2005b). The species has never been documented in Colorado, and given that only three populations are known from the lower 48 states, it is unlikely that any populations exist in Colorado.

### Barr's milkvetch (*Astragalus barrii*)

Barr's milkvetch is known from South Dakota, southeast Montana, eastern Wyoming, and northwestern Nebraska. The species typically inhabits grassland, sagebrush-grassland, or saltbush

grassland on dry badlands and prairie breaks at elevations ranging from 900-5,700 ft (Ladyman 2006a). The species is unlikely to be found on the Forest due to the distance from known occurrences and the known elevation range which is below those found on the Forest.

### Bloodroot (*Sanguinaria canadensis*)

Bloodroot is a species of deciduous forests in the eastern U.S., reaching North Dakota to Texas in the west. Although some eastern relicts have been found on the San Carlos Ranger District, bloodroot has not been found on the Forest. In the Black Hills (the only known occurrences in Region 2), bloodroot is found in rich hardwood forests (Hornbeck et al. 2003). The Forest is outside the known range of the species.

### Brandegee's buckwheat (*Eriogonum brandegeei*)

Brandegee's buckwheat grows in association with open sagebrush or piñon-juniper stands on white to grayish limestone-shale soils of the Dry Union and Morrison formations at elevations ranging from 5,700 to 7,600 ft. These formations do not appear on the PSI, so this species is not likely to occur on the Forest, and activities are not likely to impact nearby sites. Brandegee's buckwheat is endemic to Chaffee, El Paso, Fremont, and Park counties of Colorado.

### Cary's beardtongue (*Penstemon caryi*)

Cary's beardtongue is a local endemic known only from the Bighorn and Pryor Mountains of northern Wyoming and adjacent southern Montana (Heidel and Handley 2004b). The Forest is outside the known range of the species.

### Cathedral Bluff meadow-rue (*Thalictrum heliophilum*)

Cathedral Bluff meadow-rue is an endemic of western Colorado known from Rio Blanco, Garfield, and Mesa counties. It inhabits steep talus slopes of the Green River Formation (Spackman et al. 1997). The species is unlikely to be disjunct by hundreds of miles over the Continental Divide, and appropriate habitat is lacking on the Forest. Thus, the species is not expected here. There are no appropriate geologic formations on the Forest where this species would be expected to occur.

### Club spikemoss (*Selaginella selaginoides*)

Club spikemoss is a perennial, mat-forming herb of the little spikemoss family (Selaginellaceae) that grows in marshy areas and wet spruce forests and produces spores during July and August. Wetland indicator status for this species has been rated as obligate wetland in the mountains (NatureServe 2011). Club spikemoss is found in Alaska, Canada, and several eastern states, Idaho, Montana, Nevada, and Wyoming, with a report from Colorado. This report comes from the east side of the Park Range in eastern Park County, but it has been determined that this is based on erroneous information (Heidel and Handley 2006). As a result, the nearest known locations are in northwestern Wyoming. The Forest is outside the known range of the species.

### Common twinpod (*Physaria didymocarpa* var. *lanata*)

Common twinpod is a local endemic known from Bighorn Range and Powder River Basin of northern Wyoming and adjacent Montana (Heidel and Handley 2004c). The Forest is outside the known range of the species.

### Cushion bladderpod (*Physaria pulvinata*)
Cushion bladderpod is known to occur only in San Miguel and Dolores counties in western Colorado. It is a habitat specialist on a specific shale formation in that area (NatureServe 2011). It is not expected to occur on the Forest.

### Cushion Townsend daisy (*Townsendia condensata* var. *anomala*)
Cushion Townsend daisy is a local endemic known only from the northern part of the Absaroka Mountains in northwestern Wyoming (Marriott and Lyman 2006). The Forest is outside the known range of the species.

### Dropleaf buckwheat (*Eriogonum exilifolium*)
Dropleaf buckwheat is known only from Wyoming and Colorado. In Colorado, the plant has been found in North and Middle Parks of Jackson and Grand counties at elevations ranging from 7,500-9,000 ft. The Forest is outside the known range of the species.

### Elliptic spikerush (*Eleocharis elliptica*)
The taxonomy and distribution of elliptic spikerush is not well understood. However, neither the USDA Plants database (NatureServe 2011) nor the most recent taxonomic treatment (Smith et al. 2002) includes Colorado in the distribution of *E. elliptica*. Reports of *E. elliptica* from Colorado (Nellessen 2006a) are for *E. elliptica* var. *compressa*, a taxon not recognized by the latest taxonomic treatment. This species is not expected on the Forest.

### English sundew (*Drosera anglica*)
English sundew is known from Alaska, Canada, the Pacific Northwest, California, and Wyoming. It was discovered in 2006 in the San Juan Mountains of Colorado in an acidic fen (Wolf et al. 2006); however, it is not expected on the Forest.

### Foxtail sedge (*Carex alopecoidea*)
In Region 2, foxtail sedge is known from wetlands in western North Dakota and eastern Wyoming (Moore et al. 2006a). The Forest is outside the known range of the species.

### Fremont's bladderpod (*Lesquerella fremontii*)
Fremont's bladderpod is a local endemic known only from Fremont County, Wyoming (Heidel and Handley 2004a). The Forest is outside the known range of the species.

### Giant helleborine (*Epipactis gigantea*)
Giant helleborine is found in warm-water seeps and springs, at elevations ranging from 4,800 to 8,000 ft. It ranges from British Columbia south to California, Texas, and Mexico. In Colorado, it is found mostly in the far western portion of the state, but a few populations are located on the east slope in Chaffee, Las Animas, and Saguache counties. Populations occur near Poncha Springs, but similar conditions are not present on the Forest. Forest projects are not likely to impact this species or its habitat on or near the Forest. It has also been found near the Comanche National Grassland in the Purgatoire River Canyon.

### Groundcedar (*Lycopodium complanatum*)
Groundcedar is found in Alaska, Canada, and the northern tier of American states. It reaches its southernmost Rocky Mountain distribution in Wyoming. The Forest is outside the known range of the species.

### Hall's bulrush (*Schoenoplectus hallii*)

Hall's bulrush is a wetland species known from the eastern and Midwestern U.S. It reaches its westernmost American distribution in Nebraska, Oklahoma, and Kansas. The Forest is outside the known range of the species.

### Harrington's beardtongue (*Penstemon harringtonii*)
Harrington's beardtongue is a local endemic known from a roughly 80 by 50 mile swath in Eagle, Garfield, Grand, Pitkin, Routt, and Summit counties of northwestern Colorado (Spackman-Panjabi and Anderson 2006). The species has not been documented outside of this narrow distribution and thus is not expected on the Forest.

### Iowa moonwort (*Botrychium campestre*)
Iowa moonwort grows on dry, gravelly hillsides at elevations ranging from 3,700-10,800 ft. The plant is found across the northern tier of states with Colorado representing the southernmost extension of its range. It is known from Yuma County at 3,700 ft on the eastern plains. Reports of the species in the central mountains are based on individuals of other species. The Forest is outside the known range of the species.

### Laramie columbine (*Aquilegia laramiensis*)
Laramie columbine is a narrow endemic known only from the Medicine Bow Mountains of southeastern Wyoming (Marriott and Pokorny 2006). The Forest is outside the known range of the species.

### Largeflower goldenweed (*Pyrrocoma carthamoides* var. *subsquarrosa*)
Largeflower goldenweed is endemic to the foothills of the Absaroka Mountains of Wyoming, and the Beartooth and Pryor mountains of Montana (Beatty et al. 2004b). The Forest is outside the known range of the species.

### Largeflower triteleia (*Triteleia grandiflora*)
Largeflower triteleia is known from British Columbia, the Pacific Northwest, California, Wyoming, Utah, and Colorado. In Colorado, it is known from a single collection in the far southwestern portion of the state (Montezuma County). The plant is unranked in Utah (suggesting it is more common there), while it is ranked S1 in Colorado (NatureServe 2011). It is unlikely that a disjunct population would be found over the Continental Divide. This species is not expected on the Forest.

### Lesser bladderwort (*Utricularia minor*)
Lesser bladderwort is an aquatic but may become stranded as water levels fall in summer and fall. The plants are insectivorous with bladders acting as tiny insect traps. The species is found in Alaska, Canada, across the northern U.S., and south to California along the Pacific Coast and to Colorado in the Rocky Mountains. In Colorado, the species is known from shallow water in

subalpine ponds at 5,500-9,000 ft. in the Boulder area. Although habitat may be present on the PSI, vegetation surveys have not found populations of this species.

### Lesser round-leaved orchid (*Platanthera orbiculata*)

Lesser round-leaved orchid is known from the eastern U.S., upper Midwest, Pacific Northwest, Canada, and Alaska. It reaches its southernmost Rocky Mountain distribution in Wyoming. It has never been documented from Colorado and is not expected to occur in the southern portion of the state. The Forest is outside the known range of the species.

### Lone Mesa snakeweed (*Gutierrezia elegans*)

Lone Mesa snakeweed is a recently described species known only from the western part of the San Juan Mountains. Its occurrence on the Forest is extremely unlikely.

### Many-stemmed goldenweed (*Pyrrocoma integrifolia*)

Ladyman (2006c) states "*Pyrrocoma integrifolia (many-stemmed goldenweed) is a regional endemic restricted to southwestern Montana, east-central Idaho, and northwestern Wyoming.*" Thus, it is not expected in south-central Colorado. The Forest is outside the known range of the species.

### Missouri milkvetch (*Astragalus missouriensis* var. *humistratus*)

Decker (2006a) states "*Astragalus missouriensis* var. *humistratus* (Missouri milkvetch) is a local endemic plant whose global distribution is limited to the upper basin of the San Juan River in southwestern Colorado and northwestern New Mexico." It is unlikely that a local endemic would be disjunct over the crest of the Continental Divide. This species is not expected on the Forest.

### Mountain lady's slipper (*Cypripedium montanum*)

Mountain lady's slipper is known from Alaska, Canada, the Pacific Northwest, California, and Wyoming. It reaches its southernmost Rocky Mountain distribution in Wyoming and has not been documented in Colorado. The Forest is outside the known range of the species, thus, it is not expected.

### Mountain tansymustard (*Descurainia torulosa*)

Mountain tansymustard is a Wyoming endemic never documented from Colorado. It is unlikely to be disjunct by hundreds of miles in southern Colorado. The Forest is outside the known range of the species.

### Pagosa Springs bladderpod (*Lesquerella pruinosa*)

Pagosa Springs bladderpod is endemic to southwestern Colorado (Archuleta and Hinsdale counties) and adjacent New Mexico. It is a substrate specialist mostly found on outcrops of Mancos shale near Pagosa Springs, Colorado (Anderson 2006b). The species is not expected on the Forest due to the lack of appropriate substrates. The Forest is outside the known range of the species.

### Peculiar moonwort (*Botrychium paradoxum*)

Peculiar moonwort ranges from British Columbia to Saskatchewan south to Utah and Montana (Flora of North America Editorial Committee 1993+). It has recently been found on the Bighorn

National Forest in Wyoming, and on the west slope of Colorado. The Forest is outside the known range of the species.

### Prairie dodder (*Cuscuta plattensis*)

Prairie dodder is known to occur in Washington and Wyoming. It is likely to be more common and widespread than records indicate. It appears to be most common in gardens and in agricultural lands. The Forest is outside the known range of the species.

### Ripley's milkvetch (*Astragalus ripleyi*)

This milkvetch is a perennial herb of the bean family (Fabaceae). Flowering occurs from June into July, with fruit remaining on the plant through October (Ladyman 2003). The known distribution includes Taos and Rio Arriba counties of New Mexico and Conejos County in Colorado. The species inhabits a variety of habitat types, including ponderosa pine/Arizona fescue, piñon-juniper, edges of mixed conifer forest, pine-Gambel oak, and rabbitbrush and occurs exclusively on volcanic-derived soils (Ladyman 2003). The currently known or expected range of this species does not include the Forest.

### Roundleaf orchid (*Amerorchis rotundifolia*)

In Region 2, roundleaf orchid is known only from two occurrences in Wyoming (Handley and Heidel 2005). The Forest is outside the known range of the species.

### Roundleaf sundew (*Drosera rotundifolia*)

Roundleaf sundews are widely distributed in North America, ranging from Alaska and Canada to the Pacific Northwest and California. It is also known from the upper Midwest and most of the eastern states. The Colorado populations in Gunnison and Jackson counties are disjunct. The Forest is outside the known range of the species.

### Sandhill goosefoot (*Chenopodium cycloides*)

Ladyman (2006e) states that *Chenopodium cycloides* is an annual plant species endemic to sandy soils of eastern Colorado, western Nebraska, western Kansas, eastern New Mexico, and western Texas. It has been observed at elevations between 3,845 and 5,699 ft in Colorado, between 1,040 and 3,491 ft in Kansas, and between 2,549 and 4,902 ft in Texas. No particular aspect characterizes its habitat, probably because it generally grows on gentle slopes, ranging from 0 to approximately 5% inclination. *C. cycloides* may grow on steeper slopes in dune environments, but no details of the steepest incline that it can colonize are available. It occurs in sandy soils, frequently but not exclusively around the vegetated edges of blowouts on sand dunes (Freeman 1989, Clemants and Mosyakin 2003 *in* Ladyman 2006d). The Forest is outside the known range of this species.

### Scarlet gilia (*Ipomopsis aggregata* ssp. *weberi*)

Scarlet gilia is a narrow endemic known from the Park Range in Colorado (Grand and Routt counties) and the Sierra Madre Range in Wyoming (Ladyman 2004b). The Forest is outside the known range of the species.

### Shoshone carrot (*Shoshonea pulvinata*)
Shoshone carrot is a calciphilous (calcium or limestone-loving) species known from southern Montana and northwestern Montana (Ladyman 2005c). It is unlikely to be disjunct by hundreds of miles in southern Colorado. The Forest is outside the known range of the species.

### Stonecrop gilia (*Aliciella sedifolia*)
Stonecrop gilia is known from only two locations on the San Juan National Forest. It has been found only on talus slopes composed of ash-flow tuff (Anderson 2004a). No such habitat exists on the Forest. The Forest is outside the known range of the species.

### Tranquil goldenweed (*Pyrrocoma clementis* var. *villosa*)
Tranquil goldenweed is a Wyoming endemic never documented from Colorado. It is unlikely to be disjunct by hundreds of miles in southern Colorado. The Forest is outside the known range of the species.

### West silver bladderpod (*Physaria scrotiformis*)
West silver bladderpod is a recently described species occurring in the western San Juan Mountains. Its occurrence on the Forest is extremely unlikely.

### Winding mariposa lily (*Calochortus flexuosus*)
Winding mariposa lily inhabits desert flats, dry slopes, and plains. In Colorado, it is known only from Montezuma, Dolores, San Miguel, and Montrose counties where it reaches its easternmost distribution (Panjabi and Anderson 2006). It is unlikely to be disjunct over the Continental Divide. The Forest is outside the known range of the species.

### Visher's buckwheat (*Eriogonum visheri*)
Visher's buckwheat is known from Montana, North Dakota, and South Dakota. It has never been documented from Colorado and it is unlikely to be disjunct by hundreds of miles in southern Colorado. The Forest is outside the known range of the species.

### Yellow widelip orchid (*Liparis loeselii*)
The core range of yellow widelip orchid is the northeastern U.S. and upper Midwest with disjunct populations scattered in the southeastern U.S., Pacific Northwest, and western Canada. Although potential habitat exists on the Forest, the species is not known from Colorado (NatureServe 2011, Magrath 2003). The nearest known location is central Nebraska and there are historic records in Kansas where it is presumed extinct (NatureServe 2011). The Forest is outside the known range of the species.

## INVERTEBRATES EXCLUDED

### Cooper's Rocky Mountain snail (*Oreohelix strigosa cooperi*)
Cooper's Rocky Mountain snail is thought to be endemic to the Black Hills in Wyoming and South Dakota (NatureServe 2011). There are no known or expected populations on the Forest and it is outside of the known distributional range for this species.

### Nokomis fritillary (*Speyeria nokomis nokomis*)

Nokomis fritillary butterfly is known to occur in southwestern Colorado and adjacent states in the Four Corners Region. They are found in streamside meadows and open seepage areas with an abundance of violets in generally desert landscapes. Colonies are often isolated in riparian wetland areas. There are no known or expected populations on the Forest and it is outside of the known distributional range for this species.

### Ottoe skipper (*Hesperia ottoe*)

Ottoe skipper is strictly a species of prairie habitat. They inhabit mid-grass to tall grass undisturbed prairies on the Great Plains (apparently restricted to the drier prairies), and dry fields and prairies, including sand prairies near the Great Lakes (NatureServe 2011). Along the Colorado Front Range, it is found in association with stands of *Andropogon gerardii* in isolated stands along the low foothills. The Forest is outside of the known distributional range for this species and there are no known or expected populations.

### Pygmy mountain snail (*Oreohelix pygmaea*)

This species is known only from Wyoming. Little is known about the distribution, abundance, and habitat associations of this litter-dwelling ground snail. There are no known or expected populations on the Forest and it is outside of the known distributional range for this species.

### Regal fritillary butterfly (*Speyeria idalia*)

Regal fritillary butterfly is associated with mesic prairie environments. The adults of this species emerge mid-June to mid-September in wet meadows and marshlands where they lay their eggs on dead vegetation. The larvae overwinter as hatchlings and are nocturnal feeders of violets in the spring. The regal fritillary butterfly may occur in the following Colorado counties: Douglas, El Paso, and Jefferson; however, there are no known or expected populations on the Forest.

## FISH EXCLUDED

### Bluehead sucker (*Catostomus discobolus*)

Within Colorado, *C. discobolus* is found in most major tributaries of the Upper Colorado River Basin (Ptacek et al. 2005). Holden and Stalnaker (1975) found *C. discobolus* to be common to abundant at sample locations in the Yampa, Gunnison, middle to upper Green and Colorado rivers. Bluehead suckers occupy a wide range of fluvial habitats including cold, clear mountain streams to warm, turbid streams. Adults typically are found in moderate to fast flowing water above rubble-rock substrate; young prefer quiet shallow areas near shoreline (NatureServe 2011). Because *C. discobolus* is restricted to the Colorado River basin, it is geographically and topographically isolated from the Arkansas and Platte River Basins and the Forest. The Forest is outside the known range of the species. Therefore, Forest activities will not impact its status.

### Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*)

Historically distributed in streams and rivers of the Colorado River Basin throughout the colder headwaters of the Green and Colorado rivers as far south as the San Juan River; perhaps occupied portions of the lower reaches of large rivers in winter (Young 1995). Currently limited to a few small headwater streams of the Green and upper Colorado rivers in Colorado, Utah, and Wyoming, including the Escalante River drainage in southern Utah. As a result of stocking, occurs also in

several high elevation lakes in the Rocky Mountains; most of these populations are not self-sustaining due to lack of adequate spawning streams (Spahr et al. 1991). Requires cool, clear water and well-vegetated streambanks for cover and bank stability; instream cover in the form of deep pools and boulders and logs also is important; adapted to relatively cold water, thrives at high elevations (Spahr et al. 1991, Young 1995). Most remaining populations are fluvial or resident (Young 1995). Occurs also in lakes (Trappers Lake in Colorado formerly had the largest pure population; now hybridized with rainbow trout) (NatureServe 2011). Adfluvial populations largely have been eliminated, though reestablished lacustrine stocks have been reported in Wyoming and in Rocky Mountain National Park in Colorado (Young 1995). Eggs are laid in clean gravel beds in cool flowing water. They may sometimes spawn in intermittent streams. Spawners may quickly return to mainstem streams after spawning or may remain in tributaries until at least mid-summer. Fry may migrate to a lake or mainstem river in late summer; some fry may winter in tributaries (Young 1995). Because *G. elegans* is restricted to the Colorado River basin, it is geographically and topographically isolated from the Arkansas and Platte River Basins and the Forest. Therefore, Forest activities are not expected to impact its status.

### Finescale dace (*Phoxinus neogaeus*)

The finescale dace has a strong habitat preference for sluggish, spring-fed streams with abundant vegetation and woody debris. They can also be found in small, spring-fed lakes and bogs characterized by a series of beaver ponds filled with a constant supply of ground water (Stasiak and Cunningham 2006). A critical component of their habitat is the exclusion of large predatory fishes. In Region 2, *P. neogaeus* has only been found in Nebraska, South Dakota and Wyoming. The species is not present in Kansas and only the hybrid *P. neogaeus* X *P. eos* is found in Colorado (Stasiak and Cunningham 2006). Suitable habitat may exist on the Forest, however, and the FS, CPW, FWS as well as other stakeholders conduct intensive annual fish surveys. Thus far *P. neogaeus* has never been documented in or adjacent to FS-managed lands. Therefore, *P. neogaeus* is not expected on the Forest and activities will not impact its status.

### Flannelmouth sucker (*Catostomus latipinnis*)

The flannelmouth sucker is distributed widely in medium to large rivers of the upper Colorado River Basin, which includes the mainstem Colorado River and numerous tributaries that drain a large portion of Colorado (Rees et al. 2005a). The flannelmouth sucker is seldom in small creeks and is absent from water impoundments. Because *C. latipinnis* distribution is restricted to the Colorado River basin, it is geographically isolated from both the Arkansas and Platte River basins and the Forest. Therefore, Forest activities will not impact its status.

### Flathead chub (*Platygobio gracilis*)

The flathead chub is found in the western drainages of the Mississippi River bounded by the Rocky Mountains to the west (Rahel and Thel 2004a). Colorado populations of the flathead chub are restricted to the Arkansas and Rio Grande rivers in the southern part of the state. Flathead chubs historically occurred in the Arkansas River up to Salida, Colorado, but specimens are no longer found upstream of the large water diversion near Florence, Colorado (Woodling 1985). Salida and Florence are near the Forest's administrative boundaries. Because of the close proximity of the Forest to these historic collection sites, suitable habitat on Forest-managed lands may exist. However, extensive sampling of Forest streams occurs annually by the CPW, FWS, FS and other stakeholders in and near the Arkansas River where previous collections occurred. No flathead chub

specimens have been collected from these sampling efforts. Woodling (1985) speculates that *P. gracilis* has likely been extirpated from the Arkansas River due to pollution from mining combined with the large diversion structure at Florence preventing re-colonization, even though water quality has improved. Flathead chub are not expected on the Forest, and Forest activities will not impact its status.

### Hornyhead chub (*Nocomis biguttatus*)

The hornyhead chub is usually found in small to medium sized, warm water streams with abundant aquatic vegetation, but is rarely found in lakes or large rivers (Miller et al. 2005). The distribution of *N. biguttatus* was primarily plains streams and rivers of North America, prior to the Pleistocene glaciation period (Miller et al. 2005). The advance and retreat of glaciers is likely responsible for isolated populations in Region 2, specifically the Platte River in Colorado. However, Propst and Carlson (1986) conducted a survey of the Platte River basin in Colorado from 1978-1980 and concluded that hornyhead chub had been extirpated from that riverine system. Therefore, horneyhead chub are not expected to occur in streams or rivers on the Forest, and its activities will not impact its status.

### Lake chub (*Couesius plumbeus*)

In Canada and the Great Lakes, the lake chub prefer the clear waters and gravel bottoms of glacial scour lakes and tributary rivers that feed into them (Stasiak 2006a). In the Great Plains, habitat preference is markedly different (Bestgen et al. 1991). There, populations are often confined to small first order streams and cool spring seeps. In the Region 2, the southernmost limits of *C. plumbeus* are approximately 40° N Latitude and roughly the northern one-third portion of Colorado. Within Colorado, the species was historically limited to Platte River drainage. Woodling (1985) listed the species as extirpated in Colorado. However, Bestgen et al. (1991) rediscovered a single specimen in a tributary of the Platte River. Lake chub are not expected to occur in streams or rivers on the Forest, and Forest activities will not impact its status.

### Mountain sucker (*Catostomus platyrhynchus*)

Mountain sucker primarily occur in lotic waters, from small montane streams to large rivers (Belica and Nibbelink (2006). Mountain sucker have also been found in lentic habitats including lakes and reservoirs. In Region 2, mountain sucker are most common in low gradient stream reaches in meadows (K. Foster, USFS Fisheries Biologist pers. comm. 2006). Among the five states in Region 2, the distribution of mountain sucker is most widespread in Wyoming where it is considered common in all drainages west of the Continental Divide. In Colorado, mountain sucker populations are found in the northwestern part of the state. On the Forest, mountain sucker have not been documented and are not expected to occur based on intensive fish sampling efforts conducted by the CPW, FS, FWS and other stakeholders. Therefore, Forest activities are not expected to impact its status.

### Northern redbelly dace (*Phoxinus eos*)

The northern redbelly dace has a strong habitat preference for sluggish, spring-fed streams with abundant aquatic vegetation and woody debris (Stasiak 2006b). Northern red-belly dace are native to the South Platte River Basin. In recent years, only five specimens of the northern red-belly dace have been collected in Colorado. Forest activities will not impact its status.

### Pearl dace (*Margariscus margarita*)

Pearl dace have a strong habitat preference for slow moving, spring fed streams with a sinuous channel, well vegetated undercut banks and a diverse array of pool habitats (Cunningham 2006). In the five Region 2 states, pearl dace are only known from Wyoming, South Dakota and Nebraska including the Platte River system. Intensive fish sampling of streams on the Forest have not documented pearl dace and they also have never been documented in Colorado.

### Plains minnow (*Hybognathus placitus*)

Plains minnows are found in low gradient silt-laden large rivers and streams, with slower water, and side pools of silty streams. They are moderately widespread in streams in the prairies of central North America from Texas into Canada. There have been substantial declines in some areas (Kansas, Nebraska, Missouri, and portions of Oklahoma) in abundance and distribution; declining in the southern half of range and apparently stable in the northern portions of range (NatureServe 2011). There is no habitat present on the Forest, and plains minnow is not expected to occur on or adjacent to the Forest. Therefore, Forest activities will not impact its status.

### Rio Grande chub (*Gila pandora*)

This species is most common in flowing shallow pools of headwaters, creeks, and small rivers, often near inflow of riffles and in association with cover such as undercut banks and plant debris. They are also found in impoundments, and frequently associated with aquatic vegetation. Their historic and current distribution is limited to the Rio Grande Basin of southern Colorado and New Mexico (NatureServe 2011). The Rio Grande Basin is geographically and topographically isolated from the Arkansas and Platte River Basins and the Forest. Therefore, Forest activities will not impact its status.

### Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*)

Prior to the arrival of Europeans in the American West, Rio Grande cutthroat trout likely occupied a variety of fluvial habitats ranging from first-order streams to the Rio Grande mainstem (Pritchard and Cowley 2006). Today however, the presence of non-native trout has excluded *O. clarki virginalis* from most suitable habitat, restricting them to small, high elevation streams (Behnke 1992). Rio Grande cutthroat trout are known to be native to the Rio Grande and Pecos River drainages of northern New Mexico and southern Colorado. Because there are no hydrologic connections between the Rio Grande and Pecos River drainages and the Arkansas and Platte River Basins, Rio Grande cutthroat trout are not expected on the Forest. Therefore, Forest activities will not impact its status.

### Rio Grande sucker (*Catostomus plebeius*)

Little information is available regarding the habitat requirements of *C. plebeius*. While some habitat associations have been reported, there is a great need to study seasonal and life-history habitat requirements (Rees and Miller 2005c). The Rio Grande sucker is endemic to the Rio Grande Basin in Colorado and New Mexico. Historically it was common throughout the Rio Grande and associated tributaries. Because there is no hydrologic connection between the Rio Grande Basin and the Arkansas and Platte River Basins, Rio Grande sucker is not expected on the Forest. Therefore, Forest activities will not impact its status.

### Roundtail chub (*Gila robusta*)

Roundtail chub evolved in the Colorado River Basin (Rees et al. 2005b). Most reaches of this system transport heavy sediment loads from high annual peak flows, contrasted with low base flows. Little is known about the specific influence of these annual events, but healthy roundtail chub populations have persisted in habitats with a wide range annual flows, sediment transport, and even sediment deposition, providing that these events are associated with a natural flow regime (Rees et al. 2005b). The roundtail chub is endemic to the Colorado River Basin in Colorado and Wyoming. Historically, *G. robusta* was known to commonly occur in medium to large tributaries of the Upper Colorado River Basin (Holden and Stalnaker 1975). The Colorado River Basin is geographically and topographically isolated from the Arkansas and Platte River Basins and, therefore, roundtail chub are not expected on the Forest. Therefore, Forest activities are not expected to impact its status.

### Southern redbelly dace (*Phoxinus erythrogaster*)

Southern redbelly dace have a strong preference for sluggish headwaters and spring fed upland creeks with vegetation (primarily watercress) and woody debris (Cross 1967). They also prefer clear water with a substrate of sand or gravel (Stasiak 2007). The southern redbelly dace is widely distributed throughout the Mississippi, Ohio and Missouri River drainages in the U.S.. In Region 2, *P. erythrogaster* is restricted to small, scattered populations in headwater tributaries of the Missouri River in South Dakota, Kansas and Colorado. In Colorado, populations occur in the headwaters of the Arkansas River near Pueblo and Caňon City. Caňon City is located in south-central Colorado approximately 30 miles west of Pueblo, adjacent to the San Carlos Ranger District. Stream habitat in and near Caňon City is more similar to prairie stream habitats of the central U.S. (low gradient, sandy bottoms and aquatic vegetation) rather than the high gradient, high elevation, cold-water mountainous streams of the Forest. Because of the contrast in habitat types between streams in the Caňon City area and adjacent streams on the National Forest, and the lack of suitable habitat on the Forest, we do not expect *P. erythrogaster* to occupy streams on the Forest. Also, the FS conducts intensive annual fish surveys on the Forest, along with CPW, FWS and other stakeholders; and *P. erythrogaster* has never been documented to occur on the PSI.

### Sturgeon chub (*Macrhybopsis gelida*)

Sturgeon chub prefer large, turbid rivers of the Great Plains region of the U.S. (Rahel and Thel 2004b). Sturgeon chub are most abundant in main channel or in association with sand or gravel bars; but are seldom found in backwater areas (Rahel and Thel 2004b). Sturgeon chubs occur in the mainstem of the Yellowstone, Missouri and Mississippi rivers in the central portion of the U.S., primarily in Montana, Wyoming, North Dakota, South Dakota, Nebraska, Iowa, Kansas, Illinois, Kentucky, and Missouri. Sturgeon chubs have never been documented in Colorado and are, therefore, not expected to occur on the Forest. Therefore, Forest activities are not expected to impact its status.

### Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*)

Yellowstone cutthroat trout occupy a wide range of fluvial habitats including rivers, creeks, beaver ponds and large lakes. Optimum water temperature for *O. clarki bouvieri* is generally between 4.5-15.5$^{o}$ C, but tolerance of much warmer temperatures probably occurred historically in larger rivers (now mostly extirpated), and warm-water populations occur currently in some geothermally heated streams, though the fishes there may rely on thermal refugia (Gresswell 1995). Yellowstone

cutthroat trout are primarily restricted to the upper Yellowstone River and upper Snake River drainages in Montana, Wyoming, and Idaho (NatureServe 2011). Because of this, they are geographically and topographically isolated from the Arkansas and Platte River basins and the Forest. Therefore, Forest activities are not expected to impact its status.

## AMPHIBIANS AND REPTILES EXCLUDED

### Black Hills red-bellied (*Storeria occipitomaculata pahasapae*)

The known distribution of this species is limited to the Black Hills region of South Dakota and Wyoming (NatureServe 2011). Red-bellied snakes are animals of moist, forested habitats, although some have been taken in moist grassland habitats. There is no habitat present, and use is not expected on or adjacent to the Forest. The Forest is well outside the known range of this species.

### Columbia spotted frog (*Lithobates luteiventris*)

Breeds usually in shallow water in ponds or other quiet waters in the Northern Rockies and Pacific Northwest (Alaska, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming) (NatureServe 2011). Suitable habitat includes riparian/riverine corridors, wetlands, and wetland/upland mosaics in which wetland patches are separated by less than 1 km of upland habitat; it also includes any upland habitat regularly used for feeding or wintering (e.g., mesic forest for wood frogs). This species is considered highly aquatic, thus rarely found far from permanent quiet water. These habitats usually occur at the margins of streams, lakes, ponds, springs, and marshes (NatureServe 2011). The Forest is well outside the known range of the species. There is no habitat present, and use is not expected on or adjacent to the Forest.

### Desert massasauga rattlesnake (*Sistrurus catenatus edwardii*)

This is also a federal candidate species. See the discussion above.

### Wood frog (*Lithobates sylvatica*)

This frog inhabits various forest and woodland habitats including edges of ponds and streams, willow thickets, and grassland, willow, and aspen communities. Suitable habitat includes riparian and riverine corridors, wetlands, and wetland/upland mosaics in which wetland patches are separated by less than 0.6 mi of upland habitat; it also includes any upland habitat regularly used for feeding or wintering. This species ranges in the eastern U.S into Canada. The Forest is well outside the known range of this species.

## BIRDS EXCLUDED

### American bittern (*Botaurus lentiginosus*)

This species is a summer resident on the eastern plains of Colorado and in mountain parks. It inhabits larger (≥7½ ac) cattail marshes or wetlands with tall emergent vegetation and occasionally ventures into adjacent wet meadows, "*rarely breeding on wetlands smaller than 3 hectares*" (Wiggins 2006). This elusive bird is most active at dusk and night. The bittern is known to occur on the Great Plains, including the Lower Arkansas River drainage provides a portion of the primary range in Colorado. Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Black tern (*Chlidonias niger*)

A spring migrant on the eastern plains and mountain parks in Colorado, the black tern is associated with aquatic habitats that have emergent vegetation, such as cattail marshes, with adjacent large open water in every county except Teller. It resides in Otero, Pueblo, and Park counties and the southeast portion of Fremont County in the summer where it usually nests in small colonies on floating vegetation. The R2 species assessment prepared for this bird (Naugle 2004) shows that the most recent Colorado breeding records are from the late 19$^{th}$ century, which was extirpated from the San Juan Mountains over 100 years ago. The tern is known to occur in the San Luis Valley and incidentally along the Arkansas River, but not on Forest-managed lands. Suitable habitat is not present, and use is not expected on or adjacent to the Forest. The Forest is outside the known range of the species

### Black-backed woodpecker (*Picoides arcticus*)

This species is associated with boreal and montane coniferous forests, especially in areas with standing dead trees such as burns, bogs, and windfalls; less frequently in mixed forest and rarely in winter in deciduous woodland (AOU 1983). Distribution is closely associated with closed boreal forests and montane coniferous forests. The southern limits are Wyoming, South Dakota, and Idaho in the Rocky Mountain region. They are extremely restricted in its use of habitat types and are strongly associated with recently burned forests (Raphael and White 1984). The Forest is outside of their distributional range; therefore, use is not expected on or adjacent to the Forest.

### Cassin's sparrow (*Peucaea cassinii*)

This sparrow inhabits various open, arid grasslands and shortgrass prairies. Breeds primarily in rabbitbrush and sandsage grasslands; avoids both pure grasslands that lack shrubs and shrublands that lack grass (Faanes et al. 1979 *in* Andrew and Righter 1992). A common summer resident on the eastern plains (Andrew and Righter 1992), these birds stay well east of the mountains at elevations under 5,200 ft (Kingery 1998). Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Chestnut-collared longspur (*Calcarius ornatus*)

In Colorado, these birds were only located in plains grasslands well east of the mountains (Kingery 1998). Breeding evidence was only documented in 1% (14) of 1,745 priority blocks surveyed—all occurring in the northeastern part of Colorado (Kingery 1998). They breed in local patches of slightly tall shortgrass prairie and introduced grasses (Andrew and Righter 1992). This species is fairly common on eastern and northeastern plains, but is rare west to base of foothills and accidental in mountains (Andrew and Righter 1992). Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Columbia sharp-tailed grouse (*Tympanuchus phasianellus columbianus*)

This species is limited to western Colorado, northeastern Utah, western Wyoming, extreme western Montana, northern Nevada, northwestern California, eastern Oregon, eastern Washington, Idaho, and southeastern British Columbia (Spomer 1987). They are found in native bunchgrass and shrub-steppe communities. In western Idaho, they prefer big sagebrush habitats with moderate vegetative cover, high plant species diversity, and high structural diversity; in general selected vegetative communities that were least modified by livestock grazing (Saab and Marks 1992). Suitable habitat is not present, and use is not expected on or adjacent to the Forest.

### Grasshopper sparrow (*Ammodramus savannarum*)

In Colorado, grasshopper sparrows almost exclusively prefer the prairie grasses or grasslands with rabbitbrush or saltbrush, but avoid extensive shrublands (Kingery 1998, Andrews and Righter 1992). All breeding evidence is well east of the Forest (Kingery 1998), mostly from Morgan and Otero counties eastward (Andrews and Righter 1992). Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Greater prairie-chicken (*Tympanúchus cupido*)

They are restricted to tall grasslands (prairies), occasionally they are found in cultivated lands and formerly in eastern (fire-maintained) grassland and blueberry barrens (AOU 1983). They nest in grasslands and prairies, pastures, and hayfields. Nests are a shallow scrape lined with grasses and other available vegetation (NatureServe 2011). Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Greater sage grouse (*Centrocercus urophasianus*)

Depend totally upon sagebrush-dominated habitats and prefer large contiguous areas of sagebrush on flat or gently rolling terrain. Most of the reports are located in the northwest corner of the state. Historically, they occurred in Lake and Chaffee counties, but were extirpated in the early 1900's (Andrews and Righter 1992). Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Harlequin duck (*Histrionicus histrionicus*)

This duck was once a summer resident and possibly occurred in Park and El Paso counties. A small breeding population historically occurred in the mountains, but apparently became extinct in the 1880's. The harlequin duck breeds along swift, turbulent mountain streams with a high macroinvertebrate food source and dense riparian vegetation. Presently, the harlequin duck breeds on inland mountain streams and winters along the Pacific Coast. Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Lesser prairie-chicken (*Tympanúchus pallidicinctus*)

This bird is an uncommon resident in extreme southeastern Colorado. It occupies sandsage and sandsage-bluestem grassland plant communities. A population of the lesser prairie chicken was transplanted in Pueblo County but naturally occurs in southeastern Colorado, primarily in Baca County and southwestern Kansas, including the Comanche and Cimarron National Grasslands. Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Long-billed curlew (*Numenius americanus*)

This species occurs as a summer resident on the southeastern plains including the Comanche National Grassland. It historically occurred in mountain parks and valleys, including South Park, where it still may occur as a migrant. The curlew is now found primarily in plains grasslands and sometimes in wheat fields or fallow fields and nests close to standing water. Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### McCown's longspur (*Rhynchophanes mccownii*)

In Colorado, McCown's longspurs were only located by surveyors in plains grasslands well east of the mountains (Kingery 1998). Northern Weld County in northeastern Colorado is the center of breeding in the state. McCown's longspurs select the shortgrass and grazed mixed grass prairies of the Great Plains. They are considered rare west to the base of the foothills and accidental in mountains (Andrews and Righter 1992). Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Purple martin (*Progne subis*)

This species is a summer resident of the mountains of western Colorado, but occasionally is found on the east slope and plains. In Colorado, it is known to breed in loose colonies of old growth aspen forests but also inhabits deciduous riparian woodlands, aspen stands, open coniferous forests, burns with snags, woodland edges and urban areas. Nesting occurs in tree cavities or eaves of buildings. There are no known occurances on the Forest and it is outside of the know distribution of this species (Andrews and Righter 1992).

### Sage sparrow (*Amphispiza belli*)

High-country sagebrush and plains sandsage do not make suitable nesting habitat, nor do sagebrush parks of 30 acres or less (Kingery 1998). Sage sparrows do not nest as high as their obligate plant, sagebrush, grows. Most breeding takes place in the northwestern and western part of the state, but also in the lower San Luis Valley. Records in the San Luis Valley show they nest up to 8,400 ft. There are no breeding records on the Forest. Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Short-eared owl (*Asio flammeus*)

It occurs in short-grass grasslands, agricultural areas, and marshes. This species is rarely observed in sagebrush shrubland or piñon-juniper woodland. They are a rare resident in the San Luis Valley and eastern plains and rare migrant and nonbreeding summer resident in other mountain parks. This species may be locally uncommon or fairly common in winter because status in western valleys is poorly known. It is accidental in the mountains outside parks (three records). This species appears to be declining in Colorado, and its distribution is very spotty, especially in the western part of the state. It is on the National Audubon Society Blue List (Tate 1986 *in* CNDIS 2004). The Forest is outside of the known distributional range for this species. Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Trumpeter swan (*Cygnus buccinator*)

They are found in freshwater ponds, lakes, and marshes, having reeds, sedges, or similar emergent vegetation. They occasionally use brackish habitats, wintering on open ponds, lakes and sheltered bays and estuaries (AOU 1983). In the intermountain western U.S., they winter in areas of geothermal activity, springs, and dam outflows (Spahr et al. 1991). Primarily breeds in freshwater, on edges of large inland waters; typically in emergent marsh vegetation, or on a muskrat house, beaver lodge, or island (NatureServe 2011). The Forest is outside of the known distributional range for this species. Use is not expected on or adjacent to lands on the Forest.

## MAMMALS EXCLUDED

### Black-tailed prairie dog (*Cynomys ludovicianus*)

This prairie dog forms larger colonies or "towns" in shortgrass or mixed prairie. They consume large quantities of annual forbs and native grasses. Grasses and sedges are preferred. During late fall, winter, and spring, they frequently dig and eat roots of forbs and grasses. Their habits of clipping vegetation, consuming roots, and moving dirt for crater mounds leads to substantial changes in the vegetation composition found in the colony areas versus areas surrounding the prairie dog town. Black-tailed prairie dogs are diurnal and are active above ground year-round. Above-ground activity periods are bimodal in the warmer months and diminish in wintertime by as much as 45%. Predators include, badgers, coyotes, foxes (*Vulpes* and *Urocyon* spp.), bobcats, black-footed ferrets (*Mustela nigripes*), rattlesnakes (*Crotalus* spp.), red-tailed and ferruginous hawks (*Buteo regalis*), and golden eagles (Fitzgerald et al. 1994). The nearest known colony is 6 miles from the Forest boundary. The Forest lies on the western edge of their distributional range and contains poor black-tailed prairie dog habitat due to the isolated and fragmented nature of its grasslands. For these reasons, it is unlikely that black tailed prairie dogs would occur on the Forest.

### Desert bighorn sheep (*Ovis canadensis nelsoni*)

The desert bighorn sheep is a subspecies of bighorn sheep that occurs in the desert southwest regions of the U.S. and in the northern regions of Mexico. The characteristics and behavior of desert bighorn sheep generally follow those of other bighorn sheep, except for adaptation to the lack of water in the desert: bighorn sheep can go for extended periods of time without drinking water. Populations of the desert bighorn sheep declined drastically with European colonization of the American Southwest beginning in the 16th century. As of 2004, desert bighorn sheep numbers are extremely low, although the overall population trend has increased since 1960. These declines were followed by a period of population stabilization that was ascribed to conservation measures (McCutchen 1995).

Southern desert bighorn sheep are adapted to a desert mountain environment with little or no permanent water. Some of the bighorn may go without visiting water for weeks or months, sustaining their body moisture from food and from rainwater collected in temporary rock pools. They may have the ability to lose up to 30% of their body weight and still survive. After drinking water, they quickly recover from their dehydrated condition. Wildlife ecologists are just beginning to study the importance of this adaptive strategy, which has allowed these small bands to survive in areas too dry for many of their predators (FWS 2002c). The Forest is outside of the known distributional range for this species and use is not expected on or adjacent to the Forest.

### Kit fox (*Vulpes macrotis*)

This species is restricted to the western slope of Colorado, south-central Arizona, western New Mexico, and the Great Basin of the western U.S. They inhabit primarily semi-desert shrub and shrubsteppe habitats throughout its range in Colorado. They appear to prefer scattered short shrubs and sparse herbaceous vegetation (Boyle and Reeder 2005). The Forest is outside of the known distributional range for the kit fox (*ibid*) and use is not expected on or adjacent to the Forest.

### New Mexico meadow jumping mouse (*Zapus hudsonicus luteus*)

This is also a federal candidate species. See the discussion above.

### Spotted bat (*Euderma maculatum*)

This bat occurs in a wide range of habitats most often in rough rocky semi-arid and arid terrain. Vegetation cover in these habitats ranges from ponderosa pine forest to scrub and open desert. Day roosts are often located on high cliffs (Harvey et al. 1999). The spotted bat is Colorado's rarest bat known only to occur in Dinosaur National Monument, though recent reports have come from lower elevations in the Four Corners area (Armstrong et al. 2006). The Forest is well outside the known distribution for this species and it is not expected to occur on Forest-managed lands.

### Swift fox (*Vulpes velox*)

This species occurs in eastern Colorado and is associated with plains grasslands habitat. It inhabits open prairies, plains, and shrubby desert areas away from extensively cultivated land. It is found in areas with gently rolling hills or undulating topography. The decline of the swift fox is related to loss of prairie habitat, prairie dog control, and excessive trapping pressure (Kahn et al. 1997). For more information about this species see the *Swift fox (Vulpes velox): A Technical Conservation Assessment* prepared for the Region 2 Species Conservation Project (Stevens and Anderson 2005). Suitable habitat is not present, and use is not expected on or adjacent to lands on the Forest.

### Water vole (*Microtus richardsoni*)

This species occupies the boreal and alpine zones of major mountain ranges in the northwestern U.S. and southwestern Canada, extending eastward into the mountains of northern and western Wyoming. This species is known to occur on only two National Forests in Region 2, the Shoshone and Bighorn (Klaus and Beauvais 2004). For more information about this species see the *Water Vole (Microtus richardsoni): A Technical Conservation Assessment* prepared for the Region 2 Species Conservation Project (Klaus and Beauvais 2004). The Forest is far outside the known distributional range for the vole.

### White-tailed prairie dog (*Cynomys leucurus*)

This species is associated with intermountain valleys, benches, and plateaus that offer prairie-like topography and vegetation (Knowles 2002). White-tailed prairie dogs are associated with dryer sites compared to mesic plateaus, higher mountain valleys, and lowlands where Gunnison prairie dogs (*C. gunnisoni*) are found. This species' current range is extreme southern Montana, central Wyoming, northwestern Colorado (the West Slope), and northeastern Utah and their distribution is centered in the "*Four-corners Region*". The Forest is outside of the current or expected range of this species.

### Wyoming pocket gopher (*Thomomys clusius*)

This species' known distribution is limited to western Wyoming and eastern Idaho. They are found in grasslands and herbaceous shrublands and chaparral (NatureServe 2011). They burrow in well-drained soils, often-gravelly soils of ridge tops and edges of deeply eroded stream-cut washes. The Forest is outside of the known distributional range for this species. Use is not expected on or adjacent to lands on the Forest.

### 2.3.2 R2 SENSITIVE SPECIES EXPECTED ON THE FOREST (SPECIES THAT ARE CARRIED FORWARD FOR ANALYSIS)

### PLANTS INCLUDED

#### Altai (Whitebristle) cotton-grass (*Eriophorum altaicum* var. *neogaeum*) and Chamisso's cottongrass (*Eriophorum chamissonis*)

Altai cottongrass and Chamisso's cottongrass are perennial rhizomatous herbs in the sedge family (Cyperaceae). Taxonomic distinctions among this group of sedges are not well defined. The Flora of North America Editorial Committee (1993+) merges *E. altaicum* var. *neogaeum* into *E. chamissonis*. Technical characters show a full range of overlap between these species, as well as *E. scheuchzeri*. All forms in this complex are rare, and may be best treated together until taxonomic issues are better evaluated.

Altai and Chamisso's cottongrass are circumpolar species found in Alaska, Canada, the Pacific Northwest, and upper Midwest. Altai has been recorded twice on the South Park Ranger District (Ladyman 2004a). Another site may be partly on the Leadville Ranger District in Park County. Chamisso's is known from within four miles of the Leadville Ranger District on the White River National Forest. Altai and Chamisso's cottongrass have both been found on sites at elevations of 10,200 to 13,200 ft (Spackman et al. 1997). The known sites for Altai cottongrass are within the Mosquito-Gore Range (McNab et al. 2005). Nearby records are in the San Juan Mountains, and in the Sangre de Cristo. It occurs in an uncommon habitat which may be vulnerable to altered hydrology, peat mining, livestock grazing, and unregulated recreation (Ladyman 2004a, Decker et al. 2006a).

#### Autumn willow (*Salix serissima*)

Autumn willow is a woody shrub of the willow family (Salicaceae) that flowers from May through July with catkins maturing in late July through early September. It is found in montane calcareous marshes and fens (Spackman et al. 1997) at elevations ranging from 7,800 to 10,200 ft. Autumn willow ranges from subarctic Canada south to Colorado, Illinois, and New Jersey. In Colorado, where the species reaches its southernmost distribution, autumn willow is known from Custer, Park, Larimer, and Routt counties. It is apparently secure globally, although it is rare in portions of its range and thus is ranked G4 (NatureServe 2011). In Colorado, the species is disjunct from the greater part of the species range and it is considered critically imperiled (ranked S1, CNHP). It may be threatened by unregulated recreation, hydrologic alterations, and peat mining in its habitat.

#### Bill's neoparrya (*Neoparrya lithophila*)

Bill's neoparrya is a perennial herb in the umbel family (Apiaceae). It flowers from May to early July, and fruits from late June to September. It is found in piñon-juniper woodlands on north-facing ledges, cliffs, and canyons associated with volcanic dikes composed of igneous outcrops or sedimentary rock, and in montane meadows and grasslands (Anderson 2004c). It is found at elevations ranging from 7,000 to 10,000 ft. Bill's neoparrya is endemic to south-central Colorado and is ranked G3 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is ranked S3. The G3S3 ranking indicates that the species is considered vulnerable throughout its range due to its limited distribution. Documented sites for Bill's neoparrya are within the Sangre

de Cristo (McNab et al. 2005). Potential threats to Bill's neoparrya are unregulated recreation, grazing, road maintenance, invasive species, and development (Anderson 2004c).

### Blueberry willow (*Salix myrtillifolia*)

Blueberry willow is a woody shrub of the willow family (Salicaceae) that inhabits calcareous fens at 6,700-10,000 ft from the foothills to alpine. Wetland indicator status for this species has been rated as facultative wetland (FACW+) (NatureServe 2011). It flowers in May and June, and catkins mature from late June to mid-July. The species is common in Alaska and Canada with widely disjunct populations in northwest Wyoming and Park County, Colorado. Although blueberry willow is considered secure globally (ranked G5 by NatureServe 2011), it is critically imperiled in Colorado and ranked S1 by the Colorado Natural Heritage Program. Potential threats to blueberry willow include peat mining and changes in hydrology (Neid et al. 2006). Blueberry willow is of high nutritional value for wildlife and livestock.

### Chamisso's cottongrass (*Eriophorum chamissonis*)

See discussion of Altai cotton-grass and Chamisso's cotton-grass above.

### Clawless draba (*Draba exunguiculata*)

Clawless draba is a perennial herb of the mustard family (Brassicaceae) that flowers from late June into July and produces fruit in early August. It is found in talus and gravelly or sandy slopes at elevations of 11,500 to 14,000 ft (Spackman et al. 1997) on granitic substrates. It is a Colorado endemic known from eight counties in Colorado: Boulder, Clear Creek, El Paso, Gilpin, Grand, Lake, Park, and Summit. Clawless draba is ranked G2 by NatureServe (2011). It is also tracked by the Colorado Natural Heritage Program and is ranked S2. It is a small plant and easily overlooked in its abundant habitat. The documented records of this draba are within the Mosquito-Gore Range (McNab et al. 2005). It tends to occur under rock overhangs. This species may be threatened by unregulated recreation, over-collecting, and mining within its habitat (Ladyman 2004e).

### Colorado tansy-aster (*Machaeranthera coloradoensis*)

Colorado tansy-aster is a perennial herb of the sunflower family (Asteraceae) that flowers from July to mid-August and fruits during August. The species is endemic to Wyoming and Colorado where it inhabits mountain parks, slopes, rocky outcrops, and dry tundra at elevations ranging from 7,600-13,000 ft. In Colorado, known occurrences exist in Chaffee, Gunnison, Hinsdale, La Plata, Lake, Mineral, Park, Pitkin, Saguache, and San Juan counties. A recent taxonomic revision changes the scientific name from *Machaeranthera coloradoensis* to *Xanthisma coloradoense* (Morgan and Hartman 2004). Colorado tansyaster is ranked G2 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is ranked S2. Known sites of Colorado tansyaster are within Mosquito-Gore Range (McNab et al. 2005). Habitat of Colorado tansyaster can be affected by unregulated recreation, mining, road construction, off-highway vehicle (OHV) use, and invasive species (Beatty et al. 2004c).

### Degener's beardtongue (*Penstemon degeneri*)

Degener's beardtongue is a perennial herb in the figwort family (Scrophulariaceae), flowering in June and July, and fruiting in late July. It is found in piñon-juniper woodlands, montane grasslands and mountain meadows on rocky soils with igneous bedrock (Spackman et al. 1997) at elevations ranging from 6,000 to 9,500 ft. Degener's beardtongue is often associated with Parry's oatgrass

(*Danthonia parryi*), prairie sagewort (*Artemisia frigida*), mountain goldenbanner (*Thermopsis montana*), and mountain muhly (*Muhlenbergia montana*). Degener's beardtongue is endemic to central Colorado where it is found in Fremont, Chaffee, and Custer counties. Degener's beardtongue is ranked G2 by NatureServe (2011) and S2 (critically imperiled) by the Colorado Natural Heritage Program due to its limited distribution. Documented sites for Degener's beardtongue are within the Wet Mountains (McNab et al. 2005). Threats to Degener's beardtongue include unregulated motorized recreation, invasive species, road maintenance, and succession. It may need fire to maintain open site conditions. This species' seeds may be long-lived in the seedbank.

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

Northern blackberry is an herbaceous perennial plant in the rose family (Rosaceae). It flowers from late June to early July and sets fruit in late July to August; however, the species seldom sets fruit in Colorado. It is a wetland species found in willow carrs and on mossy streamsides at elevations ranging from 8,600 to 9,700 ft. Wetland indicator status for this species has been rated as OBL (NatureServe 2011). Northern blackberry is circumboreal, ranging south in North America to Oregon, Colorado, Michigan, and Maine. Northern blackberry is ranked G5T5 by NatureServe (2011) indicating that the species and subspecies are secure globally. Populations in this area are at the southern extreme of the species range. The species is tracked by the Colorado Natural Heritage Program and is considered critically imperiled in Colorado with a rank of S1. Populations of dwarf raspberry in this area are at the southern extreme of the species range. It may be threatened by unregulated recreation, livestock grazing, invasive species, and peat mining (Ladyman 2006b).

### Gray's Peak whitlow-grass (*Draba grayana*)

Gray's Peak whitlow-grass is a perennial herb of the mustard family (Brassicaceae) that flowers during July and August and produces fruit from August to September. It is a Colorado endemic found in rocky alpine areas including talus slopes. It has been found in Clear Creek, Gilpin, Grand, Lake, Larimer, Park, and Summit counties at elevations of 11,500-14,000 ft. It is considered imperiled both globally and in Colorado and is ranked G2 by NatureServe (2011). It is also tracked by the Colorado Natural Heritage Program and is ranked S2. The known sites for Gray's draba within the Mosquito-Gore Range, and in the Sangre de Cristo Range (McNab et al. 2005). This plant may be threatened by increasing unregulated recreation in its habitat, over-collecting, mining, and stochastic events (Ladyman 2004d).

### Greenland primrose (*Primula egaliksensis*)

Greenland primrose is a perennial herb of the primrose family (Primulaceae) that inhabits wet meadows, streambanks, willow carrs, and fens. Wetland indicator status for this species has been rated as FACW in the mountains (NatureServe 2011). Flowers are produced in June and July and fruit is set in July and August. The species has an unusual distribution; it is circumboreal and widespread in Alaska and Canada with disjunct populations in Wyoming and Colorado. The Colorado populations are located in Park County at elevations of 9,000-10,000 ft. Greenland primrose is considered secure globally although rare in portions of its range (ranked G4 by NatureServe 2011), but is imperiled in Colorado (ranked S2 by the CNHP). Colorado populations are disjunct from the greater part of the species range and the species occurs in an uncommon habitat. The recorded sites of Greenland primrose are within the Mosquito-Gore Range and South Park (McNab et al. 2005). Greenland primrose occurs in an uncommon habitat which may be

vulnerable to hydrologic alteration, peat mining, livestock grazing, water development, and unregulated recreation. This species appears in the rock-garden trade.

### Ice cold buttercup (*Ranunculus karelinii*)

Ice cold buttercup is a perennial herb of the buttercup family (Ranunculaceae) that inhabits alpine slopes and summits, and is often found amongst rocks and scree at elevations ranging from 12,000-14,100 ft. It flowers during July and fruit is produced during August. Tundra buttercup ranges from Alaska and Canada south to Idaho, Montana, Wyoming, Utah, and Colorado. It reaches its southernmost Rocky Mountain distribution in Colorado. The Colorado county distribution includes Chaffee, Clear Creek, Gunnison, Lake, Park, and Summit counties. The species is globally ranked G4G5 by NatureServe (2011), indicating that the species is secure globally but sometimes rare at the edges of its distribution. In Colorado, the species is ranked S2 (imperiled) by the Colorado Natural Heritage Program due to the few known occurrences. The recorded sites of ice cold buttercup are within the Mosquito-Gore Range and the Sawatch Range (McNab et al. 2005). It may be threatened by unregulated recreation, livestock grazing, and mining (Panjabi and Anderson 2006).

### Kotzebue's grass-of-Parnassus (*Parnassia kotzebuei*)

Kotzebue's grass of Parnassus is a perennial herb that flowers in June and July and usually sets fruit in July and August. Most botanists consider it a member of the saxifrage family (Saxifragaceae), but Dr. Weber (Weber and Wittmann 2001) places it in its own family (Parnassiaceae–the grass of Parnassus family). The species inhabits wet rocky areas, especially along small streams and amongst moss mats in the alpine and subalpine zones. Wetland indicator status for this species has been rated as FACW or obligate (OBL) (NatureServe 2011). The plant is circumboreal, ranging in North America from Alaska and Canada to Washington, Idaho, Montana, Wyoming, Nevada, and Colorado. It reaches its southernmost Rocky Mountain distribution in Colorado where it is found at 10,000-12,000 ft. Known occurrences are found in the north-central and southwestern portions of the state, including Clear Creek, San Juan, Park, and Summit counties. Kotzebue's grass of Parnassus is ranked G5 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is ranked S2. The recorded sites are at the southern edge of the species range, with small populations in vulnerable habitats.

### Lesser panicled sedge (*Carex diandra*)

Lesser panicled sedge is a graminoid of the sedge family (Cyperaceae) that inhabits montane to subalpine willow carrs and rich fens (Weber and Wittmann 2001) and produces flowers and fruit from June to August. Wetland indicator status for this species is OBL (NatureServe 2011). Lesser panicled sedge is circumboreal, ranging across the northern half of the U.S. and reaching its southernmost Rocky Mountain distribution in Colorado. It is known from Boulder, Grand, Jackson, and Larimer counties at elevations ranging from 7,000-9,000 ft. Populations in the state are at the southern extreme of the species range.

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

Lesser yellow lady's-slipper is a perennial herb of the orchid family (Orchidaceae) that inhabits subalpine wetlands (wetland indicator status for the species is rated as FACW by NatureServe 2011) as well as a wide variety of habitats in the lower montane zone including aspen groves and moist ponderosa pine/Douglas-fir forests. It flowers from May to July and fruits from June to

August. The species is widespread in North America, growing in Alaska and Canada as well as most of the northern and eastern states. It reaches its southern Rocky Mountain distribution in Colorado. Although widespread, it is uncommon in most of its range and populations are widely scattered in Colorado where the species is known from ten counties at a narrow elevation range of 7,400-8,500 ft. Lesser yellow lady's-slipper is ranked G5 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is ranked S2. Sites for lesser yellow lady's-slipper are within the Sangre de Cristo Range and Wet Mountains (McNab et al. 2005). It is listed in the CITES Appendix II list, restricting international trade. Threats include over-collecting, livestock grazing, timber harvest operations, fire suppression, unregulated recreation, invasive species, and habitat conversion. Lesser yellow-lady's-slipper may also respond favorably to light disturbances.

### Livid sedge (*Carex livida*)

Livid sedge is a perennial graminoid of the sedge family (Cyperaceae) that flowers from May to July and sets fruit in July and August. It is a calcareous wetland species occurring in rich fens and other mineral-rich wetlands. Its wetland indicator status is OBL (NatureServe 2011). It is found at elevations ranging from 9,000 to 10,100 ft. The species ranges from Alaska and Canada, the Pacific Northwest, Wyoming, and Colorado in the west to the upper Midwestern and northeastern states. Although it is widespread in North America, "*the distribution of Carex livida is very scattered; it is uncommon to rare over much of its range...*" (Ball and Reznicek 2002). Like many of our rare species, it reaches its southern Rocky Mountain distribution in Colorado. In Colorado, it has been found in Boulder, Grand, Jackson and Larimer counties. Similar to other species with this distribution pattern, it is ranked secure globally (ranked G5 by NatureServe 2011) but critically imperiled in Colorado where it is ranked S1 by the Colorado Natural Heritage Program. Livid sedge occurs in a vulnerable habitat (Gage and Cooper 2006). It could be threatened by hydrologic alteration, unregulated recreation, roads and trails, and indirectly by timber harvest (Gage and Cooper 2006).

### Narrow-leaved moonwort (*Botrychium lineare*)

Slender moonwort, including many populations that had been tentatively known as forkleaved moonwort, is found in deep grass and forb meadows and under trees in woods, sagebrush, cirqueland, and other habitats (Beatty et al. 2003). It has been found in stabilized subalpine areas, 20 to 60 years after disturbance. This species is found at elevations ranging from 7,900 to 12,500 ft. Narrow-leaved moonwort ranges from Washington and Montana south to California and Colorado, and there are historic records in QC and NB. This plant is small and easily over-looked, and may not be present every year. Because of the wide variety of habitats this species is known from, its occurrence could be anticipated throughout much of the Forest.

### Narrowleaf peatmoss *(Sphagnum angustifolium)*

Narrowleaf peatmoss is a circumboreal species found in North America south to British Columbia, Colorado, Missouri, and New Jersey (NatureServe 2011). This species is ranked G5 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is ranked S2. Local records are in strongly acidic fens with high concentrations of iron and other ions (Weber 2000). There is a documented occurrence of this species on the South Platte Ranger District, and a historic, 1873, record near Twin Lakes in Lake County. Altered hydrology and peat mining have reduced the numbers and quality of fens. These activities along with unregulated recreation continue to threaten iron fen habitat in Colorado.

### Park milkvetch (*Astragalus leptaleus*)

Park milkvetch is a perennial herb of the bean family (Fabaceae) that grows in moist swales and meadows. It has been found in Idaho, Montana, Wyoming, and Colorado, although the species is more common in Colorado than in the other states (Moseley 1991). In Colorado, this milkvetch is found from South Park to the Wet Mountain Valley in Park, Fremont, and Custer counties at elevations ranging from 7,500-10,000 ft. The species is ranked G4 by NatureServe (2011), indicating that the species is secure globally but rare in parts of its range. It is tracked by the Colorado Natural Heritage Program and is ranked S2, indicating that the species is imperiled in Colorado. Park milkvetch is found within South Park (McNab et al. 2005). Park milkvetch appears to be rare range-wide, and may be over-looked because of its small size among dense vegetation. Threats include competition from non-native invasives, unregulated recreation, and livestock grazing (Ladyman 2006c).

### Plains rough (Hall) fescue (*Festuca hallii*)

Plains rough fescue is a perennial graminoid of the grass family (Poaceae) that inhabits alpine and subalpine grasslands and meadows. It is found in Canada, Washington, Montana, Wyoming, North Dakota and Colorado where it reaches its southernmost Rocky Mountain distribution. The Colorado distribution includes Larimer and Huerfano counties where it is found at 11,000-12,000 ft. Populations in Colorado are outlying from the greater part of the species range and differ morphologically from individuals growing in the core range. The Huerfano County site was previously identified as *Festuca campestris*, but field work performed in 2005-2006 has shown that the site is occupied by *Festuca hallii* rather than *Festuca campestris* (Anderson 2006a). Plains rough fescue may be in a range-wide decline with a low potential for recovery (Anderson 2006a). It may be threatened by over-grazing, exotic encroachment, and habitat disturbances. The species has a global rank of G4 (NatureServe 2011), indicating that it is considered apparently secure globally but rare in portions of its range. Although the Colorado rank is SH (state historical, a rank given to species not seen in the state since 1920), the University of Colorado Museum has a specimens from 1956 and 1978, and several collections made in 2005 and 2006 by Brian Elliott were identified as *Festuca hallii* by specialists in the genus.

### Porter's false needlegrass (*Ptilagrostis porteri*)

Porter's false needlegrass is a perennial graminoid of the grass family (Poaceae) that grows on hummocks located in peat bogs, fens and willow carrs. The distinctive feathery fruit matures from mid-August through early September. The species is endemic to central Colorado where it is found from 9,200-12,000 ft in El Paso, Lake, Park, and Summit counties. Porter feathergrass is ranked G2 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is ranked S2. It was petitioned for listing as a federally threatened or endangered species on March 5, 2002. On February 4, 2005, it was determined that there was not enough information to warrant listing (FWS 2005c). The known locations of Porter's false needlegrass are within Mosquito-Gore Range, and Sawatch Range (McNab et al. 2005). Porter's false needlegrass may be threatened by hydrologic alterations, peat and placer mining, unregulated recreation, and livestock grazing (Johnson 2006).

### Rock cinquefoil (*Potentilla rupincola*)

This cinquefoil is a perennial herb in the rose family (Rosaceae) that flowers from mid-June through August and is found on granitic outcrops or on thin, gravelly granitic soils at elevations of 6,900 to

10,500 ft. Rocky Mountain cinquefoil is endemic to Colorado where it is found in Boulder, Clear Creek, Larimer, and Park counties which is adjacent to the Forest and suitable habitat is present on the Forest. This species may be threatened by hybridization with the closely related *Potentilla effusa* (Anderson 2004b).

### Rocky Mountain alpineparsley *(Oreoxis humilis*)

Rocky Mountain alpineparsley is endemic to the Pike's Peak region of Colorado on the Pike National Forest where it grows on granitic soils in alpine and subalpine zones. The species has been found on Pikes Peak and Windy Point granites (Beatty et al. 2004a).

### Rocky Mountain monkeyflower (*Mimulus gemmiparus*)

Rocky Mountain monkeyflower is an annual herb of the figwort family (Scrophulariaceae) found in granitic seeps, slopes, and alluvium in open sites within spruce-fir and aspen forests at 8,400-11,000 ft. This species is known to occur in seeps occurring in forested vegetative communities. *Mimulus gemmiparus* sometimes flowers in mid-July, but flowering is rare and the flowers are sterile. The species has a unique reproductive strategy; the leaf petioles are modified to contain dormant embryos (the specific epithet *gemmiparus* refers to a gemma, an asexual reproductive mechanism often found in mosses). It is endemic to the mountains of central and northern Colorado where it is found in Grand, Jefferson, Larimer, and Park counties.

### Rydberg's golden columbine (*Aquilegia chrysantha* var. *rydbergii*)

Rydberg's golden columbine is a perennial herb in the buttercup family (Ranunculaceae). It flowers in June and fruits in July and grows along streams or in rocky ravines of the mountains at elevations of 5,200 to 8,500 ft. Wetland indicator status for this species has been rated as facultative (FAC) (NatureServe 2011). It is endemic to Colorado and is known only from El Paso and Fremont counties (Ladyman 2005a). Golden columbine is ranked G4T1Q globally, indicating that it is considered secure globally but that questions exist about the taxonomic status of the subspecies (NatureServe 2011). The distinctiveness of this variety has been questioned in the Flora of North America (Whittemore 1997). It is tracked by the Colorado Natural Heritage Program and is ranked S1. There are potential threats to some populations from recreational uses along roads and trails, and from invasive species.

### Sageleaf willow (*Salix candida*)

Sageleaf willow is a woody shrub of the willow family (Salicaceae) found on pond and stream edges as well as in fens of foothill and montane wetlands. Wetland indicator status for this species has been rated as OBL (NatureServe 2011). It flowers from May to June and fruits in June and July. The species is found in Alaska, Canada, and across the northern tier of American states, reaching its southernmost distribution in Colorado where it is found from 8,800-10,600 ft in Gunnison, Hinsdale, Lake, La Plata, Larimer, and Park counties. Although sageleaf willow is considered secure globally (ranked G5 by NatureServe 2011), it is tracked by the Colorado Natural Heritage Program which considers the species critically imperiled in Colorado and ranks it S1. Colorado sites are near the southern edge of the species range. Known sites for sageleaf willow are within the Mosquito-Gore Range (McNab et al. 2005). Sageleaf willow may be threatened by altered hydrology, livestock grazing, peat mining, unregulated recreation, and invasive species (Decker 2006b).

### Selkirk's violet (*Viola selkirkii*)

Selkirk's violet is a perennial herb in the violet family (Violaceae) that grows in aspen forests, moist woods, and thickets. Selkirk's violet ranges from British Columbia to Greenland and south to Washington and New Mexico. In Colorado, it is found at elevations ranging from 8,500-9,100 ft and flowers during May-June. In Colorado, it is known from only three areas; Rocky Mountain National Park, where it was last seen in 1965, the Rampart Range, where it was rediscovered in 2005, and on the Forest where it was discovered in the Wet Mountains in 2006. Selkirk's violet is ranked as G5 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is ranked S1 due to the limited number of occurrences. The Colorado populations are disjunct from the greater range of the species. The nearest other populations are in the Black Hills of South Dakota.

### Siberian sea thrift (*Armeria maritima* ssp. *sibirica*)

Sea pink is a bunch-forming perennial herb of the thrift family (Limoniaceae), although it has been placed in the leadwort family (Plumbaginaceae) by some taxonomists. It flowers from late June to August. The sub-species inhabits alpine meadows and alpine wetlands, often at the base of talus slopes. Wetland indicator status for this species has been rated as FACU, although not enough information is available for determination in Colorado (NatureServe 2011). Sea pink grows at high elevation with known sites at 11,900-13,000 ft. The plant is found in the Pacific Coast states from Alaska to California. It is disjunct in Colorado where it is found in Park and Summit counties. Ranked secure globally (G5T5) by NatureServe (2011), it is on the edge of its range and considered critically imperiled in Colorado (S1) by the Colorado Natural Heritage Program. The known sites for Siberian sea thrift are within the Mosquito-Gore Range (McNab et al. 2005). There are potential threats to Siberian sea thrift from unregulated motorized recreation and mineral development (McNab et al. 2005).

### Simple bog sedge (*Kobresia simpliciuscula*)

Simple bog sedge is a perennial graminoid of the sedge family (Cyperaceae) that grows in alpine areas including tundra, fens, moist gravel and glacial outwash. It is a wetland species rated as OBL (NatureServe 2011). The species is found in Alaska, Canada, the Pacific Northwest (except Washington), Wyoming, Utah, and Colorado. In Colorado, known occurrences are found in Boulder, Clear Creek, and Park counties at 9,000 to 13,000 ft. Although ranked G5 by NatureServe (2011) and considered secure globally, the species is imperiled in Colorado due to its rarity and is ranked S2 by the Colorado Natural Heritage Program. The recorded sites of simple bog sedge are within Mosquito-Gore Range (McNab et al. 2005). This species may be threatened by changes in hydrology, livestock grazing, peat mining, and unregulated recreational activities (Decker et al. 2006b).

### Slender cottongrass (*Eriophorum gracile*)

Slender cottongrass is a perennial graminoid of the sedge family (Cyperaceae) that flowers beginning in June and July with fruit produced from July through September. The species grows in montane and subalpine wetlands as well as fens, wet meadows and pond edges. Wetland indicator status for this species has been rated as OBL (NatureServe 2011). Slender cotton-grass is circumboreal, ranging in North America from Alaska, Canada and the northern states to California and Colorado in the south. It reaches its southernmost Rocky Mountain distribution in Colorado where it is known from elevations of 8,100-12,000 ft at widely scattered sites in Jackson, Las

Animas, and Park counties. The species is secure globally, being ranked G5 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is considered imperiled in Colorado with a rank of S2. It occurs in an uncommon habitat which may be vulnerable to mining, grazing, water development, and recreation. Documented sites of slender cotton-grass are within Mosquito-Gore Range (McNab et al. 2005). It occurs in an uncommon habitat which may be vulnerable to altered hydrology, peat mining, livestock grazing, and unregulated recreation (Decker et al. 2006c).

### Smith's draba (*Draba smithii*)

Smith's draba is a perennial herb in the mustard family (Brassicaceae). It flowers from May to August, and fruits from June through August. It is found in cliffs and canyons, talus slopes, crevices, and between rocks in shaded, protected sites in upper montane and lower subalpine areas. Elevations range from 7,700 to 13,100 ft. Smith's whitlow-grass is endemic to south-central Colorado where it is known from small and scattered populations in Custer, Las Animas, Mineral, and Saguache counties. It is ranked G2 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program and is ranked S2. The known site for Smith's draba is within the Sangre de Cristo Range (McNab et al. 2005). Smith's draba may be threatened by unregulated recreation and road improvements within its habitat (Ladyman 2004c).

### Smooth northern-rockcress (*Braya glabella*)

Smooth northern-rockcress is a perennial herb of the mustard family (Brassicaceae) that flowers and fruits from late June through August. It is an alpine species found at elevations of 12,000-13,000 ft on sparsely vegetated slopes, and is often found on limestone or dolomite substrates, scree slopes, and poorly developed gravelly or disturbed soils. Smooth northern-rockcress is circumboreal, ranging in North America from Alaska to Quebec, with disjunct populations in Colorado. The Colorado distribution includes Chaffee, Gunnison, Park, and Pitkin counties. Smooth northern-rockcress is ranked G5T? by NatureServe (2011). The species is also tracked by the Colorado Natural Heritage Program and is ranked S1 due to the limited number of occurrences. Populations in Colorado are disjunct from the major part of the species range. Small and disjunct populations make smooth rockcress vulnerable to chance disturbances. Smooth northern-rockcress locations are within the Mosquito-Gore range and the Sawatch Range (McNab et al. 2005). Small populations make smooth northern-rockcress vulnerable to unregulated recreation and mining (Moore et al. 2006b). However, it may be tolerant of occasional light disturbance.

### Trianglelobe moonwort (*Botrychium ascendens*)

Trianglelobe moonwort is found from Alaska to Montana south to California and Nevada (Flora of North America Editorial Committee 1993+). It has recently been discovered in subalpine areas on the South Park Ranger District.

### Weber's draba (*Draba weberi*)

Weber's draba is a perennial herb in the mustard family (Brassicaceae or Cruciferae). It flowers from late June through July (Decker 2006d). It occurs on streamside rocks and on rocks in moist spruce-fir forests. Elevation is from 11,000 to 11,500 ft. It is on northeast aspects. It is endemic to a small area in central Colorado. There are four known sites for Weber's draba. One of these is on the PSI. Weber's draba is ranked G1 by NatureServe 2011). It is tracked by Colorado Natural Heritage Program and is ranked S1. Weber's draba is known from the Mosquito-Gore Range as

defined by McNab et al. (2007). Sites are underlain by biotitic gneiss, schist, and migmatite (Tweto 1979). Soils are mapped as Moran family, 40 to 65% slope (Irvine in prep.). Other records are found to the north of the PSI.

### Wheel milkweed (*Asclepias uncialis*)

Dwarf milkweed is a perennial herb in the milkweed family (Asclepiadaceae) that flowers in April and May and fruits in June and July. It is associated with shortgrass prairie and open piñon-juniper woodland, often growing on sandy soils or in gravelly areas. Dwarf milkweed ranges from Wyoming south to Arizona, New Mexico, and Texas. In Colorado, the species is found on the eastern plains up to the east slope foothills of the Rocky Mountains. The distribution also extends up the valleys that exit the mountains including the Arkansas and Huerfano River Valleys on the Forest. Known at elevations ranging from 4,000 to 6,500 ft, the plant's Colorado distribution includes Baca, Fremont, Huerfano, Las Animas and Pueblo counties. At present, some taxonomic dispute exists over the designation of subspecies, and uncertainty also exists about the global distribution and degree of rarity for the species, but it is considered vulnerable throughout its range. Dwarf milkweed is globally ranked G3G4 by NatureServe (2011). In Colorado, it is considered imperiled to critically imperiled (ranked S2). It is known in the Wet Mountain Valley (McNab et al. 2005). Threats may include altered disturbance regime including fire suppression and livestock grazing, habitat loss, and invasive species.

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

This is a perennial herb of the orchid family (Orchidaceae) that is found in riparian areas, often in association with mosses where it is kept wet by water spray. Its wetland indicator status is FACW (NatureServe 2011). It flowers in July and fruits in August. Populations are typically quite small and the species is widely disjunct in the western U.S., being found in Colorado and California. Elsewhere it is found in Alaska, Canada, the upper Midwest, and northeastern U.S. In Colorado, it is known from Boulder, El Paso and Jefferson counties at elevations of 7,200-8,000 ft. NatureServe (2011) ranks adder's-mouth as G4 indicating that it is apparently secure but rare in parts of its range. It is tracked by the Colorado Natural Heritage Program and is ranked S1 (critically imperiled) due to the extreme rarity of the plant in the state.

## INVERTEBRATES INCLUDED

### Hudsonian emerald (*Somatochlora hudsonica*)

This dragonfly appears to be an uncommon species, both from the standpoint of its encounters with human beings as well as the number of specimens found in collections (Packauskus 2005). Very little historical information or primary literature exists for this dragonfly, and it has never been studied in depth. Although the species is reported to be widely distributed across Canada (Dunkle 2000), the only records of its occurrence in the continental U.S. place it at seven locales in Colorado, possibly three in Wyoming, and one in Montana. Most records are over 30 years old, and little or no documented collecting has been done at these sites since the originals. All seven sites in Colorado are within a 40-mile radius of Boulder (Packauskus 2005).

As with other dragonflies, the main threat to the viability of this species would be the degradation of its aquatic habitat. Trees and shrubs are an important component of areas surrounding the aquatic habitats of the Hudsonian emerald dragonfly since they provide areas for prey foraging by adults as

well as shade that maintains lower water temperatures. Trees and shrubs may also serve as mating areas. The loss of trees can occur through timber harvest, fuel reduction, or wildfires. Grazing by livestock may decrease perching or emergence vegetation for this species as well as degrade the aquatic habitat by increasing sedimentation. Sedimentation may also occur as a result of road construction or clear cutting. Tree harvest, grazing, and road construction can also help to produce nutrient runoff, increasing nutrient loads to the aquatic habitat, thus producing eutrophication. Use of pesticides, like piscicides and herbicides can also serve to decrease population densities of the Hudsonian emerald dragonfly as well as populations of prey species when these chemicals enter the aquatic environment. For more information on this species see *Hudsonian Emerald Dragonfly (Somatochlora hudsonica): A Technical Conservation Assessment* prepared for the Rocky Mountain Region Species Conservation Project (Packauskas 2005). Numerous water bodies occur on the Forest and no insect surveys have been conducted to date. Given the proximity to documented locations in Colorado and lack of species information, it is assumed the Forest may contain potential habitat.

### Rocky Mountain capshell snail (*Acroloxus coloradensis*)

Recent studies indicate that this freshwater limpet (gastropod mollusk) is found in the littoral zone of oligotrophic and mesotrophic mountain lakes from 8,800 to 9,800 ft in elevation. It appears to prefer neutral to slightly alkaline water containing high dissolved oxygen content. The Rocky Mountain capshell snail is known from six locations in Colorado. The sites are located on the Routt and Arapahoe National Forests, Rocky Mountain National Park and on private land within Boulder County (Anderson, 2005). The Boulder County population is nearest to the Forest, approximately 115 miles north. Most populations exist in Canada and the Boulder population is the furthest south of those documented. It's possible that the Boulder population is at the southern extent of its distribution. It's doubtful that *A. coloradensis* disperses to other lakes. Freshwater gastropods may attach to the feathers of waterfowl and survive simulated flight conditions (Boag 1986). However, if passive dispersal of *A. coloradensis* were to occur in this manor, it would likely be very rare (Anderson 2005).

### Susan's-purse-making caddisfly (*Ochrotrichia susanae*)

This caddisfly is a local endemic known from only two sites: one on the Forest on the Salida Ranger District and another on private land near the Pike National Forest in South Park; however, its distribution is not completely known due to limited surveys. It is ranked as G2/S2 by NatureServe (2011). This species has a relatively narrow set of ecological requirements. Water temperatures in the spring habitat were cold and varied little (14.4–15.8$^{o}$C). Stream conditions included extremely high levels of dissolved oxygen (at or near 100% saturation), as well as high concentrations of dissolved Ca, Mg, and $SO_4$, which gave the water a higher conductance value than typically seen in most regional streams at the same elevation. Overall, larvae may be said to inhabit waters in small streams that are cold, well-oxygenated, highly buffered, and low in trace. Like most caddisflies, the adults are weak fliers, flying only about 1-2 m when disturbed, and tend to remain close to the larval habitat for mating and oviposition (Herrmann 2006). The habitat of this species may be affected by livestock grazing improvements to inhabited wetlands, and by OHVs.

## FISH INCLUDED

No FS sensitive fish species are expected to occur or be impacted from activities on the Forest.

## AMPHIBIANS AND REPTILES INCLUDED

### Boreal toad (*Anaxyrus boreas boreas*)

They were once considered common in the southern Rocky Mountains, but populations have declined drastically over the past 15-20 years (Boreal Toad Recovery Team 1998). By 1989, boreal toads were found to be absent from 83% of historic breeding locations in Colorado (Boreal Toad Recovery Team 1998, Loeffler 2000). In Colorado, boreal toads occupy habitats between approximately 7,500 and 12,500 ft in elevation. This toad inhabits marshes, wet meadows, and the margins of streams, beaver (*Castor canadensis*) ponds, shallow lakes, and glacial kettle ponds in subalpine areas of Colorado (Hammerson 1999). It is found in shallow water or among sedges and shrubby willows where soil is damp or wet. Specific habitats including breeding ponds, summer range, and overwinter refugia all occur within lodgepole pine and spruce–fir forests, and alpine meadows (Boreal Toad Recovery Team 1998). The breeding season generally begins in late spring with eggs deposited late May and early June, but may extend into July at higher elevations where snow pack is more persistent. Adult toads, especially females, may move up to 2.5 mi to drier sites in forested habitats after the breeding season, while young toads are restricted to wetland habitat (Boreal Toad Recovery Team 1998) and researchers in Chaffee County Colorado have documented female adult toads as much as 5 miles from breeding sites (Lambert pers. comm. 2003). They can be long-lived in the wild (12+ years old). The adult boreal toad is an insectivore, feeding on a variety of insects. Historically, boreal toads were known to breed at several locations in Lake and Chaffee counties. Populations in Colorado have become scarce or extinct in both low and high elevation sites and have experienced significant downward population trends (Hammerson 1982, 1999, Corn and Fogleman 1984).

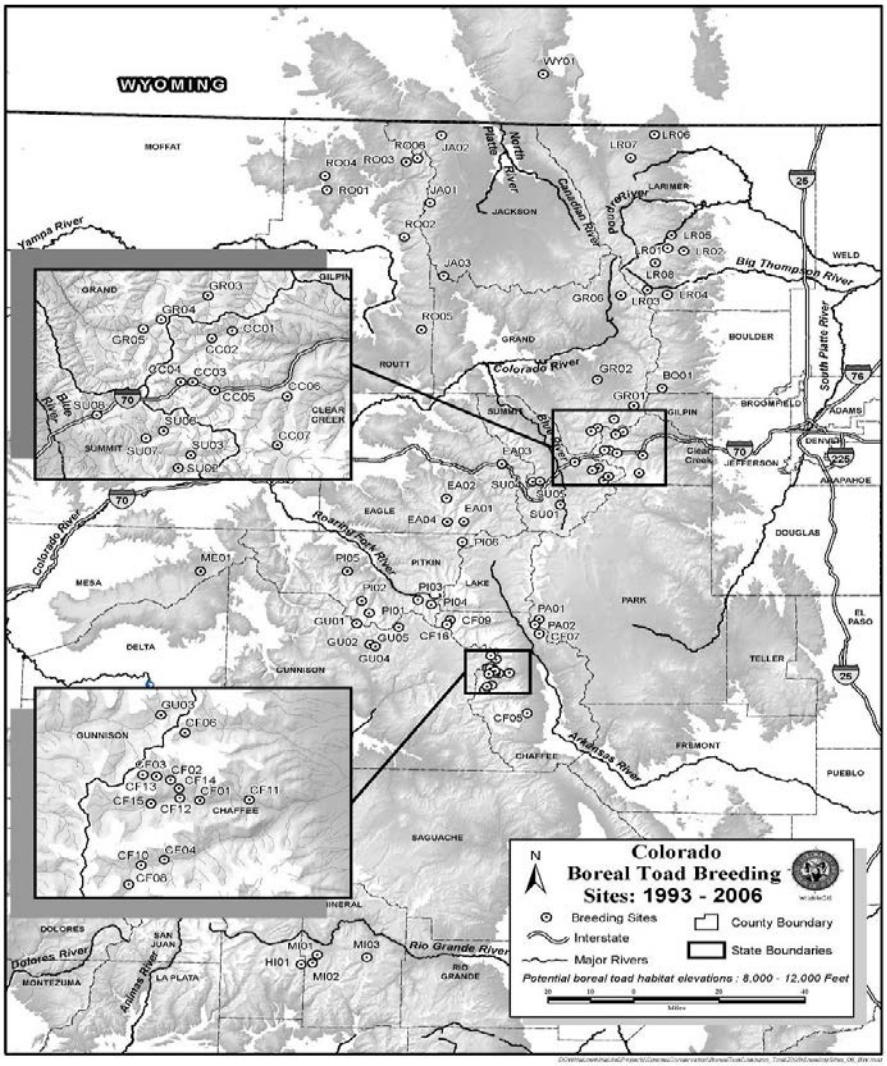
One of the most pervasive factors decreasing habitat quality at the range-wide scale is the presence of the chytrid fungus (*Batrachochytrium dendrobatidis [Bd]*) in suitable habitats. This disease causes mass mortality of a wide range of amphibians, including boreal toads, and it has been found in several populations of toads throughout the West. Populations of boreal toads infected with chytrid have declined to near extinction within one year, and there are no documented cases of an infected population recovering (Keinath and McGee 2005). Environmental stress, which includes global climate change, water chemistry and temperature changes caused by humans and management activities, and undoubtedly habitat change has been linked to increased vulnerability to this disease (Keinath and McGee 2005). Spread of this deadly disease is by transportation of water, mud, or other material from areas where these fungal spores are present to areas where they are not. *Bd* was recently documented by CPW (T. Jackson, CPW, pers. comm. 2006) in a new area in Lake County. There are also other nearby sites with *Bd*, which increase the potential of spread to previously uninfected toad sites.

The boreal toad occurs throughout most of the mountainous portion of Colorado but appears to be absent from the Sangre de Cristo Range, Wet Mountains, and Pikes Peak region. The CPW and CNHP have conducted surveys within suitable habitat and identified populations of boreal toads in portions of the Forest over the past several years. Specifically, intensive monitoring and survey

work in Chaffee County began in 1994 and has continued through 2011 (CNHP 2011). A few sites have been monitored in Park and Lake Counties as well (*ibid*).

The Chaffee County population on the Salida Ranger District is the only population meeting the Recovery Team's definition as a viable population within the state of Colorado and the southern Rocky Mountains (Boreal Toad Recovery Team 1998). These criteria are based on a "*Bd* free population" (this disease has not been detected to date in the county) that has successfully reproduced over a several year period. The Chaffee County population of boreal toads contains the most robust and concentrated density of breeding sites that are *Bd* free in the state of Colorado (SRM-DPS). Within the Chaffee County population on the Salida Ranger District, there are four subpopulations of boreal toads. They are located in four subwatersheds of the Arkansas River Basin. A fifth newly discovered population is in Lake County on the Leadville Ranger District. A sixth nearby subpopulation of boreal toads is on the Pike National Forest (South Park Ranger District). As a result, there are only six known subpopulations of boreal toads in the Planning Area (PSICC).

**Figure 5.** Boreal toad observations 1993-2006 (CPW).



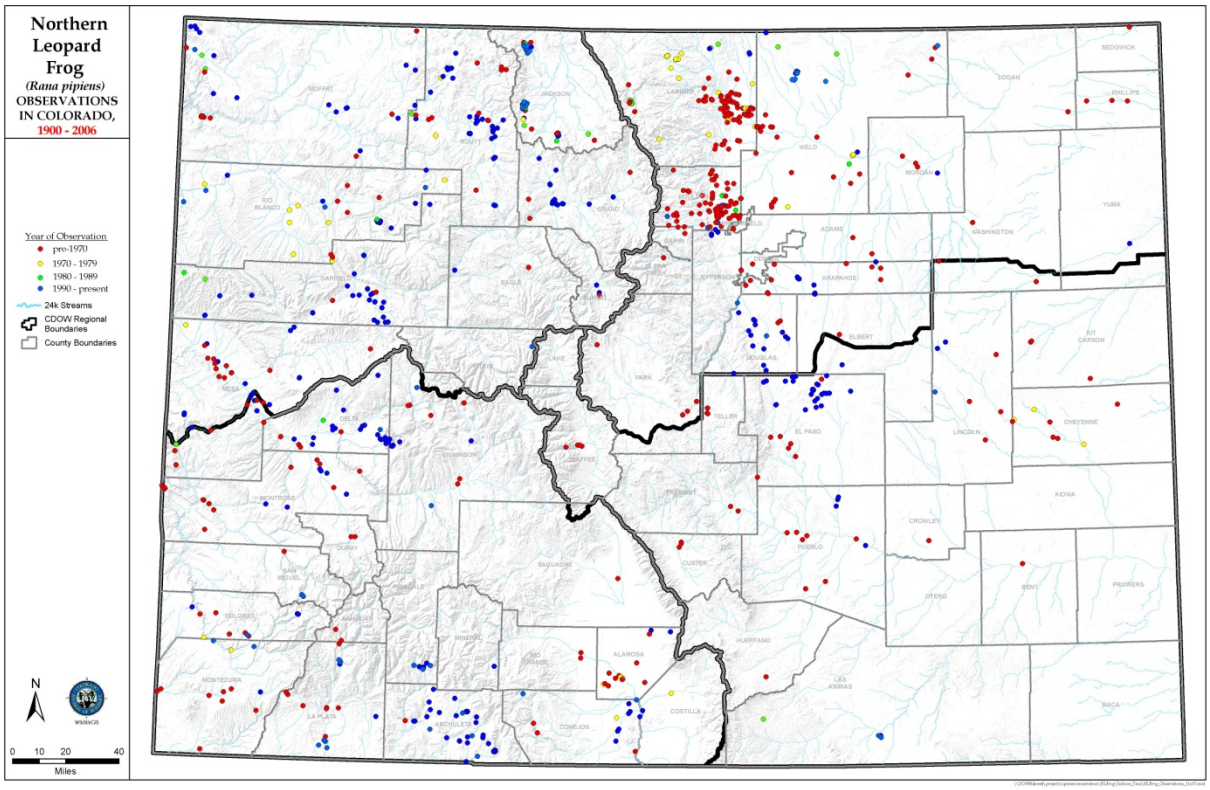
### Northern leopard frog (*Lithobates pipiens*)

Northern leopard frogs have one of the broadest distributions of any North American frog, ranging throughout southern Canada and in the U.S., from the Northeast through the Great Lakes Region, Midwest, Great Plains, Rocky Mountains, Pacific Northwest, and Southwest. They are a widely ranging species that are found throughout most of Colorado in mountainous and plains habitats. Recently however, they have experienced significant population declines across most of their range (Smith and Keinath 2007) and have become scarce in Colorado (Hammerson 1999). The current status of leopard frogs in Colorado are uncertain because the species has disappeared from former sites, but remains common in other parts of the state (Lambert 2006). There are many historic sites that have not been recently surveyed and where current information is lacking. Although their distribution in Colorado is widespread, they are scarce in many areas. The current population status in the state is unknown. Nationally, their population trends are downward throughout most of their range, for reasons unknown at this time.

They are found in a wide variety of habitats within the state including banks and shallow portions of marshes, ponds, lakes, reservoirs, beaver ponds and streams, especially those with rooted aquatic vegetation up to 11,000 ft in elevation (Hammerson 1999). Leopard frogs emerge from winter retreats in March and remain active through November or October. Breeding pools contain mats of algae and clear water. Eggs are laid from April-July on emergent vegetation in shallow water often on the north side of ponds (Hammerson 1999). This frog appears to be especially associated with rooted aquatic vegetation. They may disperse along aquatic and riparian corridors.

Threats include dewatering of riparian habitat through irrigation, or habitat degradation through overgrazing, by improper forest management, or by development, which can cause downward habitat trends. Smith and Keinath (2007) list habitat destruction, diseases, chemical contamination, acidification of water, increased ultraviolet light due to loss of the ozone layer, introduced predators, over collecting, climatic changes, and general environmental degradation as factors that have been invoked to explain northern leopard frog population declines. Aquatic habitats are vulnerable to modification and degradation through numerous natural and anthropogenic factors. They are subject to a number of natural predators, including the recently described chytrid fungus and introduced predatory fishes and bullfrogs (*Rana catesbeiana*).

**Figure 6.** Northern leopard frog observations 1900-2006 (CPW).




## Plains leopard frog (*Lithobates blairi*)

This frog inhabits the margins of streams, natural and artificial ponds, reservoirs, creek pools, irrigation ditches, and other water bodies in plains grassland, sand hills, stream valleys, or canyon bottoms. One researcher found general habitat differences between the plains and northern leopard frog in Nebraska. Plains and northern leopard frogs have some overlap between their ranges. The plains leopard frog occurs mainly along turbid streams in areas of loess soils, whereas the northern leopard frog was typically associated with clear streams in areas of sandy soils. Plains frogs may disperse and feed far from water during mild, wet conditions. Winter is spent underwater at the bottom of ponds and deep pools. Their primary activity period in Colorado extends between March and April through October, and probably warm periods in November as well. These frogs are capable of long dispersal movements. Some plains frogs were found to move up to five miles between ponds from one year to the next (Hammerson 1999). This species occurs in the Great Plains portion of the Arkansas River drainage in southeastern Colorado and in the Republican River drainage in northeastern Colorado at elevations below 6,000 ft. It inhabits the margins of streams, natural and artificial ponds, reservoirs, creek pools, irrigation ditches, and other bodies of water in plains grassland, sandhills, stream valleys, or canyon bottoms (Hammerson 1999). Some potential habitat is present at the eastern edge of the Wet Mountains where a plains leopard frog was found, according to Hammerson (1999). In 2007, CPW personnel located one in the Wet Mountain Valley near Deweese Reservoir, about 8 miles from the nearest National Forest System lands (E. Schmal, CPW pers. comm. 2007).

## BIRDS INCLUDED

### American peregrine falcon (*Falco peregrinus anatum*)

This falcon was formerly listed as an endangered species on June 2, 1970 under the precursor of the ESA. Restrictions on pesticide use as well as implementation of various management acts, including release of approximately 6,000 captive reared falcons resulted in the attainment of recovery goals and delisting of the peregrine falcon occurred on August 25, 1999 (FWS 1999b). Monitoring results from 2003 indicate that the peregrine population is secure and vital (FWS 2006b). When peregrine populations hit their lowest point, the last remaining eyries were those that were located on cliffs higher than 200 ft. Kingery (1998) and Andrews and Righter (1992) describe peregrine falcon habitat and behavior as follows. Breeding pairs usually nest on ledges of high cliffs. Peregrines nest on foothills and mountain cliffs from 4,500 to over 9,000 ft; although most nest sites (eyries) are near the lower end of this range. Piñon-Juniper grows in the vicinity of about one-half of all the nest sites and ponderosa pine at about one-quarter of the sites. The typical eyrie has a wide view, plenty of prey availability in the vicinity, is near water, receives little disturbance, has a level site at least 2 ft in diameter, and has a sheltering overhang and some debris (e.g., sand, sticks) for constructing a scrape for the eggs (Kingery 1998, Andrews and Righter 1992). Peregrine falcons have been observed on the Forest, which has several known historical and active nests (over the last several years) and other potential nesting areas that have not been surveyed.

### Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle was delisted as a threatened species in 2007. It is a large predatory raptor that occurs primarily in aquatic ecosystems, frequenting estuaries, large lakes, reservoirs, major rivers, and seacoasts (FWS 1999a). They are rarely associated with smaller streams or ponds (Leighton et al. 1979). Most eagles migrate in summer to northern breeding grounds but return to lower latitudes during the winter. They consume a wide variety of prey items depending on the season and availability including fish, water birds, and carrion (DeGraaf et al. 1980). Breeding bald eagles are rare in Colorado, although some nesting does occur near open water including rivers, streams and lakes, nesting and roosting in large ponderosa pine, Douglas-fir, or cottonwood trees in proximity to open water. Mature and open forest structures are considered to be important components of bald eagle breeding habitat (Mosher and Andrew 1981, Anthony and Isaacs 1981, Anthony et al. 1982).

In Colorado, most eagles migrate in summer to northern breeding grounds but return to lower latitudes during the winter. Winter habitat in Colorado consists of roost trees along rivers and other large open bodies of ice-free waters allowing access to fish, although they also forage in uplands that are distant (up to 5 mi) from waterbodies (M. Wrigley, USFS, pers. obs. 2002-2007). Winter roost sites vary in their proximity to food resources (up to 21 miles) and may be determined to some extent by a preference for a warmer microclimate at these sites. Wintering areas are commonly associated with open water though in some areas eagles use habitats with little or no open water if other food resources (e.g., rabbit , deer carrion) are readily available (NatureServe 2011). Carrion and easily scavenged prey provides important sources of winter food in terrestrial habitats far from open water. Bald eagles are often observed during the winter months in Lake, Chaffee, and Fremont counties along the Arkansas River and other ice-free open water bodies and adjacent uplands and within close proximity to the South Platte River and other waterbodies/uplands in Jefferson, Douglas, and Park counties. Successful breeding has not been documented on the Forest for many decades; however, in 2012 a pair of bald eagles have been observed exhibiting nesting

behavior and appear to be nesting on the Leadville Ranger District. Adult bald eagles have been observed at the time of this writing sitting on a nest (J. Windorski and M. Wrigley, USFS Wildlife Biologists, 2012 pers. obs.).

### Black swift (*Cypseloides niger*)

Swifts invariably nest on vertical or precipitous cliffs or rock faces near or behind high waterfalls, or in dripping caves. Other than the above requirement, they inhabit a variety of landscapes, from seacoasts to the Rocky Mountains. Black swifts spend most of the daylight hours pursuing aerial insects, often ranging far from nesting areas in search of the abundant but patchy preferred food resources. Foraging birds range at high elevations widely (over most montane and adjacent lowland habitats and the adults typically return to feed the young at in the evening. They sometimes cruise over the summits of 14,000 ft peaks and over croplands or deserts 25 miles from nesting colonies. The slow developing nestlings fledge much later (45-49 days) than most other swift species and are still on the nest well into September (Kingery 1998, Andrews and Righter 1992). Black swift nesting has been documented on the Forest in the Salida Ranger District (M. Wrigley, USFS pers. obs., 2005-2010), Wet Mountains, and the Sangre de Cristo ranges [R. Torretta, J. Grabowski (Valledares), USFS, pers. obs., 2006-2011 and 2000, respectively]. Rocky Mountain Bird Observatory staff (J. Beason et al. 2010) also documented reproduction in the Sangre de Cristo Mountains in 2010.

### Boreal owl (*Aegolius funereus*)

This owl inhabits primarily mature spruce-fir forests, but can also be found in lodgepole pine, mixed conifer, Douglas-fir, and aspen interspersed with meadows (Udvardy 1977, Andrews and Righter 1992). It inhabits coniferous woodlands occurring in the higher mountain areas statewide from 9,500 to 11,500 ft in elevation (Andrews and Righter 1992). Boreal owls prefer extensive growth of stunted spruce in close proximity to open grasslands-meadows which provide prey species (especially voles). For nesting habitat, boreal owls prefer forests with a relatively high density of large trees (10 inches diameter at breast height [dbh] and larger), open understory, and multi-layered canopy (Hayward 1997). The boreal owl is a secondary cavity nester that utilizes deserted woodpecker holes or natural cavities in snags with at least 15-inch dbh (Harrison 1979). This owl is a year-round resident in Colorado. Nesting and breeding activity most likely occurs from mid-February-late April, and eggs are laid from April-June (Udvardy 1977). The boreal owl primarily consumes voles and other small mammals, and like most owls exhibits nocturnal to crepuscular activity (Udvardy 1977). Voles, primarily red-backed voles (*Clethrionomys gapperri*), comprised 79% of boreal owl prey items in Colorado (Hayward and Hayward 1993). Home range may cover as many as 2,200 ac, but only a small area around the nest is defended during the breeding season.

This non-migratory species has been recently observed as a year-round resident throughout most of the west-central portion of Colorado, inhabiting the proper habitat and elevations in most of the higher ranges of the state (Andrews and Righter 1992). Boreal owls disperse readily across non-forested areas. In most years boreal owls are highly sedentary, remaining in the same home range throughout the year for several years. The first confirmed breeding records were in 1981 and 1982 at Cameron Pass, located in the north-central portion of the state in Larimer County (Andrews and Righter 1992). Although breeding is suspected in other portions of the state, other breeding

locations have not yet been confirmed (Andrews and Righter 1992). These owls are more abundant in numbers today than previously thought.

Boreal owls tend to avoid openings, such as clearcuts and open meadows, except for occasional use of edges for foraging. However, radio marked owls have been observed moving long distances, including movements across inhospitable habitat. It is unlikely that owls would use conventional or graded trails, roads, or lifts because these areas would be cleared of the downed woody debris that provides essential habitat for prey species. The overall effect of vegetation disturbance in spruce-fir, lodgepole pine, and mixed coniferous forest stands would be to decrease habitat suitability of the area for boreal owls by decreasing nesting, roosting and foraging habitat (Hayward 1997). Nest sites would be lost due to a loss of trees with cavities suitable for nesting. Elimination of forest within individuals' home ranges would reduce roosting opportunities (Hayward and Hayward 1993). Changes in forest structure or tree species composition will affect boreal owls by changing prey abundance or availability. Given that boreal owls hunt from perches, forest removal affecting areas greater than several hectares will always eliminate foraging habitat even if prey populations increase (Hayward 1997). Also, changes in forest structure or composition that influence red-backed vole populations will likely influence boreal owl populations. No evidence exists that disturbance is an important factor in nest loss or owl movements. Boreal owls tolerate human and machine noise well. In Colorado, boreal owls have nested within 100 ft of a major highway. These owls also tolerate frequent direct nest inspection and will deliver prey to the nest, even when humans are within several meters (Hayward 1997). However, because the Southern Rocky Mountains are the southern periphery of this species' range in North America they have relatively low reproduction and potentially higher mortality than their northern counterparts. In addition, they are secondary cavity nesters relying on large trees that are generally lacking, may combine to make this species more vulnerable to outside factors than their northern counterparts. Boreal owls have been documented on several areas on the Forest.

### Brewer's sparrow (*Spizella breweri*)

This species is sagebrush obligate that is often the most abundant songbird in sagebrush shrubsteppe habitats. This assessment focuses on the *S. b. breweri* subspecies, which is found in Region 2. Brewer's sparrow is considered globally "secure" by the Natural Heritage Program because of its wide distribution across North America. However, according to the Breeding Bird Survey, Brewer's sparrow populations have declined by over 50 percent during the past 25 years. Brewer's sparrow populations within the states of Region 2 have exhibited similar long-term declines; in fact, declines in Colorado and Nebraska have outpaced national trends. In South Dakota and Kansas, the species is considered "imperiled" by the states' natural heritage programs. The Brewer's sparrow is listed as a priority species in the Colorado and Wyoming Partners in Flight bird conservation plans. It is also listed as a species of special concern by the FWS (Holmes and Johnson 2005). The Colorado Breeding Bird Atlas shows confirmed breeding evidence for the brewer's sparrow in Lake County (Kingery 1998) and breeding/use may also occur elsewhere on the Forest.

### Burrowing owl (*Athene cunicularia*)

This owl nests primarily in rodent burrows in grasslands, shrublands, deserts and grassy urban areas (Kingery 1998). Most observations occur in the eastern third of Colorado, with only two incidental observations made in the mountains outside parks (Andrews and Righter 1992). More than 70% of Colorado atlas sightings occurred in shortgrass prairie (Kingery 1998). Suitable habitat is unlikely

on the Forest; however this species may potentially be affected by some management actions on the Pike and South Park Ranger Districts.

### Ferruginous hawk (*Buteo regalis*)

Optimum habitat for this species is characterized as vast expanses of grasslands and shrublands with varied topography, including hills, ridges, and valleys (Ensign 1983). Trees or similar structures are typically selected for nest sites when available; however, they also nest on rock pinnacles or on the ground. Ferruginous hawks usually nest within about ½-mile of their primary hunting areas (Olendorff 1973). Habitat vegetation density appears to be critical in their choice of hunting sites. They primarily feed on small to medium sized mammals. Winter habitat use is often concentrated near prairie dog towns. They hunt from the air and elevated perches. They begin laying eggs from mid-March to early April (Kingery 1998). During the egg incubation period, ferruginous hawks appear sensitive to human activity. Human visits of their nest usually cause abandonment (Olendorff 1973, Fitzner et al. 1977). Major types of disturbance occurring at nest sites are from OHV recreation, farming, military activities, and persons present at the nest site whose activities are directed at the birds (Allen et al. 1987). Successfully nesting ferruginous hawks are found on large expanses of undisturbed areas. This species is a fairly common winter resident on eastern plains; it is uncommon to rare in western valleys and mountain parks (Andrews and Righter 1992). Although this species is endemic to the grasslands and shrub-steppe areas of western North America, they have also been documented in piñon-juniper woodlands. Suitable habitat is unlikely on the Forest; however this species may potentially be affected by some management actions on the South Park Ranger District.

### Flammulated owl (*Otus flammeolus*)

This owl is an uncommon to common summer resident in the foothills and lower mountains of Colorado (Andrews and Righter 1992). This species appears to be more common than most observers previously realized (Andrews and Righter 1992); however, this may be a result of improved survey techniques and increased survey effort. The range of the flammulated owl is restricted to montane forests of the western U.S. and Canada. It extends throughout the west with the eastern limit formed by prairies adjacent to the Rocky Mountain forest (Peterson 1990, McCallum 1994, Verner 1994). In Colorado, this owl is known or suspected to breed throughout most of the western half of the state (Andrews and Righter 1992).

Flammulated owls are associated with mature (greater than 150 yrs) to old-growth (greater than 200 yrs) ponderosa pine and ponderosa-Douglas-fir forests, often mixed with mature aspen, and has been observed in pure aspen stands (Andrews and Righter 1992, Reynolds and Linkhart 1992). They also occur in old-growth piñon-juniper woodlands (Andrews and Righter 1992). Ponderosa pine forests typically occur from 5,500 to 9,500 ft (Andrews and Righter 1992). Douglas-fir forests are usually mixed with ponderosa pine, lodgepole pine, and aspen and occur from 5,500 to 10,500 ft (Andrews and Righter 1992). Occupied home ranges tend to occur on ridges and south-facing slopes and territories of nesting owls may range from 90 to 140 acres (Winn 1998). These owls will apparently forage in grassland-forage edges (Goggans 1986) as well as in tree crowns (Reynolds and Linkhart 1987).

This neo-tropical species is migratory, spending the winters in Mexico and Central America. In Colorado, migrating male flammulated owls generally return to breeding territories during the first week of May, while females may return as late as the first week of June and begin pair formation at

that time (Reynolds and Linkhart 1987). They display a high degree of site tenacity as adults, returning from their wintering grounds to the same or neighboring territories. The primary breeding season typically lasts from mid-May to mid-June.

Flammulated owls are secondary cavity nesters that use a variety of mature tree species as long as there are cavities, an open forest structure for foraging on insects, and brush/dense foliage for roosting (Kingery 1998). Flammulated owls in Colorado have most frequently been found nesting in aspen trees, but occasionally will use other species such as ponderosa pine or Douglas-fir for nesting (B. Linkhart pers. comm. 2012). These owls consume mainly nocturnal arthropods and hunt exclusively at night. Reynolds and Linkhart (1987) reported that noctuid moths appeared to be the only food available to owls during cold spring nights in Colorado. Large Douglas-fir and old ponderosa pine trees provide a large crown volume tend to present a greater crown and trunk surface area, which provides important foraging habitat (Linkhart et al. 1998).

Because this species shows a close association with older ponderosa forests, declines in the extent of mature and older ponderosa pine due to timber harvest and fires (i.e., fires from settlement and mining periods) may have led to declines in the species. Fire suppression has changed the disturbance regime of these forests substantially, and because of this, mature and older forests are at greater risks to stand replacement fires. Various Forest Service personnel have documented flammulated owls visually and audibly on the Forest.

### Gunnison sage-grouse (*Centrocercus minimus*)

This is also a federal candidate species. See the discussion above.

### Lewis's woodpecker (*Melanerpes lewis*)

This woodpecker prefers open pine forests, burnt-over areas with abundant snags and stumps, riparian and rural cottonwoods, and piñon-juniper woodlands (Kingery 1998). Andrews and Righter (1992) stated that Lewis's woodpeckers are year round residents in the foothills of southern Colorado and use lowland and foothill riparian forests, agricultural areas and urban areas with tall deciduous trees, but rarely in piñon-juniper woodlands. Their elevation preferences appear to be between 3,500 and 7,000 ft, with rare or accidental records as high as 12,000 ft in the Wet Mountains of Custer and Pueblo counties. On the southeastern plains, it occurs mostly in open farmland with scattered tall cottonwoods and avoids riparian forests (Bock et al. 1971 *in* CNDIS 2004). Locally, the woodpecker is a fairly common resident in valleys, plains, foothills, and mesas in southern Colorado from Mesa, Chaffee, southwestern El Paso, and Prowers counties southward. On the southeastern plains, about half of the birds were resident and half wintered to the west in the southern foothills (Hadow 1973 *in* CNDIS 2004). It seems to be especially common in the Durango area, La Plata County and in southwestern Baca County. Early in the 1900s, they were primarily mountain birds in Colorado, preferring ponderosa pine habitat for breeding. By the late 1950s, they had expanded their nesting onto the plains as cottonwoods in the stream bottoms and around farms matured. Data from the Colorado Breeding Bird Atlas work (Kingery 1998) shows this species typically breeding in riparian habitats, using old decadent cottonwoods to nest in (Kingery 1998). During the breeding season, they feed almost exclusively on emergent insects versus grubs, unlike other woodpeckers.

### Loggerhead shrike (*Lanius ludovicianus*)

Shrikes are migrant and summer residents and primarily inhabit open riparian areas, agricultural areas, grasslands, and shrublands, especially semi-desert shrublands, and sometimes piñon-juniper woodlands. Breeding birds are typically near isolated trees or shrubs (Andrews and Righter 1992). Shrikes eat mostly insects, but vertebrates such as birds, reptiles (lizards), frogs, and toads also make up a significant portion of their diet. Shrikes are found to have breeding sites at elevations ranging from below 4,000 ft to possibly as high as 8,900 ft (Kingery 1998). Loggerheads are listed as rare to uncommon in the grasslands and vicinity by Andrews and Righter (1992). Mainly an eastern plains species in Colorado, the loggerhead shrike is often in open habitats with trees less than 15 ft for nesting (Kingery 1998). Nearly all breeding occurs below 8,900 ft elevation (Andrews and Righter 1992). There are no confirmed breeding records in the mountain parks or mountains. This species is likely within suitable habitats on several ranger districts on the Forest.

### Mountain plover (*Charadrius montanus*)

This species is found in short-grasslands, occurring on primarily on flat areas with short grass and scattered cactus, generally avoiding taller grasses and hillsides (Graul 1975). Suitable areas may also occur near active prairie dog towns (Knowles et al. 1982). Migrants sometimes occur on dry mudflats and shorelines of dry reservoirs (Andrews and Righter 1992). They occur primarily on the eastern plains of the state, but are also found in South Park, the San Luis Valley, North Park, and were historically present in Middle Park (Grunau and Wunder 2001, Kingery 1998). Mountain Plovers in South Park have been found to nest on steeper slopes than those used on the shortgrass prairie of the Eastern Plains. Also, they will nest in comparatively thick, tall vegetation, and near stark edges (Grunau and Wunder 2001). The Forest is outside of the plover's known distribution; however, some of the suitable habitat in South Park may overlap into the Forest (< 1% of the potentially suitable habitat in South Park) in some locations (Grunau and Wunder 2001, Kingery 1998). There are no confirmed breeding records of mountain plover on the Forest. Suitable habitat is unlikely on the Forest; however this species may potentially be affected by some management actions on the Forest.

### Northern goshawk (*Accipiter gentilis*)

Goshawks inhabit mixed hardwood and coniferous forests in temperate and boreal regions from 7,500 to 11,000 ft in elevation; however, they are occasionally found below 7,000 ft in winter and during migration. They may also utilize other coniferous forest types and structures as available. In Colorado, the goshawk is found throughout the forested mountains. They prefer woodlands with intermediate canopy coverage interspersed with fields or wetlands in remote areas.

In the West, goshawks commonly nest in the lower portions of mature Douglas-fir, ponderosa pine, lodgepole pine, or aspen canopies (Andrews and Righter 1992), and prefer old-growth structure, although a variety of habitats may be used throughout the region. Goshawks typically nest in large hardwood trees that are most often found within mature to old-growth forests. These stands most often have high (60-90%) canopy closure with little understory and are often associated with north facing slopes and drainages. The same nest may be used for several seasons. Most nests in Colorado are located on gentle slopes (less than 40%) with a north to east aspect on benches or basins surrounded by much steeper slopes. Sites usually have a sparse understory, which contrasts with dense, multi-leveled understory observed in Oregon. All nest sites in Colorado were located within 1,148 ft of openings. Mature trees serve as perch sites, while plucking posts are frequently

located in denser portions of the secondary canopy. In Colorado, goshawks frequently select aspen and occasionally select pine, spruce, fir, and juniper for nest construction. Birds often return to the same nest site year after year and will use alternate nests within the same territory over several years (Harrison 1979).

In the southwestern U.S., the Forest Service recommends roughly 5,400 ac for a foraging area for the goshawk (Reynolds et al. 1992). Prey consists of birds, small mammals, and occasionally insects (Udvardy 1977). Goshawks hunt for prey in dense woodlands, clearings, and open fields. Goshawks hunt from a perch or while flying through the forest, or pursue prey on the ground, but usually fly low to attack animals by surprise.

Goshawks have been recorded at several locations on the Forest and appear to be fairly common on their breeding grounds in the northern forests and in the forested mountains of the west. However, there has been concern over the last decade regarding potential decline in species abundance in the FS Southwestern Region and elsewhere in the western U.S. Nesting habitat is the most important component in limiting distribution and number of birds. Breeding goshawks are sensitive to disturbance during the nesting season (Richardson and Miller 1997). Intrusion into the nest site may cause adult birds to flush from their nest for long periods of time, directly affecting the viability of embryos or nestlings. Breeding pairs will aggressively defend the nesting territory during incubation and fledging periods. Modification or destruction of goshawk nesting habitat and human disturbance during nesting represent the greatest endangerments to this species, and may directly affect nest site use. Logging activities have resulted in nest abandonment on National Forest-managed lands due to the habitat alteration that occurs with these operations. Timber harvesting, extensive fragmentation of habitat by roads and other development, and increasing human activity may threaten goshawk habitat suitability and quantity. Most lower elevation ponderosa pine forests are in early successional stages, are substantially roaded, and are being increasingly developed which threatens goshawks. This species has been documented on every ranger district on the Forest.

### Northern harrier (*Circus cyaneus*)

Harriers are a resident in most of Colorado during migration and summer but they are rarely found in the analysis area. They inhabit grasslands, agricultural areas, and marshes, but in the fall they also range up to the alpine tundra. Nesting habitat requires abundant cover such as tall wetland vegetation and grasses. Northern harriers' diet varies upon season of year and consists primarily of small- and medium-sized mammals, primarily rodents, birds (chiefly passerines and small waterbirds), reptiles, and frogs in summer; during the winter, in the northern part of their range, it is almost exclusively *Microtus* voles; in the southern part, mammals and birds (MacWhirter and Bildstein 1996). They have been observed at elevations ranging from approximately 3,500-13,000 ft (Kingery 1998, Andrews and Righter 1992). This species has been documented on several ranger districts on the Forest where suitable habitat is present.

### Olive-sided flycatcher (*Contopus cooperi*)

In Colorado, the olive-sided flycatcher is a breeding mountain resident nesting at elevations between 7,000 and 11,000 ft (Jones 1998). It is associated with the mature spruce/fir forest, particularly if there are large conifers, bogs, and meadows present (Kingery 1998), preferring areas with abundant snags (Ehrlich et al. 1988). They are frequently associated with forest openings and

edges and following natural and anthropogenic disturbances, such as tree fall gaps, fire, and logging. The juxtaposition of forest openings, mature forest and the presence of snags are key components of the habitat required by olive-sided flycatchers. Although breeding habitat for this species is primarily located in mature spruce-fir, Douglas-fir, and occasionally in some other types of forests, it also occurs in montane and foothill riparian and aspen forests (Andrews and Righter 1992). Tall trees, trees with spiked tops, or high conspicuous dead branches and dead snags as well as adequate live trees for nesting sites are important components of all nesting habitats.

Olive-sided flycatchers consume almost exclusively flying insects, such as bees, flies, moths, grasshoppers, and dragonflies (Jones 1998). This flycatcher is classified as a passive searcher who forages primarily by sallying, concentrating on prey available via aerial attack. They have a broad range of preferences in habitat structures. They prefer to nest high up in the conifers where their larger body size is well hidden, but they normally forage from dead perches where the visibility of flying insects is better and aerial maneuvers are easier (Eckhardt 1979). Olive-sided flycatchers have been documented on the Forest.

### White-tailed ptarmigan (*Lagopus leucura*)

Ptarmigans primarily occur in alpine tundra. Areas that are mostly snow free early in the season are used for breeding, and females with broods generally occur on rocky, wet tundra. Males generally winter above timberline in areas of short willow thickets, while females often winter at or below timberline in taller, denser willow thickets and along willow-dominated watercourses (Hoffman and Braun 1975). Ptarmigan distribution is closely associated with availability of mesic vegetation in spring and summer, particularly willow. Common local winter residents are found above treeline and in higher mountains below treeline. During fall and winter, they are very concentrated, and large areas may be unoccupied. Females may winter below timberline in higher mountains, and in areas of western Colorado where snowfall is heavy, both sexes move below timberline. There are records into the lower mountains in late fall and winter. They have high energy and nutrient requirements due to their high metabolic rates. Consequently, they must maximize their use of plant productivity by closely tracking plant phenology. While vegetation cover and proximity of water are important, most occupied habitats also contained boulders which may provide cover and help themoregulate, particular on hot or windy days (Johnson 1968, May 1975). White-tailed ptarmigan have been documented in several alpine areas on the Forest.

### Yellow-billed cuckoo (*Coccyzus americanus*)

This is also a federal candidate species. See the discussion above.

## MAMMALS INCLUDED

### American hog-nosed skunk (*Conepatus leuconotus*)

Little information exists on the life history/ecology of hog-nosed skunk. Hog-nosed skunks are omnivorous and consume insects, small mammals and reptiles, fruits, berries, and nuts. In addition to the above, it is speculated that hog-nosed skunk are primarily nocturnal (Fitzgerald et al. 1994). Hog-nosed skunks are primarily a mammal of Mexico and the southwestern U.S. with records from southeastern Colorado marking the northern extreme of the species' range. Colorado records are from canyon lands, frequently about piñon stands (Armstrong 1972). Fitzgerald et al. (1994) identifies the hog-nosed skunk's habitat to be that of rocky canyon country in piñon-juniper

woodlands and montane shrublands of the Southwest; it has also been reported from desert and grassland environments. Colorado records are associated with oakbrush and piñon-juniper woodland in the southeastern portion of the state. Hog-nosed skunks use rocky ledges, caves, abandoned mines, abandoned burrows, woodrat (*Neotoma* spp.) nests, and similar sites for denning. In Texas, they were found to feed mostly on terrestrial insects. However, they also consumed small reptiles and mammals, carrion, and vegetable matter such as prickly pear fruits, berries, and nuts. They seemed to spend a large portion of their time rooting for insects with the snout and long front claws (Fitzgerald et al. 1994). A confirmed hog-nosed skunk skull was located in the Babcock Hole Area on the San Carlos Ranger District in June 2000 (M. Mellaci [White], USFS, pers. obs. 2000). It was located in ponderosa pine/oakbrush woodlands with rock outcroppings and rimrock.

### American marten (*Martes americana*)

Martens are mink-sized nocturnal members of the mustelid family inhabiting late-successional forest communities throughout boreal forests in northern North America (Allen 1987). In Colorado, martens are found at elevations from 7,000 to 13,000 ft, but are most common above 9,000 ft. Optimum habitat elements appear to be mature and old-growth spruce-fir (*Picea-Abies*) communities with greater than 30% canopy cover, well established understory of fallen logs and stumps, and lush shrub and forb vegetation to support prey (Burnett 1981). Martens show consistent close association with mesic, dense coniferous forests with complex physical structure near the ground (Buskirk and Powell 1994). During the winter, they prefer mature and old-growth over younger-aged and deciduous cover; summer habitat use is somewhat broader. Stand structure is more important than species composition. Complex physical structure, especially near the ground appears to address three important life needs of martens. It provides protection from predators; access to the subnivean spaces where most prey is captured in winter; and provides protective thermal microenvironment, especially in winter (Buskirk and Powell 1994). Principal winter habitat consists of mature spruce-fir and lodgepole pine forests with moderate to high-density canopy cover (30-50%). Marten also inhabit tundra rock piles and talus slopes in the summer months (Koehler and Hornocker 1977, Allen 1987, Buskirk and Powell 1994). Eighty percent of all marten observations in Colorado have occurred in spruce-fir or forest types in which spruce was a component (Allen 1987) and they are rare to absent in stands dominated by Ponderosa pine and piñon pine (Buskirk et al. 1989). They prefer a mosaic landscape and avoid large clear-cut or burned areas for about 15 years until dense overhead cover returns (Koehler and Hornocker 1977, Soutiere 1979). Martens make little use of open clearings without overhead cover (Spencer et al. 1983, Steventon 1979, Steventon and Major 1982, Buskirk and Powell 1994), but may use riparian areas and meadows (Spencer et al. 1983) and forest edges (Simon 1980). They avoid hunting in winter across openings, but they might utilize these in summer if food and cover are available (Koehler and Hornocker 1977, Soutiere 1979). They stay close to overhead cover and investigate openings to subnivean spaces where CWD penetrates the snow surface in winter (Buskirk and Powell 1994).

Large snags, CWD, large live trees, and squirrel middens are important characteristics of maternal dens. CWD, especially in the form of large-diameter tree boles is an important habitat component for martens (Buskirk and Powell 1994), providing thermal protection, access to subnivean spaces, and escape cover (Corn and Raphael 1992). Martens are generalists, eating a variety of vertebrates smaller and larger than themselves with much seasonal variation. They feed mainly on small mammals (e.g., red squirrels, snowshoe hares, voles [*Clethronomys* spp., *Microtus* spp.], pine

squirrels [*Tamiasciurus hudsonius*], and ground squirrels [*Spermophilus* spp.]), birds, insects, fruits and nuts, and carrion (Fitzgerald et al. 1994). Dens are located in hollow trees, used squirrel nests, rock piles, and hollow logs. Normal home range is one square mile for males and one-quarter square mile for females, although they may range as far as 15 miles. Martens breed in July and August and give birth the following April. Winter distribution of martens may be governed more by prey availability than by other habitat factors (Soutiere 1979), and are regulated by food throughout the year (Clark 1984, Simon 1980). Martens are active at all seasons (Halvorson 1961), but are more active in the summer than winter. Generally, but not always, they are solitary (Herman and Fuller 1974). They are primarily crepuscular (Markley and Bassett 1942), although they can be active at any time of the day or at night.

Trapping has direct impacts to marten populations (Buskirk and Powell 1994). Marten densities also decline with increasing loss of forest cover from timber harvesting; at the landscape level, 25 to 30% loss of forest cover may represent a threshold of habitat suitability. Populations are sensitive to habitat alterations resulting from timber harvest, snag removal, and firewood gathering (Finch 1992). In general, martens are not considered highly sensitive to human disturbance although, increased access through the creation of trails and campsites may have an adverse effect on individuals (Hayward and Garton 1989). Martens have a smaller distribution now than in pre-settlement times (Gibilisco 1994). It still occurs throughout most of the northern portion of North America, but because of habitat loss, it has been extirpated from many southeastern areas of Canada and northeastern U.S. Habitat management practices that favor martens include maintaining forest diversity through natural processes and human activity, and retaining old-growth spruce-fir communities (Burnett 1981, Clark 1984). Continuous optimum habitat connected to smaller habitat patches by corridors of at least marginal habitat is important. Marten do not use clear cuts in the winter. Forest management that minimizes clear-cutting, maintaining shrub understory, and at least 30% canopy cover such as selective timber harvests are less detrimental than clear cuts, and may benefit martens. Marten may forage in burned areas with abundant CWD. Dead standing and leaning trees and snags provide denning and hunting sites for martens that if retained in addition to slash piles, downed timber, and other logging debris may benefit martens. In Sierra Nevada, riparian areas protected from livestock grazing appear to have more marten use than those areas with heavy grazing pressure. This species has been documented or expected on every ranger district on the Forest.

### Fringed myotis (*Myotis thysanodes*)

Fringed myotis bat status in Colorado is poorly known and they are apparently not common in the state. They are found in ponderosa pine and piñon-juniper woodlands, greasewood, oakbrush, and saltbrush shrublands; preferring coniferous woodlands and desert scrub habitats (Fitzgerald et al. 1994). They also use lower-elevation Douglas-fir or aspen stands along the central Front Range (Adams 2003). Fringed myotis are slow, maneuverable fliers that forage close to vegetation in shrubs and woodlands, low over meadows, or near water. They have a relatively broad diet, feeding on moths, beetles, caddis flies, ants, wasps, bees, and other insects (Fitzgerald et al. 1994, Armstrong 1972). Snags are very important for this species for roost sites. Suitable snag densities for fringed myotis bats are likely over 8 large snags per acre and, in California, regular pockets containing over 80 large snags per hectare (32/ac) could be necessary to support fringed myotis populations (Keinath 2004). Individuals utilize crevices, mines, caves, or buildings for both day and night roosts. Hibernation sights can include caves, mines, and buildings. Fringed myotis

winter range is not known in Colorado (Fitzgerald et al. 1994, Armstrong 1972). This species has been documented on and near the Forest.

### Gunnison's prairie dog (*Cynomys gunnisoni*)

This is also a federal candidate species. See the discussion above.

### Hoary bat (*Lasiurus cinereus*)

The hoary bat was recently added to the FS sensitive species list for R2 in response to recent and rapid changes due to the influence of the bark beetle on forested habitat used by the hoary bat. This species is also disproportionately affected by wind turbines because the migration strategy and social behavior of these bats make them particularly susceptible to collisions with wind turbine blades (Arnett et al. 2008).

The following species account comes from Fitzgerald et al. (1994). The hoary bat is a solitary and wide-ranging species (the only land mammal native to Hawaii). The hoary bat probably occurs throughout Colorado in suitable habitat from the eastern plains to elevations of 10,000 ft in the mountains. They use a variety of trees as roost sites. They appear to favor deciduous trees such as cottonwoods for roosts in the eastern U.S. In Colorado, they are frequently detected in Douglas-fir and ponderosa forests where large deciduous trees are lacking. Roosts are located 13-16 ft above ground, protected from above with leaf cover and branches, while allowing a clear flight path from below. Such trees are frequently associated with margins of clearings or with windbreaks of the narrow fringe of deciduous trees along irrigation canals on the plains. They emerge well after dark late in the evening and their diet consists primarily of moths, but also includes beetles, flies, grasshoppers, dragonflies, and wasps (Adams 2003).

Mating is thought to occur on the winter range, although males with scrotal testes have been captured in Colorado in July and August. Males and females are segregated in the summer, with males tending to stay in western North America while females continue north and east to bear and rear young. In June or early July, the female gives birth to 1 to 2 pups. The young are capable of flight by 34 days of age.

Hoary bats never seem to be abundant in any area and most collections are of single individuals, except for when small groups are encountered in migration. Hoary bats are migratory and may travel from Canada to the southern portion of the U.S. and into Mexico. The species apparently migrates north and south in distinct waves (May-June northerly movement; late August to early September southerly movement). Females migrate north earlier than males. Winter range is unknown. This species is present on the Forest.

### North American wolverine (*Gulo gulo luscus*)

This is also a federal candidate species. See the discussion above.

### Pygmy shrew (*Sorex hoyi*)

There are two distinct subspecies in the region, with *S. h. montanus* occupying high elevation, mesic coniferous mountain forests in northern Colorado and south-central Wyoming (Beauvais and McCumber 2006). This subspecies prefers moist coniferous forests, possibly preferring late-seral stands and edges between wet and dry forest types. They are found in "*wet conifer forests*" with all

known locations found in montane or subalpine landscapes dominated by conifer forests and dense stream networks that interact with various bogs, marshes, and other wetlands (Beauvais and McCumber 2006). This species is completely insectivorous, eating mostly arthropods (Beauvais and McCumber 2006). See the Region 2 Species Conservation Assessment (Beauvais and McCumber 2006) for additional information. Beauvais and Smith (2005) summarized known locations and identified potential habitat for this subspecies within the region; which include areas on the Medicine Bow-Routt, Arapahoe-Roosevelt, White River, and Grand Mesa-Gunnison-Uncompahgre National Forests. Based on statistical models of other similar habitats, they concluded that potential habitat is not present on the Forest, however no surveys have been conducted for this species on our Forest and similar habitat features described for this species do occur on the Forest.

### River otter (*Lontra canadensis*)

They occur in streams, lakes, reservoirs, wetlands and marine coasts. River otters were extirpated from Colorado due to unregulated fur harvest and habitat destruction during the 1800's (Boyle 2006). Regulation of trapping, improved water quality and intensive management activities including reintroductions, have occurred in and otter populations appear to be established in parts of their former range. In Colorado, otters formerly occupied both the upper and lower reaches of the Arkansas and Platte Rivers (Armstrong 1972). In the 1970s, the CPW began to restore populations to several drainages, including the Upper Colorado, the Dolores, and the Upper South Platte Rivers. Current populations in Colorado are located in the Colorado River (Rocky Mountain National Park), Gunnison River (Delta and Montrose counties), Piedra River (Archuleta County, Dolores River (Dolores County) and the Green River (northwestern Colorado) (Boyle 2006, CPW 2003). An unsuccessful reintroduction was attempted at Cheesman Reservoir on the South Platte River. For more information about this species see the *North American River Otter (Lontra canadensis): A Technical Conservation Assessment* prepared for Region 2 Species Conservation Project (Boyle 2006). An individual was recently documented on the Leadville Ranger District (CPW 2011) and suitable habitat is also present on other ranger districts in the Arkansas River watershed.

### Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*)

Rocky Mountain bighorn sheep are distributed throughout the mountainous regions of western North America from British Columbia and Alberta south to northern New Mexico and central Arizona. Their current distribution is confined to scattered populations in open or semi-open, often precipitous, terrain characterized by a mix of steep or gentle slopes, broken cliffs, rock outcrops, and canyons and their adjacent river benches and mesa tops. Slope steepness appears to be a significant feature of bighorn sheep habitat. They use slopes of 36 to 80% in Montana and Colorado, while avoiding slopes less than 20% (Beecham et al. 2007). Bighorn sheep are primarily animals of open habitats, such as alpine meadows, open grasslands, shrub-steppe, talus slopes, rock outcrops, and cliffs; in some places, however, they may use areas of deciduous and conifer forests, especially where openings may have been created by clear-cuts or fire (Beecham et al. 2007). Densely forested areas provide little forage and poor visibility and are rarely used by bighorn sheep, except for shade in summer, escape from insects, and protection from high winds on very cold days (Beecham et al. 2007). Open forests, however, are used in some areas for foraging and thermal cover (Beecham et al. 2007).

Seasonal use of different slopes and aspects results in a mosaic of plant communities and phenological patterns which provide foraging and security opportunities for bighorn sheep (Valdez and Krausman 1999). Visibility is an important habitat variable for bighorn sheep, so much so that the structure and height of vegetation are probably more important than composition of plant species because high visibility facilitates the detection of predators (Beecham et al. 2007). While bighorns feed in open areas, they are rarely found more than 400 meters from escape cover, where they have an advantage over most predators (Beecham et al. 2007). Talus slopes, rock outcrops, and cliffs provide habitat for resting, lambing, and escape cover (Beecham et al. 2007).

Mountain sheep are very gregarious and spend much of their life in groups, therefore transmission of diseases and parasites are important factors. Disease is probably the most important limiting factor affecting bighorn sheep, often causing large (over 50%) and sudden (under 12 months) declines (Shackleton et al. 1999). Major bighorn sheep population declines have occurred in North America since the late 1800's, often resulting from contact with domestic sheep and environmental stress (Beecham et al. 2007). Pasteurellosis also appears to be responsible for many large-scale die-offs.

Factors other than disease that influence mortality rates in bighorns may include inclement weather, inbreeding depression, poor maternal condition, poor mothering skills, human disturbance, and predators. At the root of these proximal mortality factors are those population and habitat conditions that lead to extreme birthing dates, poor range conditions, high population density, and the quality of escape cover (Hass 1989).

Strongholds within R2 are found in northwestern Wyoming and south-central Colorado (including the southern portion of the Forest). Colorado has the largest number of bighorn sheep in the U.S. (approximately 7,200 sheep). Although bighorn sheep numbers declined dramatically with the settling of the West and are currently at less than 10% of historic numbers, they are still considered somewhat secure throughout much of their range including in Colorado (NatureServe 2011). The southern portion of the Forest (Sangre de Cristo and Spanish Peaks on the San Carlos Ranger District) has been identified as a "*low risk area of extirpation*" in Colorado (Beecham et al. 2007) due to relatively large herd sizes and numbers, fairly good connective corridors and vegetation conditions, and others. Conversely, the northern portion of the Forest including northeastern Salida Ranger District and the eastern portion of the Leadville Ranger District have been identified as having a "high risk of extirpation" due to the presence of domestic grazing allotments (even though they are not currently stocked at this time), poor connectivity between several small herds among other factors (Beecham et al. 2007).

Many regional sheep herds are vulnerable because they consist of small numbers (often less than 100 animals while many biologists consider herds with less than 200 animals at risk due to extrinsic factors), are isolated from adjacent sheep populations (sometimes by large expanses of unsuitable habitat), and because many are threatened by disease transmitted from domestic livestock (Beecham et al. 2007). Threats to the long-term viability of bighorn sheep in Region 2 include diseases transmitted by domestic livestock, the lack of connectivity and/or loss of genetic variability (fitness) due to habitat fragmentation, habitat loss, increased human disturbance, competition with domestic livestock, and predation on small, isolated herds.

From the late 1800's through the mid-1900's, bighorn sheep populations experienced significant declines across their range as a result of diseases introduced from domestic livestock, unregulated and market hunting, habitat loss, and competition from domestic livestock. In the 1960's, many western states, including those in Region 2, began active bighorn sheep transplant programs in an effort to augment small, remnant sheep populations and to reintroduce bighorns into historic, but vacant, habitat. Factors associated with bighorn sheep declines included overgrazing by and competition with domestic sheep and cattle in the 1800's; introduction of domestic sheep diseases; unregulated hunting, including market hunting; habitat loss; competition from mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), and mountain goats (*Oreamnos americanus*); disturbance from mining, logging, oil and gas exploration, road construction, and other human related causes (Beecham et al. 2007). See the Region 2 Species Conservation Assessment (Beecham et al. 2007) for additional information: *Rocky Mountain Bighorn Sheep (Ovis canadensis): A Technical Conservation Assessment.* This species has been documented on every ranger district on the Forest.

### Townsend's big-eared bat (*Corynorhinus townsendii*)

Townsend's big-eared bats are found in a variety of vegetation types, but have specific roosting and hibernating requirements. According to Schmidt (2003), most accounts of their habitat focus on the requirement for suitable roosts including caves, mines, and rocky ledges and overhangs. It has been reported to use basal hollows of old-growth trees and is common in mesic habitats with coniferous and deciduous forests. Townsend's big-eared bats are extremely sensitive to roost disturbance, including loud noise but apparently are not negatively impacted by some commercial thinning (Schmidt 2003). In Colorado, this bat inhabits the rough, "*broken country*" vegetation typical of brush or open woodland at elevations up to 9,500 ft (Fitzgerald et al. 1994). Edge habitat seems to be a preferred habitat of some big-eared bats, primarily because it may be it is easier for them to feed where there are fewer branches to avoid while pursuing prey and it is able to discriminate insects at greater distances. These bats also glean insects from leaves, with a majority of their foraging occurring over water (Fitzgerald et al. 1994). The edge habitat also provides nearby cover and an abundance of moths for bats (Clark et al. 1993). This species has been documented on or near several ranger districts on the Forest.

## 3.0 ENVIRONMENTAL BASELINE

As defined under the ESA, the environmental baseline includes past and present impacts of all federal, state, and private actions in the action area; the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation; and the impact of state and private actions which are contemporaneous with the section 7 consultation process. Future actions and their potential effects are <u>not</u> included in the environmental baseline. The LRMP identifies past and planned FS activities on the PSI. In addition to the activities identified below, please refer to the LRMP for additional information regarding federal actions on the PSI. Many of these are ongoing activities that can be also considered as cumulative effects as well.

## 3.1 PAST AND CURRENT ACTIVITIES OCCURRING ON THE FOREST

Profound changes to the ecosystems conditions have occurred on the Forest over the past 150 years that can be attributed to both direct and indirect human impacts. Veblen et al. (2000) in assessing the historic range of variability of the vegetation of the PSI gave the following overview.

> *In the early settlement period (c. 1860-1910), extensive and unregulated timber harvest, increased fire ignitions from mining and other settlement activities, and intensive livestock grazing affected most of the Forest. Native Americans had much less intensive and extensive impacts on the landscape of the Forest. Although their influences on fire and game populations may have been ecologically significant, the magnitudes of these impacts were less than the changes wrought during the Euro-American settlement period. The impacts associated with Euro-American settlement created lasting legacies in the landscape including changes in forest structures and for some cover types that are clearly outside the range of historic variability. This is most evident in the montane zone where old (> c. 150 years) ponderosa pine and Douglas-fir forests have been nearly entirely replaced by younger stands or non-forest cover types.*
>
> *During the latter half of the 20th century, landscape scale patterns have been further altered by logging, road construction, and active fire suppression. In particular, logging and road construction have altered forest conditions so that they are probably outside the range of historic variability in terms of abundance of sharp edges and edge effects, smaller patch sizes [increased forest fragmentation], increased homogeneity of tree sizes and ages, reduced abundance of stands older than c. 150 years, and generally more abundant younger trees. In the montane zone, fire exclusion has had a demonstrable impact on stand and landscape structure, especially in the ponderosa pine cover type. Exclusion of surface fires from montane forests has been both intentional, as a result of active fire suppression, and indirect, as a result of fuel reduction and fragmentation by grazing, roads, logging, and other features that cause landscape fragmentation. Fire exclusion contributes to insect outbreaks and pathogen infection in the montane zone, but it has not been determined that modern levels of infestations are significantly outside the range of historic variability. In the sub alpine zone, the effectiveness and ecological consequences of modern fire suppression policy have been dramatically less than in the montane zone."*

The following is a further summary of specific activities that have occurred on the Forest that have affected TEPS species and habitats.

### 3.1.1 MINING

Historic mining activities have had one of the most significant impacts to wildlife species and it was largely responsible for shaping the landscape and the vegetation present today. Throughout the Forest and adjacent state and private lands, there are many mining claims and districts, many of which are still active today. During the mining boom in Colorado of the 1800-1900s, many backcountry locations contained railroads and established towns with year-round human settlements. Much of the Forest and surrounding region lies within the region commonly referred to as the "*Mineral Belt*" that has had active small- and large-scale mineral activities for a variety of locatable minerals including: placer gold, iron ore, manganese, molybdenum, tungsten, thorium, uranium, and gemstones, among others. Throughout the vicinity, there have been thousands of smaller mining operations on federal and private lands, producing millions of dollars of a variety of minerals. Many of these smaller operations utilized hand tools, sluice box, and small suction dredging operations for the extraction of free flowing gold in placer operations and other mineral extraction techniques for a variety of mining operations. Currently, there is still a significant

amount of mining activity taking place on mining claims throughout the Forest and there are many pits and trenches that remain unclaimed in some areas. Some of these unclaimed mines have been left by illegal and unpermitted mining activity, thus it is difficult, if not impossible, to control reclamation at those sites.

Much of the mature forests in this area were harvested and removed to support mining, railroad, and other related activities. Wildfires caused by miners also significantly changed these forests (e.g., tree ages, species composition, etc.) which altered wildlife habitats for many species as well. Much of these forests were harvested for mining timbers, fuelwood, and charcoal. Snags and CWD that provided important habitats were also removed for fuel with many of the large diameter trees harvested. Roads were built to access these operations that have fragmented the landscape, increased human disturbances to wildlife, increased erosion and sediment into streams, and impacted habitat throughout the Forest. Roads have facilitated the spread of invasive species and noxious weeds, which have changed species composition of the Forest, increased competition with native plant species, and altered fire regimes, which all have adversely affected many of the plant and wildlife species addressed here.

Mining caused destruction of upland and riparian habitats from the leaching of heavy metals in to streams changing stream pH, erosion, sedimentation into streams, and weed invasion (Brock and Green 2003). Mining pollution has also has seriously degraded some streams and stream segments. Water contamination by runoff from mining can be particularly lethal to amphibians and lethal to many other aquatic and even terrestrial organisms. Diana and Beasley (1998) showed that a diverse array of mining byproducts, such as mercury, cadmium, lead, acidification, aluminum, zinc, iron, and copper, are deleterious to various amphibians. These chemicals can cause increased mortality as well as malformations in a variety of fish and wildlife species, particularly aquatic life. In addition to indirect effects from runoff, large areas have been directly impacted by the large mining operations where vegetation and habitat has been removed, displacing many species for a number of years until habitat components redevelop, although this process may be extremely slow. Activities associated with mining typically include haul roads or railroads that can indirectly cause substantial impacts to animal behavior and migration routes, increased sedimentation, introduction of noxious weeds, etc. (see *Roads* section below for additional discussion). Succession of abandoned mine spoils may take tens to hundreds of years to recover (Ogle and Redente 1988) and will impact these species in the long-term. Some abandoned mine sites potentially benefit some wildlife species such as bats that may use them as roost sites and hibernacula and other species that may use rock piles, ponds, and restored mine lands that can create habitat and provide forage areas to attract wildlife species (National Research Council 1999). Each of the above activities has incrementally impacted wildlife species directly, indirectly, and cumulatively through habitat loss, fragmentation, and loss of effectiveness. Under the General Mining Act of 1872, the Forest has limited ability to regulate mining activities and cannot prohibit the discovery or development of minerals; however, the Forest has the authority to protect surface resources on unpatented mining claims located on Forest lands.

### 3.1.2 RECREATION

Approximately 84% of the recreation use on the Forest occurs within the Roaded Natural, Rural, and Urban classes (LRMP). The remaining 16% takes place in Primitive and Semi-primitive classes. Where resources attract intensive recreational use (i.e., developed recreation such as the Monarch and Ski Cooper ski areas) major investments in recreational facilities and visitor assistance has been made. Specific management direction for these areas is to provide for resource protection and for public health, safety, and enjoyment. Both primitive and semi-primitive recreation use occur in Roaded Natural settings which include scenic drives, highways, timber harvest areas, and adjacent lands. Because Roaded Natural areas are located on relatively gentle terrain with abundant access, most of the total acreage is usable by recreational activities.

Historically, recreation use on the Forest and adjacent BLM, state, and private lands has fluctuated dramatically, although it has increased substantially over the past two decades. Use has increased and is expected to continue this trend because of expanding populations in the Front Range cities (e.g., Denver, Colorado Springs, and Pueblo). Motorized touring (e.g., automobiles, four-wheeled drive vehicles [OHVs], and snowmobiles) is the most prevalent recreational activity on the Forest, followed by camping, hiking, mountain biking, mountain climbing, and other activities such as fishing, hunting, rock climbing, and horseback riding. On the national level, OHV usage has risen substantially. The number of people who reported engaging in OHV activities rose by 8 million individuals between 1982 and 1995, and an increase of 16% nationally is anticipated during the next 50 years (CNHP 2011). OHV use can negatively impact conditions in riparian areas through damage to riparian vegetation and stream banks, leading to increased sedimentation. Recreation activities have greatly influenced the travel system throughout the Forest Trails and user created new routes that have become established over time (and eventually viewed by the public as system roads or trails) have impacts to wildlife and plant populations by fragmenting and decreasing habitat effectiveness and capability within the Forest.

Effects of past and ongoing recreation activities on TEPS species vary and depend on the type of activity as well as the species affected. Cole and Knight (1991) identified four ways in which recreational activities can impact animals:

1. harvesting animals
2. habitat modification
3. pollution and
4. noise disturbance or human presence

Recreational activities have the potential to contributing to each of these to varying degrees. Harvesting wildlife has been purported to affect age and sex ratios, alter birth and death rates, influence behaviors, and alter habitat usage (Batcheler 1968, Douglas 1971). Impacts to habitats and species has also occured from passive recreation, both in the short- and long-term as shown below (adapted from Miller 1994 and Cole and Knight 1991).

***Short-term impacts of recreation and examples:***

- *Habitat – trampling (soil compaction, change in soil microenvironment and soil structure, vegetation, and subnivean habitats [e.g., the gap between the surface of the ground and/or between logs and the ground surface]) of riparian habitats*
- *Habitat – reduced vigor of plants within riparian areas*
- *Habitat – removal of instream habitat structure, including rocks, large instream wood, CWD in the riparian corridor, sedimentation, and loss of bank stability*
- *Species – behavioral change (shift in foraging areas and increased stress)*
- *Species – death (crushing from vehicles, trampling, and attacks from domestic pets)*

***Long-term impacts of recreation and examples:***

- *Habitat – continued and increase in disturbance tolerate species (non-native exotic plant and animal species) such as Kentucky bluegrass, dandelion, pussytoes, etc.*
- *Habitat – reduced biological integrity (changes in plant species composition)*
- *Habitat – loss of species diversity (disturbance intolerant species disappear – replaced by tolerant species)*
- *Habitat – loss of riparian and streamside vegetation, also resulting in the loss of stream shading and cover*
- *Species – altered behavior (abandonment of foraging areas or attraction to areas providing unnatural characteristics such as food wastes)*
- *Species – altered vigor (continued disturbance to animals physically stressed – may abandoned breeding attempts to insure their own survival*
- *Species – shift in species composition (disturbance/human intolerant species may replace disturbance/human intolerant species)*
- *Species – decreased biological integrity (habitat or food generalists such as some predators may replace habitat or food specialists*
- *Species – altered productivity (low reproductive success due to changes in predator assemblage or densities)*

Another way that wildlife has been affected by recreational activities is from human presence and noise disturbance. Disturbance can be intentional (i.e., harassment or hunting) or unintentional. Unintentional disturbance may include such things as attempting to photograph wildlife, naturalists viewing nesting birds, hikers crossing an animal's territory. When one sees wildlife fleeing from human encounters along trails or roads, the reproductive success or elevated heart rates in animals are not as apparent, but are real. Behavioral responses alone however are inadequate indicators of acute stress in bighorn sheep (MacArthur et al. 1982) and other species (Baldock and Sibly 1990) because various stimuli, including disturbance by humans, elicit heart rate changes even in the absence of overt behavioral responses. The perception that "*passive*", non-consumptive recreation has no significant environmental impact is unfortunately misconceived (Miller 1994). Factors that influence responses are the type of activity, timing, location, frequency, predictability and characteristics of wildlife being disturbed (Cole and Knight 1991). Each are discussed below.

- **Type of activity** – different activities may elicit different responses; however, they may not be different impacts. The context in which a particular activity occurs may also influence wildlife response.
- **Timing and duration** – disturbance at any time of year can affect an animal's fitness; however, they are more sensitive during the breeding and winter seasons. For example, disturbance during the incubation period for birds and denning period for mammals results

in higher reproductive failure and other periods. Disturbances can cause adults to temporarily leave their nest or den, increasing young to environmental factors, stress, and predation. Outside of the breeding season animals still respond to disturbance, thereby potentially reducing energy acquisition (foraging) or increasing energy expenditure (feeing and elevated heart rates) (Owens 1977, Stalmaster 1983).

- **Location** – the spatial context in which disturbance occurs can influence the response shown by wildlife because of the degree of threat or security posed by the spatial arrangement. For example, bighorn sheep and raptors such as eagles showed stronger reactions to hikers and other human activities approaching from above than from below (Hicks and Elder 1979). Animals also appear to feel safer when they have greater open distances between themselves and potential impacts.
- **Frequency** – the number of disturbance bouts that occur during the time interval can influence wildlife responses. For example, birds whose nests were disturbed frequently had lower reproductive success than those visited infrequently (Bunnell et al. 1981). There appears to be thresholds of disturbance frequencies where measurable wildlife responses occur. Regular or consistent disturbance along highways may result in some wildlife to become habituated; however, if there is infrequent or irregular traffic, then negative responses may occur.
- **Predictability** – when disturbances are predicted to be benign, it causes little response. Disturbance which appears to be threatening (e.g., active persecution), albeit predicable, would result in a different type of response from wildlife. For example, some wildlife habituate to highways and high volumes of traffic if there is no threat, but if cars stop (like to photograph wildlife), a negative response can occur.
- **Characteristics of wildlife being disturbed** – the number, composition of wildlife groups and individual differences/tolerances among individuals may influence the response to disturbance. For example, animals feeding in groups respond to approaching threats at greater distances than solitary individuals (Owens 1977, Madsen 1985). Individuals in these groups have different tolerances to disturbances. Age and sex also may influence wildlife responses by recreationists. Nutritional state of animals can also play a role in response rates. Lastly, intra- and inter-specific responses to disturbance have both innate and learned components. For example, peregrine falcons in New Mexico showed a 22-fold difference in the distances at which they responded to similar stimuli (Johnson 1988) and Suter and Joness (1981) reported a 45-fold difference in flushing distances among three raptor species. Learned components have been attributed to the number and outcome of interactions between individuals and stimuli over the individual's lifetime (Knight and Temple 1986). That is, increased avoidance and negative reactions increase with negative encounters.

If animals are disturbed while performing essential behaviors, such as foraging or breeding, that population will likely decline (Cole and Knight 1991). The recreation activities have affected TEPS species primarily through disturbances. Displacement is an animal's immediate response to disturbance. This can have negative effects, especially to species with low tolerances to humans, or species with limited distribution or mobility. For example, the flight distances and return intervals for a given species following disturbance is unknown for most species. It is known that repeated or intensive disturbance can lead to long-term effects on distribution, abundance, demographics, species composition and interactions by altering behavior, vigor, and productivity (Knight and Gutzwiller 1995). Although the direct effect may be displacement of individuals, there may be

additional indirect effects as well. Additional stress may occur during periods when animals are already stressed, for example, during periods of low food supplies, winter periods with increased competition or limited foraging habitat. For example, snowmobile use can also result in mortality, habitat loss, and harassment of wildlife (Bury 1978). Snowmobiling occurs during the winter, when animals may be stressed by climate and food shortages and could influence survival of wildlife. Studies of snowmobile effect on white-tailed deer (*Odocoileus virginianus*) showed significant displacement and increased movement of deer (Dorrance et al. 1975). Other examples include elk preferring to be at least one-half mile from people engaged in out-of-vehicle activities such as camping, picnicking, fishing, and harvesting timber (Ward 1973) and other recreational activities. Additionally, he found that elk moved to densely timbered and remote areas during hunting seasons.

Human activities have in the past and continue near breeding areas at critical periods of the nesting/denning cycle may also cause reproductive failure from interruption of breeding behavior, nest/den abandonment, or inability of adults to feed juveniles when kept away from the nest or den (Knight and Gutzwiller 1995). Disturbance during the breeding season can cause denning carnivores may move young to a new den location following disturbance, resulting in increased exposure to predators and increased stress to females and their young. Some outdoor recreational activities (e.g., OHV, motorbike use/racing, snowmobiling, jeep tours, etc.) may disturb wildlife species. Noise disturbance during the breeding season may affect productivity; disturbance outside of this period may affect the energy balance and therefore survival. Wildlife may respond to noise disturbances during the breeding season by abandoning their nests/dens or young (Cole and Knight 1995). It has also become apparent that disturbance outside of a species' breeding season may have equally severe effects.

When an animal is displaced, it moves into adjacent suitable habitat if possible and if not occupied by other species. However, little study has been done on how animals redistribute themselves if adjacent habitat is occupied. Territorial species may need to move long distances to find suitable unoccupied habitat if their existing territory becomes unusable. Displaced animals, especially juveniles, may be more susceptible to predation while fleeing or in unfamiliar areas.

Tolerance of human (anthropogenic) activities varies both intra and inter specifically. Some species or individuals of a species may be very tolerant of humans while others are highly sensitive to these disturbances. The type, duration, and intensity of human activity also play an important role in the impact on a particular species. Hunting, snowmobiling, skiing, snowshoeing, camping, etc. can displace animals from an area for a short period of time, or longer if the activity is sustained. The flight or flushing distance varies for different species. Human behaviors, the predictability of the disturbance, the frequency, magnitude, timing, and location of the activity all have an influence on how animals react (Knight and Gutzwiller 1995). Therefore, it is important to look at recreation use patterns and other activities that are occurring over a larger area in conjunction with this permit. Noise can affect animals by disturbing them to the point that detectable change in behavior may occur. Such behavioral changes can affect their activity and energy consumption (Bowles 1995). Dangerous or unfamiliar noises are more likely to arouse wildlife than harmless and familiar noises. Habituation is the crucial determinant of success in the presence of noisy disturbances. Exposures of some experienced birds to frequent or expected activities may produce no or minimal losses of some species (Black et al. 1984). The habituation process can occur slowly, so it may not be detected in the short-term. In the long-term, some wildlife may become more tenacious and less

responsive in the presence of human disturbance if they are not deliberately harassed. Knight and Gutzwiller (1995) found responses to noise disturbances and habituation in nesting birds become more tenacious and less responsive in the presence of human disturbance if they were not deliberately harassed.

Recreational use is high at all times of the year throughout many areas of the PSI – depending on activity and location. Winter recreation occurs at developed and undeveloped areas. For example, the Monarch and Ski Cooper areas and several snow play areas are present in many mountain pass areas on the Forest. There are numerous recreation special events SUPs that are occurring – either annually or periodically on the Forest as well. There are also many developed recreation sites such as campgrounds, picnic areas, and other sites. Table 3 below indicates the number of people that are estimated to use these facilities on only four of the six ranger districts on the Forest. Each of the above activities have incrementally impacted many wildlife species directly, indirectly, and cumulatively through habitat loss, fragmentation, harassment, and loss of effectiveness through short and long-term human disturbance.

**Table 3.** FS developed sites listed in the LRMP (1984) on 4 of the 6 ranger districts on the Forest and PAOT (people at one time capable of occupying an area which is equal to 5 persons per family unit) for campgrounds and picnic grounds – other sites vary) (Forest Service 1984).

| District | Campgrounds | | Picnic | | Other | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Sites | PAOT | Sites | PAOT | Sites | PAOT | Sites | PAOT |
| Leadville | 13 | 2,455 | 4 | 285 | 18 | 1,352 | 35 | 4,092 |
| Salida | 13 | 1,365 | 2 | 195 | 10 | 585 | 25 | 2,145 |
| San Carlos | 12 | 1,265 | 4 | 440 | 7 | 670 | 23 | 2,375 |
| South Platte | 23 | 1,748 | 9 | 257 | 4 | 407 | 36 | 2,412 |
| **TOTALS** | 61 | 6,833 | 19 | 1,177 | 39 | 3,014 | 119 | 11,024 |

**Table 4.** Active winter sports areas on the Forest and level of use as listed in the LRMP (Forest Service 1984).

| Areas | SAOT [1] Capacity | Visits [2] | RVD [3] | Max Capacity in RVD [4] |
|---|---|---|---|---|
| Ski Cooper | 2,500 | 46,132 | 23,066 | 187,500 |
| Monarch | 3,000 | 140,000 | 70,163 | 237,000 |
| **TOTALS** | 5,500 | 186,132 | 93,229 | 424,500 |

*([1] capacity in skiers at one time (SAOT); [2] visits are from 1983-84 lift ticket sales; [3] recreation visitor days – equals one visitor for 12 hours [the average length of stay at a ski area is considered to be 6 hrs or 0.5 RVD]; [4] theoretical capacity presumes a maximum SAOT at 7 days per week and a 150 day season, except that a 160 day season for Monarch)*

Recreation activities have also greatly impacted wildlife habitats throughout the Forest. Hundreds of miles of motorized trails and roads occur on the Forest. Increased use of four-wheel drive vehicles, all-terrain vehicles, and motorcycles (OHVs) for recreational use has resulted in an extensive “user-created” network of travel routes (non-system routes). These new routes become more established over time and eventually are viewed by the public as roads or trails; thereby increasing their use. The creation of new routes has increased harassment of animals and decreased habitat effectiveness and capability on the Forest.

There are several major non-motorized trails, including portions of the Colorado Trail, Continental Divide National Scenic Trail (CDNST), and others on the Forest. There are hundreds of miles of non-motorized trails and roads on the Forest. For example, based on trailhead register data and estimates by the Forest recreation staff, approximately 17,500 people used the Colorado Trail and 16,500 people on the CDNST in 2008. Recreationists used these trails for hiking, backpacking, mountaineering, cross-country skiing, snowshoeing, etc.. Since many people choose not to register at FS trailheads, true user numbers and use are likely much higher. Many people utilize extensive road networks (both system and non-system) to walk their dogs, run, bike, hunt, target shoot, drive four-wheel vehicles, cross-country ski, and snowmobile. For example, as shown on Table 5 below, permitted outfitter and guide (O&G) use on these two popular trails on the Forest is minor compared to general public use (approximately 4% of the total estimated use on the Colorado Trail and 12% of the CDNST).

There are several Wilderness Areas on the PSI. Use within these areas is restricted to non-motorized recreation only. Mountain climbing such as climbing the numerous 14,000 ft. peaks on the Forest are very popular activities during the summer. Hundreds of recreationists typically visit many "14'ers" each week – particularly on weekends causing habitat destruction of sensitive alpine habitats, and harassment of alpine wildlife species.

A substantial amount of public recreation currently occurs within the Forest. For example, unlike permitted/authorized special use permits (SUPs) such as O&Gs, public snowmobile use is essentially unrestricted over the entire Forest (outside of Wilderness Areas). This increases in orders of magnitude the impacts from snow compaction, noise disturbance, and numerous other impacts from these and other recreation activities on these species. For example, on a typical winter weekend recreation use in several highly recreated mountain passes represent a substantial amount of use by the public. To illustrate this, Table 5 shows the high percentage of overall public recreation use on several mountain pass areas on the Salida Ranger District. This amount and type of use is similar for other ranger districts on the PSI.

**Table 5**. An example of permitted (O&G) versus public winter use on the Salida RD estimating typical use (in service days) during the winter (total use) and on a typical weekend in the winter in areas of concentrated use on four mountain pass areas.

| Use Area | Total Use | Average Weekend Use | Percent of total |
|---|---|---|---|
| **Marshall Pass[1]** | | | |
| O&G | 750 | 25 | 20 |
| Public | 3,000 | 100 | 80 |
| **Monarch Pass/Fooses Creek[1]** | | | |
| O&G | 2,230 | 70 | 50 |
| Public | 1,800 | 60 | 50 |
| **Cottonwood Pass and Upper South Cottonwood Watershed[1]** | | | |
| O&G | 800 | 10 | 10 |
| Public | 3,500 | 200 | 90 |
| **Upper Chalk Creek Watershed (Tin Cup/Hancock)** | | | |
| O&G | 255 | 20 | 10 |
| Public | 6,000 | 130 | 90 |

Big Game hunting - Hunting on the Forest, BLM, state, and private is a popular recreational activity. There are multiple seasons occurring for approximately three months during the fall including a variety of hunting methods for a variety of wildlife species. Hunters typically either stay in nearby motels in the vicinity, or camp in campgrounds or dispersed areas. Hunters typically travel Forest roads, trails, and cross-country travel using 4X4 trucks, OHV, foot, and horses/mules. This use results in harassment of animals and decreased habitat effectiveness and capability on the Forest. Hunting seasons vary by species and method, but typically start in late August and end in January when many animals are stressed.

Fishing - There are hundreds of miles of streams and hundreds of alpine lakes on the Forest, including several lower elevation lakes and reservoirs. Larger lakes provide boating and fishing recreation throughout the summer months, while the smaller lakes and streams provide fishing and other recreational opportunities for Forest users. CPW actively stocks many of these lakes with a variety of fish species. Hatchery stocking and recreational angling have contributed significantly to the presence of whirling disease on the Forest, lethal to most native and nonnative trout species. Nonnative brook have been stocked and are present in most streams throughout the Forest. The presence and competitive advantage brook trout have over others fish species was a primary factor in the federal listing of greenback cutthroat trout as a threatened species under the ESA. Fishing in and adjacent to the Forest is a popular recreational activity that has remained relatively stable at approximately 267,000 recreational days annually (G. Policky, CPW Fisheries Biologist, pers. comm. 2003). Use on the Forest is highest on larger lakes and approximately 90,000 recreation days on small named and unnamed streams, and approximately 32,000 recreation days on high elevation lakes. Other popular fishing areas occur off the Forest, including the nationally recognized Arkansas River which attracts large numbers of anglers annually. CPW has had an active stocking program in alpine lakes and larger lakes on the Forest which has resulted in increased fishing use. As with hunters, many anglers typically either stay in nearby motels in the vicinity of the Forest, or camp in campgrounds or dispersed areas throughout the Forest. Forest roads are used to access these areas which increase harassment of animals and decreases habitat effectiveness and capability on the Forest.

### 3.1.3 ROADS

Roads have facilitated the spread of invasive and noxious weeds which have changed species composition of the Forest, increased competition with native plant species, and altered fire regimes which has adversely affected many plant and wildlife species addressed here. For dispersed recreation, many people utilize the extensive roads network (both system and non-system) to walk their dogs, run, bike, hunt, target shoot, drive four-wheel vehicles, hunt, cross-country ski, and snowmobile. Many roads were primarily built for timber harvesting, mining, homesteading residential development, administering grazing operations, and recreational development. These activities have fragmented the landscape, increased human disturbances to wildlife, and removed or impacted habitat throughout the Forest. These activities have directly affected species addressed in this assessment. Many roads are located in low-lying areas adjacent to watercourses because of the gentler terrain. The location of these roads is problematic for several reasons. Roads impact aquatic systems in complex ways including blocking fish passage, introducing fine sediment and nonnative species, damaging riparian vegetation necessary for channel stability, altering the amount

of shading and cover, direct channel infringement and increasing access and predation by anglers (Switalski et al. 2004). Roads have directly and indirectly degraded aquatic habitats throughout the Forest. Traffic volumes on most roads have risen steadily over the last 15 years and are projected to continue growing. High traffic volumes and speeds can impede the movements of numerous wildlife species due to mortality and perceived disturbance by animals.

Roadsides are preferred sites for colonization of invasive plants (noxious weeds) that can affect TEPS species in the short and long-term. In particular, Brock and Green (2003) state once invasive plants (noxious weeds) enter an ecosystem, there can be drastic changes. Most human-induced erosion on the Forest is related to ground disturbing activities, such as road and trail construction and maintenance, which have negatively impacted riparian and aquatic habitats. Vitousek et al. (1996) consider invasive plants to be one of the six factors indicating global environmental change, along with changes in atmospheric carbon dioxide, biogeochemical cycles, persistent organic compounds, land use and cover changes, and harvesting of natural populations. Invasive species are often more aggressive in sequestering nitrogen or water than native species. Often, colonization by invasive species results in fragmentation of habitats, which reduces ecological networks in the native communities and puts more stress on rare and endangered organisms. Invasive vegetation alters the composition or the structure of an area and changes ecosystem function. A change from diverse plant communities to lower diversity or a monoculture results in a change of energy flow and the food web. With the loss of biodiversity, there is often a change in physical aspects of watersheds such as changes in surface hydrology, regeneration of ground water, and changes in fire regimes. The extinction of native species and changes in ecosystem processes and functions, such as food webs, water yield in quantity and quality, and protection of soil resources, are results of these plant invasions.

As mentioned above, increased use of OHVs for recreational use over the past couple of decades has resulted in an extensive “user-created” network of travel routes (i.e., non-system routes). These new routes become established over time and eventually are viewed by the public as system roads or trails; thereby increasing their use. The creation of new routes has decreased habitat effectiveness and capability within the Forest in the short and long-term that has affected habitat use patterns and distribution of many wildlife species due to increased disturbance levels of animals. Plants and animals are disturbed by human action, especially concentrated recreation sites and along roads and trails. Concentrated recreation areas can also be sites of invasion by undesirable plants (noxious weeds). Recreation may interfere with biotic communities by causing habitat fragmentation and animal disturbance, which may negatively influence animal behavior (Brock and Green 2003). Roads have facilitated the spread of invasive and noxious weeds, which have changed species composition of the Forest, increased competition with native plant species, and altered fire regimes, which has adversely affected many plant and wildlife species addressed here.

Each of the above activities have incrementally impacted many fish, wildlife, and plant species addressed in this assessment directly, indirectly, and cumulatively through fragmentation, habitat loss, harassment of animals, and loss of effectiveness through human disturbance.

### 3.1.4 SPECIAL USE PERMITS

A variety of special use permits (SUPs) occur throughout the Forest including: right-of-ways (e.g., water and gas pipelines and overland electronic transmission lines) and a variety of temporary and long-term recreational and non-recreational activities and special events. The Forest includes the headwaters of the Arkansas River, South Platte River, and other sub-watersheds, providing municipal water supplies for Front Range cities and agricultural uses (e.g., Antero Reservoir). There are also hundreds of small- to large-scale recreational and non-recreational special uses (e.g., single residence powerlines, waterlines, road access permits, etc.) within the Forest. These activities and facilities have caused habitat loss and degradation, habitat fragmentation, mortality, human disturbance, snow compaction, and restriction of movement across the landscape; all of which have directly and indirectly affected species.

### 3.1.5 WILDFIRES AND PRESCRIBED FIRES

Except for changes in climate, wildfires historically had the largest single impact in shaping the ecology of Front Range forests prior to Euro-American settlement. Whether lightning-caused, started by native peoples, unintentionally or deliberately set by settlers, wildfires were a frequent event over much of this area. Major consequences of such frequent fires were the maintenance of a relatively open forest structure in many mid-elevation forests, the prevention of tree encroachment into mountain meadows and grasslands, and in some areas the replacement of forested land with grassland, savannah, and other fire-adapted shrub communities such as oak (*Quercus gambellii*) or mountain mahogany (*Cercocarpus montanus*) over the landscape.

Historically fire has been a frequent and major ecological factor on the Forest and adjacent lands. Fire regimes are based on fuel type and condition, ignition sources, topography, and the weather at the time of ignition. Fire exclusion efforts in the past 100 years or so, combined with other land-use practices have in many places dramatically altered natural fire regimes so that present day fires tend to be larger and more severe, having substantial effects to the ecosystem and species dependent on them for survival. Significant fire suppression efforts over the past century have led to increased fuel loading and canopy closure in some, but not all areas where the fire return interval is typically longer than 100 years. Fuel build up is perhaps one of the biggest contributors to current trends of larger and more catastrophic wildland fires. It is widely believed that fuel loading over much of the west is currently outside the historical range of variability (HRV). HRV considers: (1) the range and variation in characteristics of the “natural” regime; (2) “natural” regimes are considered to be the period prior to Euro-American settlement with climate similar to current; and (3) generally described by the average, minimum, maximum, and median for a 300 to 400 year time period. The historic fire regimes have changed dramatically since settlement suggesting that fuel amounts may have contributed, increasing the fire return intervals, which were once very short in some forests such as ponderosa pine. Widespread and intensive livestock grazing played an important role in removing fine fuels that carried frequent, surface fires; roads and trails broke up the continuity of forest fuels and became barriers, further reducing fire frequency and size. Fire suppression beginning in the early half of the twentieth century by settlers and land management agencies also played a major role in the cessation of these frequent, natural fires. Forests with historically frequent, low intensity fires in ponderosa pine forests have been most affected with shifts in forest structure and historically unprecedented increases in tree density (Brown et al. 1999).

Fire suppression over the past century prevented natural thinning of conifer stands and limited tree growth. Some of these stands are now relatively homogenous and may be somewhat more susceptible to increased levels of insect and disease populations and tree mortality that have created snags/CWD where they have not been salvaged. These forests are generally denser and have a higher canopy closure, which have benefited some species and adversely affected others that require more open, less dense areas. Other forests, such as spruce, lodgepole pine, and others have longer fire return intervals and they have not been as affected by fire suppression activities, thus wildlife species using those areas have been impacted to a lesser degree. Fewer snags were created as a result of fire suppression and many existing snags have been harvested for fuelwood. These activities combined to produce a forest that has smaller trees, less structure (snags and CWD), less species diversity, and a low stand age diversity in many areas than occurred pre-settlement. Because of the exclusion of fire as a disturbance agent many aspen stands and grasslands on the Forest now have encroaching conifers as successional processes continues.

Most fires on the Pike National Forest have been small in recent history. Since 1994, the Forest averaged approximately 70 fires per year, burning an average of 135 acres annually. Most (97%) of the fires are 10 acres or less (D. Page, USFS Fire Management, pers. comm. 2012). Approximately 64% of all fires are natural ignitions, with the remainder (36%) being human caused. However, three large fires (Hayman-2002, Buffalo Creek-1996, and High Meadows-2000) account for approximately 94% of the total acres burned. Large and catastrophic fires have occurred on the Forest in recent years, including the largest fire recorded in Colorado history, the Hayman Fire, in 2002 (Graham 2003). Although fires of this magnitude are not common on the Forest, a fire this severe and large can have profound effects on the landscape. The Hayman fire burned over 138,000 ac of varying severity, primarily in the South Platte River watershed. Depending on its severity, a fire of this magnitude and intensity can cause large-scale direct and indirect impacts to wildlife, soil properties and runoff, erosion, terrestrial and aquatic habitats, forest structure, and native species composition. Although extreme weather events play a large role in fire severity and growth, it is thought that catastrophic wildfires, such as the Hayman Fire, are the result of increased fuel loadings in post-settlement forests and changes in climate, particularly in certain forest types that historically experienced frequent fires of low intensity (i.e., ponderosa pine forest types) (Covington and Moore 1994, Grissino-Mayer and Swetnam 1999, Schoennagel et al. 2004). However, local fire history studies (prior to settlement) have shown that the size of the Hayman Fire was not unusual during extremely dry summers; however the patterns of fire severity were unlike the patterns in pre-1900 fires (Romme et al. 2003).

Prescribed fires change wildlife habitats within the Forest and adjacent areas. Prescribed fires are used alone and with other management activities to restore or maintain desirable plant community attributes, as well as important ecological processes. Prescribed fire is used as a tool to enhance ecosystem resiliency and to maintain desired fuel levels. Projects within the Forest and nearby BLM, state, and private lands have included broadcast burning as well as slash and pile burning to reduce fuel loading. Over the past few years, fuels management activities on the Forest treated approximately 6,000-8,000-ac forest-wide, using a combination of both mechanical and prescribed fire treatments. These projects typically include an emphasis on fire-risk reduction in and around human communities and hazard fuel reduction to reduce the risk of crown fires, and larger projects with a goal to enhance resilience and sustainability of ecosystems. Prescribed fire may, however,

burn too cool or outside of the normal (historic) fire season that may lead to changes in species composition and encourage growth of invasive and noxious weeds, which may adversely affect many species addressed here.

### 3.1.6 TIMBER HARVEST

To better understand current forest conditions, it is critical to see how these communities developed, and why they look as they do today. Profound ecological changes have been well documented by past and ongoing anthropogenic activities in forests across the PSI – particularly lower elevation montane forests. Widespread burning (discussed above) and logging in the late 1800s is responsible for many of the young, even-aged stands that we see on the Forest today. Similarly, other activities such as livestock grazing (discussed below) in the late 1800s and early 1900s facilitated vast increases in tree density in some former grassland and other areas. Historical logging has generally exacerbated changes such that logged forests now bear little resemblance either to modern unlogged, fire-excluded forests or to contemporary, fire-maintained counterparts (Naficy et al. 2010). The synergistic effects of these practices have resulted in denser forests, consisting of mostly smaller trees, reductions in fine fuels, higher accumulation of ladder fuels and forests at higher risks of larger-scale, stand replacement fires (Bock and Block 2005). In addition, fire exclusion of these forests has led to changes in forest composition, and in many area conifers are encroaching upon open meadows and parks converting them into forests.

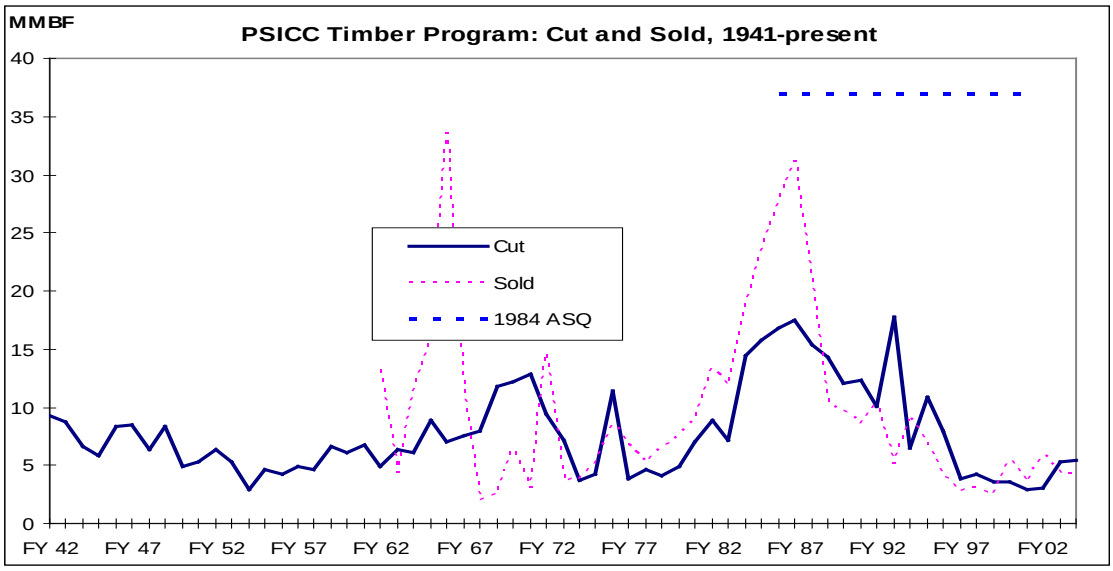
**Figure 7.** Dense forests that have developed as a result of past management practices such as logging, removal of large trees, grazing, fire suppression, etc.

Because of historical selective harvest targeted at cutting and removing bigger more economically valuable trees, fewer older forests with large trees exist today throughout the Forest. In addition, fire management practices and fuelwood harvesting of larger-diameter snags (the most important biologically to wildlife species) are now even less abundant in present-day forests. The effects of removing these older trees and snags are long lasting. These practices also do not allow trees sufficient time to become large live trees, snags, and downed logs (Reynolds et al. 1992).

As stated above, many stands in the Forest are denser, have fewer older successional and larger trees and snags, and they are more homogeneous in tree age and size than what occurred prior to settlement by Euro-Americans because of recent and past management practices. Trees older than 150 years at both the landscape and project area scale are dramatically less than what occurred historically. The accessibility of lower elevation forests on the Forest facilitated the removal of virtually all of the larger and older trees from these stands which has resulted in substantially less structural diversity in these stands (Veblen et al. 2000, Veblen and Donnegan 2005).

Historically, the amount of timber harvesting on the Forest and nearby lands has fluctuated dramatically since it was established. There were four general periods with relatively high volumes of timber harvested on the Forest (Figure 1). The first period was during the 1880's to 1910's, during the mining boom when the area was first being settled. In addition, with increased accessibility of the region by railroads, greater numbers of people were also lured into the region, resulting in increased demands for timber products. Vast areas of the Forest including those within the analysis area were harvested to support mining activities, including charcoal operations, and timbers needed for mining, railroad expansions, housing, furniture, fuelwood, and other needs. Much of the more accessible areas were initially high-graded, with the most valuable trees harvested first, and then as supplies dwindled, smaller lower valued trees were harvested. Harvest levels decreased, then increased again during World War II with primarily clearcuts in spruce-fir forest to support a number of local lumber mills in the area. During 1939 to 1952, there was an extensive spruce beetle (*Dendroctonus rufipennis*) outbreak, which affected old-growth spruce and fir. Some of these trees were salvaged during this time. The third and fourth periods of relatively high timber harvest activity came during the 1960's, and again in the 1980's, as a result of increased fuelwood and salvage sales. Harvest methods varied from selective harvests such as shelterwood, and selection cuts, to relatively small clearcut harvests. Roads constructed to access these areas have facilitated the spread of invasive and noxious weeds, which have changed species composition of the Forest, increased competition with native plant species, and altered fire regimes, which has adversely affected many TEPS species addressed here.

**Figure 8.** Timber harvest activity on the PSICC from 1941-2001. (Source: PSICC).




Over the past two decades, timber harvest levels has averaged about 5,000 ccf (1 ccf=1,000 cubic ft) over approximately 1,100 ac per year on the Forest. Timber harvesting on adjacent BLM, state, and private lands has occurred at approximately similar levels as those on the Forest, in response to market fluctuations, fuel reduction efforts, and insect outbreaks. Elevated mountain pine beetle (MPB) (*Dendroctonus ponderosae*) populations in Colorado in recent years have resulted in increased ponderosa pine mortality, which many wildlife species rely heavily on for food and shelter. As a result, several salvage sales, fuel reduction timber sales, and fuelwood sales have been completed on the Forest. MPB infestations have periodically occurred in ponderosa pine and other

forest types historically on the Forest, and have been at high levels in portions of the Forest over the past several years. In addition to MPB, Ips beetle (*Ips confusus*) infestations in piñon pine are also increasing on the Forest, partially as a result of recent drought conditions and overcrowding making them more susceptible to infections.

Romme et al. (2006) states that perceived current "*epidemics*" of MPB observed today may in fact be well within the historical range in variability and Colorado, and the Rocky Mountains have coexisted with these native bark beetles and defoliators for thousands of years. They found that there is no evidence to support that current levels are unnaturally high, as similar outbreaks have occurred in the past. They identified four complex and interactive ecological factors that control insect populations such as MPB in Colorado, thus affecting species that rely on these habitats.

1. Long-term drought, which stresses trees and makes them more vulnerable to insects;
2. Warm summers, which further stress the trees and may accelerate growth of insects;
3. Warm winters, which enhance survival of insect larvae; and
4. Abundant food (trees) for insects in Colorado's extensive and often dense forests.

Brown (2000) briefly describes natural ecological processes and disturbance events within dry forest types (present within the project area) which are applicable here. He states, "*Periodically, small groups of older trees were killed by bark beetles and, often after falling, would be consumed by fire. This would leave exposed mineral soil and an opening in the canopy, ideal conditions for establishment of a group of young pine trees. This cohort of trees would be thinned by competition, insects, disease, and fire as they grew older, eventually replacing the patch of older trees that previously occupied the site. This dynamic would repeat across the landscape, producing extensive stands of large old trees that appeared even-aged but were actually comprised of many patches of trees of different ages.*"

Timber harvest has impacted many wildlife species addressed here, particularly those requiring unfragmented, older-aged forests with high canopy closures, and high amounts of snags, logs, and CWD directly, indirectly, and cumulatively through habitat loss, fragmentation, and loss of effectiveness. These changes have both positive and negative effects on habitat availability, quality, and functionality and contribute cumulatively to effects to a variety of species.

These recent and prior timber harvests have all changed forest composition, structure and fire frequency and increased human disturbance of wildlife. They removed CWD and large-diameter snags, reduced tree densities and canopy cover leading to more open canopy forests with more light reaching the forest floor (which may be beneficial or detrimental depending on the species affected). Associated road building and logging operations increase soil disturbance, compaction, and noxious weed invasion. In general, these activities drastically altered the landscape with the removal of much of the late-successional and old-growth trees, snags, and CWD that was present pre-Euro-American settlement. These activities reduced the vertical and horizontal structural diversity throughout much of the Forest, depending on harvest methods and intensities. In addition, tree species composition has changed over time as particular species have been selected over others, and regeneration species were of different composition, or forests reverted to earlier successional stages. For instance, the occurrence of Douglas-fir was likely more prevalent on portions of the Forest prior to Euro-American settlement than currently occurs on the Forest today. Past timber

harvest activities, particularly those that occurred on the Forest in the late 1800's and early 1900's caused substantial effects to many of the species addressed in this assessment by changing the vegetation composition and the horizontal and vertical structure of the Forest for much of this harvesting concentrated on the removal of the largest and most merchantable trees and logs. The synergistic effects of historical timber harvesting, heavy grazing, and fire suppression all had considerable direct and indirect adverse effects to these species by removing and adversely affecting breeding, feeding, sheltering, and suitable habitat and populations themselves.

These activities also degraded riparian and aquatic resources as well. Impacts from these activities have reduced the capacity of riparian areas to function properly. Vegetation next to water bodies plays a major role in sustaining the long-term integrity of aquatic systems. Values provided include shade, bank stability, fish cover, woody debris input, storage and release of sediment, flood attenuation, surface-ground water interactions, and plant-and-animal habitats. Riparian zones must be managed with care to protect these values. Increased sedimentation resulting from poorly functioning riparian buffers can cause stream channel disequilibria, elevated water temperatures, reduced pool habitat, increased turbidity, reduced large woody debris recruitment, reduced spawning habitat and reduced spawning success.

### 3.1.7 LIVESTOCK GRAZING

Livestock grazing (e.g., cattle and sheep) on the Forest and adjacent lands has fluctuated over years, reaching a peak in the early 1900's to the 1930's. The number of animals was reduced on the Forest from the 1930's through 60's because of degraded watershed conditions. Historical descriptions of the Forest described livestock utilization and impacts include: 1) livestock roamed freely over the early timber reserves; 2) the most severe damage due to overgrazing was in riparian habitats; 3) in at least some non-riparian habitats livestock damaged tree regeneration though browsing and trampling; and 4) local observations reported a decline in productivity and shifts in species composition of some plant communities which were directly attributed to livestock grazing (Verblen et al. 2000). Over the last 60 years canopy cover in forested areas, open parks, and meadows have increased in many areas of the Forest – likely a result at least in part because if high stocking levels of the past. This has resulted in reduced forage production for a variety of species directly and indirectly.

Livestock grazing can impact some plant and vertebrate populations, primarily through indirect effects on the habitat structure and prey availability, although there are also direct effects such as trampling (Bull et al. 2001). Direct effects of grazing can also include the removal of vegetative cover (biomass) and trampling of grass and shrubs. Indirect effects of grazing include altered forage composition, reduced vigor of plants, increased soil compaction, and accelerated soil erosion resulting in a reduction of land productivity (Page et al. 1978).

If permitted, livestock tend to congregate in riparian ecosystems, which are among the biologically richest habitats, the ecological costs of grazing are magnified (Fleischner 1994). The most extensive human-caused influence on riparian zones in the western U.S. has been livestock grazing (Ehrhart and Hansen 1997). Overgrazing by livestock is considered the most widespread cause of deterioration of riparian systems on public lands (Knopf and Cannon 1982). Historical and current management activities have degraded many riparian and aquatic resources to varying degrees on the

Forest. Livestock negatively affects four general components of riparian systems: 1) streamside vegetation; 2) stream channel morphology; 3) shape and quality of water column; and 4) structure of streambank soil (Platts 1979, 1981a, 1981b, Kauffman and Krueger 1984, Platts and Nelson 1989). Livestock grazing can negatively impact riparian zones along stream corridors by changing, reducing, or eliminating vegetation, and can eliminate riparian zones altogether through channel widening, channel aggrading, or lowering of the water table (Platts 1991). Livestock grazing in riparian areas can cause changes in plant species composition (Schulz and Leininger 1991), reduce structural complexity (Ohmart and Anderson 1986), reduce understory, and replace native species with nonnative species (Krueper et al. 2003). Arnold (1950) determined that livestock grazing substantially reduced vegetative cover, especially perennial bunchgrasses, leading to a shift in species composition and more perennial weeds. Heavy livestock grazing has been shown to reduce or eliminate *Salix* (willow) in riparian ecosystems (Kovalchik and Elmore 1992). Each of these has impacted TES species' and their habitats on the PSI.

Historical livestock grazing activities have heavily influenced the Forest. Impacts from these activities, especially grazing have reduced the capacity of riparian areas to function properly. Both domestic and wildlife species often aggregate in riparian areas causing a lowering of the water table, reduced bank stability and changes in vegetative conditions. Increased sedimentation resulting from poorly functioning riparian buffers can cause stream channel disequilibria, elevated water temperatures, reduced pool habitat, increased turbidity, reduced large woody debris recruitment, reduced spawning habitat and reduced spawning success. Improper grazing practices can adversely affect riparian areas and species that depend on them (Brock and Green 2003). Grazed riparian areas typically have less ground cover, a poorly developed understory and midstory, and decreased vegetative biomass when compared to similar ungrazed riparian areas (Krueper 1995). The compatibility of grazing in riparian areas depends on the extent to which grazing management has considered and adapted to certain basic ecological relationships. Grazing practices have affected natural functions on riparian ecosystems; the growth and reproduction of woody and herbaceous plants in these areas; hydrologic and geomorphic conditions and processes (e.g., downcutting); soils (e.g., erosion); and water quality (Leonard et al. 1997), altering species' habitat directly and indirectly. Livestock have also been a contributing factor to the entrenching of stream channels in the Southwest, including many of the areas on the Forest. The degradation of western riparian habitats began with severe overgrazing in the late Nineteenth Century. Many areas of the Forest have not yet recovered from that early grazing. A minimum of 95% of the riparian habitats in the west have been lost, altered, or degraded by human-induced change (Ohmart 1994) and this holds true for the PSI.

### 3.1.8 HUMAN DEVELOPMENT

The Front Range Region of Colorado and areas surrounding the Forest have experienced exponential growth over the past few decades. Although residential development is not occurring on the National Forest itself, adjacent private lands are experiencing substantial growth. Population trends have increased dramatically over the past decade and are expected to continue to increase in the region into the future. For example, on the Salida Ranger District the estimated population of Chaffee County in April 1990 was 12,684 and it increased to 16,242 in April 2000, an average of 2.4% increase per year (CDLA 2003). Other areas on the Forest have experienced similar growth and expansion adjacent to their Forest boundaries. While much of this growth occurred in towns and other urban areas, certainly a high portion of this growth was outside of urban areas. For

example, several new subdivisions have been built adjacent to the Forest and within inholdings that are adversely affecting plant and wildlife species addressed in this assessment by increasing fragmentation, human disturbance, increased recreational use, and other associated activities. In addition, housing units and human developments within wildland/urban interface areas immediately adjacent to the Forest substantially increase the risk of catastrophic wildfires on the Forest. Efforts are currently underway to decrease these threats; however, vast areas have yet to be treated and new areas adjacent to the Forest are continuing to be developed.

One of most urgent threats to wildlife species throughout the U.S. is the loss and fragmentation of habitat. The removal of vegetation and natural features required for many large-scale and high-density developments directly and indirectly impacts many species. Contributing to habitat fragmentation is the construction of new roads that access high-density developments adjacent to the Forest and within private in-holdings. While few new permanent roads are being constructed on Forest-managed lands, their proximity to Forest boundaries results in the same net effect in fragmenting fish and wildlife habitat. For a thorough discussion of the many other negative impacts of roads see *Section 3.1.1* of this document. Habitat loss, degradation, and fragmentation are widely accepted causes contributing to raptor population declines worldwide (Newton 1979, LeFranc and Millsap 1984). Habitat fragmentation is the process by which a large and continuous block of natural habitat is transformed into much smaller and isolated patches by human activity (Noss and Csuti 1994). Fragmentation has two components (1) reduction of the total amount of habitat type and (2) apportionment of remaining habitat into smaller, more isolated patches (Harris 1984, Wilcove et al. 1986, Saunders et al. 1991). Vegetation next to water bodies plays a major role in sustaining the long-term integrity of aquatic systems. Values provided include shade, bank stability, fish cover, woody debris input, storage and release of sediment, flood attenuation, surface-ground water interactions, and plant-and-animal habitats. Riparian zones must be managed with care to protect these values. Stream flow modifications have also been detrimental to aquatic resources through dewatering of streams and increased flow in some cases due to trans-continental water diversions to urban areas on the Front Range and elsewhere to support increased human development there as well.

Secondary impacts to wildlife species from developments include: casualties caused by pest control, pollution, collisions with cars, radio towers, glass windows, power lines, and cat predation are often underestimated, although likely increasing in occurrence due to human population growth (Banks 1979, Klem 1979, Churcher and Lawton 1987). Even where human-related deaths are uncommon, they may still substantially affect populations of rare birds (Cartron et al. 2000) and other species.

### 3.1.9 CLIMATE CHANGE

It has been well documented by numerous studies – the world is warming. U.S. average temperatures have increased more than 2°F in the last 50 years, and are projected to increase further (USGCRP 2009). Significant increases in the amounts of carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$) in the atmosphere are leading to an enhancement of the earth's natural greenhouse effect (Price and Root 2005). These increases in greenhouse gases can largely be attributed to human activities, including burning of fossil fuels and land use changes such as deforestation. There is evidence that earlier arrival dates, breeding dates, and changes in distribution of neotropical migrant birds, and the average latitude of occurrence of some species of

North American birds has shifted northward by almost 100 km (60 mi) in the last 20 years (Price and Root 2005). Numerous studies have shown shifts in density, which can be created by a change in abundance within the range of species, and/or a shift in range boundaries. Ultimately, the greatest impact on plants and wildlife may not be from the climate change itself, but rather from the rate of change. Given enough time, many species would likely be able to adapt to shifts in the climate, as they have done in the past. However, the current projected rate of warming is thought to be greater now than has occurred at any time in the last 10,000 years (IPCC 2007).

Fish, wildlife, plants, and the ecosystem processes they depend upon are threatened by a number of existing stressors that are discussed in other sections here. Many of these stressors will be exacerbated by climate change, while some may reduce a species' ability to adapt to changing conditions. While the magnitude of climate change is expected to vary regionally, the overall vulnerability of some ecosystems may be primarily driven by the severity of these non-climate stressors. Resource managers must consider climate impacts in the context of multiple natural and human-induced changes that are already significantly affecting species, habitats, and ecosystem functions and services, including habitat loss, fragmentation and degradation, invasive species, over-use, and disease. Habitat fragmentation, loss, and degradation have been pervasive problems for natural systems and are expected to continue.

As discussed above, average temperatures have increased more than 2°F in the U.S. over the last 50 years (more in higher latitudes) and are projected to increase further. On average, precipitation in the U.S. has increased approximately 5% in the last 50 years (USGCRP 2009). Models suggest northern (wet) areas of the U.S. will become wetter, while southern (dry) areas of the country will become drier (USGCRP 2009). In areas of high snowpack, runoff is beginning earlier in the spring, causing flows to be lower in the late summer. These changes in precipitation combined with increased temperatures are also expected to increase the instance and severity of drought, the conditions of which can lead to an increase in the frequency and intensity of fires. Adding changes in climate to habitat fragmentation will put species with narrow geographic ranges and specific habitat requirements at even greater risk than they would otherwise be. Range reductions and population declines from synergistic impacts of climate and non-climate stressors may be severe enough to threaten some species with extinction over all or significant portions of their ranges.

A changing climate can affect growth rates, alter patterns of food availability, and change rates and patterns of decomposition and nutrient cycling. Changes can be driven by one or multiple climate related factors acting in concert or synergistically and can alter the distribution, abundance, phenology, and behavior of species, and the diversity, structure, and function of ecosystems. One forecast that seems certain is that the more rapidly the climate changes, the higher the probability of substantial disruption and unexpected events within natural systems (Root and Schneider 1993). The possibility of major surprises, in turn, increases the need for adaptive management strategies—where actions and approaches are flexible enough to be adjusted in the face of changing conditions.

Species and populations likely to have greater sensitivities to climate change include those with highly specialized habitat requirements, those already near temperature limits or having other narrow environmental tolerances, currently isolated, or rare or those with declining populations and poor dispersal abilities, and groups especially sensitive to pathogens (Foden et al. 2008). Species

with these traits will be even more vulnerable if they have a small population, a low reproductive rate, long generation times, low genetic diversity, or are threatened by other factors.

Vegetation dynamics, disturbance, climate and their interactions are key elements in predicting the future condition of ecosystems and landscapes and the vulnerability of species and populations to climatic change. Climatic factors such as temperature, precipitation, and wind patterns are among the many factors that influence vegetative structure and composition, fire behavior and wildlife habitat. For example, lynx have a competitive advantage in deep snow habitats that are common throughout the Southern Rockies. Climate change, therefore, has potential to affect factors that influence lynx (and other TEPS species) and their habitats in the Southern Rockies.

There is little scientific disagreement that global warming is occurring at an accelerating rate and that human activities (greenhouse gas emission increases, etc.) have contributed to this phenomenon. Some uncertainty exists as to the magnitude of these effects in relation to natural variation and the precise effects of how feedback mechanisms (increased water vapor, reduced snow cover) influence the extent and magnitude of global warming patterns and trends. More recently, the extensive Arctic Climate Impact Assessment (ACIA 2004) has provided compelling evidence that among numerous other effects (1) arctic climate is now warming more rapidly than the rest of the earth, (2) much larger changes are projected in the future and (3) arctic warming and its consequences have worldwide implications.

Other indirect effects of global warming may have beneficial or detrimental effects on many wildlife and plant species alike. For example, some lower-elevational and warmer-climate adapted species' range and distribution, currently limited due to climate/environmental conditions present at higher elevations, may expand their distributions to higher elevations in given geographical areas as well as expand their ranges northward, as more favorable climatic conditions are created by warmer climates in some areas. A recent study of the effect of climatic change on wildfire in the western U.S. (McKenzie et al. 2004) determined that with warming climate fire seasons will likely be extended and that total area burned is likely to increase. As a result, significant changes in the distribution and abundance of dominant plant species in some ecosystems may occur. Some species that are sensitive to fire may decline, whereas the distribution and abundance of species favored by fire may be enhanced. Stand replacing fires are a common occurrence throughout much of lynx habitat and often provide conditions conducive to producing good quality snowshoe hare habitat.

It appears likely that climate change may affect many species such as lynx and others over the long term by altering the extent of deep snow habitats preferred by them. Kerr and Packer (1998) used the general circulation model (GCM) developed at the Goddard Institute of Space Sciences for the Intergovernmental Panel on Climate Change to predict future mammal diversity patterns in Canada. Based upon their analysis they predicted that at least 25 mammal species, including Canada lynx, are limited by the Arctic Ocean in their ability to disperse northward and are likely to undergo significant losses of habitat (Keer and Packer 1998). Features of the snow may also influence lynx interaction with snowshoe hare for example. Stenseth et al. (2004) have shown that large-scale climatic fluctuations can mechanistically influence lynx population biological patterns. Since the effects of global warming are occurring over relatively long periods, the effects on lynx over the short term (10-15 years) are less clear. More focused research is needed on the effect of climate

change on specific threatened and endangered species such as the Canada lynx and other TEPS species, to more accurately predict specific effects of climate change in the Southern Rockies.

In summary, there is incomplete or unavailable information upon which to base any more detailed analysis of climate change risk factors for plant and wildlife species addressed. The best available information does provide some evidence that climate change poses risks, but the exact nature of these risks remains uncertain.

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# 5.0 APPENDICES

## APPENDIX A – FWS SPECIES LIST FOR PSI COUNTIES

United States Department of Interior
Fish and Wildlife Service

Project name: TES species of the PSI Forests

### Official Species-list: *TES species of the PSI Forests*

Colorado Ecological Services Field Office

Following is an official U.S. Fish and Wildlife Service species-list from the Colorado Ecological Services Field Office. The species-list identifies listed and proposed species and designated and proposed critical habitat that may be affected by the project "TES species of the PSI Forests". You may use this list to meet the requirements of section 7(c) of the Endangered Species Act of 1973, as amended (ESA).

This species-list has been generated by the Service's on-line Information, Planning, and Conservation (IPaC) decision support system based on project type and location information you provided on May 3, 2012, 10:49 AM. This information is summarized below.

Please reference our tracking number, 06E24000-2012-SLI-0466, in future reference to this project to assist in expediting the process.

Newer information based on updated surveys, changes in the abundance and distribution of listed species, changed habitat conditions, or other factors could change this list. Please feel free to contact the office(s) identified below if you need more current information or assistance regarding the potential presence of federally proposed, listed, or candidate species, or proposed or designated critical habitat. Please note that under the ESA, a species-list is valid for 90 days. Therefore, the Service recommends that you visit the IPaC site at regular intervals during project planning and implementation for updates to species-lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive this list. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

`http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF`

This list below only addresses federally proposed, listed, or candidate species and federally designated critical habitat. Please contact the appropriate State agencies for information regarding State species of special designation. Also, please feel free to contact the office(s) identified below if you would like information on other important trust resources (such as migratory birds) in your project area.

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Page 1

United States Department of Interior
Fish and Wildlife Service

Project name: TES species of the PSI Forests

**This Species-list document is provided by:**

COLORADO ECOLOGICAL SERVICES FIELD OFFICE
DENVER FEDERAL CENTER
P.O. BOX 25486
DENVER, CO 80225
(303) 236-4773
http://www.fws.gov/coloradoES
http://www.fws.gov/platteriver

**TAILS consultation code:** 06E24000-2012-SLI-0466

**Project type:** ** Other **

**Project Description:** Species list that will be used for future impact analysis for TES species/critical habitats on the PSI

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United States Department of Interior
Fish and Wildlife Service

Project name: TES species of the PSI Forests

**Project counties:** Alamosa, CO | Chaffee, CO | Clear Creek, CO | Custer, CO | Douglas, CO | Fremont, CO | Huerfano, CO | Jefferson, CO | Lake, CO | Las Animas, CO | Park, CO | Pueblo, CO | Saguache, CO | Teller, CO

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United States Department of Interior
Fish and Wildlife Service

Project name: TES species of the PSI Forests

## Endangered Species Act Species-list

Arkansas darter *(Etheostoma cragini)*

Listing Status: Candidate

Black-Footed ferret *(Mustela nigripes)*

Population: U.S.A. (specific portions of AZ, CO, MT, SD, UT, and WY)

Listing Status: Experimental Population, Non-Essential

Bonytail chub *(Gila elegans)*

Population: entire

Listing Status: Endangered

Canada Lynx *(Lynx canadensis)*

Population: (Contiguous U.S. DPS)

Listing Status: Threatened

Colorado Butterfly plant *(Gaura neomexicana var. coloradensis)*

Listing Status: Threatened

Colorado pikeminnow *(Ptychocheilus lucius)*

Population: except Salt and Verde R. drainages, AZ

Listing Status: Endangered

Greenback Cutthroat trout *(Oncorhynchus clarki ssp. stomias)*

Listing Status: Threatened

Gunnison sage-grouse *(Centrocercus minimus)*

Population: entire

Listing Status: Candidate

Gunnison's prairie dog *(Cynomys gunnisoni)*

Population: central and south-central Colorado, north-central New Mexico

Listing Status: Candidate

Humpback chub *(Gila cypha)*

Population: entire

Listing Status: Endangered

Least tern *(Sterna antillarum)*

Population: interior pop.

Listing Status: Endangered

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United States Department of Interior
Fish and Wildlife Service

Project name: TES species of the PSI Forests

Condition(s):
- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Mexican Spotted owl *(Strix occidentalis lucida)*

Listing Status: Threatened

Critical Habitat: Final designated

New Mexico meadow jumping mouse *(Zapus hudsonius luteus)*

Listing Status: Candidate

North American wolverine *(Gulo gulo luscus)*

Listing Status: Candidate

Pallid sturgeon *(Scaphirhynchus albus)*

Listing Status: Endangered

Condition(s):
- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Pawnee Montane skipper *(Hesperia leonardus montana)*

Listing Status: Threatened

Penland Alpine Fen mustard *(Eutrema penlandii)*

Listing Status: Threatened

Piping Plover *(Charadrius melodus)*

Population: except Great Lakes watershed

Listing Status: Threatened

Condition(s):
- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Preble's Meadow Jumping mouse *(Zapus hudsonius preblei)*

Population: U.S.A., north-central CO

Listing Status: Threatened

Critical Habitat: Final designated

Razorback sucker *(Xyrauchen texanus)*

Population: entire

Listing Status: Endangered

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United States Department of Interior
Fish and Wildlife Service

Project name: TES species of the PSI Forests

Rio Grande Cutthroat trout *(Oncorhynchus clarki virginalis)*

Listing Status: Candidate

skiff milkvetch *(Astragalus microcymbus)*

Listing Status: Candidate

Southwestern Willow flycatcher *(Empidonax traillii extimus)*

Listing Status: Endangered

Uncompahgre Fritillary butterfly *(Boloria acrocnema)*

Listing Status: Endangered

Ute ladies'-tresses *(Spiranthes diluvialis)*

Listing Status: Threatened

Western Prairie Fringed Orchid *(Platanthera praeclara)*

Listing Status: Threatened

Condition(s):

- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Whooping crane *(Grus americana)*

Population: except where EXPN

Listing Status: Endangered

Condition(s):

- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Yellow-Billed Cuckoo *(Coccyzus americanus)*

Population: Western U.S. DPS

Listing Status: Candidate

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# APPENDIX B – R2 REGIONAL FORESTER'S SENSITIVE SPECIES (*June 10, 2011*)

## ANIMALS

### MAMMALS

| | |
|---|---|
| *Conepatus leuconotus* | American hog-nosed skunk |
| *Corynorhinus townsendii* | Townsend's big-eared bat |
| *Cynomys gunnisoni* | Gunnison's prairie dog |
| *Cynomys leucurus* | white-tailed prairie dog |
| *Cynomys ludovicianus* | black-tailed prairie dog |
| *Euderma maculatum* | spotted bat |
| *Gulo gulo* | wolverine |
| *Lasiurus cinereus* | hoary bat |
| *Lontra canadensis* | river otter |
| *Martes americana* | American marten |
| *Microtus richardsoni* | water vole |
| *Myotis thysanodes* | fringed myotis |
| *Ovis canadensis canadensis* | Rocky Mountain bighorn sheep |
| *Ovis canadensis nelsoni* | desert bighorn sheep |
| *Sorex hoyi* | pygmy shrew |
| *Thomomys clusius* | Wyoming pocket gopher |
| *Vulpes macrotis* | kit fox |
| *Vulpes velox* | swift fox |
| *Zapus hudsonius luteus* | New Mexican meadow jumping mouse |
| *Zapus hudsonius preblei* (Wyoming SPR) | Preble's meadow jumping mouse |

### BIRDS

| | |
|---|---|
| *Accipiter gentilis* | northern goshawk |
| *Aegolius funereus* | boreal owl |
| *Aimophila cassinii* | Cassin's sparrow |
| *Ammodramus savannarum* | grasshopper sparrow |
| *Amphispiza belli* | sage sparrow |
| *Asio flammeus* | short-eared owl |
| *Athene cunicularia* | burrowing owl |
| *Botaurus lentiginosus* | American bittern |
| *Buteo regalis* | ferruginous hawk |
| *Calcarius mccownii* | McCown's longspur |
| *Calcarius ornatus* | chestnut-collared longspur |
| *Centrocercus minimus* | Gunnison sage-grouse |
| *Centrocercus urophasianus* | greater sage-grouse |
| *Charadrius montanus* | mountain plover |
| *Chlidonias niger* | black tern |
| *Circus cyaneus* | northern harrier |
| *Coccyzus americanus* | yellow-billed cuckoo |
| *Contopus cooperi* | olive-sided flycatcher |
| *Cygnus buccinator* | trumpeter swan |
| *Cypseloides niger* | black swift |
| *Falco peregrinus anatum* | American peregrine falcon |
| *Haliaeetus leucocephalus* | bald eagle |
| *Histrionicus histrionicus* | harlequin duck |
| *Lagopus leucura* | white-tailed ptarmigan |
| *Lanius ludovicianus* | loggerhead shrike |
| *Melanerpes lewis* | Lewis's woodpecker |
| *Numenius americanus* | long-billed curlew |
| *Otus flammeolus* | flammulated owl |

| | |
|---|---|
| *Picoides arcticus* | black-backed woodpecker |
| *Progne subis* | purple martin |
| *Spizella breweri* | Brewer's sparrow |
| *Tympanuchus cupido* | greater prairie-chicken |
| *Tympanuchus pallidicinctus* | lesser prairie-chicken |
| *Tympanuchus phasianellus columbianus* | Columbian sharp-tailed grouse |

**AMPHIBIANS**

| | |
|---|---|
| *Anaxyrus boreas boreas* | boreal toad |
| *Lithobates blairi* | plains leopard frog |
| *Lithobates luteiventris* | Columbia spotted frog pop. 4 (Bighorn Mountain spotted frog) |
| *Lithobates pipiens* | northern leopard frog |
| *Lithobates sylvatica* | wood frog |

**REPTILES**

| | |
|---|---|
| *Sistrurus catenatus edwardii* | desert massasauga rattlesnake |
| *Storeria occipitomaculata pahasapae* | Black Hills red-bellied snake |

**FISHES**

| | |
|---|---|
| *Catostomus discobolus* | bluehead sucker |
| *Catostomus latipinnis* | flannelmouth sucker |
| *Catostomus platyrhynchus* | mountain sucker |
| *Catostomus plebeius* | Rio Grande sucker |
| *Couesius plumbeus* | lake chub |
| *Gila pandora* | Rio Grande chub |
| *Gila robusta* | roundtail chub |
| *Hybognathus placitus* | plains minnow |
| *Macrhybopsis gelida* | sturgeon chub |
| *Margariscus margarita* | pearl dace |
| *Nocomis biguttatus* | hornyhead chub |
| *Oncorhynchus clarkii bouvieri* | Yellowstone cutthroat trout |
| *Oncorhynchus clarkii pleuriticus* | Colorado River cutthroat trout |
| *Oncorhynchus clarkii virginalis* | Rio Grande cutthroat trout |
| *Phoxinus eos* | northern redbelly dace |
| *Phoxinus erythrogaster* | southern redbelly dace |
| *Phoxinus neogaeus* | finescale dace |
| *Platygobio gracilis* | flathead chub |

**INSECTS**

| | |
|---|---|
| *Hesperia ottoe* | Ottoe skipper |
| *Ochrotrichia susanae* | Susan's purse-making caddisfly |
| *Somatochlora hudsonica* | Hudsonian emerald |
| *Speyeria idalia* | regal fritillary |
| *Speyeria nokomis nokomis* | Nokomis fritillary or Great Basin silverspot |

**MOLLUSCS**

| | |
|---|---|
| *Acroloxus coloradensis* | Rocky Mountain capshell |
| *Oreohelix pygmaea* | pygmy mountain snail |
| *Oreohelix strigosa cooperi* | Cooper's Rocky Mountainsnail |

## PLANTS

### NONVASCULAR PLANTS

*Sphagnum angustifolium*
*Sphagnum balticum*

### FERNS & ALLIES

*Botrychium ascendens*
*Botrychium campestre*
*Botrychium lineare*
*Botrychium paradoxum*
*Lycopodium complanatum*
*Selaginella selaginoides*

### MONOCOTS

*Amerorchis rotundifolia*
*Calochortus flexuosus*
*Carex alopecoidea*
*Carex diandra*
*Carex livida*
*Cypripedium montanum*
*Cypripedium parviflorum*
*Eleocharis elliptica*
*Epipactis gigantea*
*Eriophorum altaicum* var. *neogaeum*
*Eriophorum chamissonis*
*Eriophorum gracile*
*Festuca hallii*
*Kobresia simpliciuscula*
*Liparis loeselii*
*Malaxis brachypoda*
*Platanthera orbiculata*
*Ptilagrostis porteri*
*Schoenoplectus hallii*
*Triteleia grandiflora*

### DICOTS

*Aliciella sedifolia*
*Aquilegia chrysantha* var. *rydbergii*
*Aquilegia laramiensis*
*Armeria maritima* ssp. *sibirica*
*Asclepias uncialis*
*Astragalus barrii*
*Astragalus leptaleus*
*Astragalus missouriensis* var. *humistratus*
*Astragalus proximus*
*Astragalus ripleyi*
*Braya glabella*
*Chenopodium cycloides*
*Cuscuta plattensis*
*Descurainia torulosa*
*Draba exunguiculata*
*Draba grayana*
*Draba smithii*
*Draba weberi*

*Drosera anglica*
*Drosera rotundifolia*
*Eriogonum brandegeei*
*Eriogonum exilifolium*
*Eriogonum visheri*
*Gutierrezia elegans*
*Ipomopsis aggregata* ssp. *weberi*
*Lesquerella fremontii*
*Lesquerella pruinosa*
*Machaeranthera coloradoensis*
*Mimulus gemmiparus*
*Neoparrya lithophila*
*Oreoxis humilis*
*Parnassia kotzebuei*
*Penstemon absarokensis*
*Penstemon caryi*
*Penstemon degeneri*
*Penstemon harringtonii*
*Physaria didymocarpa* var. *lanata*
*Physaria pulvinata*
*Physaria scrotiformis*
*Potentilla rupincola*
*Primula egaliksensis*
*Pyrrocoma carthamoides* var. *subsquarrosa*
*Pyrrocoma clementis* var. *villosa*
*Pyrrocoma integrifolia*
*Ranunculus karelinii*
*Rubus arcticus* ssp. *acaulis*
*Salix arizonica*
*Salix barrattiana*
*Salix candida*
*Salix myrtillifolia*
*Salix serissima*
*Sanguinaria canadensis*
*Shoshonea pulvinata*
*Thalictrum heliophilum*
*Townsendia condensata* var. *anomala*
*Utricularia minor*
*Viburnum opulus* var. *americanum*
*Viola selkirkii*

# APPENDIX C – SAN ISABEL NATIONAL FOREST TEPS SPECIES LIST

Threatened, endangered, proposed, candidate, and FS sensitive species with the potential to occur within the San Isabel National Forest (Leadville, Salida, and San Carlos Ranger Districts). This table will be used as a baseline in future Biological Evaluations/Assessments that analyze at the Forest, Ranger District, or project area scale.

[1]**Status Codes**: **E**=Federally listed endangered; **T**=Federally listed threatened; **P**= Federally proposed for listing; **C**= Federal candidate for listing; and **S**=Forest Service sensitive
[2]**Exclusion Rationale Codes**: **ODR**=outside known distributional range of the species; **HAB**= no habitat present in analysis area; **ELE**= outside of elevational range of species; **SEA**=species not expected to occur during the season of use/impact; and **INV**= presence of non-native salmonids.

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR? | RATIONALE FOR EXCLUSION[2] | BRIEF HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| ***PLANTS*** | | | | |
| *Aquilegia chrysantha* var. *rydbergii*<br>Rydberg's golden columbine | S | | | along streams and in rocky canyons; 5,200-8,500 ft; El Paso & Fremont counties |
| *Armeria maritima* ssp. *sibirica*<br>Siberian sea thrift | S | | | grassy tundra slopes, on wet, sandy, or spongy organic soils; 11,460-12,580 ft; Park & Summit counties |
| *Asclepias uncialis*<br>Wheel milkweed | S | | | plains, short-grass prairie, outwash mesas and gravelly side-slopes; 3,920-7,640 ft; Baca, Bent, Cheyenne, El Paso, Fremont, Huerfano, Kit Carson, Las Animas, Otero, Pueblo, Prowers, Washington & Weld counties |
| *Astragalus leptaleus*<br>Park milkvetch | S | | | ecotone of saturated and dry soils; 6,000-9,000 ft; Chaffee, Eagle, Gunnison, Jackson, Larimer, Park & Summit counties |
| *Botrychium ascendens*<br>Trianglelobe moonwort | S | | | disturbed and stabilized subalpine areas; 10,800 ft; Park County |
| *Botrychium lineare*<br>Narrow-leaved moonwort | S | | | disturbed sites, grassy slopes among medium height grasses, along edges of streamside forests, alpine areas & aspen forests; 7,900-12,500 ft; Boulder, Chaffee, El Paso, Grand, Huerfano, Park, Saguache & Summit counties |
| *Carex diandra*<br>Lesser panicled sedge | S | | | fens; 7,677-9,616 ft.; Boulder, Garfield, Grand, Jackson, Larimer & Saguache counties |
| *Cypripedium parviflorum*<br>Lesser yellow lady's slipper | S | | | moist forests and aspen groves; 5,800-12,683 ft; Clear Creek, Custer, El Paso, Garfield, Huerfano, Jefferson, La Plata, Larimer, Las Animas, Montrose, Park, Pueblo & Teller counties |
| *Draba exunguiculata*<br>Clawless draba | S | | | alpine on rocky and gravelly slopes or fell fields; 11,700-14,000 ft; Boulder, Clear Creek, El Paso, Gilpin, Grand, Lake, Park & Summit counties |
| *Draba grayana*<br>Gray's peak whitlow-grass | S | | | alpine and subalpine on tundra, gravelly slopes or fell fields; 11,600-14,100 ft; Chaffee, Clear Creek, Gilpin, Grand, Huerfano, Larimer, Park, Pitkin, Saguache & Summit counties |

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR? | RATIONALE FOR EXCLUSION[2] | BRIEF HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| *Draba smithii*<br>Smith whitlow-grass | S | | | upper montane to alpine, xeric to seeping, sunny or shaded volcanic rocks; 7,760-13,123 ft; Alamosa, Archuleta, Custer, Las Animas, Mineral & Saguache counties |
| *Draba weberi*<br>Weber's draba | S | | | rocky streamsides, rocky moist spruce forest; 11,200-11,800 ft; Park & Summit counties |
| *Eriophorum altaicum var. neogaeum*<br>Altai (Whitebristle) cottongrass | S | | | open areas with hydric soils, fens; 10,160-13,200 ft; Eagle, Gunnison, Hinsdale, La Plata, Mineral, Park, Pitkin, Saguache, San Juan & San Miguel counties; includes *Eriophorum chamissonis* |
| *Eriophorum chamissonis*<br>Chamisso's cottongrass | S | | | open areas with hydric soils, fens; 10,160-13,200 ft; Eagle, Gunnison, Hinsdale, La Plata, Mineral, Park, Pitkin, Saguache, San Juan & San Miguel counties; includes *Eriophorum altaicum* var. *neogaeum* |
| *Eriophorum gracile*<br>Slender cottongrass | S | | | montane and subalpine fens, saturated soils; 7,030-11,140 ft; Gunnison, Jackson, Larimer, Las Animas, Park, San Miguel & Summit counties |
| *Festuca hallii*<br>Hall or plains rough fescue | S | | | alpine and subalpine grasslands and meadows; 8,500-11,500 ft; Huerfano & Larimer counties |
| *Machaeranthera coloradoensis*<br>Colorado tansy-aster | S | | | Dry parks, piñon-juniper woodlands, alpine fell fields; 7,675-12,940 ft; Dolores, Gunnison, Hinsdale, La Plata, Lake, Park, Pitkin, Rio Grande, Saguache & San Juan counties |
| *Neoparrya lithophila*<br>Bill's neoparrya | S | | | volcanic substrates, rock shelves; 7,280-9,800 ft; Chaffee, Conejos, Fremont, Huerfano, Mineral, Rio Grande & Saguache counties |
| *Penstemon degeneri*<br>Degener's beardtongue | S | | | piñon/juniper, ponderosa pine woodlands, & montane grasslands with coarse gravelly or rocky reddish soil with igneous bedrock, rock slab cracks; 6,000-9,450 ft; Custer, Fremont & Teller counties |
| *Ptilagrostis porteri*<br>Porter feathergrass | S | | | hummocks in fens and willow carrs; 9,350-12,000 ft; El Paso, Lake, Park & Summit counties |
| *Ranunculus karelinii*<br>Ice cold buttercup | S | | | alpine slopes among rocks and scree; 12,000-14,100 ft; central Colorado, including Chaffee, Clear Creek, Gunnison, Hinsdale, Lake, Ouray, Park & Summit counties |
| *Salix candida*<br>Sageleaf willow | S | | | rich fens, saturated soils; 8,900-10,400 f.; Lake, Larimer & Park counties |
| *Viola selkirkii*<br>Selkirk's violet | S | | | moist, shaded forests; 7,300-11,100 ft; Douglas, El Paso, Larimer & Park counties |

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR | RATIONALE FOR EXCLUSION[2] | HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| ***INVERTEBRATES*** | | | | |
| Hudsonian emerald<br>*Somatochlora hudsonica* | S | | | breeding sites in quiet water of boggy wetlands, streams, ponds, & reservoirs above 9,500 ft in Colorado; documented in Lake and Park counties; however, distribution in Colorado is unknown; populations appear to be disjunct |
| Rocky mountain capshell snail<br>*Acroloxus coloradensis* | S | | | littoral zone of oligotrophic and mesotrophic mountain lakes with neutral to slightly alkaline water & high dissolved oxygen content; 8,800-9,800 ft |
| Susan's purse-making caddisfly<br>*Ochrotrichia susanae* | S | | | springs and seeps found in Chaffee & Park counties; further distribution unknown |
| Uncompahgre fritillary butterfly<br>*Boloria acrocnema* | E | | | known to only occur above timberline on Mt. Uncompahgre, laying eggs on snow willow (*Salix nivalis*); potentially occurring in Custer & Saguache counties |
| ***FISH*** | | | | |
| Greenback trout<br>*Oncorhynchus clarki stomias* | T | | | well-oxygenated headwaters of mountain streams, restricted to 7 drainages on Pike-San Isabel NF; found in Custer, Douglas, El Paso, Huerfano, Lake, Park & Pueblo counties |
| ***AMPHIBIANS AND REPTILES*** | | | | |
| Boreal (western) toad<br>*Anaxyrus boreas boreas* | S | | | breeds in ponds & over winter in refugia within lodgepole pine, spruce-fir forests, & alpine meadows; 7,500-12,000 ft; Chaffee Co has the only viable population in Colorado |
| Northern leopard frog<br>*Lithobates pipiens* | S | | | uplands, banks & shallow portions of marshes, ponds, lakes, reservoirs, beaver ponds & streams, especially those with rooted aquatic vegetation up to 11,000 ft |
| Plains leopard frog<br>*Lithobates blairi* | S | | | margins of streams, natural or artificial ponds, creek pools, reservoirs, irrigation ditches, and other bodies of water; up to 6,000 ft |
| ***BIRDS*** | | | | |
| American peregrine falcon<br>*Falco peregrinus anatum* | S | | | wide variety of vegetation types, selects cliff ledges or rock outcroppings for nesting, preferring high, open, cliff faces that dominate the surrounding area |
| Bald eagle<br>*Haliaeetus leucocephalus* | S | | | near open water including reservoirs, rivers, streams & lakes; nesting & roosting in large ponderosa pine, Douglas-fir, or cottonwood trees in proximity to open water & rivers |
| Black swift<br>*Cypseloides niger* | S | | | nests on cliffs near or behind high waterfalls |

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR | RATIONALE FOR EXCLUSION[2] | HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| Boreal owl<br>*Aegolius funereus* | S | | | high elevation, subalpine mature & old-growth coniferous woodlands, including mature Engelmann spruce, subalpine fir or spruce/fir-lodgepole pine forests, interspersed with meadows, nesting in cavities in trees larger than 15 inch dbh |
| Brewer's sparrow<br>*Spizella breweri* | S | | | Sagebrush, mountain meadows & mountain shrub habitat in Colorado |
| Flammulated owl<br>*Otus flammeolus* | S | | | old-growth or mature ponderosa pine & Douglas-fir forests, often mixed with mature aspen, nesting in cavities, feeding on insects |
| Gunnison sage grouse<br>*Centrocercus minimus* | C, S | | | tall dense stands of sagebrush near wet meadows with tall grasses for hiding; occurring primarily in SW & W Colorado, but also including Saguache & S Chaffee counties |
| Lewis' woodpecker<br>*Melanerpes lewis* | S | | | open montane forests, burned forest with snags, riparian deciduous forests & piñon-juniper woodland; may use agricultural areas or oak woodlands in winter |
| Loggerhead shrike<br>*Lanius ludovicianus* | S | | | open riparian areas, montane meadows, agricultural areas, grasslands, shrublands & piñon/juniper woodlands |
| Mexican spotted owl<br>*Strix occidentalis lucida* | T | | | steep-sided rocky canyons or outcroppings with old-growth mixed conifer (ponderosa pine, Douglas-fir, white fir) forests possessing cool, shady microclimates; up to 9,500 ft; Critical habitat is designated by FWS |
| Northern goshawk<br>*Accipiter gentilis* | S | | | primarily forest habitat, especially in mountains, nesting in lower portions of mature Douglas-fir, ponderosa pine, lodgepole pine, or aspen canopies; prefers mature or old-growth forest structure |
| Northern harrier<br>*Circus cyaneus* | S | | | spring & fall migrant in western valleys mountain parks, and eastern plains in Colorado inhabiting grasslands, agricultural areas, marshes & tundra in fall; 3,500-13,000 ft |
| Olive-sided flycatcher<br>*Contopus cooperi* | S | | | mature spruce-fir & Douglas-fir forests, other conifer forest, montane & foothill riparian & aspen; associated with forest openings & edges near water & burned areas |
| White-tailed ptarmigan<br>*Lagopus leucura* | S | | | inhabits alpine tundra with moist, low-growing alpine vegetation, particularly willows (*Salix* ssp.), with boulders, in proximity of water; may winter just below treeline with willow. |
| Yellow-billed cuckoo (eastern subspecies)<br>*Coccyzus americanus* | C, S | | | Eastern subspecies: riparian forests along the Arkansas River & urban areas with tall trees; a rare to uncommon spring & fall migrant & summer resident of E Colorado & SW KS & potentially on the San Carlos RD |

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR | RATIONALE FOR EXCLUSION[2] | HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| ***MAMMALS*** | | | | |
| American hog-nosed skunk<br>*Conepatus leuconotus* | S | | | grasslands & foothills, prefers partly wooded, brushy, rocky area; SE & south-central Colorado |
| American marten<br>*Martes americana* | S | | | spruce-fir & lodgepole pine mature to old-growth forests with moderate to high density canopy closures & abundant snags & logs; 8,000- 13,000 ft |
| Canada lynx<br>*Lynx canadensis* | T | | | dense spruce-fir, Douglas-fir, early seral lodgepole pine, mature lodgepole pine with developing understory of spruce-fir & aspen in subalpine zone & timberline, using caves, rock crevices, banks, logs for denning, closely associated with snowshoe hare; suitable habitats have been mapped by FS |
| Fringed myotis<br>*Myotis thysanodes* | S | | | rare colonial bat of low to mid- elevation shrub, piñon-juniper, or ponderosa forests, often where rocky outcrops, cliffs, caves, or mines exist (usually below 7,500 ft) |
| Gunnison's prairie dog<br>*Cynomys gunnisoni* | C, S | | | shrub- grassland habitats between 6,000 – 12,000 ft in mesic plateaus, intermountain valleys, benches & arid lowlands |
| Hoary bat<br>*Lasiurus cinereus* | S | | | solitary bat that roosts in trees hidden among foliage, but on occasion in caves or tree cavities; associated with montane & riparian forests in Colorado; forages in a variety of open & forested habitats; can fly round trips of >20 mi in a night; migratory |
| North American wolverine<br>*Gulo gulo luscus* | C, S | | | alpine & subalpine mature/intermediate timbered areas around natural openings, including cliffs, slides, basins & meadows, dependent on ungulates, historically in Colorado with some recent observations on the Forest |
| Pygmy shrew<br>*Sorex hoyi* | S | | | occupies a wide variety of habitats in the mountains of Colorado at elevations above 9,600 ft. such as subalpine forests, edges of meadows, bogs, willow thickets, aspen-fir forests, & parklands |
| River otter<br>*Lontra canadensis* | S | | | occurs in streams, lakes, reservoirs, wetlands and marine coasts; reintroduction efforts occurred in the upper reaches of both the Arkansas and Platte Rivers in the 1970's |
| Rocky mountain bighorn sheep<br>*Ovis canadensis canadensis* | S | | | prefers semi-open, precipitous terrain characterized by a mixture of steep and gentle slopes, broken cliffs, rocky outcrops & canyons |
| Townsend's big-eared bat<br>*Corynorhinus townsendii* | S | | | typically associated with caves & abandoned mines for day roosts & hibernacula, will also use abandoned buildings; forages in shrubland, piñon/juniper woodlands & open montane forests in elevations up to 9,500 ft, but hibernacula can be up to 10,500 ft |

# APPENDIX D – PIKE NATIONAL FOREST TEPS SPECIES LIST

Threatened, endangered, proposed, candidate, and FS sensitive species with the potential to occur within the Pike National Forest (South Park, South Platte, and Pike's Peak Ranger Districts). This table will be used as a baseline in future Biological Evaluations/Assessments that analyze at the Forest, Ranger District, or project area scale.

[1]**Status Codes**: **E**=Federally listed endangered; **T**=Federally listed threatened; **P**= Federally proposed for listing; **C**= Federal candidate for listing; and **S**=Forest Service sensitive
[2]**Exclusion Rationale Codes**: **ODR**=outside known distributional range of the species; **HAB**= no habitat present in analysis area; **ELE**= outside of elevational range of species; **SEA**=species not expected to occur during the season of use/impact; and **INV**= presence of non-native salmonids.

**** Species do not occur on the PSI although they MAY be affected if a project results in water depletions in the Platte River Basin.***

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR? | RATIONALE FOR EXCLUSION[2] | BRIEF HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| ***PLANTS*** | | | | |
| *Armeria maritima* ssp. *sibirica*<br>Siberian sea thrift | S | | | grassy tundra slopes, on wet, sandy, or spongy organic soils; 11,900-13,000 ft; Park & Summit counties |
| *Astragalus leptaleus*<br>Park milkvetch | S | | | moist swales and meadows; South Park to the Wet Mountain Valley; 7,500-10,000 ft; Park, Fremont & Custer counties |
| *Botrychium ascendens*<br>*Trianglelobe moonwort* | S | | | disturbed and stabilized subalpine areas; 10,800 ft.; Park County |
| *Botrychium lineare*<br>Narrow-leaved moonwort | S | | | disturbed sites, grassy slopes among medium height grasses, along edges of streamside forests, alpine areas & aspen forests; 7,900-9,500 ft; Boulder & El Paso counties |
| *Braya glabella*<br>Smooth northern-rockcress | S | | | sparsely vegetated slopes above timberline, especially on calcareous substrates; 12,000-13,000 ft; Chaffee, Gunnison, Park & Pitkin counties |
| *Carex diandra*<br>Lesser panicled sedge | S | | | wet meadows and subalpine willow carrs; 7,400-9,000 ft; Boulder, Grand, Jackson & Larimer counties |
| *Carex livida*<br>Livid sedge | S | | | fens and wetlands; 9,000-10,000 ft; Jackson, Larimer & Park counties |
| *Cypripedium parviflorum*<br>Lesser yellow lady's slipper | S | | | moist forests and aspen groves; 7,400-8,500 ft; Clear Creek, Custer, El Paso, Huerfano, Jefferson, Las Animas, Park, Pueblo & Teller counties |
| *Draba exunguiculata*<br>Clawless draba | S | | | alpine on rocky and gravelly slopes or fell fields, usually on granitic substrates; 12,000-14,000 ft; north-central Colorado including Lake, Park & Summit counties |
| *Draba grayana*<br>Gray's peak whitlow-grass | S | | | alpine and subalpine on tundra, gravelly slopes or fell fields; 11,500-14,000 ft; central Colorado, including Chaffee, Clear Creek, Huerfano & Park counties |
| *Draba weberi*<br>*Weber's draba* | S | | | rocky streamsides, rocky moist spruce forest; 11,200-11,800 ft; Park & Summit counties |

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR | RATIONALE FOR EXCLUSION[2] | HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| *Eriophorum altaicum var. neogaeum* Altai (Whitebristle) cottongrass | S | | | open areas with hydric soils, fens; 10,160-13,200 ft; Eagle, Gunnison, Hinsdale, La Plata, Mineral, Park, Pitkin, Saguache, San Juan & San Miguel counties; includes Eriophorum chamissonis |
| *Eriophorum chamissonis* Chamisso's cottongrass | S | | | open areas with hydric soils, fens; 10,160-13,200 ft; Eagle, Gunnison, Hinsdale, La Plata, Mineral, Park, Pitkin, Saguache, San Juan & San Miguel counties; includes Eriophorum altaicum var. neogaeum |
| *Eriophorum gracile* Slender cottongrass | S | | | montane and subalpine wetlands, wet meadows and pond edges; 8,100-12,000 ft; Jackson, Las Animas & Park counties |
| *Eutrema penlandii* Penland alpine fen mustard | T | | | alpine areas, downslope from persistent snowfields providing year round moisture, bogs that are wet with a constant source of flowing water; 12,000-12,800 ft; known to occur on the leeward side of the crest of the Mosquito Range, from Hoosier Pass to Mount Sherman, Park & Summit counties |
| *Festuca hallii* Hall or plains rough fescue | S | | | alpine and subalpine grasslands and meadows; 11,000-12,000 ft; Huerfano & Larimer counties |
| *Kobresia simpliciuscula* Simple bog sedge | S | | | alpine areas including tundra, fens, moist gravel, and glacial outwash; Park & Clear Creek counties |
| *Machaeranthera coloradoensis* Colorado tansy-aster | S | | | mountain parks, slopes & rock outcrops & dry tundra; 8,500-12,500 ft; Gunnison, Hinsdale, La Plata, Lake, Mineral, Park, Pitkin, Saguache & San Juan counties |
| *Malaxis brachypoda* White adder's-mouth orchid | S | | | riparian areas, amongst mosses; 7,200-8,000 ft; El Paso & Jefferson counties |
| *Mimulus gemmiparus* Rocky Mountain monkeyflower | S | | | granitic seeps, slopes, and alluvium in open sites within spruce-fir and aspen forests; 8,500-10,500 ft; Grand, Jefferson, Larimer & Park counties |
| *Neoparrya lithophila* Bill's neoparrya | S | | | piñon/juniper woodlands, rocky places, montane grasslands and openings, and sometimes on Dry Union formation; 7,000-10,000 ft; Chaffee, Conejos, Fremont, Huerfano, Mineral, Rio Grande & Saguache counties |
| *Oreoxis humilis* Rocky Mountain alpineparsley | S | | | alpine meadows, fell fields, krummholz, bristlecone pine woodlands between 10,800-14,100 ft; El Paso, Teller counties |
| *Parnassia kotzebuei* Kotzebue's grass of parnassus | S | | | alpine and subalpine, in wet rocky areas, amongst moss mats and along streamlets; 10,000-12,000 ft; north-central and southwestern Colorado, including Park & Summit counties |

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR | RATIONALE FOR EXCLUSION[2] | HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| *Platanthera praeclara* Western prairie fringed orchid * | T | | | found in mesic areas of the tallgrass prairie and wet meadows of the Great Plains outside of the Forest; however, it may be affected by water depletions |
| *Potentilla rupincola* Rock cinquefoil | S | | | subalpine or montane granitic outcrops amongst ponderosa or limber pine; 6,900-10,500 ft; Boulder, Clear Creek, Larimer & Park counties |
| *Primula egaliksensis* Greenland primrose | S | | | wet meadows, streambanks, willow carrs, fens, and on hummocks; 9000-10,000 ft; Park County |
| *Ptilagrostis porteri* Porter feathergrass | S | | | hummocks in fens and willow carrs; 9,200-12,000 ft; El Paso, Lake, Park & Summit counties |
| *Ranunculus karelinii* Ice cold buttercup | S | | | alpine slopes and summits amongst rocks and scree; 12,000-14,100 ft; central Colorado, including Chaffee, Clear Creek, Gunnison, Lake, Park & Summit counties |
| *Rubus arcticus* ssp. *acaulis* Dwarf blackberry | S | | | wetlands in willow carrs and mossy streamsides; 8,600-9,700 ft; Clear Creek & Park counties |
| *Salix candida* Sageleaf willow | S | | | fens and pond and stream edges in foothill/montane wetlands; 8,800-10,600 ft; Gunnison, Hinsdale, Lake, La Plata, Larimer & Park counties |
| *Salix myrtillifolia* Blueberry willow | S | | | in fens from foothills to alpine; 9,300 ft; Park County |
| *Salix serissima* Autumn willow | S | | | wetland areas including marshes, fens, and bogs; 7,800-10,200 ft; Custer, Park, Larimer & Routt counties |
| *Spiranthes diluvialis* Ute ladies'-tresses | T | | | sub-irrigated riparian meadows; below 6,500 ft; found in Moffat, Boulder, Jefferson, Larimer, El Paso & Weld counties |
| *Sphagnum angustifolium* Narrowleaf peatmoss | S | | | acidic fens with high concentrations of iron and other ions |
| *Viola selkirkii* Selkirk's violet | S | | | forests from montane to subalpine; 6,000-9,100 ft; found in Douglas, El Paso & Larimer counties |
| ***INVERTEBRATES*** | | | | |
| Hudsonian emerald *Somatochlora hudsonica* | S | | | breeding sites in quiet water of boggy wetlands, streams, ponds, & reservoirs above 9,500 ft in Colorado; documented in Lake and Park counties; however, distribution in Colorado is unknown; populations appear to be disjunct |
| Pawnee montane skipper *Hesperia leonardus montana* | T | | | occurs only in the watershed of the North Fork and mainstem of the South Platte River; habitat is ponderosa pine forest with moderate canopy cover & understory of blue grama and *Liatris*; up to 7,500 ft |
| Rocky mountain capshell snail *Acroloxus coloradensis* | S | | | littoral zone of oligotrophic and mesotrophic mountain lakes with neutral to slightly alkaline water & high dissolved oxygen content; 8,800-9,800 ft |
| Susan's purse-making caddisfly Ochrotrichia susanae | S | | | springs and seeps found in Chaffee & Park counties; further distribution unknown |

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR | RATIONALE FOR EXCLUSION[2] | HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| Uncompahgre fritillary butterfly *Boloria acrocnema* | E | | | known to only occur above timberline on Mt. Uncompahgre, laying eggs on snow willow (*Salix nivalis*); potentially occurring in Custer & Saguache counties |
| ***FISH*** | | | | |
| Greenback trout *Oncorhynchus clarki stomias* | T | | | well-oxygenated headwaters of mountain streams, restricted to 7 drainages on Pike-San Isabel NF; found in Custer, Douglas, El Paso, Huerfano, Lake, Park & Pueblo counties |
| Pallid sturgeon * *Scaphirhynchus albus* | E | | | found in large, turbid, free-flowing riverine habitats in the Mississippi-Missouri river system outside of the Forest; however, they may be affected by water depletions |
| ***AMPHIBIANS AND REPTILES*** | | | | |
| Boreal toad (western toad) *Anaxyrus boreas boreas* | S | | | breeds in ponds & over winter in refugia within lodgepole pine, spruce-fir forests, & alpine meadows; 7,500-12,000 ft; Chaffee Co has the only viable population in Colorado |
| Northern leopard frog *Lithobates pipiens* | S | | | uplands, banks & shallow portions of marshes, ponds, lakes, reservoirs, beaver ponds & streams, especially those with rooted aquatic vegetation up to 11,000 ft |
| ***BIRDS*** | | | | |
| American peregrine falcon *Falco peregrinus anatum* | S | | | wide variety of vegetation types, selects cliff ledges or rock outcroppings for nesting, preferring high, open, cliff faces that dominate the surrounding area |
| Bald eagle *Haliaeetus leucocephalus* | S | | | near open water including reservoirs, rivers, streams & lakes; nesting & roosting in large ponderosa pine, Douglas-fir, or cottonwood trees in proximity to open water & rivers |
| Black swift *Cypseloides niger* | S | | | nests on cliffs near or behind high waterfalls |
| Boreal owl *Aegolius funereus* | S | | | high elevation, subalpine mature & old-growth coniferous woodlands, including mature Engelmann spruce, subalpine fir or spruce/fir-lodgepole pine forests, interspersed with meadows, nesting in cavities in trees larger than 15 inch dbh |
| Brewer's sparrow *Spizella breweri* | S | | | sagebrush, mountain meadows & mountain shrub habitat in Colorado |
| Burrowing owl *Athene cunicularia* | S | | | grasslands and rarely semidesert grasslands; usually in or near prairie dog towns on the Pike's Peak RD |
| Ferruginous hawk *Buteo regalis* | S | | | endemic to grasslands and shrublands; however, some management on the Forest may affect this species |

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|---|---|---|---|---|
| Flammulated owl<br>*Otus flammeolus* | S | | | old-growth or mature ponderosa pine & Douglas-fir forests, often mixed with mature aspen, nesting in cavities, feeding on insects |
| Least tern *****<br>*Sternula antillarum* | E | | | uncommon summer resident in SE Colorado; breeding occurs on bare sandy shorelines outside of the Forest; however, they may be affected by water depletions |
| Lewis' woodpecker<br>*Melanerpes lewis* | S | | | open montane forests, burned forest with snags, riparian deciduous forests & piñon-juniper woodland; may use agricultural areas or oak woodlands in winter |
| Loggerhead shrike<br>*Lanius ludovicianus* | S | | | open riparian areas, montane meadows, agricultural areas, grasslands, shrublands & piñon/juniper woodlands |
| Mexican spotted owl<br>*Strix occidentalis lucida* | T | | | steep-sided rocky canyons or outcroppings with old-growth mixed conifer (ponderosa pine, Douglas-fir, white fir) forests possessing cool, shady microclimates; up to 9,500 ft; Critical habitat is designated by FWS |
| Mountain plover<br>*Charadrius montanus* | S | | | found in short-grass prairie with short grass and scattered cactus; may also occur near prairie dog colonies; migrants use dry mudflats and shorelines of dry reservoirs |
| Northern goshawk<br>*Accipiter gentilis* | S | | | primarily forest habitat, especially in mountains, nesting in lower portions of mature Douglas-fir, ponderosa pine, lodgepole pine, or aspen canopies; prefers mature or old-growth forest structure |
| Northern harrier<br>*Circus cyaneus* | S | | | spring & fall migrant in western valleys mountain parks, and eastern plains in Colorado inhabiting grasslands, agricultural areas, marshes & tundra in fall; 3,500-13,000 ft |
| Olive-sided flycatcher<br>*Contopus cooperi* | S | | | mature spruce-fir & Douglas-fir forests, other conifer forest, montane & foothill riparian & aspen; associated with forest openings & edges near water & burned areas |
| Piping plover *****<br>*Charadrius melodus* | T | | | found in shallow wetlands; migrant during the spring and fall in Colorado and breeding in SE Colorado outside of the Forest; however, they may be affected by water depletions |
| White-tailed ptarmigan<br>*Lagopus leucura* | S | | | inhabits alpine tundra with moist, low-growing alpine vegetation, particularly willows (*Salix* ssp.), with boulders, in proximity of water; may winter just below treeline with willow. |
| Whooping crane *****<br>*Grus americana* | E | | | found in shallow wetlands; migrant during the spring and fall in eastern Colorado outside of the Forest; however, they may be affected by water depletions |

| SPECIES COMMON AND SCIENTIFIC NAME | STATUS[1] | POTENTIAL TO OCCUR | RATIONALE FOR EXCLUSION[2] | HABITAT DESCRIPTION AND RANGE IN COLORADO |
|---|---|---|---|---|
| ***MAMMALS*** | | | | |
| American hog-nosed skunk<br>*Conepatus leuconotus* | S | | | grasslands & foothills, prefers partly wooded, brushy, rocky area; SE & south-central Colorado |
| American marten<br>*Martes americana* | S | | | spruce-fir & lodgepole pine mature to old-growth forests with moderate to high density canopy closures & abundant snags & logs; 8,000- 13,000 ft |
| Canada lynx<br>*Lynx canadensis* | T | | | dense spruce-fir, Douglas-fir, early seral lodgepole pine, mature lodgepole pine with developing understory of spruce-fir & aspen in subalpine zone & timberline, using caves, rock crevices, banks, logs for denning, closely associated with snowshoe hare; suitable habitats have been mapped by FS |
| Fringed myotis<br>*Myotis thysanodes* | S | | | rare colonial bat of low to mid- elevation shrub, piñon-juniper, or ponderosa forests, often where rocky outcrops, cliffs, caves, or mines exist (usually below 7,500 ft) |
| Gunnison's prairie dog<br>*Cynomys gunnisoni* | C, S | | | shrub- grassland habitats between 6,000 – 12,000 ft in mesic plateaus, intermountain valleys, benches & arid lowlands |
| Hoary bat<br>*Lasiurus cinereus* | S | | | solitary bat that roosts in trees hidden among foliage, but on occasion in caves or tree cavities; associated with montane & riparian forests in Colorado; forages in a variety of open & forested habitats; can fly round trips of >20 mi in a night; migratory |
| North American wolverine<br>*Gulo gulo luscus* | C, S | | | alpine & subalpine mature/intermediate timbered areas around natural openings, including cliffs, slides, basins & meadows, dependent on ungulates, historically in Colorado with some recent observations on the Forest |
| Preble's meadow jumping mouse<br>*Zapus hudsonius preblei* | T | | | closely associated with undisturbed riparian ecosystems ranging from large perennial rivers to small ephemeral drainages that are well-developed with adjacent forest & grassland communities up to 7,600 ft; Critical habitat is designated by FWS |
| Rocky mountain bighorn sheep<br>*Ovis canadensis canadensis* | S | | | prefers semi-open, precipitous terrain characterized by a mixture of steep and gentle slopes, broken cliffs, rocky outcrops, & canyons |
| Townsend's big-eared bat<br>*Corynorhinus townsendii* | S | | | typically associated with caves & abandoned mines for day roosts & hibernacula, will also use abandoned buildings; forages in shrubland, piñon/juniper woodlands & open montane forests in elevations up to 9,500 ft, but hibernacula can be up to 10,500 ft |