Appendix

I

MEDICINE BOW NATIONAL FOREST

Revised Land and Resource Management Plan
Final Environmental Impact Statement

# Appendix I – Part 1: Biological Assessment of Threatened, Endangered, Proposed, and Candidate Species

# Part 2: Biological Evaluation of Sensitive Species

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# Part I: Biological Assessment

## Introduction

This Biological Assessment is prepared in compliance with Section 7 (Interagency Cooperation) of the Endangered Species Act and 50 CFR 402.12 Biological Assessments. The purpose of this Biological Assessment is to determine if any listed or proposed species is present in the planning area (Section 7(a)(2)) and to identify any species likely to be affected by the selected alternative of the Land and Resource Management Plan (Alternative D-FEIS) Section 7(c). The planning area is the area of National Forest System lands covered by the Medicine Bow National Forest Land and Resource Management Plan.

## Changes between Draft and Final

- Radio collared Canada lynx were reported on the MBNF in September 2003.
- The USFWS proposal to list the Mountain Plover as a threatened species was withdrawn on September 9, 2003. The species is now on the R2 Sensitive Species list and is addressed in the Biological Evaluation.
- Standards and guidelines to protect the bald eagle and Preble's Meadow Jumping Mouse were added or reworded to Revised Plan Chapter 1 – Forestwide Standards and Guidelines.

## Legal and Administrative Framework

Federally listed threatened and endangered species are those plant and animal species formally listed by the USFWS under authority of the Endangered Species Act of 1973, as amended. An endangered species is defined as one, which is "in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as one "that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range…" (FSM 2670.5 (81) and FSM 2670.5 (211), respectively). A proposed species is defined as one in which "information now in possession of the FWS (that) indicates that proposing to list the species as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threats are not currently available to support proposed rules." (FSM 2670.5).

## Relationship Between ESA and Forest Planning

A forest plan does not compel action. With regard to ESA, however, the Ninth Circuit has held that approval of a forest plan constitutes an "action" for purposes of Section 7 consultation *(Pacific Rivers Council v. Thoma*s, 30 F.3d 1050, 1055 (9 th Cir. 1994). Agency policy is to establish habitat goals, and standards, guidelines, and prescriptions to meet the goals, for threatened and endangered plants and animals through the forest planning process (Departmental Regulation 9500-4, FSM 2620.2 and 2670.31).

A Memorandum of Agreement (MOA) for Endangered Species Act Section 7 Programmatic Consultations and Coordination was signed by the Bureau of Land Management, USDA Forest Service, National Marine Fisheries Service and Fish and Wildlife Service, effective August 30, 2000. This MOA provides the following consultation guidance:

> "The agencies will informally and or formally consult and confer on: (1) land management plans both during development of a new, amended, or revised plan; (2) existing plans if a new species is listed or critical habitat designated, or significant new information becomes available; and, (3) other programmatic level proposals, as appropriate. The action agencies also agree to include candidate species in biological assessments/evaluations provided during the plan/consultation process."
>
> "Because land management plans do not normally prescribe the specific timing and location of expected land management activities, there is a significant level of uncertainty associated with the potential environmental consequences of plans. In this MOA, the Forest Service agrees to consult on plans so that future activities formulated and allowed under the parameters of the plans are not likely to jeopardize the continued existence of listed species or result in the destruction/adverse modification of designated critical habitat. Additionally, because of the conservation mandate of section 7(a)(1) of ESA, plans can be very helpful in recovery of listed species."

Because the programmatic nature of this decision, there are no interrelated or interdependent actions associated with Revision of the Forest Plan.

## Project Location and Background

The Medicine Bow National Forest covers approximately 1,085,000 acres (measured by GIS acres) in southeastern Wyoming (See Map1). Elevations range from 6,300 feet to 12,013 feet. The Forest consists of four separated units: the Laramie Peak Unit at the north end of the Laramie Range; the Pole Mountain Unit, in the Sherman Mountain section of the Laramie Range; the Medicine Bow Range, the north extreme of the Front Range of Colorado; and the Sierra Madre, the north extreme of Colorado's Park Range.

The Medicine Bow National Forest is about 80 percent forested and about 20% non-forested, which is predominantly shrubs and grasses. On the Medicine Bow Range (approximately 512,000 acres) and the Sierra Madre Mountains (approximately 336,000 acres), the Forest boundary approximates the transition from forested mountain land to valley grass and shrub lands. On the Laramie Peak Unit (approximately 181,000 acres), NFS land is intermingled with private land, and includes mostly the higher forested areas (over 90% forested) within that intermingled ownership pattern. The smaller Pole Mountain unit (approximately 55,000 acres) is mostly open grassland and shrub, with only 36% forested.

The Medicine Bow National Forest provides a wide diversity of habitats that support over 300 vertebrate species, including 75 mammals, 227 birds, 19 reptiles, and 6 amphibians (Von Ahlefeldt and Speas 1996). These species provide Forest users and visitors with a broad range of wildlife related recreation opportunities that include sport, commercial, and viewing activities.

Historical records reveal that some species once present on the Forest had been extirpated by the early 1900s. Examples are the grizzly bear, gray wolf, and mountain bison. Animals with decreased populations include wolverine, northern river otter, lynx, bobcat, mountain lion, and black bear (Von Ahlefeldt and Speas 1996). Beaver were greatly reduced by trapping, but have recovered following successful reintroductions. An isolated population of White-tailed Ptarmigan in the Snowy Range (the highest mountains on the Medicine Bow Range) is believed to have been extirpated during the late 1970's (Scholl and Smith 2001).

The Medicine Bow National Forest lies in the headwaters of the Colorado River (142,000 acres of NFS lands in this basin) and the North Platte River (943,000 acres in this basin). Birds, fish, and plants downstream in these systems may be affected by actions taken on the Forest that alter the amount of water leaving the Forest.

Map I-1 Vicinity Map, Medicine Bow National Forest

## Description of the Proposed Action

The Forest Service proposes to revise the 1985 Land and Resource Management Plan (forest plan) for the Medicine Bow National Forest. The revised forest plan will be used to guide all natural resource management activities on the forest to meet the objectives of federal law, regulations, and policy. From the time of implementation, the Plan would be in effect for 10 to 15 years, when it would be evaluated for the need for further revision. Amendments to the Plan can be made at anytime, and are done through a public process (NEPA) and with consultation with the FWS if the amendment changes may alter effects on Federally listed species.

The following is a list of key forest plan decisions for long-term management of national forests:

- Establish forest wide goals and objectives, 36 CFR 219.11(b).
- Establish forest wide standards and guidelines, 36 CFR 219.13 to 219.27.
- Establish management area prescriptions and associated standards and guidelines, 36 CFR 219.11(c).
- Designate suitable timber land and establish the allowable sale quantity (ASQ). Designate lands suitable for grazing and browsing. Identify lands available for oil and gas leasing. 36 CFR 219.14, 219.16, 219.20, and 228.102(d).
- Establish monitoring and evaluation requirements, 36 CFR 219.11(d).
- Document that we will/will not recommend any additional wilderness areas. 36 CFR 219.17

The decision does not propose any site-specific action. Projects that implement the Plan with potential effects on federally listed species will be analyzed under NEPA and will involve consultation with the FWS.

## Description of the Selected Alternative--Alternative D FEIS

In the Draft Environmental Impact Statement, Alternative D (now called Alternative D DEIS) was the "preferred alternative." Alternative D FEIS, which is described and analyzed in the Final EIS, was developed from Alternative D DEIS in response to comments received on the Proposed Revised Land and Resource Management Plan (Proposed Plan) and Draft Environmental Impact Statement (DEIS) from the public, Forest Service personnel, the State of Wyoming, and Federal agencies.

This Alternative provides:

- A mix of multiple-use activities with a primary emphasis on enhancing non-motorized recreation opportunities while maintaining active forest vegetation management. Non-motorized uses play a larger role than in the 1985 Plan.

- Two Wild and Scenic Rivers totaling 28 miles. These areas provide important resource related protection measures to preserve the free-flowing conditions of the Encampment and North Platte Rivers.
- Thirteen Special Interest Areas totaling 18,708 acres provide a mix of biological, zoological and historical values, which may be enjoyed by all forest visitors.
- Six Research Natural Areas totaling 15,476 acres provide relatively undisturbed areas representing important natural ecosystems and environments as well as special or unique scientifically important characteristics. Snowy Range Research Natural Area was established in the 1930's and will continue to be managed as a Research Natural Area.
- The existing 78,850 acres of designated Wilderness and an additional 27,973 acres of Recommended Wilderness areas, provide opportunities for solitude and for primitive and unconfined recreational experiences.

The following table displays how Alternative D-FEIS responds to the issues associated with the six major revision topics.

| **Major Revision Topic** | • **Response to Issue** |
|---|---|
| **Biodiversity** | • Forest vegetation patterns and successional conditions will generally be influenced by natural disturbance processes such as fire, insects and diseases on 45% of the Forest.<br>• On 26% of the Forest, harvest activities are designed to emulate natural pattern, structure, and function. |
| **Timber** | • Allowable Sale Quantity of Timber is 22.8 million board feet per year. Timber management activities are evident on 38% of the Forest.<br>• Clearcutting is generally the optimum method for regenerating lodgepole pine.<br>• Created openings vary in size from less than 40 acres to 250 acres in size, or are staged to create larger patches over time. |
| **Recreation** | • 76% of the planning area is allocated to summer-motorized recreation on existing roads and trails.<br>• 71% of the planning area is allocated to winter-motorized recreation or snowmobiling. |
| **Special Areas** | • Six Research Natural Areas (15,476 acres); Five new and one existing (Snowy Range) RNA will continue to be managed as an RNA<br>• 13 Special Interest Areas (18,708 acres, 2% of the forest)<br>• 2 Wild and Scenic Rivers (28 miles). |

| | |
|---|---|
| **Roadless Management** | • 7% of the Forest in Existing Wilderness Areas. 3% in recommended Wilderness Areas.<br>• 95% of inventoried roadless areas retain roadless character and 69% of roadless areas are fully consistent with the Roadless Area Conservation Rule. |
| **Oil & Gas Leasing** | • 25% of the Forest is available for oil and gas leasing with a variety of leasing stipulations. |

There are six decisions made in Plan Revisions; the results of these and estimates of proposed activities are described below.

**1. Establish forest-wide Goals and Objectives.**

Specific Goals and objectives related to threatened, endangered, and proposed species and their habitat are given below. The full set of Forest Goals and Objectives are in **Appendix 1- Forest Goals, Objectives and Strategies**.

**Subgoal 1.b:** Provide ecological conditions to sustain viable populations of native and desired non-native species. (USDA Forest Service Strategic Plan 2000 Revision Objective 1.b)

**Objectives**

1. Over the life of the plan, move terrestrial, aquatic, and riparian area composition, structure, patterns, and processes toward conditions typical of those created by natural processes.
2. Within 15 years, assess ecological conditions and current uses for at least 30% of $5^{th}$ level watersheds and identify opportunities for restoration, habitat enhancement and commodity production.
3. Over the life of the plan, identify habitat improvement needs (such as fish migration barriers) in at least 30% of $5^{th}$-level watersheds. Implement improvement projects when necessary.
4. Within 3 years, identify and map old growth forest-wide to be used in project planning to ensure that desired old growth amounts and distribution are maintained as defined in Chapter 1-Standards and Guidelines.
5. Within 15 years, demonstrate stable or positive trends in habitat availability, habitat quality, population distribution throughout a species range within the planning area, and other factors affecting ESA listed species, regional forester sensitive species, rare plant communities and maintain or improve Forest-wide habitat for MIS across the forest in the long-term.

**Strategies**

a. Maintain or restore terrestrial, aquatic, and riparian communities, which have been reduced in quality and quantity. Examples of such communities include ponderosa pine, aspen, willow, sagebrush and meadows.

b. Restore or maintain fire-adapted ecosystems consistent with land uses, historic fire regimes, and other plan related goals and objectives.

c. Manage grass, forbs, and shrub communities to provide for sustainable levels of grazing and browsing use by big game and domestic livestock.

d. Maintain and manage habitat to retain connectivity typical of that created by natural processes unless detrimental to threatened, endangered, proposed or sensitive species.

e. Implement management practices such as prescribed burning, timber harvest, thinning, and livestock grazing that mimic natural disturbances to move landscapes toward desired vegetation composition and structure.

f. Manage old growth and recruitment old growth to maintain desired composition and structure and to reduce the risks of loss.

g. Analyze project-level contributions to desired future conditions at the geographic area scale.

h. The Forest will consult with the Fish and Wildlife service in accordance with section 7 of the ESA as amended 16 USC 1531 for all Forest Service activities or actions which "may affect" a listed species.

i. Cooperate with the U.S. Fish and Wildlife Service (USFWS) in development and implementation of conservation and recovery strategies and plans for plant and animal species listed as threatened, endangered, proposed, or candidate under the Endangered Species Act (ESA).

j. Conduct habitat management activities and modify use to maintain or improve conditions that support threatened or endangered species and sensitive species.

k. Coordinate with the Wyoming Game and Fish to prevent introductions of fish and other wildlife species where there is potential for adverse impacts on threatened, endangered, and sensitive species or species of concern.

l. For sensitive species and "species of local concern" whose habitat occurs exclusively on the Medicine Bow National Forest, develop conservation assessments and implement conservation strategies. For sensitive species and "species of local concern" with habitat on several Region 2 forests, participate in multi-forest development of assessments and strategies.

m. For Colorado River cutthroat trout:
    - Link subpopulations to create metapopulations.

- Conduct habitat survey and assessment of known and potential Colorado River cuthroat streams.
- In cooperation with the State of Wyoming, identify potential impacts of fishing and coordinate management through road, trail, and sign placement.

n. Maintain the ecological values of unusual plant communities (like alpine tundra), special features (like talus, coves, cliffs, and wetlands) and sites of high biological diversity.

o. Conduct habitat management activities and modify use in habitats to maintain or improve conditions that support listed species.

p. Coordinate with local road management agencies during construction, reconstruction and recurring maintenance to minimize barriers to animal movement.

q. Maintain or improve security areas through vegetation management design and by decommissioning roads identified in project level analyses.

r. Map the location and intensity of snow compaction in lynx habitat to serve as a benchmark for future evaluation of affects on lynx.

**2. Establish forest wide standards and guidelines**

**Standards** are actions that must be followed or are required limits to activities in order to achieve forest goals. Deviations from standards must be analyzed and documented in a forest plan amendment.

**Guidelines** are advisable courses of action that should be followed to achieve forest goals. Deviations from guidelines must be analyzed during project level analysis and documented in a project decision document but do not require a forest plan amendment.

Threatened and endangered species conservation measures are contained both in direction specific to the needs of the species and in direction in other parts of the Plan that results in management of habitat to provide healthy and diverse ecosystems for the species to inhabit. The latter may be listed under biodiversity, aquatics, soil, range, silviculture, or other headings and can be found in **Appendix 2-Forestwide Standards and guidelines**. Standards that specifically address the needs of threatened, endangered, proposed, and candidate species and raptors are listed below

Standards 1. Prior to authorization and commencement of management activities that may disturb bald eagles or their habitats, survey suitable habitats for bald eagle nests and winter roosts. All nest surveys should be conducted using procedures that minimize the potential for adverse effects to nesting raptors.

2. For known Bald Eagle nest sites, develop a plan for each nest site including a map showing a buffer where surface occupancy is prohibited (within ½ mile of nest), where seasonal disturbance is prohibited (within 1 mile of nest, February 1 to August 15) and where disruption of foraging behavior is prohibited (in suitable foraging habitat, generally within a 2.5 mile radius of nest). Nests that have been occupied within the last 5 years are considered "active" (See Table 1). These buffers may be reduced in response to site-specific conditions in consultation with the USFWS.
3. If a bald eagle winter roost site is discovered, write a management plan to ensure that habitat components are maintained. Prohibit activities within 250 yards of the roost between November 15 and March 1.
4. Within each occupied Northern Goshawk territory, select three nests in each occupied territory and protect 30 acres of dense vegetation surrounding each, defining the boundaries of each area based on habitat quality. If fewer than 3 nests are found within an occupied territory, substitute 30-acre areas with characteristics of nesting habitat.
5. Within each occupied Northern Goshawk territory, designate a Northern Goshawk post-fledging area (PFA) of at least 200 acres that includes the three 30-acre nest sites selected. The PFA may exceed 200 acres to encompass the identified nest sites. The large tree component within the PFA should include snags, down dead wood, and clumps of trees with interlocking crowns. Within the PFA, prohibit management activities that may degrade goshawk foraging habitat.
6. To help reduce disturbance to nesting goshawks, prohibit construction, drilling, timber harvest and fuel treatments, and other intensive management activities within proximity of active northern goshawk nests from April 1 to August 30. Set buffer at ½ mile from active nest unless site-specific conditions are such that a lesser distance can be shown to provide the same degree of protection.

7. To protect nest sites for open-country raptors that are (1) on the Sensitive Species list or (2) sensitive to human disturbance near the nest and also use a limited number of nest sites year after year (listed in the following table): Prohibit construction of new facilities (surface occupancy) yearlong and prohibit activities that create human disturbance (like construction, logging, reclamation, or oil and gas drilling) within the distances and during dates shown in Table 1. Sensitive raptors that are not limited by nest sites need protection only from disturbance around active nests.

   Nest sites of raptors need protection for varying intervals after the last occupancy (depending on availability of nest sites). See Table below. Sites may be classified as inactive following natural destruction of the site. Set buffer at ½ mile from active nest unless site-specific conditions are such that a lesser distance can be shown to provide the same degree of protection.

Table I-1 Summary table of restrictions on surface occupancy and disturbance around raptor nests.

| Species | Number of years the site is protected after last occupancy | Buffer for surface occupancy | Seasonal Buffer for Human Disturbance | Dates for Seasonal Disturbance Restriction |
|---|---|---|---|---|
| Bald Eagle | 5 | ½ mile | 1 mile | February 1 to August 15 |
| Golden Eagle | 7 | ¼ mile | ½ mile | February 1 to July 31 |
| Ferruginous hawk | 7 | ¼ mile | ½ mile | March 1 to July 31 |
| Peregrine falcon | 7 | ¼ mile | ½ mile | March 1 to August 15 |
| Osprey | 7 | ¼ mile | ½ mile | April 1 to August 15 |
| Swainson's Hawk | 7 | ¼ mile | ½ mile | April 1 to August 15 |
| Northern Harrier* | 0** | No buffer | ½ mile | April 1 to August 15 |
| Short-eared Owl* | 0** | No buffer | ¼ mile | March 1 to August 1 |

* Protect nests from disturbance only in year the nest is active.

** No occupancy buffer because these ground nesting species have more nest site options and move around from year to year

8. In habitat suitable for the Preble's meadow jumping mouse, prescribed fires will be designed to burn no more than 25% of the Preble's habitat within each linear mile stretch of habitat. The percentage of habitat actually burned in each linear mile will be reported to the US Fish and Wildlife Service. Because of the unpredictability of fire, this standard will be achieved if no more than one of every four fires exceeds the 25% limit in size. If more than two of the first eight fires in Preble's habitat exceed 25% of the suitable habitat, the Forest Service will consult with the US Fish and Wildlife Service to revise this standard.

9. Following burns in suitable habitat within the range of Preble's meadow jumping mouse, on-site surveys will be conducted to determine if vegetation has recovered, using US Fish and Wildlife Service guidelines.

10. In suitable habitat within the range of the Preble's meadow jumping mouse, avoid placing new recreation sites, trails or roads within the riparian zone. Existing roads in desiganted critical habitat will be reviewed for possible closure or relocation.

11. Allow no loss or degradation of occupied or known historic habitat for the boreal toad, wood frog, or northern leopard frog.

12. Forest Service employees working in boreal toad habitat will disinfect waders (nets and other items that come in contact with the water) with 10% bleach solution before moving between ponds or drainages to reduce the likelihood of chytrid fungus and other disease transmission.

13. During project planning, if potential habitat occurs in the project area, survey for threatened, endangered, proposed, and candidate species on the US Fish and Wildlife Service's species list for the forest. Provide mitigation of potential adverse effects for species present.

14. If black-tailed prairie dogs are found on forest land, activities that could have adverse effects will be halted. The area will be surveyed to determine the extent of the colony and to survey for the presence of Mountain Plovers and black-footed ferrets. Mitigation consistent with standards in the Regional Deskguide will be adopted for the interim and will be applied to activities that may adversely affect the species present. Standards and guidelines will be modified or added to the Forest Plan as needed.

15. Activities will be managed to avoid disturbance to sensitive species, which would result in a trend toward Federal listing or loss of population viability. The protection will vary depending on the species, potential for disturbance, topography, location of important habitat components and other pertinent factors. Special attention will be given during breeding, young rearing, and other times, which are critical to survival of both flora and fauna.

Guidelines 1. If possible, in suitable habitat for the Preble's meadow jumping mouse, burn during hibernation period (October 1 to May 15).

**Canada Lynx**

**Applicable to All Programs and Activities:**

Standard 1. New or expanded permanent developments and vegetation management activities and practices must maintain habitat connectivity.

Guideline 1. Techniques to avoid or reduce effects on lynx should be used in proposals to construct and/or reconstruct highways across federal land. Techniques such as wildlife fencing and associated underpasses or overpasses should be considered to reduce mortality risk.

**Applicable to Specific Programs and Activities:**

The following apply to lynx habitat inside Lynx Analysis Units (LAUs) that are within National Forest System lands. Standards applicable to LAU Boundaries:

Standard 1. LAU boundaries will not be adjusted except through agreement with the U.S. Fish and Wildlife Service, based on new lynx habitat information.

Standards Applicable to Vegetative Management Activities

Standards 1. Unless a broad scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: if more than 30% of lynx habitat within an LAU on NFS lands is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management activities or practices. Wildland Fire Use practices and activities that restore ecological processes are accepted.

2. Timber management practices, such as timber harvest and salvage sales, shall not change more than 15% of lynx habitat within an LAU to an unsuitable condition within a 10-year period.

3. Maintain denning habitat within an LAU in patches generally larger than 5 acres, comprising at least 10% of the lynx habitat. Where less than 10% denning habitat is present within an LAU, defer vegetation management activities and practices that alter vegetation in stands that have the highest potential for developing denning-habitat structure in the future. Wildland Fire Use practices and activities that restore ecological processes are accepted.

4. Following a disturbance, such as blowdown, fires, insects, or pathogens mortality that could contribute to lynx denning habitat, do not salvage harvest when the affected area is smaller than 5 acres. Exceptions to this include:

    a. Developed recreation sites, administrative sites, or authorized special use structures or improvements;

    b. Designated roads and trails corridors where public safety or access has been or may be compromised; and

    c. LAUs where denning habitat has been mapped and field validated, provided that at least 10 percent denning habitat is retained and is well distributed.

5. Pre-commercial thinning may be allowed only when stands no longer provide snowshoe hare habitat (e.g., self-pruning processes have eliminated snowshoe hare cover and forage availability during winter conditions with average snow pack). Pre-commercial thinning within the home ignition zone (200 feet of administrative sites, dwellings and/or associated outbuildings) may occur prior to the stands no longer providing snowshoe hare habitat.

Guidelines

1. Where little or no habitat for snowshoe hares is currently available, vegetation management practices in lynx habitat should be planned to recruit a high density of conifers, hardwoods, and shrubs preferred by snowshoe hares. Preference should be given to mid-seral stage stands. Provide for continuing availability of lynx foraging habitat in proximity to denning habitat.

2. Where recruitment of additional denning habitat is desired, or to extend the production of snowshoe hare foraging habitat where forage quality and quantity is declining due to plant succession, vegetation management practices should retain sufficient vertical diversity, standing dead trees and coarse woody debris. The juxtaposition of denning and foraging habitat should be maintained or improved.

3. Vegetation management should provide for the retention or restoration of denning habitat on landscape settings with a low probability of loss from stand replacing fire events.

4. Fire management activities should not create permanent travel routes that would facilitate snow compacting activities. Construction of permanent firebreaks on ridges or saddles should be avoided.

5. Habitat for alternate prey species (primarily red squirrel) should be provided in each LAU.

Standards Applicable to Livestock Grazing Activities

Standards

1. In fire and harvest created openings, manage livestock grazing to assure management does not prevent successful regeneration of shrubs and trees.

2. In aspen stands, manage livestock grazing to ensure impacts do not prevent or inhibit sprout survival sufficient to perpetuate the long-term viability of the clones.

3. Manage livestock grazing in riparian areas and willow carrs (in LAUs) to help maintain or achieve a preponderance of mid or later seral stages, similar to conditions that would have occurred under historical disturbance regimes.

4. Manage livestock grazing in shrub steppe habitats, within the elevation ranges that encompass forested lynx habitat (within LAUs and linkage areas) to help to maintain or achieve a preponderance of mid or later seral stages, similar to conditions that would have occurred under the historical disturbance regimes.

Standards and Guidelines Applicable to Human Uses (HU)

Standards

1. Allow no net increase in groomed or designated over-the-snow routes, outside of baseline areas of consistent snow compaction within the lynx habitat matrix, by LAU unless the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply within permitted ski area boundaries, to winter logging, access to private inholdings and other access regulated by HU Standard 3.

2. If diurnal security habitat is identified as a need, then in the development or expansion of ski areas, locate the trails, access roads and lift termini, to maintain and provide lynx diurnal security habitat.

3. Restrict motorized winter access to designated routes and designated over-the-snow routes for non-recreation special uses, mineral and energy exploration and development sites and facilities.

4. Manage recreational activities to protect the integrity of lynx habitat.

Guidelines

1. In the development or expansion of ski areas, provide adequately sized inter-trail islands, including the retention of coarse woody debris, to maintain snowshoe hare habitat.
2. In the development or expansion of ski areas, provide nocturnal foraging opportunities for lynx while being consistent with operational needs, especially in landscapes where lynx habitat occurs as narrow bands of coniferous forest across the mountain slopes.
3. Plan recreational development and recreational operational uses to provide for lynx movement and to maintain effectiveness of lynx habitat.
4. Remote monitoring of mineral and energy development sites and facilities should be encouraged to reduce snow compaction.
5. A reclamation plan should be developed (e.g. road reclamation and vegetation rehabilitation) for closed mineral and energy development sites and facilities that promote the restoration of lynx habitat.
6. Upgrading unpaved roads that would result in increased speeds and traffic volume or that would foreseeably contribute to development or increases in human activity in lynx habitat should be avoided. This applies to upgrading roads to higher maintenance levels (to Levels 4 or 5) that result in substantially increased speeds, traffic volumes or potential future use.
7. New permanent roads should not be built on ridge tops and saddles and in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.
8. Roadside brushing on low speed and low volume roads should be done at the minimum level necessary, while providing for public safety.
9. Public motorized use should be restricted on new roads constructed for project specific activities. Provide for an effective closure in the initial design of the road. Upon project completion, these roads should be reclaimed or decommissioned, if not needed for other management objectives.

Standards and Guidelines Applicable to Linkage Areas

Standard

1. When highway construction/reconstruction is proposed in linkage areas, identify potential highway crossings.

Guideline 1. National Forest System lands should be retained in public ownership.

**3. Establish Management Area prescriptions and associated standards and guidelines.**

Management Area direction (management area prescriptions) applies to future management activities in that management area and mapping of these areas. These Management Area prescriptions and the acres allocated to each are given in the following Table. Their position on the land is shown on the accompanying map of Management Area allocations of the selected alternative (Alternative D-FEIS).

Table I-2 Acres in each management area prescription.

| Management Area | Title | Acres in the MA |
|---|---|---|
| 1.13 | Wilderness, Semi-primitive | 78,908 |
| 1.2 | Recommended for Wilderness | 27,973 |
| 1.31 | Backcountry Recreation, Year-round non-motorized | 36,505 |
| 1.33 | Backcountry Recreation Summer non-motorized with winter snowmobiling | 91,123 |
| 1.5 | National River System – Wild Rivers, Designated and Eligible<br>*(included within congressionally designated wilderness)* | 7052<br>*7052* |
| 2.1 | Special Interest Areas | 18,708 |
| 2.2 | Research Natural Areas<br>*(included within congressionally designated wilderness)* | 15,476<br>*10,043* |
| 3.31 | Backcountry Recreation – Year round Motorized | 67,613 |
| 3.33 | Backcountry Recreation Summer Motorized with Winter Non-motorized | 3,828 |
| 3.4 | National River System – Scenic Rivers, Designated and Eligible | 1,285 |
| 3.5 | Forested Flora or Fauna Habitats Limited Snowmobiling | 49,156 |
| 3.54 | Special Wildlife Area – Sheep Mountain | 16,990 |
| 3.56 | Aspen Maintenance and Enhancement | 30,280 |
| 3.58 | Crucial Deer and Elk winter Range | 59,763 |
| 4.2 | Scenery | 14,864 |
| 4.3 | Dispersed Recreation | 23,442 |
| 5.12 | General Forest and Rangelands – Rangeland Vegetation Emphasis | 66,837 |
| 5.13 | Forest Products | 132,047 |
| 5.15 | Forest Products, Ecological Maintenance and Restoration Considering Historic Range of Variability | 281,835 |
| 5.41 | Deer and Elk Winter Range | 62,610 |
| 5.42 | Bighorn Sheep Habitat | 7,998 |

| Management Area | Title | Acres in the MA |
|---|---|---|
| 7.1 | Residential/Forest Interface | point feature |
| 8.21 | Developed Recreation | 4,788 |
| 8.22 | Ski Resorts – Existing/Potential | 1,364 |
| 8.3 | Utility Corridors and Electronic Sites | 10 points, 56 miles |
| 8.6 | Administrative Sites | 1,040 |

**4. Designate suitable timber land and establish the allowable sale quantity (ASQ). Designate lands suitable for grazing and browsing. Identify lands available for oil and gas leasing.**

Of the 1,084,390 acres of land on the Forest, the 1985 Plan designated 474,828 acres as suitable for timber production. The Revised Plan (Alternative D-FEIS) would designate 320,835 acres.

The 1985 Plan had an allowable sale quantity of 28.9 mmbf/yr; the Revised Plan will have and ASQ of 22.8 mmbf/yr. Over the past three years the actual harvest has been 2.4 mmbf. The annual harvest expected in the first decade under the Revised Plan, giving funding levels similar to what has been experienced, is 10.4 mmbf.

Essentially all the timber harvested will come from lodgepole pine and spruce-fir on the Sierra Madre and Medicine Bow Mountains. There is no scheduled harvest in the Laramie Peak or Pole Mountain Units.

**5. Establish monitoring and evaluation requirements**

The Monitoring Plan for the Revised Plan is contained in Chapter 4 of the Plan.

**6. Document that we will/will not recommend any additional wilderness areas.**

The Forest Service mapped 31 inventoried roadless areas, totaling 319,738 acres on the Forest. Current Wilderness on the Forest totals 78,850 acres in the Savage Run, Platte River, and Huston Park Wildernesses. Alternative D-FEIS recommends additional proposed wilderness in the Encampment River Additions (on the north half or the existing Encampment River Wilderness Area), the Huston Park Additions and portions of the Little Snake River Inventoried Roadless Area (to the Huston Park Wilderness Area)), and the majority of the Rock Creek Inventoried Roadless area, for a total of 28,031 acres. These recommended Wilderness areas will be managed to protect the characteristics that make them desirable for wilderness management. Designation by Congress is required for areas to be added to the Wilderness system.

Under Alternative D-FEIS, 95% of Forest Service inventoried roadless areas will retain their roadless character.

## Other Projected Activities that are not Major Plan Decisions

**Recreation.** Recreation is one of the major public uses of the MBNF. Resulting disturbance may increase energetic demands or cause habitat abandonment. Overuse or inappropriate use can cause resource damage.

Table I-3 Motorized and non-motorized areas in Alternative D-FEIS, based on ROS (Recreation Opportunity Spectrum).

| | Summer | | Winter | | |
|---|---|---|---|---|---|
| | Motorized | Non-motorized | Motorized | Non-motorized | Motorized Travel Limited to roads/trails |
| Acres | 826,094 | 258,296 | 768,625 | 258,611 | 57,154 |
| Percentage of Forest | 76% | 24% | 71% | 24% | 5% |

The MBNF has relatively few trails and increasing trails is an expected outcome of all alternatives. The forest has approximately 2600 system roads. The majority of these are low standard roads. An increase in motorized trails (many expected to be from converting roads to trails) would reduce the safety hazard of mixing street vehicles and off-road vehicles on the same travelways. There is also a desire for more non-motorized trails. The projected increase in the trail system for both motorized and non-motorized use under the selected alternative (D-FEIS) would be 6 miles/year. (The desired level, given adequate funding, would be 10 miles/year.)

**Livestock Grazing.** Grazing will continue as in the past. A research study will addresses the question of grazing (and burning) on Preble's meadow jumping mice. (See Subgoal 3.b, Strategy a).

**Timber.** Allowable Sale Quantity of timber is that amount of timber that may be harvested from suitable timberlands for timber purposes over a ten-year period. It is usually expressed as an average annual amount but the amount of timber sold from the planning area must not exceed the ten-year total. Under the 1985 Forest Plan, the MBNF would produce not more than 28.9 million board feet per year Allowable Sale Quantity (ASQ) from 3245 acres, and, under the Revised Plan (Alternative D-FEIS), not more than 22.8 million board feet per year of ASQ from 2736 acres.

**Firewood**. The rate of removal of dead wood (snags, logging residue, and fresh downed wood) is expected to continue at the current rate (1.5 mmbf/year). The Plan forbids cutting of snags in riparian zones (within 150 feet of water) (Special Forest Products Standard 2).

**Roads**. System roads are expected to decline from the current 2,592 miles to an estimated 2,244 miles. At least 150 miles of designated roads will be decommissioned in 10 years (Subgoal 4a, objective 3). Roads built to access timber sales will be designed as short-term roads whenever there is no long-term need for access in the area.

## Species Considered and Evaluated

### FWS Endangered, Threatened and Proposed Species

The list of Threatened, Endangered, and Proposed species addressed in the BA was identified in cooperation with the US Fish and Wildlife Service. The U.S. Fish and Wildlife Service listed, in a letter dated July 22, 2003, seven federally listed and one proposed species that occur in the vicinity of the Medicine Bow National Forest. One additional plant (Colorado butterfly plant) was analyzed in response to comments from the FWS on the DEIS for Plan Revision. The following table displays the endangered, threatened and proposed species on the FWS species list.

Table I-4 Endangered, Threatened, and Proposed Species on the FWS species list for the MBNF.

| Species | Status | Expected Occurrence |
|---|---|---|
| Canada lynx (*Lynx canadensis*) | Threatened | Resident of forested areas |
| Preble's meadow jumping mouse (*Zapus hudsonius preblei*) and critical habitat | Threatened | Riparian habitats east of Laramie Mts. and south of the N. Platte River |
| Bald eagle (*Haliaeetus leucocephalus*) | Threatened | Nesting, winter resident, migrant |
| Black-footed ferret (*Mustela nigripes*) | Endangered | Grasslands |
| Wyoming Toad (*Bufo baxteri*) | Endangered | Single pond on Laramie Plains, no hydrologic connection to MBNF outflow |
| Ute ladies' tresses (*Spiranthes diluvialis*) | Threatened | Seasonally moist soils and wet meadows of drainages below 7000 feet elevation |
| Colorado butterfly plant (*Guara neomexicana ssp. coloradensis*) | Threatened | Riparian or other wet areas |
| Mountain Plover (*Charadrius montanus*)* | Proposed | Grassland |
| * The proposal for listing the Mountain Plover was withdrawn on September 9, 2003 and the species is now a Forest Service Regional Sensitive Species. As a result, this species is not included in the BA but is addressed in the Biological Evaluation of Sensitive Species. The species had been analyzed and a determination of "no effect" had been reached. No records of occurrence or suitable habitat for the Mountain Plover occur on the MBNF. | | |

Canada lynx, Preble's meadow jumping mouse and bald eagle are discussed under "Species with Habitat on the Medicine Bow National Forest".

Based on records from the Wyoming Natural Diversity Database, the Wyoming Game and Fish Department's Atlas and Database, and on local knowledge of biologists and others on the Forest, there is no indication that the black-footed ferret, the Wyoming toad, the Ute ladies' tresses, or the Colorado butterfly plant, occur on the MBNF.

Only 25-30 acres are marginal potential habitat for the black-tailed prairie dog and black-footed ferret. The evaluation of black footed ferret and Wyoming toad will be

brief and is in the section "Species that are Extremely Rare or Not Present on the Medicine Bow National Forest."

No suitable habitat is present for the Wyoming toad and the Utes Ladies' Tresses or the Colorado Butterfly Plant. The Colorado Butterfly Plant was not supplied in the list from FWS but is found nearby the MBNF in habitat similar to the Ute Ladies' Tresses. The discussion of these two plant species is found in the section "Off Forest Species Subject to Effects of Forest Management".

**Downstream Species**

In addition, to the previously disclosed species, The U.S. Fish and Wildlife Service (USFWS) further documented the need to assess the effects of water depletions on the MBNF on additional species occurring downstream. Actions on the Forest may alter downstream habitat used by five federally-listed birds, one threatened plant, and one endangered fish on the Platte River (in Nebraska) and four endangered fish on the Colorado River (in Colorado).

Species in the Platte River system include:

- Endangered Whooping Crane (*Grus Americana*)
- Endangered Interior Least Tern (*Sterna antillarum*)
- Threatened Piping Plover (*Charadrius melodus*)
- Endangered pallid sturgeon (*Scaphirhynchus albus*)
- Threatened Bald Eagle (*Haliaeetus leucocephalus*)
- Endangered Eskimo Curlew (*Numenius borealis*)
- Threatened western prairie fringed orchid (*Platanthera praeclara*)

Species in the Colorado River system include:

- Endangered Bonytail (*Gila elegans*)
- Endangered Colorado pikeminnow (*Ptychocheilus lucius*)
- Endangered Humpback chub (*Gila cypha*)
- Endangered Razorback sucker (*Xyrauchen texanus*)

Four Candidate Species are also on the FWS species list; they are presented in the Biological Evaluation along with other Regional Forester Sensitive Species, rather than in this Biological Assessment. In compliance with the 2000 MOU, they are included in **Appendix 3-Candidate Species**. The candidate species considered and evaluated are Black-tailed prairie dog (*Cynomys ludovicianus*), Western Yellow-billed Cuckoo (*Coccyzus americana occidentalis*), Western boreal toad (*Bufo boreas boreas*, southern population), and Slender Moonwort (*Botrychium lineare*).

# I. Species with Habitat on the Medicine Bow National Forest

Table I-5 Endangered, Threatened, and Proposed Species with potential or suitable habitat in the MBNF

| Species | Status | Expected Occurrence |
|---|---|---|
| Canada lynx (*Lynx canadensis*) | Threatened | Resident of forested areas |
| Preble's meadow jumping mouse (*Zapus hudsonius preblei*) and critical habitat | Threatened | Riparian habitats east of Laramie Mts. and south of the N. Platte River |
| Bald eagle (*Haliaeetus leucocephalus*) | Threatened | Nesting, winter resident, migrant |

## Lynx - *Lynx Canadensis*

### Status and distribution of species

The distinct population segment of the Canada lynx in the contiguous United States was listed as threatened by on March 24, 2000. The single factor identified as threatening this population was "the inadequacy of existing regulatory mechanisms, specifically the guidance for conservation of lynx in National Forest Land and Resource Plans and BLM Land Use Plans…" (Federal Register Volume 65, Number 58, p.16082.)

In the lower 48 states, lynx are still thought to occur in relatively high numbers only in Washington, Montana, and Maine, and in somewhat lower numbers in Wyoming and a few of the Great Lake States. The status in the other western states, Idaho, Colorado (prior to population augmentation), and Utah is unknown but considered very low, and they are considered extirpated from Oregon.

The Southern Rockies population was very low in the early 1990's and many areas believed (or known) to be in the historic range were no longer occupied. Lynx habitat is naturally limited in the Southern Rockies and "does not contribute substantially to the persistence of the persistence of the contiguous United States DPS" (Federal Register Volume 65, Number 58, p. 16082).

In 1998, a cooperative effort between the Colorado Division of Wildlife (CDOW), the Forest Service, the U.S. Fish and Wildlife Service, the BLM, and the National Park Service developed a draft augmentation conservation strategy for the Canada lynx and wolverine. During 1999 and 2000, 96 lynx were introduced to augment the existing small population in Colorado. Of these, 34 were still being tracked in 2002. In the first year of augmentation, mortality from starvation was high.

Thereafter, release methods were changed with animals being held in captivity longer so that they were released in spring in better condition. By 2003, 129 lynx had been released (33 of these in 2003). In summer 2003, 61 radio-collared animals were still being tracked of the 83 known to be still alive. Another 46 were known to

be dead, with mortality from gunshots and vehicle collisions the main causes of death (Colorado Division of Wildlife website 8/4/2003). The status of the other released lynx is not known. Signals were lost when the collar no longer functioned or the individual left the area being monitored.

Breeding was first documented in spring of 2003, when 5 females were found to have produced 16 kittens (Colorado Division of Wildlife website 8/4/2003). Introduction of 140 more lynx is planned (Colorado Division of Wildlife website 6/20/2003).

At this writing (September 2003), four radio-collared lynx were north of I-70 in Colorado. Some of these crossed the Wyoming-Colorado border and were on the Routt and Medicine Bow National Forests. These animals were still making long-distance movements and it is not known whether any will become long-term residents of the Medicine Bow. The lynx's ability to disperse long distances suggests that, if reproduction continues, it is probable that the population will continue to expand.

**Status and distribution on the Medicine Bow NF**

The Medicine Bow NF lies within the Southern Rockies Lynx Geographic Area (Ruediger, Claar et al. 2000, p. 4-1) No permanent lynx population is known to occur on the MBNF. With 4 radio-collared animals from Colorado introductions moving in and out of the Forest in the summer of 2003, it seems likely that resident animals will be present soon. Lynx habitat occurs on only two of the four units on the Forest, the Sierra Madre and Medicine Bow Mountains. See Map 2 on following page.

Prior to 2003, only a few lynx had been sighted in recent years on the Medicine Bow NF. It is not known whether these were naturally-dispersing animals or releases of domesticated animals held in captivity as pets or at fur farms. There are five possible records of lynx prior to 2003, all in the Medicine Bow Range of the Forest (Neighbours 1998): Bow River GA (1856, specimen), Snowy Range East GA (1856, specimen), Pole Mountain GA (1963, trapped), Sheep Mountain (2002, sighting by public, track measured and photographed by Brad Rogers (USFWS) and Greg Eaglin (USFS). The fifth is an unverified record of a lynx walking in lodgepole pine forest (1987).

Surveys were conducted according to National Lynx Detection Protocol on the Laramie and Brush Creek Districts in 2000, 2001, and 2002. "Hair snare" transects were conducted for three consecutive years (2000-2002) on the Brush Creek/Hayden and Laramie Ranger Districts, using the National Survey Protocol. Each year, 25 transects, each containing 5 hair-collecting pads, were left at baited stations for 4 weeks. No lynx hairs were collected.

Map I-2 Lynx analysis units and "linkage areas" on the Medicine Bow National Forest

There is no reliable information on the occurrence of lynx on the forest in the past other than the two specimens cited above. Wyoming trapping data from early in the century often reported as "lynx cat" both lynx and bobcats, so it is not possible to distinguish between the species. However, data from the adjacent Routt NF in Colorado reported the species separately. From 1914 to 1916, 376 lynx were trapped on the Routt NF. During 1923 and January 1924, 103 lynx were killed at poison stations set for predators in Colorado. The high number of lynx on the adjacent Routt National Forest 80 years ago and the presence of two specimens from the nineteenth century make it probable that lynx inhabited areas that are now on the MBNF. It is probable that lynx populations on the fringes of the range (like the Medicine Bow NF) grew and shrank with conditions that affected the contiguous population in Colorado.

**Habitat and Natural History**

Lynx are temperate forest dwelling carnivores. They are mostly dependent upon snowshoe hare for prey, but also prey regularly on red squirrels when hare are not abundant.

Lynx take other mammals, grouse, and ptarmigan during the summer months. In the northern portions of their geographic range, lynx undergo dramatic fluctuations in populations based on the ten-year cycle of hare abundance. In the southern portions of their range (Colorado), hare population fluctuations are not as extreme, but do occur (Hodges 2000). Southern lynx hare populations at the peak are 1-2 hare/ha, while in the northern populations peak density is 4 to 6 hares/ha (Koehler 1990; Hodges 2000). Southern lynx populations appear similar to those occurring during the hare population lows in the northern portions of their ranges (Koehler 1990). Reported that most (84 percent) lynx records in Colorado are associated with the Rocky Mountain Conifer Forest type at elevations above 2,750 meters (9,020 feet); they reported that 11 percent occurred between 2,250 and 2,750 meters (7,380 to 9,020 feet). The Colorado Natural Heritage Program determined that lynx habitat is in the 9,000- to 14,000-foot elevation range.

In the southern Rocky Mountains, lynx are predominantly found above 8,000 feet, primarily in lodgepole pine forests, on north-facing slopes. They typically use areas where low topographic relief creates continuous forest communities of varying stand ages and provides moist forest floor conditions to support hares (McKelvey et al. 2000). Aspen and shrub communities are also used, especially along the edges of coniferous forest (Ruediger, Claar et al. 2000).

Lynx require mid- or late-successional forest with high amounts of dead and down large woody material used as denning habitat. Old forest with an understory provides foraging habitat. Mid-successional stages of forested communities may serve to provide alternative prey. Early successional forest stands, following fire or management activities, may promote higher hare densities than late-successional forest stands, but the effect is transient.

Koehler (1990) found in Washington that snowshoe hare were most abundant in younger lodgepole pine stands than in any other forest type. Densely stocked (9,000 to 20,000 plus stems per acre) regenerated stands 15 to 30 years old appear to provide the optimum conditions for snowshoe, which translates to optimum foraging for lynx. However, in the southern part of the range (Wyoming and Colorado), high densities of snowshoe hares were associated with late-successional spruce-fir forest (Beauvais 1997; Hodges 2000) Old stands with a well-developed under story and dead downed wood support populations of prey species like hare and other small mammals. Stands lacking this structure are not valuable to lynx for foraging (Ruediger, Claar et al. 2000).

Denning lynx females typically select dense, mature forest habitats that contain large woody debris, such as fallen trees or upturned stumps, to provide security and thermal cover for kittens (Koehler 1990; Koehler and Brittel 1990). Recently, studies in Yukon indicated that a large number of denning sites were documented in sapling/pole stands containing large amounts of down material from a previous fire, suggesting that the presence of legacy components may be more important than stand structure itself. Overhead cover and structure maybe the two most important factors in lynx denning habitat.

Koehler (1990) found that lynx avoided large openings (greater than 100 meters) in the forest canopy and normally used coniferous or deciduous vegetation greater than 2 meters in height with a closed canopy for traveling. Roads may increase the vulnerability of lynx to hunters and trappers. Koehler and Brittell (1990) found that lynx frequently traveled on roads, but other studies have indicated the opposite.

The lynx's competitive advantage over other carnivores is its ability to run and hunt on deep, uncrusted snow, where its extremely large feet provide a large surface area to support its weight. Similar-sized predators, like the bobcat, sink into snow that is not compacted. Perhaps because of their more aggressive nature, bobcats appear to have a competitive advantage where the two species occur together. Lynx occupied all of Cape Breton Island until a bridge was built connecting the island to the mainland, allowing bobcats to cross onto the island. Within a few years, bobcats spread through all the lowlands, and lynx thereafter occupied only the mountains (Parker, Maxwell et al. 1983).

Two linkage areas connecting the MBNF lynx habitat with mountains to the south were mapped in the regional assessment. The Sierra Madre linkage area is 26,916 acres; the Medicine Bow Range linkage area is 33,304 acres. (See Map 2).

**Threats, limiting factors, and vulnerabilities**

The small population makes the species vulnerable to local extinction should a population start to be established.

Loss of habitat suitable for the lynx or its primary prey, the snowshoe hare, is the primary threat to lynx (Federal Register Volume 65, Number 58, p. 16074 and

16082). Development of ski areas, resorts, and residences reduces habitat locally.

Lynx have a high reproductive potential, as evidenced by their rapid recovery from population crashes in the far northern part of their range once prey is abundant. However, in the absence of superabundant prey, survival of young can be very low. Starvation of kittens is one of the two most commonly reported causes of death, along with human caused mortality, (Quin and Parker 1987; Koehler 1990). Prey abundance appears to be a limiting factor in reproductive success (Ruggiero, Aubry et al. 1994).

Grazing of livestock and increase in elk populations creates competition for forage with lynx prey, especially hares and rabbits (Ruggiero, Aubry et al. 1994). Competition with other predators (especially coyotes) may be increased at high elevation in winter by compaction of snow by human activities, though this is conjectural. Coyote numbers have probably increased with elimination of the gray wolf from much of its range (Johnson 2002).

Lynx may be killed by human activity like vehicular traffic, shooting, poaching, and (as a non-target species) by predator control activity and commercial fur trapping. Lynx are also killed by other predators including coyotes, bobcats, mountain lions, and wolverine (Koehler, Hornocker et al. 1979; Slough and Mowat 1996; O'Donoghue, Boutin et al. 1997; Squires and Laurion 2000).

Development of residential areas, ski areas, and highways further fragments the naturally patchy habitat of the Southern Rockies. Effects of loss of connectivity include restricted gene flow and increased mortality risks to animals moving between patches. Lynx readily move through landscapes altered by intensive commercial timber harvest (Squires and Laurion 2000).

Snow compaction by winter recreation may allow other predators to access the deep snow habitat historically used only by the lynx.

Trapping may have been a factor in the initial decline of lynx in the Southern Rockies. Trapping of lynx has been illegal in Wyoming since 1973, but some lynx may be caught in traps set for other species, especially bobcat. In Montana, lynx caught in leg hold traps and released wearing radio collars had lower survival than those trapped in other ways. The need for agility and speed in hunting hares, combined with their rather delicate long legs, make them vulnerable to starvation following even minor leg injury (Squires pers. comm.).

**Environmental Baseline**

Lynx Analysis Units (LAUs), each approximately the size of an individual lynx's home range, have been mapped on the MBNF (see Map 2), and those boundaries will remain fixed. Linkage areas, where management that increases or maintains permeability of the habitat to lynx is recommended, are also shown on Map 2.

There are approximately 306,400 acres (339,220 acres of Total acres in LAUs minus

32,810 acres of Non-habitat in LAUs) of lynx habitat on the Medicine Bow NF, all in the Medicine Bow Range and the Sierra Madre Mountains. This acreage includes winter forage (snowshoe hare habitat), denning, willow, high-elevation sagebrush, and low quality habitat. Acres of lynx habitat by type are shown in the next table.

Table I-6 Acres (and percent of LAU) of Lynx Habitat Classes for Lynx Analysis Units on the Medicine Bow NF.

| Lynx Analysis Unit Name | Total Acres in LAUs | Denning Habitat* Acres (%) | Winter Forage Habitat* | Other Habitat | Currently Unsuitable Habitat | Non Habitat |
|---|---|---|---|---|---|---|
| Battle Creek | 44,500 | 13,792 (31) | 14,581(33) | 24, 196 (54) | 64 (0.1) | 3,836 (9) |
| Bow River/ Pass Cr | 55,155 | 15,137 (27) | 21,059 (38) | 23,430 (42) | 2,350 (4) | 7,286 (13) |
| Cedar/Brush | 45,100 | 11,623 (26) | 14,209 (32) | 24,671 (55) | 1,825 (4) | 3,459 (8) |
| Encampment River** | 1,399 | 142 (10) | 107 (8) | 1,046 (75) | 0 (0) | 158 (11) |
| French/ Upper Douglas | 57,677 | 12,657 (22) | 18,284 (32) | 28,818 (50) | 2,396 (4) | 6,571 (11) |
| Green Mtn | 32,854 | 10,112 (31) | 12,621 (38) | 17,156 (52) | 744 (2) | 1,845 (6) |
| Little Snake River** | 2,764 | 186 (7) | 307 (11) | 2,197 (79) | 0 (0) | 211 (8) |
| NE Snowy | 54,717 | 17,119 (31) | 22,845 (42) | 20,130 (37) | 1,042 (2%) | 8,503 (15) |
| Upper Sierra Madre | 45,053 | 8,849 (20) | 10,857 (24) | 29,097 (65) | 1,955 (4%) | 952 (2) |
| **Total** | **339,220** | **89,617 (26)** | **114,870 (34)** | **170,741 (50)** | **10,376 (3)** | **32,820 (10)** |

* Denning and winter foraging habitat overlap, so some acres may occur in both columns.

** Acres only for the Medicine Bow portion of this LAU; most of the LAU is on the Routt NF.

Until 2003, lynx on the MBNF appeared to be present only intermittently. In September 2003, the number of radio-collared lynx on the Medicine Bow varied from 0 to 4 from day to day.

Past logging has created a mosaic of old and young forest. Apart from some old "strip cuts" up to a mile long (now revegetated with cover), the pattern produced is one of "perforation." Lynx could move through most of the area without leaving cover, skirting the relatively small openings in connected forest. Lynx forage in shrub and young forest habitat that creates good habitat for snowshoe hare, and only 3.1% of the LAU area is classified as "unsuitable" (forest too young to provide snowshoe hare habitat). No individual LAU contains over 5% of currently unsuitable habitat, far below the maximum recommended (30%) in the LCAS.

Most regeneration is natural, rather than seeded or planted. A natural pattern of succession occurs. Sometimes a lodgepole stand that is cut comes back as aspen, but there is no attempt to convert species composition from what would have occurred under natural disturbance.

Pre-commercial thinning in the past may have reduced the population of hares. However, in the absence of information on exactly when the lynx population

declined to near zero, it is not possible to say whether pre-commercial thinning occurred at a time when it could have contributed to the loss of lynx. The lynx may have been almost gone by the time thinning for timber production began.

One paved highway crosses lynx habitat in the Medicine Bow Range (Highway 130) and one crosses the Sierra Madre (Highway 70). Traffic is moderate, especially at night. Both highways (Highways 130 and 70) are closed by deep snow in mid-Fall and seldom open before Memorial Day at the end of May.

The Snowy Range Ski Area is located on the edge of lynx habitat, with 588 acres of the designated MA (MA 8.22) lying within an LAU (See Map 3). This resort is relatively small with 4 lifts, 250 skiable acres and a lodge with a restaurant. There is no housing at or near the site. Skiing is limited to daylight hours. No other ski areas are in the vicinity.

**Changes from Historical Range of Variation (HRV) in factors that may affect the species**

Some harvested sites have lost large downed wood used in denning and for resting. Old forest is reduced (Dillon, Knight et al. 2003). Traditionally, young stands have been thinned to a wider-spaced, more even distribution of trees than would be typical in a stand created by a fire. On the MBNF, a the time that the lynx was proposed for listing, the Forest had not thinned the acres of young forest desired due to a lack of funding; for the Medicine Bow –Routt together had a backlog of 16,857 acres that had been scheduled for thinning. Under Conservation Agreement with the U.S. Fish and Wildlife Service (2/7/2000), the Forest Service agreed to use information in the Lynx Science Report (Ruggiero 2000) and the Lynx Conservation Assessment and Strategy (Ruediger, Claar et al. 2000).

Winter habitat has been altered by the compaction of snow by human recreation, providing travelways for other predators that could compete with the lynx for prey (Buskirk, Ruggiero et al. 2000).

Map I-3 Northeast Snowy Range Lynx Analysis Unit

**Environmental Consequences**

Actions that may affect lynx populations and habitat include timber management, fire management, recreation, livestock grazing, utility corridors, and residential, commercial and agricultural developments, such as housing, ski areas and large resorts. These actions may affect one or more of the primary habitat needs of the species (Ruediger et al. 2000).

**Protection Provided in Plan**

Though there is no evidence that a persistent breeding population of lynx currently occupies the MBNF, potential habitat occurs and will be managed to retain its suitability for lynx. Since the recent observation of transient individuals from the Colorado releases, it is probable that the Medicine Bow could be occupied by breeding lynx within the life of this Revised Plan. Therefore, standards and guidelines that protect lynx from threats other than those related to habitat are also included in this revision.

The Standards and Guidelines specifically for lynx are based on recommendations in the Canada Lynx Conservation Assessment and Strategy ("LCAS," 2000). Refer to Appendix 4 of this BA for a comparison of the recommendations of the LCAS and management direction in the Revised Plan.

Goals, objectives, and strategies relevant to Lynx. All objectives and strategies under Subgoal 1.b (Appendix 1); Subgoal 3.b, strategy b (Appendix 1).

Standards and Guidelines. Lynx standards (Appendix 2); Biodiversity S1, S2, G1, G2; Livestock S1, S2, S3, S4, G2; Special forest products S2, S3; Silviculture S5, S6, G3, G5; Wildlife G1; Recreation- outfitters and guides G1.

**Direct Effects**

Effects of the following activities are mitigated or eliminated by the standards and guidelines listed above.

**Timber management**

Timber harvest is not an adverse effect unless the areas cut are extremely large and eliminate the mosaic used by lynx or large snags and downed wood removed (reducing present and future den sites and security for young.) Mitigation of these effects is provided by Lynx Vegetation Management Standards 1-5 and Guidelines 1-5, Biodiversity S1, Silviculture S5 and S6.). These standards are present in all Alternatives except the no action alternative (Alternative A).

**Thinning of young stands**. In all alternatives except A, young stands will not be thinned until they have passed the stage when they produce good snowshoe hare foraging habitat (Standard Lynx Veg 5).

**Logging in spruce-fir**. Logging can reduce the amount or quality of habitat,

including denning habitat (loss of large trees, snags, and downed wood), dispersal habitat (linkage areas), and foraging habitat (mainly winter habitat for the snowshoe hare). Under the preferred alternative, retention of large snags and downed wood would be higher than the 1985 Plan (silviculture standards 5 and 6), and no clearcutting would be permitted in spruce-fir, logging would be limited to group selection, individual tree selection and shelterwood (silviculture standard 2). Old growth targets in spruce-fir would increase from 10% to 25%, and in lodgepole from 10% to 15% (Biodiversity S1), compared to 10 % in the 1985 Plan.

Timber harvest was not identified in the listing decision as detrimental to lynx. In the Northern Rockies, lynx were broadly distributed in both developed and undeveloped areas. (Federal Register Volume 65, Number 58, p. 16073. However, though not threatening to the population of contiguous United States, timber harvest can have local effects (Federal Register Volume 65, Number 58, p.16076), but should not do so if consistent with the recommendations of the LCAS.

**Firewood cutting.** (loss of large snags and downed wood). Under the preferred alternative, marked wildlife trees and all snags within 150 feet of rivers, streams, and lakes would be protected from firewood collection (Special Forest Products Standards 2 and 3). The estimated amount of firewood removed is about 1.5 mmbf/yr.

**Snow compaction.** Sources of snow compaction under the Revised Plan are use of roads (either plowing or by snowmobile) for access to work sites (winter logging, oil and gas operations, etc.), for recreation, and (to a limited extent) for access to private property. Non-motorized recreation compacts snow but affects a much smaller area than motorized (snowmobiling). Access for specific projects (like winter logging) is local and short-term (a few years). Recreation and other forms of access occur every year.

Snow compaction may affect lynx by allowing other predators to move into high elevation forest where they would ordinarily founder in deep snow. These predators may compete with lynx for food or even kill the lynx. Compaction occurring above treeline is much less significant to lynx than that in subalpine forest. For the most part, snowmobiles are limited in range of movement by dense forest, but they may travel along riparian shrubs and meadows if these areas can be reached from a road. All alternatives allow snowmobiling to continue at its current level, except Alternative F, which limits snowmobiling to roads and trails. In lynx habitat, this would avoid compaction that would allow other predators to move into the forest from the main routes.

**Wildfire**. At present, the amount of area in early successional stage forest is within range of historic variation (Dillon et al. 2003). Most stands initiated in the last 50 years were created by logging rather than by fire, leaving fewer residual large snags and less downed wood as potential denning habitat for lynx. Alternative D-FEIS will allow more wildfire to burn than was accepted in the 1985 Plan.

**Ski area expansion**. The current ski area overlaps the edge of one LAU (the NE Snowy Range LAU). Land adjacent to the existing area has been allocated as Management Area 8.22-Ski Areas Existing and Potential, to allow consideration of expansion of the ski area. The Plan decision does not grant permission for this expansion, it only allows the possibility. If a formal proposal is received, it will be addressed as a project under NEPA.

The possible expansion area of about 434 acres is adjacent to the existing area and lies in the same LAU. The expansion would be for extreme skiing-the area is very steep. The proposal is to build 3 new lifts. The area is an old ski area and most skiing would be done on existing openings, and in thinned glades. Only about 250 acres of this area (the east side of the valley) would involve downhill skiing. See enclosed ski area map.

The expansion would increase the percentage of ski resort allocation in the NE Snowy Range LAU from 1.3% (588 acres) to 2.2% (1018 acres) of the lynx habitat in the LAU (46,211 acres after "non-habitat" in the LAU was omitted). See Map 3.

If the expansion is formally proposed, the area and uses will be limited by Lynx Human Use S1, S2, S3, S4, G1, G2 and G3.

Most of the acres in Management Area 8.22 that is within the Northeast Snowy Range LAU (91.7%) are classified as "other" (not winter foraging or denning habitat).

Table I-7 New and total NFS Acres allocated to "ski area" (within an LAU) for selected alternative (D-FEIS), and percentage of the total acres.

| Lynx Habitat Type | New "ski area" allocation (percentage of area of new allocation in D FEIS) | NFS Acres in MA 8.22 for alternative (D-FEIS) |
|---|---|---|
| Denning | 25 (5.7%) | 79 (7.7%) |
| Winter Forage | 4 (0.9%) | 4 (0.4%) |
| Other | 405 (93.3%) | 937 (92.2%) |
| Unsuited | | 0 (0%) |
| Not Lynx Habitat | | 2 (0.2%) |
| Total | 434 | 1022 |

**Residential development**. No potential for residential development exists on Forest Service land on the MBNF within lynx habitat or linkage areas.

**Oil and gas** exploration and development. There is no potential for oil and gas on 75% of the area in the LAUs. Of the remaining acres, 18% is low potential, and 7% is medium potential. There is no oil and gas potential in the linkage areas. The Reasonably Foreseeable Development report projected that two wells would be developed on the forest over the next 10 years.

**Forest roads**. The MBNF has 2,592 miles of system roads. Forest road traffic moves relatively slowly, is intermittent and is very light at night. Vehicle collisions are a major source of mortality in lynx, but these occur on large highways, not unpaved forest roads. Lynx show no avoidance of forest roads, though they cross larger, paved highways less than expected if they were ignoring the presence of the highway (McKelvey, Ortega et al. 2000). Road density is expected to decline under all the alternatives.

Table I-8 Expected miles of system roads on the MBNF at the end of the planning interval for all alternatives.

| | Current | A | B | C | D DEIS | D FEIS | E | F |
|---|---|---|---|---|---|---|---|---|
| Total System Roads | 2,592 | 2,403 | 2,400 | 2,350 | 2,223 | 2,244 | 2,210 | 1,754 |

**Security areas**. Security areas are blocks of hiding cover at least 250 acres in size that lie at least ½ mile from a road. All alternatives include a goal to increase the total acreage of such areas as projects are planned. Current Roadless Areas provide secure areas; the alternatives differ in how much current Roadless retains its "roadless character."

Table I-9 Percentage of the Inventoried Roadless Areas (98,949 acres) within LAUs that retain roadless character by Alternative.

| | A | B | C | D DEIS | D FEIS | E | F |
|---|---|---|---|---|---|---|---|
| Percentage of inventoried roadless area within LAUs with roadless character retained* | 58.4 | 67.7 | 72.4 | 99.9 | 95.7 | 97.8 | 99.9 |

* *Some of this area may allow activities not consistent with the Roadless Area Conservation Rule, but will maintain roadless character*

**Livestock grazing**. The revised Plan does not change grazing practices. Utilization standards provide for other herbivores like snowshoe hare. In addition to these standards (in "Livestock Use"), there are four standards from the LCAS that ensure habitat protection from harm cased by grazing (Lynx Livestock Grazing S1, S2, S3, and S4).

**Linkage areas.** Linkage areas provide travel pathways for lynx to move between patches of primary habitat. Barriers to movement would include highways and development of residential areas and major resorts. None of these is foreseen in the linkage areas on the MBNF connecting lynx habitat to the mountains to the south.

**Cumulative Effects**

**Reduction in the Southern Rockies lynx population**. The lynx that lived on the MBNF in the past were part of a larger Southern Rockies population. Though the species does not have the extreme cycles found in the far North, the Southern

Rockies population is assumed to have waxed and waned as conditions changed over time. Peripheral habitat, like the MBNF, may have been occupied only under relatively favorable conditions. The great decline of lynx in Colorado has left the MBNF without a "source" population to replenish the local numbers following reductions related to harsh conditions or low prey availability.

**Roads**. Roads built in the past cover the MBNF at a density of about 1.78 miles/section across the Forest. Inventoried Roadless Areas, which cover about 320,000 acres on the Forest, do not contain system roads. About 19% of the Forest is in blocks of 250 acres that lie over ½ mile from a road that is open and usable by the public. The significance of this for lynx is not known. Lynx are not sensitive to disturbance; even dens can occur at the edge of forest and in areas with high recreational use. Most roads built in the future will be designed as short-term roads and will be re-vegetated at the completion of their use. Some permanent roads may be built, especially to provide legally-required access to private inholdings.

**Highways.** Highways (like Interstates or busy state highways) are a major source of mortality, especially in lynx that are moved from their natal area and introduced to a strange area. (8 of the 46 known mortalities in the Colorado releases through summer 2003 were known or probably caused by vehicle collision (Schenk, 2003 on Colorado Division of Wildlife website, Ruediger et al 2000).

**Connectivity between Forest units.** In the past, lynx could have moved through valleys between all the units on the MBNF. Though the only areas with primary habitat are in the Sierra Madre and Medicine Bow Mountains, dispersing lynx probably used the other units. The Laramie Peak Unit would have provided a forested stepping stone for lynx spreading south in years of low food in the northern part of the range.

Loss of connectivity across valleys has occurred with building and improvement of highways, and associated residential and business development in the North Platte Valley. The presence of dogs may reduce the lynx's willingness to use the area, but few dogs roam widely in this agricultural area. However, so far residential development is quite confined to a few areas around the towns of Saratoga and Riverside/Encampment. With shrub reduction on land managed for grazing, the risk to a lynx crossing the valley surrounding the MBNF may have increased. Along much of the length of these valleys, though, connectivity has not declined appreciably. A lynx dispersing north of all the suitable habitat on the MBNF would have to cross I-80, which receives heavy traffic at all times of the day in all seasons. The great majority of the land is in sage-shrub-grass habitat (though this may be altered by intensive grazing) with only scattered towns and clusters of residences, and is certainly permeable to lynx.

Linkage areas provide adequate cover to connect the primary lynx habitat on the MBNF to similar habitat to the south, since lynx move through harvested landscapes (Squires and Laurion 2000).

**Realty**. All T&E species are favored in land adjustments by Realty and Land Adjustment Standard 1 and Guideline 3, which give priority to acquiring and retaining land with habitat identified by the U. S. Fish and Wildlife Service as necessary for T&E species' recovery.

**Residential development in lynx habitat**. Within the Forest boundary, there are scattered inholdings of private land where further residential development could occur in LAUs and linkage areas. No suitable primary habitat occurs on the adjacent private land outside the Forest boundary.

**Conclusions**

The area that now lies within the boundaries of the Medicine Bow National Forest contains an estimated 7 lynx home ranges. At no time was this area large enough to support an independently viable population; rather it was a portion of a larger that extended to the south. Lynx habitat on the forest contributes to the viability of the population of the Southern Rockies as a whole. Therefore, effects of the alternatives are considered for the Medicine Bow habitat's contribution to the Southern Rockies Lynx Geographic area (Ruediger et al. 2000).

The listing determination for lynx was based on inadequate protection in Forest Plans. Alternative A does not contain the lynx direction recommended in the LCAS, and is not expected to provide adequate habitat for this recovering species. The lynx direction would be expected to be added by amendment to the Plan if Alternative were selected.

For all other alternatives, the management direction in Chapter 1 (objectives, standards, and guidelines) are expected to provide adequate suitable, denning, foraging and dispersal (connectivity) habitat. Habitat for denning, foraging and dispersing will be protected. The 2003 Forest Plan revision will direct management of lynx habitat to contribute to the viability of the population of lynx in the southern Rocky Mountains. All action alternatives will maintain the quality and quantity of lynx habitat that will contribute to the expansion and maintenance of a viable population of lynx in the southern Rocky Mountains.

**Determination for Alternative D-FEIS**

Lynx are dispersing from the Colorado population and a resident population is probable on the Forest before the end of the Plan period. The standards and guidelines listed above will direct vegetation management to retain the components and distribution of habitat critical to the lynx and their prey the snowshoe hare and limit human uses in a way compatible with lynx residence. Lynx are not very sensitive to disturbance. Highway mortality is a potential threat to lynx on the MBNF. However, the presence of highways is not part of the decision on the Forest Plan Revision.

The single factor identified as threatening this population was "the inadequacy of existing regulatory mechanisms, specifically the guidance for conservation of lynx in

National Forest Land and Resource Plans and BLM Land Use Plans…" (Fed Reg, Volume 65, Number 58, p.16082). The addition of the goals, objectives, standards, and guidelines that are relevant to lynx conservation remedies this deficiency and is expected to maintain and improve the quality of lynx habitat on the MBNF.

The Revision of the Forest Plan, Alternative D-FEIS, is "***not likely to adversely affect***" the lynx.

## Preble's Meadow Jumping Mouse-*Zapus hudsonius preblei*

### Status and distribution of species

Preble's meadow jumping mouse is a regional endemic of the Front Range in Colorado and the northern extension of the Front Range in Wyoming (the Laramie Range). Surveys have identified locations where the subspecies was present in the past and is no longer found (Ryon 1996, cited in Federal Register 1998, 63 (92)). The species is no longer found in Adams, Arapaho, and Denver Counties in Colorado.

The subspecies was listed as "threatened" under the Endangered Species Act in 1998, based on habitat loss and reduction in range and population related to "(h)abitat alteration, degradation, loss, and fragmentation resulting from residential, commercial, recreational., flood control and water development, and agricultural and livestock uses…; inadequacy of existing regulatory mechanisms; and "other factors, including herbicide and pesticide use and intensive human development …" (Federal Register 63:92 pp13-19).

### Status and distribution on the Medicine Bow NF

Preble's meadow jumping mouse has been found on the Pole Mountain Unit and on the southeastern Laramie Peak Unit in the Horseshoe, Cottonwood, and Bear Creek Geographic Areas (Map 4). About 2/3 of the Laramie Peak Unit has been surveyed and the Preble's mouse has been found in most riparian areas. There are 13 recorded capture sites where Preble's have been identified through morphological characteristics. In the Pole Mountain Unit, 30 Preble's meadow jumping mice were trapped at 6 locations in 1998.

Riparian areas along four stream segments on the MBNF were identified as Proposed Critical Habitat for the Preble's meadow jumping mouse. Two of these areas were designated as Critical Habitat (Cottonwood and Pole Mountain) in 2003. Ten miles of Critical Habitat for the Preble's meadow jumping mouse has been identified on portions of the Laramie Peak and the Pole Mountain Units (see following Table and Map 4). Areas where Preble's were identified only in the field, without genetic or morphological measurements from specimens, are classified as suitable (but not Critical) habitat in the table below.

The table below displays critical and other suitable habitat for the Preble's meadow jumping mouse within the boundary of the Medicine Bow National Forest (the

boundary includes private as well as Forest Service land). Preble's habitat is the riparian area (approximately 100 yards on each side of the stream, measured from the 100 year floodplain) along the miles of stream in this Table.

Table I-10 Critical and Other Suitable Habitat for Preble's Meadow Jumping Mouse within the boundary of the MBNF.

| | Critical Habitat (miles) | | Other Suitable Habitat* (miles) | | Total within MBNF boundary (miles) |
|---|---|---|---|---|---|
| | NFS | Other ownership | NFS | Other ownership | |
| Cottonwood | 4.8 | 21.6 | 0 | 0 | 26.4 |
| Horseshoe | 0 | 0 | 2.5 | 1.6 | 4.1 |
| Bear Creek (Friend/ Murphy) | 0 | 0 | 18.1 | 4.3 | 22.4 |
| Pole Mountain | 4.9 | 0 | 0 | 0 | 4.9 |
| Total | 9.7 | 21.6 | 20.6 | 5.9 | 57.8 |

* *Includes original proposed critical habitat*

### Habitat

Preble's meadow jumping mice are strongly associated with riparian areas with thick ground cover adjacent to flowing streams. Though primarily found in grassland or meadow with shrubs, they may also occur open pine or aspen forest with ground cover. Herbaceous cover is essential and occupied habitat usually includes shrubs, especially willow. Day nest resting sites may be in piles of downed wood. Young may be born either in burrows or in nests above ground. Hibernation takes place in burrows in riparian areas or in uplands adjacent to summer habitat. Mice are active May to October (Welp, Fertig et al. 2000).

### Environmental Baseline

The lack of information on historic number and distribution on the Medicine Bow NF makes it impossible to assess whether the current population is stable under existing management or is either increasing or declining. Although current management seems to be compatible with continued existence of the populations on the forest, lack of information on historic populations makes this conclusion uncertain.

Map I-4 Critical and other Suitable Habitat of the Preble's meadow jumping mouse. (updated map)

Ongoing Forest Service activities that have the potential to affect habitat suitability are recreation, prescribed burning, livestock grazing, and roads.

In the Laramie Peak Unit, of the 4.8 miles of Critical Habitat on Forest Service land, 2.2 miles are within active grazing allotments and 2.6 miles are in vacant allotments. On the Pole Mountain Unit, Critical Habitat was designated along 4.9 miles of stream, all on Forest Service land and all within active grazing allotments.

**Threats, limiting factors, and vulnerabilities**

The subspecies is vulnerable because of limited global range, uncertainty in effects of management, and modification and destruction of riparian habitat. Riparian corridors and their adjacent uplands are limited in extent and are favored for recreation, residential, and agricultural uses.

Where residential development occurs, the subspecies is lost even if a buffer is provided that protects the riparian habitat. The reason for this is not known, but the presence of domestic pets (especially cats) or the lack of suitable upland sites for hibernation may contribute to the loss of the subspecies.

Overgrazing or other activity that removes streamside cover also threatens some populations. Individuals entering hibernation with low fat are less likely to survive or to breed successfully the following spring than others. As a result, late season grazing may have an adverse effect (Federal Register 63:92 May 13 1998, p. 19).

**Changes from HRV in factors that may affect the species**

Populations may be more isolated than in past if downstream habitat is less suitable where overgrazing or development has occurred. If so, gene flow could be reduced. The loss of connected populations would also reduce the likelihood of recolonization of habitat that was rendered temporarily unsuitable (for example by burning or removal of cover by overgrazing) if no remnant population survived.

**Protection in the Plan**

All alternatives except A have the following objectives and standards:

Goals, objectives, and strategies relevant to Preble's meadow jumping mouse. Subgoal 1.b; Objectives 1, 3, and 5; and Strategies a, c, d, h, i, j and n; Subgoal 3b, strategy b, Subgoal 4.a, strategy a.

Standards and Guidelines. Water and Aquatic S4, S14, S15, G1; Biodiversity S3; Livestock Use S1, S2, S3, S4, G1, G2, G3, G4; General Recreation S1; Dispersed Recreation S1, S3, G4; Real Estate-land Adjustment S1, G3.

Alternative D-FEIS includes in the Desired Condition the statement:

> "Riparian areas will be in good or improving condition. Rare habitats such as fens, wetlands and riparian areas will continue to occur and management will ensure that these habitats support the unique taxa they harbor"(see Plan).

**Environmental Consequences**

**Direct Effects**

**Alteration of vegetation by prescribed fire**. Prescribed burning removes herbaceous and shrub cover temporarily, but in the long term is necessary to maintain Preble's habitat. In rapidly moving wildfire, most small mammals survive in burrows. However, *individual animals* may be injured or killed, and litters of young may be killed by the fires or may starve due to local loss of forage.

Critical habitat (and other suitable habitat) may be *temporarily* rendered unsuitable by burning. Burning may be beneficial to the ecosystem on which the species depends *in the long-term*. In study of *Z. hudsonicus*, Kaufman (1990) found a positive effect of fire in one study and no effect in another. Grass and forb cover will return in a year or two, and shrubs will recover in a few years. Therefore, *populations* are not hurt by fire *in the long-term*, though individuals may be injured or killed and habitat temporarily reduced in suitability.

Potential adverse effects of fire on local populations and on habitat are limited by TES Standards 8 and 9 and TES Guideline 1 (Appendix 2). Prescribed burns in suitable habitat will be limited in extent to ensure a remnant population to repopulate the area and monitoring of the response of vegetation will be reported to the FWS.

**Alteration of vegetation by timber management.** Neither of the units containing Preble's habitat (the Laramie Peak Unit and Pole Mountain) have any scheduled timber harvest. Harvest may occur to benefit other resources or during mortality caused by insect and disease or following wildfire. However, there is no reason to remove threatened or dead trees to protect timber value on Forest Service land (since there is no timber allocation in either Unit with Preble's habitat). Harvest and fuel treatment is likely to be limited to reduction of threats of fire and spread of insects and disease to nearby private land and forest.

**Grazing.** There is no evidence of detrimental effects of livestock grazing on Preble's meadow jumping mouse, if the grazing meets Plan Standards. There is no information on the density or extent of **past** populations of Preble's on the Medicine Bow NF for comparison to current occurrence. However, grazing restrictions on Forest Service allotments provide for residual vegetation. (Livestock S1, S2, S3, S4, G1, G2, G3, G4.) The assumption that current regulation of livestock grazing provides conditions compatible with the recovery of the Preble's meadow jumping mouse will be tested in a study of the effects of grazing and fire on Preble's meadow jumping mouse planned on the Laramie Peak Unit (Subgoal 3.b, strategy b).

**Recreation and travel routes.** Recreation on trails along streams may disturb Preble's meadow jumping mice (Meanley in press). However, this study was conducted in a very high-use area (Boulder open space trails). Since the mice are primarily nocturnal or crepuscular, most recreation disturbance probably affects mice in day nests. Development of sites (like campgrounds or picnic areas) can eliminate

suitable habitat. Water and Aquatic Standards 4, 5, and 15 and Guideline 1, TES Standard 10 and Soils Standard 4 limit development of recreation facilities and roads and trails and require rehabilitation of disturbed sites in riparian habitat.

**Oil and gas** exploration and development. There is no potential for oil and gas in Preble's range on the MBNF.

**Realty**. All T&E species are favored in land adjustments by direction (Realty and Land Adjustment Standard 1, Guideline 3) giving priority to acquiring land with habitat identified by the U. S. Fish and Wildlife Service as necessary for T&E species' recovery.

**Cumulative Effects**

Alteration of habitat on other ownerships may have removed vegetation so that the habitat was no longer suitable for Preble's meadow jumping mouse. This would contribute to an overall reduction in the population, increasing the probability of succumbing to demographic fluctuations and reducing genetic diversity. Such changes may have interrupted connectivity between the populations on Forest Service land, which are relatively near the headwaters. In Wyoming, most of the Preble's habitat is on ranches, and most effects on vegetation would result from overgrazing. In Colorado, the primary source of loss of habitat is residential development.

**Conclusions**

Evaluation criteria are protection of riparian habitat (including water quality and retention of shrub habitat and herbaceous cover along streams within range), avoidance of new recreation sites and trails, avoidance of new roads and obliteration of existing roads and stream crossings in range, and limitation on burns in occupied habitat.

All alternatives except A will have the management direction listed above. Alternative F would require less grazing utilization by livestock, leaving a taller, denser structure of grass and shrubs. Whether this would be beneficial compared to current practices is uncertain. If adequate retention is provided by standards in the other action alternatives, habitat structure may not be limiting populations or habitat occupancy, and there may be no benefit of reducing utilization. There is no difference in effects of the other action alternatives on Preble's meadow jumping mouse.

**Determination for Alternative D-FEIS**

Even with the protection of the management direction listed above, some *individual* Preble's meadow jumping mice may be harmed or killed by Forest Service activities (especially prescribed burning) that are permitted and are probable within the life of the Plan. As a result, the determination for the species is ***likely to adversely affect*** the Preble's meadow jumping mouse.

Prescribed fire in Preble's habitat will have short-term adverse effects on habitat quality, though providing long-term benefits. It may be necessary to provide access (to mineral claims or private land) that cannot be designed to avoid all Preble's habitat. These activities are probable within the area that is suitable for the species and is inhabited by jumping mice that are probably or certainly Preble's. Current dams and water uses may affect habitat. While these effects will be minimized by the standards and guidelines, direction in the Revised Plan is expected to ***likely to adversely affect*** the designated critical habitat for the species, at least in the short-term.

## Bald Eagle - *Haliaeetus leucocephalus*

### Status and distribution of species

Outside of Alaska, the Bald Eagle is listed as "threatened" by the U. S. Fish and Wildlife Service. Historically bald eagles nested throughout North America, but the population greatly decreased during the 1900s due to shooting, habitat alteration, pesticide use (especially DDT), and disturbance at nest sites. By the 1970's, the species was extirpated from much of its former breeding habitat and greatly reduced in the remaining occupied areas in the lower 48 states.

The species was originally listed in 1978. In 1995, populations had recovered across the country and those considered "endangered" were downlisted to "threatened" status. In 1999, most recovery goals had been met and the population continued to increase, leading the USFWS to propose that the species be removed from the Endangered Species list. No action has been taken on that proposal (as of August 2003). Breeding populations now exist in all Canadian provinces, in all but two states in the United States, and in Mexico.

### Status and distribution on the Medicine Bow NF

The lack of large rivers and lakes on the MBNF limits use by Bald Eagles. Foraging occurs occasionally on reservoirs (Lake Owen, Rob Roy, and Hog Park). Winter roosts occur in valleys along larger rivers outside of National Forest land. One or two nests are occupied on the Brush Creek/Hayden RD most years. The only Bald Eagle nests known on the MBNF are in the N. Platte Valley, most in the SW corner of the Medicine Bow Range. The only active nest (occupied in the past 5 years) is the one that is currently occupied. Based on observations of birds including juveniles, it is suspected that here may be a nest in the Encampment River Wilderness Area, but no surveys have been done. Currently inactive historic nests are:

- The Holroyd Nest in the eastern edge of the Sierra Madre was discovered in 1997 and has been unoccupied since that year.
- On the Platt River, a nest on Walbright Creek in the wilderness was active in 1994. The nest was hard to find, quite far from the river, and is not known to have successfully produced young. It is occupied now.

- The Northgate nest (near the southern boundary of the Platt River Wilderness) was active in 1993 and 1994, producing young but was not maintained and has blown down.

All known nests on MBNF land are either along the N. Platte River or on the very edge of the Forest-land, suggesting that the birds are at the edge of their suitable habitat. The off-and-on pattern of occupation of the currently inactive nests on the MBNF, independent of level of disturbance, suggests that these are not the most desirable territories for Bald Eagles. In contrast, five Bald Eagle nests off the Forest along the main river in the center of the North Platte valley are continuously occupied and have more consistently high reproduction.

The known active nest (A-bar-A South) has been active for the last 5 years and has produced 4 young in that time. This nest is on the North Platte River (Map 5), downstream from (north of) the boundary of the Platte River Wilderness. It is downstream of most river recreation activity (boating, fly fishing).

**Habitat and Natural History**

Bald eagles are seldom seen far away from water, seacoasts, lakes or rivers. Eagles require large diameter trees for roosting, perching, and nesting. Breeding requires a readily available food source of moderate to large fish, large diameter trees, and minimal disturbance from humans. Carrion use is an important food source for eagles during the winter months. The nesting season typically begins in April, and lasts through July. Sexual maturity is usually reached at 5 years of age. Bald eagles lay one to four eggs.

Map I-5 Location of Known Active Bald Eagle nest.

### Threats from human activity

Nesting Bald Eagles may be disturbed by human presence near the nest. Many pairs habituate to consistent activity: for example, the birds may cease responding to passing rafts as long as people do not land on the shore. In addition to recreation, disturbance associated with resource extraction may disturb nesting pairs. Timber sales, road building, and other projects that are analyzed in NEPA will be constrained by Plan standards (see below). Foraging birds may be disturbed by recreation, especially recreation on the water. Birds may avoid foraging during periods of high use (weekends, from late morning on). Fires that are allowed to burn may degrade water quality temporarily, reducing clarity of water (and inhibiting hunting) and possibly reducing the abundance of fish prey. Timber harvest could remove trees that are used as nest sites or as foraging perches.

### Environmental Baseline

The Medicine Bow NF has few lakes and rivers large enough to provide foraging habitat for Bald Eagles. The three lake sites (Lake Owen, Rob Roy Reservoir and Hog Park Reservoir) are heavily used for recreation from the end of June to the end of August. No viable population now exists on the planning area.

The Bald Eagles that use the Medicine Bow NF are a small part of a larger population. The currently occupied nest is on the North Platte River, downstream from (north of) the boundary of the Platte River Wilderness. Amount of recreational use (floating the river) varies greatly from year to year and is correlated with water flow (see following Table). Use has been very low in the recent dry years, so the 1998-1999 numbers are probably more typical of long-term use. In 2002, the river was almost dry by the time the access points were accessible. Fourteen outfitters have permits to float the North Platte on the MBNF.

Table I-11 Boater registrations (number of parties) at access points on the North Platte River.

| Year | Routt Access (Northgate Canyon) | Six Mile Access |
|---|---|---|
| 1998 | 142 | 35 |
| 1999 | 117 | 33 |
| 2000 | 23 | 26 |
| 2001 | 13 | 41 |
| 2002 | 1 | 1 |

### Protection in the Plan

Nesting, foraging and winter habitat will be protected by Subgoal 1.b, objective 5 and strategies h, i, and j; TES S1, S2, S3; Special Forest/Rangeland S2, S3, Silviculture S5; and Water and Aquatic S1, S3, S4, S5, S6, S8, S9, S10, S11, S12, S13, S14, S15, G1 and G2.

**Environmental Consequences**

**Direct and indirect effects**

**Disturbance from recreation and Forest Service activities.** Bald Eagles are susceptible to disturbance at nest sites, though individual pairs vary greatly in their tolerance of human activity. New sources of disturbance or increased disturbance at existing nesting sites are the primary concerns: eagles that nest repeatedly at sites of high existing recreation are assumed to tolerate disturbance. Standards providing buffers around active nest sites protect the birds from seasonal disturbance associated with Forest Service activities and from construction of facilities within buffers around the nest, and from disturbances in foraging areas.

Most of these boaters would have taken out before passing the currently active nest, which is downstream of the best take-out spot. Few boats go beyond that because of difficult take-out and low water in the stretch where the active nest occurs.

If eagles nested along the more heavily used part of the river, there could be some disturbance during the floating season (May and early June) and a pair that was not tolerant of human activity might move to another site in future years.

**Sedimentation from timber harvest and roads**. Reduction in water quality that reduces fish populations or increases turbidity may reduce foraging success. Water quality is protected from effects of these sources of sediment by standards and guidelines for Water and Aquatics and for Soils.

**Timber sales and firewood collection: loss of nest sites, roosts, and foraging perches**. Surveys are required in suitable habitat; if Bale Eagle nest or roosts are found, a Management Plan for the nest or roost would be developed. Nest Plans provide protected buffers around each nest and, within a 2.5-mile radius of the nest, a quarter mile buffer on each side of the river will be protected from activities that would disturb feeding. Away from occupied habitat, the riparian buffer for timber sales is only 100 feet, or 300 feet if protecting a riparian or aquatic TES species. In watersheds occupied by Bald Eagles, this buffer would be 300 feet, but in areas not currently occupied by the species, it may be only 100 feet. Since nests may be over 300 feet from water, potential future nesting habitat could be removed with either buffer. Either buffer would protect perches along the water's edge. Foraging perches are protected from timber sale removal by the buffers proved in current territories and also by protection of snags from firewood harvest within 150 feet of lakes, rivers, and streams. Given the very limited extent of the Bald Eagle's use of high-elevation habitats found on the MBNF, it is not likely that reduction of potential nesting habitat at a site in a currently unoccupied area would limit occupation of the area by eagles.

**Oil and gas exploration and development**. There is no oil and gas potential in the part of the Forest with historic or current nest sites.

**Realty**. All T&E species are favored in land adjustments by Realty and Land

Adjustment Standard 1 and Guideline 3, which give priority to acquiring and retaining land with habitat identified by the U. S. Fish and Wildlife Service as necessary for T&E species' recovery.

**Cumulative effects.**

Some Bald Eagle nest sites have been lost over time with loss of riparian forest on other ownerships. However, the population is rising rapidly in the western U. S. Protection from shooting and the ban on DDT and other organophosphates has reversed the declines seen through the 1970's.

Past loss of large trees and snags within ¼ mile of rivers and lakes has reduced foraging perches and nest sites. Past road building provides access to the lakes and rivers, increasing disturbance and vulnerability to deliberate illegal killing.

Evaluation criteria are protection from disturbance at nest sites and foraging areas. All alternatives provide the following protection.

**Protection in Plan**

Standards and Guidelines. TES S1, S2, S3; all Water and Aquatic standards and guidelines; Special Forest Products S2, S3; Silviculture S5; Recreation- Outfitters and Guides G1.

**Conclusions**

All alternatives except A provided added protection from new or increased disturbance at known nest sites from Forest Service actions like timber sales and oil and gas development. Nest surveys will be conducted prior to projects that would affect vegetation or disturbance in Bald Eagle habitat. Water quality standards will protect prey populations. There is currently little disturbance from recreation at the active nest. If eagles nested along the more heavily used part of the river, there could be some disturbance during the floating season (May and early June) and a pair that was not tolerant of human activity might move to another site in future years. Given the limited distribution of Bald Eagles on the Forest, they are affected by few activities. All alternatives except A will have similar effects on Bald Eagles.

**Determination for Alternative D-FEIS**

The limited boating season, early timing of high water, and unreliability of good conditions suggest that there will not be a great increase over the current moderate level of disturbance. The Revision of the MBNF Plan is ***not likely to adversely affect*** the Bald Eagle.

## II. Species that are Extremely Rare or Not Present on the Medicine Bow National Forest

The species list obtained from the USFWS (Letter, July 22, 2003) includes species that are known from the general area, but for which there are no records of occurrence on the MBNF (based on the Wyoming Natural Diversity Database, the Wyoming Game and Fish database, Forest Service district records, and local knowledge of Forest Service personnel, state employees, and others. In some cases, surveys have been done that failed to find the species; in other cases there is little or no potential or suitable habitat.

Table I-12 Endangered, Threatened, and Proposed Species listed by the FWS for the Forest for which there are no known occurrences and little or no potential or suitable habitat known on the MBNF.

| Species | Status | Expected Occurrence |
|---|---|---|
| Black-footed ferret (*Mustela nigripes*) | Endangered | Grasslands |
| Wyoming Toad (*Bufo baxteri*) | Endangered | Single pond on Laramie Plains, no hydrologic connection to MBNF outflow |

### Black-footed Ferret – *Mustela nigripes*

The Black-footed ferret is listed as endangered. This carnivore lives within the abandoned burrows of prairie dogs and uses these complex underground tunnels for shelter and hunting. It is a species of open county, and is essentially always associated with large colonies of prairie dogs, and occurs only in towns over 5,000 acres in size. Each ferret typically needs about 100-120 acres of space upon which to forage for food. A mother with a litter of three would need approximately 140 acres to survive (Nowak 1991cited in; Briercheck and Csomos 2000; Massicot 2000) The U.S. Fish and Wildlife Service included this species as occurring on the Medicine Bow-Routt NF (Letter, 7/22/03). No records of this species are known within the boundaries of the Medicine Bow National Forest (based on the WYNDD, the Wyoming state database of wildlife observations, and ranger district knowledge or records). No suitable habitat is known to occur.

**Protection in Plan**

TES Standards 13 and 14.

**Determination for Alternative D-FEIS**

The limited habitat with any potential for Black-tailed prairie dogs and the spatial need of ferrets make occurrence of black-footed ferrets extremely unlikely. Surveys will be conducted prior to projects and, if Mountain Plovers or Black-tailed prairie dogs are found, potentially harmful activities will be halted. Management direction for the species will be developed in consultation with the FWS and added to the

Forest Plan.

The Revised Plan is expected to have ***no effect*** on the black-footed ferret.

## Wyoming Toad - *Bufo baxteri*

The Wyoming toad is a subspecies of the Manitoba toad that exists only in a small portion of the Laramie basin. Prior to about 1970, the Wyoming toad was relatively abundant in the Laramie basin, but now, the subspecies is confined to wetland habitats adjacent to Mortenson Lake, Mortenson National Wildlife Refuge (Baxter and Stone 1985). Reintroduced populations exist at Lake George and Hutton Lake, Hutton National Wildlife Refuge. In 1984, the U.S. Fish and Wildlife Service listed the Wyoming toad as "endangered" under the Endangered Species Act (Dickerson 1999). Nine captive-breeding facilities, including the Henry Doorly Zoo and the Saratoga National Fish Hatchery, are successfully rearing the Wyoming toad for reintroduction into the wild (Spencer 1999).

The Wyoming toad is not known to be native to the Medicine Bow National Forest. Wyoming toads have been reported to prefer floodplains, small, seepage lakes, and ponds in the Laramie basin (Baxter and Stone 1985). No suitable habitat occurs on the Forest. Although the Forest (eastern side of the Medicine Bow Mountains) is adjacent to the Laramie basin and provides water to the basin via the Laramie River, there is no evidence that Forest activities are implicated in the Wyoming toad's decline. Causes of past declines are not known.

**Determination for Alternative D-FEIS**

Because there is no clear and compelling evidence that multiple-use activities in the Medicine Bow National Forest directly affect Laramie basin wetlands, alternative D-FEIS, if implemented, is expected to have ***no effect*** on the Wyoming toad.

# III. Off-Forest Species Subject to Effects from Management

Table I-13 Threatened Species off-forest and subject to effects from forest management.

| | | |
|---|---|---|
| Ute ladies' tresses (*Spiranthes diluvialis*) | Threatened | Seasonally moist soils and wet meadows of drainages below 7000 feet elevation |
| Colorado butterfly plant (*Guara neomexicana ssp. coloradensis*) | Threatened | Riparian or other wet areas |

## Ute ladies' tresses (ULT) - *Spiranthes diluvialis*

### Distribution and Status

Populations of ULT orchids are known from three broad general areas of the interior western United States: near the base of the eastern slope of the Rocky Mountains in southeastern Wyoming and adjacent Nebraska and north-central and central Colorado; in the upper Colorado River basin, particularly in the Uinta Basin; and in the Bonneville Basin along the Wasatch Front and westward in the eastern Great Basin, in north-central and western Utah, extreme eastern Nevada, and southeastern Idaho. This orchid has recently been discovered in southwestern Montana and the Okanagan area of north-central Washington. Thirty-two populations are known to occur across this area (U.S. Fish and Wildlife Service 1992; Fertig and Heidel 2002), (Fertig 2000). The species is listed as threatened under the Endangered Species Act, has a TNC/NHP status of G2, a State status of S1, and is on the WYNDD Plant List as a High Conservation Priority (U.S. Fish and Wildlife Service 1992; Fertig 2002)

Within southeastern Wyoming, the entire Wyoming occurrence of ULT occurs outside of the boundaries of the MBNF Forest Plan Revision planning area. Total occupied habitat is about 10 acres (USDI FWS 2002). About 1/3 of the Wyoming occurrences/potential habitat are found between the MBNF forest boundary and the Wyoming-Nebraska border. Based upon surveys conducted by Hazlett (Hazlett 1997; Hazlett 1998; Burke 2000), records kept by the Wyoming Natural Diversity Database (Fertig and Thurston 2003) and records on file (Strauss 1996), ULT does not occur on the MBNF. In addition, there is no potential or suitable habitat for ULT on the MBNF (Fertig and Beauvais 1999; Fertig 2002; Fertig and Thurston 2003).

Nationally, many of the populations of ULT occur on federal lands managed by the Bureau of Land Management, the National Park Service and the Forest Service. These Federal Agencies are responsible for insuring that all activities and actions on lands they manage are not likely to jeopardize the continued existence of ULT (USFWS 1992). Within Wyoming, populations are mostly found on private lands, where threats are low under current management (Fertig 2002).

A draft recovery plan for ULT was prepared in 1995 (U.S. Fish and Wildlife Service 1995). This draft does not include population or habitat recovery goals or de-listing criteria. The recovery plan direction focuses on restoring natural stream dynamics

(hydrologic patterns). Critical habitat has not been designated for this species.

**Status and Distribution on the MBNF**

Based upon surveys conducted by Hazlett (1997), Hazlett (1998), Burke (2000), records kept by the Wyoming Natural Diversity Database (Fertig and Thurston 2003) and records on file (Strauss 1996), ULT does not occur on the MBNF. In addition, there is no potential or suitable habitat for ULT on the MBNF (Fertig and Thurston 2003, Fertig 2002, Fertig and Beauvais 1999).

**There are no populations of ULT** located between the MBNF boundary (Pole Mountain) and the Wyoming-Nebraska border on creeks that originate on the MBNF. The connection between precipitation on the MBNF and subsurface flow to other creeks in the area is undefined at the current time. There is identified potential habitat downstream of Laramie Peak Range along Fish Creek and downstream of Pole mountain along Horse Creek. Potential habitat is 2-30 miles from the MBNF boundary (Fertig and Thurston 2003). The closest documented populations are 30 miles from the MBNF boundary.

**Habitat and Natural History**

Ute ladies' tresses (ULT) is a perennial forb in the orchid family. It was first described as a species in 1994 (Sheviak 1984). It generally blooms from late July through August but, depending on location and climatic conditions, may bloom in early July or still be in flower as late as early October (U.S. Fish and Wildlife Service 1995). Its seeds are very small and may require specific symbiotic association with mycorrhizal fungi for germination (Arditti 1992). It may be like other orchid species, in which some plants may germinate and remain underground in a saprophytic state for many years before emerging. After emerging, individual plants may survive annual periods of dormancy and bloom only rarely. Many populations bloom 2 out of every 3 years (Jordan 1999). Reproduction appears to be strictly sexual. Pollinators that have been identified to date are bumblebees (*Bombus* spp.), and anthophorans (*Anthophora* spp.) (Sipes and Tepedino 1995; Sipes and Tepedino 1995).

ULT inhabits moist soils in mesic or wet meadows, gravel bars, wet streambanks, and old oxbows between elevations of 4,300 to 7,000 feet (Stone 1993). Jennings (1990) observed that ULT seems to require "permanent sub-irrigation," indicating a close affinity with floodplain areas where the water table is near the surface throughout the growing season and into the late summer or early autumn. ULT colonizes early and mid-seral successional riparian habitats subject to seasonal flooding from snowmelt and intermittent heavy thunderstorms (Jordan 1999). It is not tolerant of long-term standing water and emergent vegetation development.

**Threats from Human Activity**

Changes in natural stream dynamics and habitat destruction from development on private lands are the primary threats from human activity. Within Wyoming,

populations are mostly found on private lands where threats are low under current management.

Certain management activities on the MBNF that would affect the hydrology of streams and riparian areas downstream of the MBNF can cause a loss of equilibrium within riparian systems resulting in excessive flooding events along drainageways, sedimentation, and/or channelization. Excessive removal of vegetation on uplands can result in rill, sheet, and gully erosion and high rates of soil and water runoff. Increased rates of channelization in drainages can result in lowered water tables. Activities that lower water tables below the root zone of ULT place individual plants or populations at risk. Development of springs and seeps for livestock water can result in loss of suitable riparian habitat for ULT populations. Livestock grazing and prescribed burning can have positive, neutral, or negative effects on the hydrology of streams that supply water to ULT habitat. The effects of stock grazing and prescribed burning depend on frequency, intensity, and timing of the disturbance and the life history characteristics of Ute ladies' tresses.

Competition from non-native invasive plants can be a significant threat to ULT.

**Environmental Baseline**

**There are no populations of ULT** located between the MBNF boundary (Pole Mountain) and the Wyoming-Nebraska border on creeks that originate on the MBNF. There is identified potential habitat downstream of Laramie Peak Range along Fish Creek and downstream of Pole mountain along Horse Creek. Potential habitat is 2-30 miles from the MBNF boundary (Fertig and Thurston 2003). The closest documented populations are 30 miles from the MBNF boundary.

**Protection in the Plan**

There are no known occurrences of ULT on the MBNF and no potential habitat (Fertig and Thurston 2003), however the following measures are incorporated into the plan and will provide protection for offsite populations and habitat.

Watershed Conservation Practices (also known as best management practices) control management practices that influence hydrology and streams. Watershed conservation practices are required to be implemented during project planning and implementation.

The Fire Plan that specifies fire suppression and fire management strategies will include measures to implement standards and guidelines for T/E plants within watersheds where there are off site populations or potential habitat for ULT.

The goals, objectives, standards and guidelines regarding noxious and non-native species will limit the introduction and spread of these species within the MBNF. Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if ULT is

determined to occur within a project or contract area.

**Direct and Indirect Effects**

**Direct Effects on Populations on NFS Lands**

There are **no known occurrences** of ULT and no potential habitat on the MBNF (Fertig and Thurston 2003). Since there are no individuals or populations of ULT and no potential or suitable habitat for ULT that occur on the MBNF, there will be no direct effects on any individuals or populations of ULT.

**Indirect Effects on Populations Occurring Downstream of NFS Lands**

There are no populations of ULT located between the MBNF boundary and the Wyoming-Nebraska border on creeks that originate on the MBNF. The connection between precipitation on the MBNF and subsurface flow to other creeks in the area is undefined at the current time. There **is** identified potential habitat for ULT downstream of Laramie Peak Range along Fish Creek and downstream of Pole mountain along Horse Creek. Potential habitat is 2-30 miles from the MBNF boundary. Some of the potential habitat is separated from the MBNF by a reservoir operated by the Cheyenne Board of Public Utilities.

MBNF management areas (allocations) within the areas upstream of potential ULT habitat focus on recreation, wildlife and range management actions. Timber harvest is not a focus of these management areas.

Properly functioning riparian systems provide conditions favorable for establishment and maintenance of riparian-dependent species such as ULT downstream of the MBNF. Certain management activities on the MBNF that would affect the hydrology of streams and riparian areas downstream of the MBNF can cause a loss of equilibrium within riparian systems resulting in excessive flooding events along drainageways, sedimentation, and/or channelization. Excessive removal of vegetation on uplands can result in rill, sheet, and gully erosion and high rates of soil and water runoff. Increased rates of channelization in drainages can result in lowered water tables. Activities that lower water tables below the root zone of ULT place individual plants or populations at risk. Development of springs and seeps for livestock water can result in loss of suitable riparian habitat for ULT populations. Livestock grazing and prescribed burning can have positive, neutral, or negative effects on the hydrology of streams that supply water to ULT habitat. The effects of stock grazing and prescribed burning depend on frequency, intensity, and timing of the disturbance and the life history characteristics of Ute ladies' tresses.

Competition from non-native invasive plants can be a significant threat to ULT. Invasive plants such as Kentucky bluegrass, smooth brome, and other species often form monocultures within riparian habitats, significantly reducing the diversity of native plant communities. Invasive species can out compete ULT and reduce population numbers. Noxious weeds such as Canada thistle reduce the quality of habitat for Ute ladies' tresses but at the same time, efforts to control Canada thistle

and other invasive species with chemicals can pose a direct threat to the species. In addition, many chemicals are restricted for use within riparian zones. Invasive species are often spread by livestock grazing and recreational activities but can also be spread by other forest management activities.

The goals, objectives, standards and guidelines regarding noxious and non-native species will limit the introduction and spread of these species within the MBNF. This should effectively limit the spread of any of these species from the MBNF downstream into habitat of the ULT.

Application of insecticides for grasshopper control or other insect control has the potential to impact insect pollinator populations. The best available information will be used to assess the risks to pollinator's of this species during project planning as required by 40 CFR §1502.22 and FSH 1909.15. Known pollinators, bumblebees (*Bombus* spp.), and anthophorans (*Anthophora* spp.) rarely travel 2-30 miles (Schaffer and Wratten 1994; Williams and Osbourne 2003). So that here will be no indirect effects from pollinator changes on off site populations of ULT pollinators from proposed management actions or allocations.

Alternatives A and B have the highest levels of management actions and the greatest allocation to renewable resource uses. The impacts of renewable resource uses on downstream habitat for ULT can be controlled through project planning and implementation. Alternative F has the lowest levels of management actions and the least allocation to renewable resource uses. This alternative also has the highest predicted levels of stand replacement wildfire and stand replacement insect and disease attacks. The impacts of wildfires, insects and diseases are controllable through suppression actions, which are generally successful, but at times, incidents can exceed suppression capabilities. Burned Area Emergency Rehabilitation actions that are implemented after wildfires can also limit the downstream effects of wildfires.

**Cumulative Effects**

Development activities such as road building and other construction on private lands will continue to result in some loss of suitable habitat for the plant species and some possible mortality of threatened plants and population loss. Livestock grazing practices that are unfavorable for the conservation of this plant species are likely to continue on some private lands. Land management actions including oil and gas exploration and development on public domain land has the potential to impact populations of this species. The Bureau of Land Management has oil and gas stipulations to protect and conserve riparian areas and could also use standard lease terms to avoid impacts to this species. Land management actions on the MBNF and the Thunder Basin National Grassland that occur upstream of ULT habitat may have minor influence on the quantity or timing of the flow of water in streams that maintain ULT habitat.

Federal agencies are responsible for insuring that all activities and actions on lands

that they manage are not likely to jeopardize the continued existence of ULT. In addition, the Corps of Engineers, which issues Federal dredge and fill permits which can affect wetlands and riparian areas is required to insure permitted actions are not likely to jeopardize the continued existence of ULT.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. The areas of the MBNF that are upstream of ULT potential habitat have not been identified as having Oil and Gas leasing potential as part of the Forest Plan Revision. Any Oil and Gas leasing in these areas would be subject to site specific analysis at the time a project is proposed.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The Forest Service can control the timing, extent and intensity of grazing.

In addition, the Corps of Engineers, which issues Federal dredge and fill permits which can affect wetlands and riparian areas is required to insure permitted actions are not likely to jeopardize the continued existence of ULT.

**Biological Determinations, Risk Assessments, and Rationale**

There are no known occurrences of ULT on the MBNF and no potential habitat (Fertig and Thurston 2003). Water rights are administered by the state and the MBNF would have little or no control from effects to ULT from water depletions. The MBNF has no control over operation of the reservoir operated by the Cheyenne Board of Public Utilities.

Based upon goals, objectives and strategies in the plan, none of the activities proposed in the MBNF Forest Plan Revision would programmatically affect ULT. Management actions and on-going recreation activities on the MBNF, standards and guidelines limit effects to potential and occupied habitat of ULT. The control of effects from Forest Service management actions is both operationally and administratively feasible. The proposed forest management and recreational activities ***are not likely to adversely affect*** populations of Ute Ladies' Tresses.

## Colorado Butterfly Plant (CBP) - *Guara neomexicana ssp. coloradensis*

### Distribution and Status

#### *ESA Status and Other Organization Rankings*

US Fish & Wildlife Service: threatened (U.S. Fish and Wildlife Service 2000). Agency Status: USFS Region 2 Sensitive. Heritage Rank: Global: G3T2 WY State Rank: S2. WYNDD Plant List: Regional Endemic (High Conservation Priority) (Fertig 2001).

#### *Distribution and Status*

CBP is a regional endemic of southwestern Nebraska, southeastern Wyoming, and northeastern Colorado.

In Wyoming, CBP is known only from the southeastern plains in Laramie and Platte Counties between the boundary of the MBNF and the Wyoming-Nebraska border. Recent surveys in Wyoming suggest that extant populations are probably stable, although population sizes may vary from year to year (Fertig 2001).

The CBP only occurs outside of the boundaries of the planning area. Based upon surveys conducted by Burke (2000) and records kept by the Wyoming Natural Diversity Database (Fertig and Thurston 2003), CBP does not occur on the MBNF. In addition, there is no potential or suitable habitat for CBP on the MBNF (Fertig and Thurston 2003).

There are documented populations of CBP located between the MBNF boundary (Pole Mountain) and the Wyoming-Nebraska border on creeks (Middle Crow Creek, North Fork Crow Creek, South Branch Crow Creek, Lodgepole Creek and Horse Creek) that originate on the MBNF. There is identified potential habitat located along the same streams. Potential habitat is 20-30 miles from the MBNF boundary (Fertig and Thurston 2003). For CBP closest documented populations are 20 miles from the MBNF boundary.

#### *Recovery and Conservation Planning*

At the time of listing (USFWS 2000), the US Fish and Wildlife Service expressed the intention to designate critical habitat at some time in the future. Threats to the species across its range include; haying, grazing, herbicide spraying and urban expansion. The primary threat, however, may be vegetative succession in the absence of periodic disturbances that makes habitat unsuitable for seedling establishment (Fertig 2001).

### Habitat and Natural History

#### *Species Description*

Colorado Butterfly Plant (CBP) is a short-lived perennial herb. Flowering occurs from late June or early July until the first hard frost of fall (usually mid September to

early October). Fruit is present from late July-early October. It reproduces only by seed. Plants are self-fertile, but also outcross. Flowers open at dusk and are pollinated by moths(Fertig 2001).

***Habitat***

CBP typically occurs on sub-irrigated soils on level or slightly sloping floodplains and drainage bottoms at elevations of 5000-6400 feet. Colonies are often found in low depressions or along bends in wide meandering stream channels. Most populations are found a short distance from the actual channel and may even occur at the base of low, alluvial ridges at the interface between riparian meadows and drier grasslands. CBP occurs on soils derived from conglomerates, sandstones, and tuffaceous mudstones and siltstones of the Tertiary Wind River, Arikaree, and Ogalalla formations (Fertig 2001). Properly functioning riparian systems provide conditions favorable for establishment and maintenance of riparian-dependent species such as CBP downstream of the MBNF.

**Threats from Human Activity**

Changes in natural stream dynamics and habitat destruction from development on private lands are the primary threats from human activity. Threats to the species across its range include: haying, grazing, herbicide spraying and urban expansion. The primary threat, however, may be vegetative succession in the absence of periodic disturbances that makes habitat unsuitable for seedling establishment (Fertig 2001).

Actions that would affect the hydrology of streams and riparian areas downstream of the MBNF can cause a loss of equilibrium within riparian systems resulting in excessive flooding events along drainageways, sedimentation, and/or channelization. Excessive removal of vegetation on uplands can result in rill, sheet, and gully erosion and high rates of soil and water runoff. Increased rates of channelization in drainages can result in lowered water tables. Activities that lower water tables below the root zone of CBP place individual plants or populations at risk. Development of springs and seeps for livestock water can result in loss of suitable riparian habitat for CBP populations. Livestock grazing and prescribed burning can have positive, neutral, or negative effects on the hydrology of streams that supply water to CBP habitat. The effects of stock grazing and prescribed burning depend on frequency, intensity, and timing of the disturbance and the life history characteristics of CBP.

**Environmental Baseline**

There are documented populations of CBP located between the MBNF boundary (Pole Mountain) and the Wyoming-Nebraska border on creeks (Middle Crow Creek, North Fork Crow Creek, South Branch Crow Creek, Lodgepole Creek and Horse Creek) that originate on the MBNF. There is identified potential habitat located along the same streams. Potential habitat is 20-30 miles from the MBNF boundary (Fertig and Thurston 2003). For CBP closest documented populations are 20 miles

from the MBNF boundary.

**Protection in the Plan**

**There are no known occurrences of CBP on the MBNF and no potential habitat** (Fertig and Thurston 2003), however, the following measures are incorporated into the plan and will provide protection for offsite populations and habitat.

Watershed Conservation Practices (also known as best management practices) control management practices that influence hydrology and streams. Watershed conservation practices are required to be implemented during project planning and implementation.

The Fire Plan that specifies fire suppression and fire management strategies will include measures to implement standards and guidelines for T/E plants within watersheds where there are off site populations or potential habitat for CBP.

The goals, objectives, standards and guidelines regarding noxious and non-native species will limit the introduction and spread of these species within the MBNF. Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if CBP is determined to occur within a project or contract area.

**Direct and Indirect Effects**

***Direct Effects on Populations on NFS Lands***

There are **no known occurrences** of CBP and no potential habitat (Fertig and Thurston 2003) on the MBNF. Since there are no individuals or populations of CPB and no potential or suitable habitat for CBP that occur on the MBNF, there will be no direct effects on any individuals or populations of CBP.

***Indirect Effects on Populations Occurring Downstream of NFS Lands***

Certain management activities on the MBNF that would affect the hydrology of streams and riparian areas downstream of the MBNF can cause a loss of equilibrium within riparian systems resulting in excessive flooding events along drainageways, sedimentation, and/or channelization. Excessive removal of vegetation on uplands can result in rill, sheet, and gully erosion and high rates of soil and water runoff. Increased rates of channelization in drainages can result in lowered water tables. Activities that lower water tables below the root zone of CBP place individual plants or populations at risk. Development of springs and seeps for livestock water can result in loss of suitable riparian habitat for CBP populations. Livestock grazing and prescribed burning can have positive, neutral, or negative effects on the hydrology of streams that supply water to CBP habitat. The effects of stock grazing and prescribed burning depend on frequency, intensity, and timing of the disturbance and the life history characteristics of CBP.

Competition from non-native invasive plants can be a significant threat to CBP. Invasive species can out compete CPB and reduce population numbers. Efforts to control Canada thistle and other invasive species with chemicals can pose a direct threat to the species. In addition, many chemicals are restricted for use within riparian zones. Invasive species are often spread by livestock grazing and recreational activities but can also be spread by other forest management activities.

The goals, objectives, standards and guidelines regarding noxious and non-native species will limit the introduction and spread of these species within the MBNF. This should effectively limit the spread of any of these species from the MBNF downstream into habitat of the CPB.

Application of insecticides for grasshopper control or other insect control has the potential to impact insect pollinator populations. Specific pollinator information for this plant species is not well known. The best available information will be used to assess the risks to pollinator's of this species during project planning as required by 40 CFR §1502.22 and FSH 1909.15.

Alternatives A and B have the highest levels of management actions and the greatest allocation to renewable resource uses. The impacts of renewable resource uses on downstream habitat for CPB can be controlled through project planning and implementation. Alternative F has the lowest levels of management actions and the least allocation to renewable resource uses. This alternative also has the highest predicted levels of stand replacement wildfire and stand replacement insect and disease attacks. The impacts of wildfires, insects and diseases are controllable through suppression actions, which are generally successful, but at times, incidents can exceed suppression capabilities. Burned Area Emergency Rehabilitation actions that are implemented after wildfires can also limit the downstream effects of wildfires.

**Cumulative Effects**

Development activities such as road building and other construction on private lands will continue resulting in some loss of suitable habitat for the plant species and some possible mortality of threatened plants and population loss. Livestock grazing practices that are unfavorable for the conservation of this plant species are likely to continue on some private lands. Land management actions including oil and gas exploration and development on public domain land has the potential to impact populations of this species. The Bureau of Land Management has oil and gas stipulations to protect and conserve riparian areas and could also use standard lease terms to avoid impacts to this species. Land management actions on the MBNF that occur upstream of CBP habitat may have minor influence on the quantity or timing of the flow of water in streams that maintain CBP habitat.

Federal agencies are responsible for insuring that all activities and actions on lands that they manage are not likely to jeopardize the continued existence of CBP. In addition, the Corps of Engineers, which issues Federal dredge and fill permits which

can affect wetlands and riparian areas is required to insure permitted actions are not likely to jeopardize the continued existence of CBP.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. The areas of the MBNF that are upstream of CPB potential habitat have not been identified as having Oil and Gas leasing potential as part of the Forest Plan Revision. Any Oil and Gas leasing in these areas would be subject to site specific analysis at the time a project is proposed.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The Forest Service can control the timing, extent and intensity of grazing.

**Biological Determinations, Risk Assessments, and Rationale**

There are no known occurrences of CBP on the MBNF and no potential habitat (Fertig and Thurston 2003). Water rights are administered by the state and the MBNF would have little or no control from effects to CBP from water depletions. The MBNF has no control over operation of the reservoir operated by the Cheyenne Board of Public Utilities.

Based upon goals, objectives and strategies in the plan, none of the activities proposed in the MBNF Forest Plan Revision would programmatically affect CBP. Management actions and on-going recreation activities on the MBNF, standards and guidelines limit effects to potential and occupied habitat of CBP. The control of effects from Forest Service management actions is both operationally and administratively feasible. The proposed forest management and recreational actvities ***are not likely to adversely affect*** populations of Colorado Butterfly Plant.

# IV. Species with Habitat Downstream that may be Affected by Activities on the Medicine Bow National Forest.

## Introduction

*This section on downstream species was revised and resent to the USFWS after the October 2003 initial request for formal consultation.*

Several avian, fish, and one plant species, occurring as residents or migrants in the Platte River and Colorado River basins (inclusive of major tributaries), have experienced material declines in abundance, distribution, and the availability of suitable habitats since the turn of the twentieth century. The reasons for these declines in abundance, distribution, and availability of suitable habitats are multifarious, but the two most pervasive and encompassing reasons are: (1) the effects of water developments, including dam construction, diversion and consumptive use of water, and concomitant changes in river flow and channel characteristics; and, (2) introductions of non-native aquatic species.

Water developments such as dams, reservoirs and irrigation diversions have altered natural, surface-water hydrographs (timing, magnitude, and duration). This can have negative effects on river-dependent species. Changes in the relative magnitudes of flows before nesting versus during nesting, have resulted in more frequent inundation listed avian species nests (piping plover and interior least tern). Too little water at certain times of the year can subject federally-listed nesting and roosting birds to excessive predation (Gordon, McMahon et al. 1992); this condition can also limit the availability of forage fish. In addition, reductions in the magnitude and frequency of high flows can adversely impact the characteristics of flood-prone areas and wetlands and the ecological benefits they provide to federally-listed species; these conditions can allow vegetation to encroach on less vegetated areas, the result of which is a narrowing of relatively open channels (Gordon, McMahon et al. 1992). Finally, in the lower Platte River, pallid sturgeon may lose important migratory cues that were probably influenced by historically, unregulated higher flows in the spring of the year; relatively low spring flows have negatively impacted habitat conditions for pallid sturgeon that were dependent of historical levels of sediment transport and deposition and on the influx of greater amounts of organic material.

Habitat alterations and habitat fragmentation due to dams, reservoirs, and regulated flows have resulted in changes in habitat availability, habitat distribution, and habitat quality. Additionally, introductions of non-native fishes such as rainbow trout and brown trout have resulted in competitive exclusion and diminished abundance of native fishes in much of their historic ranges. Similar impacts have reduced populations of federally-listed fishes in the upper Colorado River basin, such as the Colorado pikeminnow. Finally, the inundation or diminution of wetland habitats due to flow regulation and reduced water availability can negatively impact wetland

plants.

The US Fish and Wildlife Service has determined that water depletions in the Medicine Bow National Forest – though they occur hundreds of miles upstream – may jeopardize the continued existence of one or more federally listed threatened or endangered species and adversely modify designated critical habitat (e.g. USFWS, 1993 and USFWS, 2002).

Vegetation management and forest succession may change water yield e.g. (Troendle and Nankervis 2000), (Troendle, Nankervis et al. 2003), and are important considerations for species conservation but are not considered water depletions. Estimated water yield due to vegetation management (timber harvest, fuels treatment, wildfire and insects and disease) for Alternative D FEIS is 3,120 acre-feet per year, while Alternative A is 2,188 acre-feet per year (estimated average annual figures for the first decade of plan implementation). Differences in water yield between alternatives are relatively small for timber harvest, fuels treatments, and insect and disease when compared to the differences predicted for wildfire (See Appendix B of the FEIS). These projected changes in water yield due to vegetation management are only expected to partially offset declines in overall water yield in the Platte River basin during the next few decades that are associated with the cyclical pattern of forest succession (Troendle et al 2003). Estimated water yields associated with vegetation-management treatments are typically based on small scale research in watersheds less than a few square miles in size and, while real, are unlikely to be measureable at the Forest boundary or any point downstream (Troendle and Nankervis, 2000). Additionally, the Forest Service has no legal means to ensure that any increased water yields would reach downstream habitats and any incidental increases in water yield would likely be used through application of existing water rights for municipal and agricultural purposes before the water reached the Platte or Colorado River mainstem ecosystems. Alternative D FEIS provides a balanced mixture of vegetation management through natural processes and human activities, which will address the terrestrial and aquatic habitat needs of local and downstream species.

In the Medicine Bow National Forest, there are several activities and associated infrastructure that constitute water depletions in both the North Platte and Colorado River basins; a depletion to river flows occurs when tributary surface water or groundwater is removed from its source –to the extent that some of the water is not returned to its source - to be used elsewhere for a beneficial use. Forest permitees who hold legal water rights are given special-use permits by the Forest to convey (irrigation ditches) their water, diverted from Forest streams, through public land to the sites of beneficial use. In addition, permitees are given easements to store irrigation water and livestock water in ponds and reservoirs located in the Forest for later use. A few relatively large Forest reservoirs are used to store municipal water (Cheyenne Water Diversions Stage I and II) and to provide recreational fisheries. The city of Cheyenne has an easement to operate a transbasin pipeline as mitigation

for withdrawing municipal water from the North Platte basin; the pipeline diverts water from several headwater streams in the Sierra Madre, west of the Continental Divide, into the North Platte River via the Encampment River. Finally, the Medicine Bow National Forest depletes water from both basins for administrative uses such as wells (for potable water) at developed campgrounds, water supply in government quarters, fire suppression, and for maintaining recreational fisheries (e.g. Barber Lake).

The Forest Service has completed programmatic Biological Assessments for minor water depletions associated with routine Forest decisions in the Platte and Colorado River Basins (USDA Forest Service 1995), (USDA Forest Service 1996), and (USDA Forest Service 1993). These BAs addressed projects with annual depletions of 25 and 100 acre-feet or less respectively for the Platte and Colorado River Basins. A summary of the projects and depletions for the Medicine Bow National Forest is shown in Table 14. The biological opinion for the Platte River BA was issued on June 13, 1996 and has been revised and updated numerous times (May 21, 1997; September 22, 1999; May 4, 2002). The biological opinion (USFWS 1993) for the Colorado River water depletions was issued and has been revised and updated (e.g. USFWS, 1999). As a result of these efforts a streamlined process for consultation for minor water depletions exists in both river basins.

Table I-14 Historic Minor Water Depletions for which consultation has already occurred:

| | Authorized Uses | | Administrative Uses | | Total |
|---|---|---|---|---|---|
| **Basin** | **# Projects** | **Depletion (ac ft/yr)** | **# Projects** | **Depletion (ac ft/yr)** | **Depletion (ac ft/yr)** |
| Platte River[1] | 83 | 31.8 | 182 | 193.5 | 225 |
| Colorado River[2] | Data not available to break out by these categories | | | | 38 |

[1] Medicine Bow National Forest activities included in the "Supplement to Programmatic Biological Assessment for Minor Water Depletions Associated with Routine Forest Decisions in the Platte River Basin" (USDA Forest Service, 1996).

[2] USFWS, 1993. Biological Opinion on the impacts of existing and proposed projects associated with minor water depletions on seven national forests in Colorado and one in Wyoming. United States Fish and Wildlife Service letter to Elizabeth Estill, USDA Forest Service Regional Forester, from John Spinks Jr., Regional Director USFWS. Sept 7, 1993.

Existing projects that did not fall under the programmatic biological assessments were to be consulted on individually. Individual consultation occurred for the Sand Lake Dam rehabilitation and operation project. (USFWS BO August 6, 2001; USFWS BO withdrawn May 3, 2002). Snowy Range Ski Area Biological Opinion was issued by the FWS on June 13, 1996.

Historic Depletions without consultation: Existing historic water depletions that have not been consulted on for water depletions include activities and projects that deplete over 25 acre-feet and 100 acre-feet per year in the Platte River and Colorado River basins, respectively. Two of these projects were identified in the Programmatic Biological Assessment for Minor Water Depletions Associated with Routine Forest Decisions in the Platte River Basin (USDA Forest Service, 1995) and

constitute an estimated depletion of 81 acre-feet per year. Because some of the depletions associated with existing projects were greater than the depletion thresholds categorized as "minor" water depletions, to date, these projects have not undergone consultation. Consultation would occur if a major federal action triggers consultation. A summary of existing projects that are considered to be historic water depletions is presented in the following Table. The Medicine Bow National and the U.S. Fish and Wildlife Service have not consulted on these historic, water depletions.

Table I-15 Historic water depletions that occur in the Platte River and Colorado River basins. Consultation related to water depletions has not occurred on these projects.

| | Platte River Basin | | | Colorado River Basin | | |
|---|---|---|---|---|---|---|
| **Type of Project** | **# Of Projects** | **Estimated Depletion** | **Total Depletion** | **# Of Projects** | **Estimated Depletion** | **Total Depletion** |
| Irrigation Ditches | 18 | > 25 acre feet | Unknown | 3 | > 100 acre feet | Unknown |
| Reservoirs | 7 | > 25 acre feet | Unknown | 0 | > 100 acre feet | Unknown |

Potential New Depletions: Most foreseeable future administrative water depletions (e.g. stock water development, wells at campgrounds) are likely to be minor. The potentially foreseeable authorized uses in Forest Plan that may be greater than specified minor water depletion amounts would be related to the Snowy Range Ski Area operations and wildfire suppression. There are no planned authorized uses, but they can be expected to occur over the life of the Forest Plan as project proponents make requests. The vast majority of these uses would be minor (e.g. spring development on Forest for residential use off Forest). Major new water developments (e.g. irrigation, reservoirs, municipal water development) on the Forest last occurred in the mid 1980's and are unlikely to occur over the life of the revised Forest Plan, especially since there are no known such projects in the planning phase at this time. Potential projects, which may be implemented over the life of the revised Forest Plan, are shown in the following Table. New projects that affect the timing or quantity of water will be consulted on through the appropriate processes and are only presented here to provide an estimate of the number and magnitude of activities that may occur over the life of the Forest Plan.

Table I-16 Potential new activities that may deplete water during implementation of the revised Forest Plan.

| | Platte River Basin | | | Colorado River Basin | | |
|---|---|---|---|---|---|---|
| **Type of Project** | **# Of Projects** | **Estimated Depletion** | **Total Depletion** | **# Of Projects** | **Estimated Depletion** | **Total Depletion** |
| **Administrative Uses** | | | | | | |
| Stock water development | 37 Revised AMPs | 0.0003 ac ft/yr, per development | 0.0111 | 15 Revised AMPs | 0.0003 ac ft/yr, per development | 0.0045 |
| Public Water Well | 1 | 0.008 ac ft/yr, per development | 0.008 | 1 | 0.008 ac ft/yr, per development | 0.008 |

| | Platte River Basin | | | Colorado River Basin | | |
|---|---|---|---|---|---|---|
| **Type of Project** | **# Of Projects** | **Estimated Depletion** | **Total Depletion** | **# Of Projects** | **Estimated Depletion** | **Total Depletion** |
| **Administrative Uses** | | | | | | |
| Snowy Range Ski Area Expansion | 1 | 5.4 ac ft/yr | 5.4 ac ft/yr | 0 | 0 | 0 |
| Prescribed Fire | 3000 acres | 0.000003 ac ft/ac | 0.009 ac ft/yr | 1000 acres | 0.000003 ac ft/ac | 0.03 ac ft/yr |
| Wild fire suppression | 1000 acres per year | 0.003 ac ft/ac | 3 ac ft/yr | 500 acres | 0.003 ac ft/ac | 1.5 ac ft/yr |
| **Authorized uses** | | | | | | |
| Domestic Spring Development | 1 | 0.04 ac ft/yr | 0.04 ac ft/yr | 1 | 0.04 ac ft/yr | 0.04 ac ft/yr |
| Irrigation | 0 | 0 | 0 | 0 | 0 | 0 |
| Reservoirs | 0 | 0 | 0 | 0 | 0 | 0 |

## Platte River Basin Species

Federally listed species in the Platte River that may be affected by water depletions on the Medicine Bow National Forest are listed in the following table. Designated Critical Habitat for the Whooping Crane and the northern Great Plains breeding population of the Piping Plover may also be adversely affected. All alternatives will have indistinguishable effects on the Platte River species.

Table I-17 Federally listed species that are native to the Platte River and may be affected by water depletions on the MBNF

| Common Name | Scientific Name | ESA Status |
|---|---|---|
| Whooping Crane | *Grus americana* | Endangered |
| Bald Eagle | *Haliaeetus leucocephalus* | Threatened |
| Eskimo Curlew | *Numemius borealis* | Endangered |
| Interior Piping Plover | *Charadrius melodus* | Threatened |
| Interior Least Tern | *Sterna antillarum* | Endangered |
| Western prairie fringed orchid | *Platanthera praeclara* | Threatened |
| Pallid Sturgeon | *Scaphirhynchus albus* | Endangered |

## Whooping Crane - *Grus Americana*

### Status and Distribution of Species

The whooping crane is listed as endangered under the Endangered Species Act of 1973. Presently, the distribution of the whooping crane is extremely limited due to habitat loss and extremely low population. Whooping cranes breed near Wood Buffalo National Park (Northwest Territories and Alberta). The birds winter near Arkansas National Wildlife Refuge (Texas Gulf Coast) and on occasion, they venture northeast into Louisiana. Migrating between these locations, whooping cranes use the Platte River flyway.

**Status and Distribution in the Medicine Bow National Forest**

None.

**Habitat**

Whooping cranes prefer marshland interspersed with potholes that have soft, marly bottoms and waters where pH ranges from 7.6 to 8.3. Special habitat preference is given to aspen stands adjacent to parklands. Additional habitats that are preferred by Whooping Cranes include: coniferous forests; shortgrass plains; salt flats; coastal marshes; lagoons; and brackish water areas. Critical Habitat for the Whooping Crane has been designated along the Platte River between Lexington and Denman, Nebraska.

**Threats due to Human Activities**

Primary threats due to human activities include draining wetland habitats, coastline development, and human activity near breeding and nesting sites.

**Environmental Consequences**

Because whooping crane populations are extremely small, their genetic integrity and persistence are highly uncertain.

**Determination**

Given the precarious state of this species and the great cumulative effects of depletions on other lands, the Fish and Wildlife Service has great concern about the effect of any water depletion, however small, on water level in the Platte River in Nebraska. Implementation of the Revised Forest Plan ***is likely to adversely affect*** the Whooping Crane and ***is likely to adversely affect*** designated Critical Habitat for the Whooping Crane.

## Bald Eagle - *Haliaeetus leucocephalus*

**Status, Distribution and Habitat of Species**

The status, distribution, and habitat of the Bald Eagle were discussed in Section II, Species with Habitat on the MBNF. Portions of the central Platte River in Nebraska are key wintering habitat for Bald Eagles (USDA FS, Region 2, 1995). Though wintering eagles eat many kinds of food (including carrion and prairie dogs), reduced flow in the river has adverse effects on the eagle's other prey, fish in the river.

**Determination**

Given the great cumulative effects of depletions on other lands, the Fish and Wildlife Service has great concern about the effect of any water depletion, however small, on water level in the Platte River in Nebraska.

Implementation of the Forest Plan ***is likely to adversely affect*** the Bald Eagle along the Platte River in Nebraska.

## Eskimo Curlew - *Numemius borealis*

### Status and Distribution of Species

The Eskimo Curlew is listed as endangered under the Endangered Species Act of 1973. This species nests in the Arctic tundra and winters in South America; the Eskimo curlew is sometimes sighted near the Texas coast during migratory interludes. Migration pathways include the Platte River flyway.

### Status and Distribution in the Medicine Bow National Forest

None.

### Habitat

The Eskimo Curlew prefers wet meadows and other marshy areas for foraging and Arctic tundra for breeding and nesting.

### Threats due to Human Activities

The Eskimo Curlew appears near the brink of extinction. Any activity that disturbs migratory habitats (including wet meadows along the central Platte River in Nebraska) is detrimental to the persistence of this species.

### Environmental Consequences and Viability

The Eskimo Curlew is at the brink of extinction.

### Determination

Given the precarious state of this species and the great cumulative effects of depletions on other lands, the Fish and Wildlife Service has great concern about the effect of any water depletion, however small, on its habitat along the Platte River in Nebraska. Implementation of the Forest Plan ***is likely to adversely affect*** the Eskimo Curlew.

## Interior Piping Plover - *Charadrius melodus*

### Status and Distribution of Species

The Interior Piping Plover is listed as threatened under the Endangered Species Act of 1973. This species breeds in south-central Alberta and Manitoba to eastern Montana and central and eastern Nebraska. In addition, these birds breed in the Great Lakes region from northern Michigan and southern Ontario to the shores of Lake Michigan and Lake Ontario. Interior Piping Plovers winter in eastern Texas and in other coastal locations along the Atlantic Seaboard fro South Carolina to Florida.

### Status and Distribution in the Medicine Bow National Forest

None.

### Habitat

These birds prefer exposed, sparsely vegetated, sandy shores and islands within shallow lakes and ponds. In addition, interior piping plovers can be found in expansive, open, sandy areas that have tufts of grass. Winter habitats comprise beaches, lagoon margins, and areas of rubble substrate. On the Platte River, critical habitat has been designated from the Lexington Bridge, Nebraska, downstream to the confluence of the Platte and Missouri rivers. Habitat included in the designation in Nebraska is composed of sparsely vegetated channel sandbars, sand and gravel beaches on islands within the high bank for nesting, temporary pools on sandbars and islands, and the interface of sand and river where plovers forage.

### Threats due to Human Activities

Flood abatement activities such as water diversions that permit shoreline vegetation to flourish and human activity in general threaten piping plover habitats and populations. Alterations of water flow change the structure of sandbars preferred for nesting (though the birds nest on sandy shores as well), and irregular flows may flood nests, or leave the sandbar connected to the shore and more vulnerable to predation.

### Environmental Consequences and Viability

Steadily declining numbers of Interior Piping Plovers and habitat loss appear to suggest that the persistence of this species is problematic.

### Determination

Given the great cumulative effects of depletions on other lands, the Fish and Wildlife Service has great concern about the effect of any water depletion, however small, on water flows in and the species' nesting habitat along the Platte River. Implementation of the Forest Plan ***is likely to adversely affect*** the Interior Piping Plover and ***is likely to adversely affect*** designated Critical Habitat for the Interior Piping Plover.

## Interior Least Tern - *Sterna antillarum*

### Status and Distribution of Species

The Interior Least Tern is listed as endangered under the Endangered Species Act of 1973. The least tern (interior variety) breeds near the following river basins: Colorado River; Red River; Platte River, Missouri; and Mississippi River from southern South Dakota, western Iowa, northwestern Indiana to central Oklahoma, Louisiana, new Mexico, and Texas. These birds winter along the Pacific Ocean near Baja California and along the Gulf Coast to South America.

### Status and Distribution in the Medicine Bow national Forest

None.

### Habitat

The Interior Least Tern prefers sandbars of rivers, inland islands, expansive sand and gravel beaches, and salt plains in Oklahoma. For nesting, this species prefers river sandbars.

### Threats due to Human Activities

Loss of gravel sand bars along rivers due to flow regulation threatens least tern populations. In addition, human disturbance in nesting areas negatively affects nesting success.

### Environmental Consequences and Viability

Population declines and habitat loss suggest that the persistence of the Interior Least Tern is problematic.

### Determination

Given the endangered status of this species and the great cumulative effects of depletions on other lands, the Fish and Wildlife Service has great concern about the effect of any water depletion, however small, on water flow and nesting habitat in the Platte River in Nebraska. Implementation of the Forest Plan ***is likely to adversely affect*** the Interior Least Tern.

## Pallid Sturgeon - *Scaphirhynchus albus*

### Status and Distribution of Species

The pallid sturgeon is listed as endangered under the Endangered Species Act and is found, almost exclusively, in the headwaters of the Missouri River (in the vicinity of Fort Benton/Great Falls, MT) downstream to the Mississippi River near New Orleans, Louisiana (Lee, Gilbert et al. 1980). In addition, the pallid sturgeon is found in the Platte River near its confluence with the Missouri River.

### Status and Distribution in the Medicine Bow NF

The Pallid sturgeon does not occur in rivers, streams, and lakes in the Medicine Bow National Forest.

### Habitat

The Pallid sturgeon prefers fast-moving, turbid waters and firm, sandy bottoms in the main channels of large rivers such as the Platte River and Missouri River. The U.S. Fish and Wildlife Service has not designated critical habitats for the Pallid sturgeon.

### Threats due to Human Activities

Human activities such as recreation (e.g. fishing) and industrial and water development projects can adversely affect the viability of the Pallid sturgeon. Recreational activities such as fishing can cause unintended mortality to individual

fish due to induced stress experienced during capture and release. In addition, industrial and water-development projects can degrade water quality conducive to supporting Pallid sturgeon life stages. Moreover, these projects and activities have drastically fragmented pallid sturgeon habitats and populations and they have substantially altered the habitat conditions that are preferred by the Pallid sturgeon.

**Vulnerabilities due to Forest Service Management Activities**

It is uncertain to what extent activities occurring in the Medicine Bow National Forest can be directly implicated in impacts downstream that affect pallid sturgeon populations and habitats. The closest known Pallid sturgeon population occurs in the lower Platte River in Nebraska, hundreds of river miles downstream from the Forest. Most of the likely impacts to Pallid sturgeon and their habitats, such as changes in water quantity, timing of flows, and water quality, occur on private land. However, when considered cumulatively, impacts that occur on Forest and on private lands are presumed to harm pallid sturgeons and their associated habitats.

**Environmental Consequences and Viability**

Habitat fragmentation and habitat loss in addition to changes in water availability and alterations in flows (magnitude, timing, and duration) suggests that the persistence of the Pallid sturgeon in the Platte River basin is problematic.

**Effects of the Proposed Management Action on Species Evaluated**

**Direct and indirect effects of the action**: Because the proposed actions (alternatives A and D FEIS) are far removed from the Pallid sturgeon and its critical habitats, it is difficult to determine their direct and indirect direct effects on this species. The overwhelming majority of direct and indirect effects occur on lands other than those administered by the Medicine Bow National Forest. Additionally, the U.S. Fish and Wildlife Service consider water depletions that have occurred and those that will occur in the Medicine Bow National Forest de facto impacts to the Pallid sturgeon.

**Cumulative effects:** The cumulative effects on the Pallid sturgeon due to activities that occur on public and private lands in the North Platte River basin (Wyoming, only) are real and measurable. The primary effects to this species are the result of water developments and water uses in the basin. The Medicine Bow National Forest comprises only 4.8 percent of the total basin area (about 17,920,000 acres) in Wyoming.

**Determination**

Alternative A incorporates historical water depletions. And, alternative D FEIS may include project-level water depletions during the planning period. Therefore, if either Alternative A or D FEIS is implemented, then that action is ***likely to adversely affect*** the pallid sturgeon. If specific projects that incorporate water depletions are proposed during the planning period, then the Forest Service will continue to consult

with the U.S. Fish and Wildlife Service.

## Western Prairie Fringed Orchid (WPFO) - *Platanthera praeclara*

### Status and Distribution of Species

Historically, the WPFO was found in tallgrass prairies west of the Mississippi river from southern Canada to Oklahoma. The current distribution of this species includes Minnesota, Iowa, Missouri, Nebraska, North Dakota and Manitoba Canada. It is believed to be extirpated from South Dakota and Oklahoma. The WPFO is associated with wetlands. Orchid populations shift in time and space in response to water levels (Hoff , Hull Sieg et al. 1999). There are 172 population sites remaining in 6 states and one population complex in Manitoba, Canada (NatureServe 2003), (NatureServe 2002), and (USDI FWS 2002). The largest populations occur in Manitoba and on the Sheyenne National Grassland in North Dakota. The Sheyenne National Grassland is not tributary to the Platte River (USDA Forest Service Sheyenne Ranger District 1999). There are an unknown number of populations located on Platte River in the targeted recovery area (U.S. Fish and Wildlife Service 2003). The species is listed as threatened by the USFWS, and has a TNC/NHP status of G2 (U.S. Fish and Wildlife Service 1996).

A recovery plan for the WPFO was approved in 1996 (U.S. Fish and Wildlife Service 1996). The recovery plan emphasizes the need for actions that prevent further declines in orchid populations and habitat quality. This plan includes protection goals for existing habitat and de-listing criteria. The recovery plan direction focuses on protection status of existing habitat. Critical habitat has not been designated for the WPFO.

Since 1989, when the WPFO was listed as threatened, the US Fish and Wildlife Service has consistently taken the position in its section 7 consultations that Federal Agency actions resulting in water depletions to the Platte River system may affect the threatened WPFO. Although the WPFO is included by FWS as a threatened species that occurs in habitat downstream on the Platte River, it is not a target species for the Platte River Endangered Species Partnership. In addition, critical habitat has not been designated for this species.

### Status and Distribution on the Medicine Bow NF

The WPFO does not occur on the MBNF. There is no suitable or potential habitat on the MBNF.

### Habitat and Natural History

The western prairie fringed orchid (WPFO) is a perennial forb with large and showy inflorescences. Plants are usually 30-85 cm tall and have 2-5 relatively thick, elongate, glabrous leaves (Sheviak and Bowles 1986). The WPFO reproduces primarily by seed, with flowering occurring between late June and mid-July and seed dispersal (wind and water) occurring in mid-September. Flowering patterns are

often erratic, and certain information suggests that the plant commonly undergoes periods of dormancy (Bowles 1983). The species is self-compatible, but pollination is required for fruit and seed production. Two species of hawkmoths have been identified as pollen vectors for the orchid (Cuthrell and Rider 1993).

The WPFO is associated with sedge meadows, primarily within the tallgrass prairie biome (Nebraska and the Great Plains). Across its range, this species is generally found in fire and grazing adapted grassland communities, most often on unplowed calcareous prairies and sedge meadows. It has also been documented in successional plant communities on disturbed sites. Maintenance of functional dynamic tallgrass prairie is key to survival of species.

**Threats from Human Activity**

The major factor contributing to the decline of this species is the conversion of native prairie to croplands.

**Environmental Baseline**

Historically, the WPFO was found in tallgrass prairies west of the Mississippi river from southern Canada to Oklahoma. The current distribution of this species includes Minnesota, Iowa, Missouri, Nebraska, North Dakota and Manitoba Canada. It is believed to be extirpated from South Dakota and Oklahoma. The need to evaluate this species is based on potential water depletions to the Platte River. These include evaporative losses and/or consumptive use, often characterized as diversions from the Platte River or its tributaries less return flows. Project elements that could be associated with depletions to the Platte River system include, but are not limited to, ponds (detention/recreation/irrigation storage/stock watering), lakes (recreation/irrigation storage/municipal storage/power generation), reservoirs (recreation/irrigation storage/municipal storage/power generation), created or enhanced wetlands, pipelines, wells, diversion structures, and water treatment facilities. Since 1989, when the WPFO was listed as threatened, the US Fish and Wildlife Service has consistently taken the position in its section 7 consultations that Federal Agency actions resulting in water depletions to the Platte River system may affect the threatened WPFO. There are an unknown number of populations located on Platte River in the targeted recovery area (USFWS pers. comm.).

**Protection in the Plan**

There are **no known occurrences** of the western prairie fringed orchid on the MBNF. The MBNF does not have suitable or potential habitat for this species, therefore, no additional conservation measures beyond the already listed water and aquatic standards and guidelines are needed as part of the LRMP.

**Direct and Indirect Effects**

**Direct Effects on Populations Occurring on the Medicine Bow NF**

**There are no individuals or populations of the Western Prairie Fringed Orchid**

**and no potential or suitable habitat on the MBNF.** Therefore, there will be no direct effects on the WFPO from proposed management actions or allocations.

**Indirect Effects on Populations Occurring Downstream of NFS Lands**

Since existing populations of WPFO are several hundred miles away from the MBNF, and since known pollinators (sphinx or hawkmoths) are not known to travel across such distances for foraging or feeding, there will be no indirect effects from National Forest management induced pollinator changes on downstream populations of western prairie fringed orchid.

Properly functioning downstream riparian systems provide conditions favorable for establishment and maintenance of riparian-dependent species such as western prairie fringed orchid. Any activities that lower water tables below the root zone of the orchids have the potential of seriously reducing orchid populations (U.S. Fish and Wildlife Service 1996). Changes in timing and flow conditions in streams that flow from the MBNF to the Platte River can result from several types of management activities: exercise of valid water rights that allow for diverting water from streams (including trans-basin diversions), associated land use authorizations that allow off-Forest entities to store or convey water across NFS lands in reservoirs, ditches and pipelines; administrative water uses including water rights for recreation sites and administrative facilities; and water yield changes from vegetation management. There would be no significant, measurable local or regional change in water yield from any of the Forest Plan alternatives. Any re-authorization of existing special uses that involve water depletions or authorization of new uses that involve water depletions would be subject to FWS review.

Alternatives A and B have the highest levels of management actions and the greatest allocation to renewable resource uses. The impacts of renewable resource uses on downstream habitat for WPFO can be controlled through project planning and implementation. Alternative F has the lowest levels of management actions and the least allocation to renewable resource uses. This alternative also has the highest predicted levels of stand replacement wildfire and stand replacement insect and disease attacks. The impacts of wildfires, insects and diseases are controllable through suppression actions, which are generally successful, but at times, incidents can exceed suppression capabilities. Burned Area Emergency Rehabilitation actions that are implemented after wildfires can also limit the downstream effects of wildfires.

In Alternative D-FEIS, management areas that emphasize renewable resource production occur on 44% of the MBNF. Management areas that emphasize special designations occur on 12% of the MBNF. Management areas that emphasize recreation uses occur on 22% of the MBNF and management areas that emphasize biological conservation occur on 21% of the MBNF.

### Cumulative Effects

Habitat for populations of this threatened species in the Platte River mainstem may be affected by changes in timing and flow conditions resulting directly, indirectly and cumulatively from National Forest Service management (U.S. Fish and Wildlife Service 1996). However, there are several major reservoirs along the Platte River between the MBNF and downstream habitat in Nebraska. Water flow in the Platte River is controlled by these reservoirs and the administrative agencies for these reservoirs. See introductory section on Platte River species for consequences of management actions under different alternatives.

The cumulative effects of all proposed management actions and land allocations are discussed in the previous section on cumulative effects. No legal means to protect any water generated by forest management actions is available to the USDA FS, and any incidental water yield increases would likely be used through application of water rights for municipal and agricultural purposes long before water reached the Platte mainstem ecosystems. See the introductory section on Platte River species for a complete discussion of these interrelated and interdependent actions. In addition, the Corps of Engineers, which issues Federal dredge and fill permits which can affect wetlands and riparian areas is required to insure permitted actions are not likely to jeopardize the continued existence of WPFO.

### Biological Determinations, Risk Assessments, and Rationale

Based upon the depletion discussion, and upon FWS opinions on the Platte River, implementation of the Forest Plan ***is likely to adversely affect*** western prairie fringed orchid.

## Colorado River Basin Species

Four endangered fish found in the Colorado River in Colorado may be affected by water depletions on the MBNF. All alternatives will have indistinguishable effects on these Colorado River species.

Table I-18 Federally listed fishes under the Endangered Species Act of 1973 that are native to the Colorado River basin and may be affected by water from the MBNF

| Common Name | Scientific Name | ESA Status |
|---|---|---|
| Colorado Pikeminnow | *Ptychocheilus lucius* | Endangered |
| Razorback Sucker | *Xyruachen texanus* | Endangered |
| Bonytail | *Gila elegans* | Endangered |
| Humpback Chub | *Gila cypha* | Endangered |

## Colorado pikeminnow - *Ptychocheilus lucius*

### Status and Distribution of species

The Colorado pikeminnow (formerly known as, Colorado squawfish) is listed as endangered under the Endangered Species Act of 1973. In addition, the Colorado

pikeminnow is listed as threatened by the state of Colorado and is legally protected by the state of Utah. The Colorado pikeminnow was historically abundant in the Colorado River and most of its major tributaries such as the Yampa River and the Green River.

**Status and Distribution in the Medicine Bow NF**

The Colorado pikeminnow does not occur in rivers, streams, or lakes in the Medicine Bow National Forest.

**Habitat**

The Colorado pikeminnow prefers eddies and pools in large, deep rivers such as the Colorado River and the Green River. The U.S. Fish and Wildlife Service has designated critical habitat for the Colorado pikeminnow as follows: the Yampa River (Moffat Co., CO) and its 100-years floodplain from State Highway 394 bridge, T.6 N., R.91 W., sec. 1, to its confluence with the Green River, T.7 N., R. 103 W., sec. 28 (6th Principal Meridian); Green River and its 100-years floodplain from its confluence with the Yampa River (Uintah, Carbon, Grand, Emery, Wayne, San Juan, counties and Moffat County, CO.), to the confluence with the Colorado River, T.30 S., R.19 E., sec.7 (Salt Lake Meridian); White River (Rio Blanco Co., CO) and its 100-years floodplain from Rio Blanco Lake Dam, T.1 N., R.96 W., sec. 6 (6th Principal Meridian) to the confluence with the Green River (Uintah Co., UT) in T.9, R.20 E., sec. 4 (Salt Lake Meridian); Gunnison River (Delta and Mesa Co., CO) and its 100-years floodplain from its confluence with the Uncomphagre River in T.15 S., R.96 W., sec. 11 (6th Principal Meridian) to the confluence with the Colorado River in T.1 S., R.1 W., sec. 22 (Ute Meridian); Colorado River (Mesa and Garfield Co., CO and Grand, San Juan, Wayne, Garfield counties, UT) and its 100-years floodplain from the Colorado River bridge at Exit 90, north off Interstate 70 (river mile 238) in T.6 N., R.93 W., sec. 16 (6th Principal Meridian) to North Wash, including the Dirty Devil arm of Lake Powell, up to the full-pool elevation in T.33 S., R.14 E., sec.29 (Salt Lake Meridian); and the San Juan River (San Juan Co., NM and UT) and its 100-years floodplain from the State Route 371 bridge in T.29N., R.13 W., sec. 17 (New Mexico Meridian) to Neskahai Canyon in the San Juan arm of Lake Powell in T.41 S., R11 E., sec. 26, up to the full-pool elevation.

**Threats due to Human Activities**

Colorado pikeminnow populations have been dramatically reduced throughout their historic range due to past and present human activities. Pervasive threats to this species are due to habitat alterations resulting from water development and diversions. However, non-native fish introductions are the most pressing impediment to the recovery of this species; predatory, non-native fishes profoundly affect recruitment by consuming juveniles (Minckley, Marsh et al. 2003). Recovery efforts, however, are expanding the abundance and distribution of this species where the effects of habitat fragmentation and habitat alteration can be directly addressed.

**Vulnerabilities due to Forest Service Management Activities**

It is uncertain to what extent activities occurring in the Medicine Bow National Forest can be directly implicated in impacts downstream that affect Colorado pikeminnow populations and habitats. The closest known Colorado pikeminnow population occurs in the Colorado River hundreds of river miles downstream from the Forest. Most of the likely impacts to Colorado pikeminnow and their habitats, such as water quantity, timing of flows, and water quality, occur on private land. However, when considered cumulatively, impacts that occur on Forest and on private lands are presumed to harm Colorado pikeminnow and their associated habitats.

**Environmental Consequences and Viability**

If implemented, both alternative A and alternative D FEIS may negatively affect the Colorado pikeminnow. Alternative A (No Action) includes historical water depletions. Alternative D FEIS, though it prescribes no water depletions at the planning level, may incorporate project-level water depletions. Both historical water depletions and any new water depletions are likely to negatively affect population and habitat conditions downstream, though assessing the effects on species viability may be difficult.

**Effects of the Proposed Management Action on Species Evaluated**

**Direct and indirect effects of the action:** Because the proposed actions (alternatives A and D FEIS) are far removed from the Colorado pikeminnow and its critical habitats, it is difficult to determine their direct and indirect direct effects on this species. The overwhelming majority of direct and indirect effects occur on lands other than those administered by the Medicine Bow National Forest. Additionally, water depletions that have occurred and those that will occur in the Medicine Bow National Forest are considered de facto impacts to the Colorado pikeminnow by the U.S. Fish and Wildlife Service.

**Cumulative effects:** The cumulative effects on the Colorado pikeminnow are due to activities that occur, primarily, on public – other than the Medicine Bow National Forest -and private lands in the upper Colorado River basin (Wyoming, only) are real and may be measurable. The cumulative effects to this species are the result, primarily, of water developments and water uses in the basin. Also, introduced species such as rainbow trout are an important component of the cumulative effects that impact the Colorado pikeminnow; exotic trout tend to prey on young age classes of the pikeminnow.

**Determination**

Alternative A incorporates historical water depletions. And, alternative D FEIS may include project-level water depletions during the planning period. Therefore, if either Alternative A or D FEIS is implemented, then that action i***s likely to adversely affect*** the Colorado pikeminnow. If specific projects that incorporate water depletions are proposed during the planning period, then the Forest Service will continue to consult

with the U.S. Fish and Wildlife Service.

## Razorback sucker - *Xyrauchen texanus*

### Status and Distribution of Species

The razorback sucker was historically, well distributed in the Colorado River and in many of its major tributaries. Presently, the Razorback sucker is listed as endangered under the Endangered Species Act of 1973. In addition, the Razorback sucker is listed as endangered in the state of Colorado and it is legally protected by the state of Utah.

Status and Distribution in the Medicine Bow NF

The Razorback sucker does not occur in rivers, streams, and lakes in the Medicine Bow National Forest.

### Habitat

The Razorback sucker prefers fast, turbid waters in large rivers, such as the Colorado River and Green River. The U.S. Fish and Wildlife Service has designated the following critical habitats for the Razorback sucker: Yampa River (Moffat Co., CO) and its 100-years floodplain from the mouth of Cross Mountain Canyon in T.6 N., R.98 W., sec. 23 (6$^{th}$ Principal Meridian) to its confluence with the Green River in T.7 N., R. 103 W., sec. 28 (6$^{th}$ Principal Meridian); Green River (Uintah Co., UT and Moffat Co., CO) and its 100-years floodplain and its confluence with the Yampa River in T.7 N., R.103 W., sec. 28 (6$^{th}$ Principal Meridian) to Sand Wash at river mile 96 in T.11 S., R.18 E., sec. 20 (6$^{th}$ Principal Meridian); Green River and its 100-years floodplain from Sand Wash at river mile 96 in T.11 S., R.18 E., sec. 20 (6$^{th}$ Principal Meridian) to the confluence to the Colorado River in T.30 S., R.19 E., sec.7 (6$^{th}$ Principal Meridian); White River (Uintah Co., UT) and its 100-years floodplain from the boundary of the Uintah and Ouray Indian Reservations at river mile 18 in T.9 S., R.22 E., sec. 21 (Salt Lake Meridian) to its confluence with the Green River in T.9 S., R.20 E., sec.4 (Salt Lake Meridian); Duchesne River (Uintah Co., UT) and its 100-years floodplain from river mile 2.5 in T.4 S., R.3 E., sec.30 (Salt Lake Meridian) to its confluence with the Green River in T.5 S., R.3 E., sec. 5 (Uintah Meridian); Gunnison River (Delta and Mesa, Co., CO) and its 100-years floodplain from its confluence with the Uncompahgre River in T.15 N., R.96 W., sec.11 (6$^{th}$ Principal Meridian) to Redlands Diversion Dam in T.1 S., R.1 W., sec. 27 (Ute Meridian); Colorado River (Mesa and Garfield Co., CO) and its 100-years floodplain from Colorado River bridge at Exit 90, north of Interstate 70 in T.6 S., R.93 W., sec.16 (6$^{th}$ Principal Meridian) to Westwater Canyon in T.20 S., R.25 E., sec.12 (Salt Lake Meridian) including the Gunnison River and its 100-years floodplain from the Redlands Diversion Dam in T.1 S., R.1 W., sec.27 (Ute Meridian) to its confluence with the Colorado River in T.1 S., R.1 W., sec. 22 (Ute Meridian); Colorado River (Grand, San Juan, Wayne, and Garfield counties, UT) and its 100-years floodplain from Westwater Canyon in T.20 S., R.25 E., sec.12 (Salt Lake Meridian) to full-pool

elevation upstream of North Wash, including the Dirty Devil arm of Lake Powell in T.33 S., R.14 E., sec.29 (Salt Lake Meridian); and, the San Juan River (San Juan Co., NM and San Juan Co., UT) and its 100-years floodplain from the Hogback Diversion in T.29 N., R.16 W., sec.9 (New Mexico Meridian) to the full-pool elevation at the mouth of Neskahai Canyon on the San Juan arm of Lake Powell in T.41 S., R.11 E., sec.26 (Salt Lake Meridian).

**Threats due to Human Activities**

The abundance and distribution of the razorback sucker has been dramatically reduced because of water developments such as dams and water diversions. In addition, the introduction of non-native trout into the historical habitats of the razorback sucker has almost eliminated their recruitment and survival (Minckley, Marsh et al. 2003). Incidental catch by recreational anglers may pose a threat due to stress caused direct and delayed mortality.

**Vulnerabilities due to Forest Service Management Activities**

It is uncertain to what extent activities occurring in the Medicine Bow National Forest can be directly implicated in impacts downstream that affect Razorback sucker populations and habitats. The closest known Razorback sucker population occurs in the Colorado River hundreds of river miles downstream from the Medicine Bow National Forest. Most of the likely impacts to Razorback suckers and their habitats, such as changes in water quantity, timing of flows, and water quality, occur on private land. However, when considered cumulatively, impacts that occur on Forest and on private lands are presumed to harm Razorback suckers and their associated habitats.

**Environmental Consequences and Viability**

Water-development projects and activities such as dam construction/operation and water diversions have materially altered the preferred habitat conditions of the Razorback sucker. Dams have altered the timing, magnitude, and duration of flows that characterize the variation in annual runoff in unaltered, large rivers; altered flows due to dam operation can also affect the abundance and distribution of spawning and rearing habitats preferred by the Razorback sucker.

**Environmental Consequences and Viability**

If implemented, both alternative A and alternative D FEIS may negatively affect the Razorback sucker. Alternative A (No Action) includes historical water depletions. Alternative D FEIS, though it prescribes no water depletions at the planning level, may incorporate project-level water depletions. Both historical water depletions and any new water depletions are likely to negatively affect population and habitat conditions downstream, though assessing the effects on species viability may be difficult.

**Effects of the Proposed Management Action on Species Evaluated**

**Direct and indirect effects of the action:** Because the proposed actions (alternatives A and D FEIS) are far removed from the Razorback sucker and its critical habitats, it is difficult to determine their direct and indirect direct effects on this species. The overwhelming majority of direct and indirect effects occur on lands other than those administered by the Medicine Bow National Forest. Additionally, the U.S. Fish and Wildlife Service consider water depletions that have occurred and those that will occur in the Medicine Bow National Forest de facto impacts to the Razorback sucker.

**Cumulative effects:** The cumulative effects on the Razorback sucker due to activities that occur on public and private lands in the upper Colorado River basin (Wyoming, only) are real and may be measurable. Cumulative effects that may negatively impact this species are the result, primarily, of water developments and water uses in the basin.

**Determination**

Alternative A incorporates historical water depletions. And, alternative D-FEIS may include project-level water depletions during the planning period. Therefore, if either Alternative A or D FEIS is implemented, then that action is ***likely to adversely affect*** the Razorback sucker. If specific projects that incorporate water depletions are proposed during the planning period, then the Forest Service will continue to consult with the U.S. Fish and Wildlife Service.

## Bonytail - *Gila elegans*

**Status and Distribution of species**

The Bonytail is listed as endangered under the Endangered Species Act of 1973. Additionally, the Bonytail is listed as endangered in the state of Colorado and it is legally protected by the state of Utah. Historically, the Bonytail was abundant in the Colorado River and in its major tributaries such as the Green River and the Yampa River. At present, the Bonytail is precariously extant in the Colorado River downstream of Lake Powell; the Bonytail is nearly extinct upstream of Lake Powell.

**Status and Distribution in the Medicine Bow NF**

The Bonytail does not occur in the Medicine Bow National Forest. This species is not native or introduced to rivers, streams, lakes, or reservoirs in the Forest.

**Habitat**

The Bonytail prefers fast-flowing, turbid waters in large, deep rivers in the upper Colorado River basin such as the Green River and Colorado River. The U.S. Fish and Wildlife Service has designated the following critical habitats for the Bonytail: Yampa River (Moffat Co., CO) from the boundary of the Dinosaur National Monument in T.6 N., R.99 W., sec. 27 ($6^{th}$ Principal Meridian) to its confluence with

the Green River in T.7 N., R.103 W., sec. 28 (6th Principal Meridian); Green River (Uintah Co., UT and Moffat Co., CO) from its confluence with the Yampa River in T.7 N., R.103 W., sec. 28 (6th Principal Meridian) to the boundary of Dinosaur National Monument in T.6 N., R. 24 E., sec. 30 (Salt Lake Meridian); Green River (Uintah and Grand Co., UT) (Desolation and Gray Canyons) from Sumner's Amphitheater in T.12 S., R.18 E., sec. 5 (Salt Lake Meridian) to Swasey's Rapid (river mile 12) in T.20 S., R.16 E., sec. 3 (Salt Lake Meridian); Colorado River (Grand Co., UT and Meas Co., CO) in T.10 S., R.104 W., sec. 25 (6th Principal Meridian) to Fish Ford in T.21 S., R.24 E., sec. 35 (Salt Lake Meridian); and, Colorado River (Garfield and San Juan Co., UT) from Brown Betty Rapid in T.30 S., R.18 E., sec. 34 (Salt Lake Meridian) to Imperial Canyon in T.31 S., R.17 E., sec. 28 (Salt Lake Meridian).

**Threats due to Human Activities**

The Bonytail is the most imperiled fish among the federally-listed fish species native to the Colorado River drainage. Water development projects and activities such as dams and water diversions have caused a nearly catastrophic decline in Bonytail populations and in preferred habitats. Further, the introductions of non-native trout in the Colorado River drainage have contributed to the decline in Bonytail abundance and distribution due to predation.

**Vulnerabilities due to Forest Service Management**

It is uncertain to what extent activities occurring in the Medicine Bow National Forest can be directly implicated in impacts downstream that affect Bonytail populations and habitats. The closest known Bonytail population occurs in the Colorado River hundreds of river miles downstream from the Medicine Bow National Forest. Most of the likely impacts to Bonytail and their habitats, such as changes in water quantity, timing of flows, and water quality, occur on private land. However, when considered cumulatively, impacts that occur on Forest and on private lands are presumed to harm Bonytail populations and their associated habitats.

Bonytail populations and preferred habitats are threatened and limited by habitat fragmentation and by the habitat alteration due to water development. Additionally, Bonytails are vulnerable to predation by non-native trout introduced into their historical habitats.

**Environmental Consequences and Viability**

If implemented, both alternative A and alternative D FEIS may negatively affect the bonytail. Alternative A (No Action) includes historical water depletions. Alternative D FEIS, though it prescribes no water depletions at the planning level, may incorporate project-level water depletions. Both historical water depletions and any new water depletions are likely to negatively affect population and habitat conditions downstream, though assessing the effects on species viability may be difficult.

**Effects of the Proposed Management Action on Species Evaluated**

**Direct and indirect effects of the action:** Because the proposed actions (alternatives A and D FEIS) are far removed from the Bonytail and its critical habitats, it is difficult to determine their direct and indirect direct effects on this species. The overwhelming majority of direct and indirect effects occur on lands other than those administered by the Medicine Bow National Forest. Additionally, the U.S. Fish and Wildlife Service consider water depletions that have occurred and those that will occur in the Medicine Bow National Forest de facto impacts to the Bonytail.

**Cumulative effects:** The cumulative effects on the Bonytail due to activities that occur on public and private lands in the upper Colorado River basin (Wyoming, only) are real and they may be measurable. Cumulative effects that may negatively impact this species are the result, primarily, of water developments and water uses in the basin. Introduced species such as rainbow trout, are a component of the cumulative effects, also; exotic trout tend to prey on young age classes of Bonytail.

**Determination**

Alternative A incorporates historical water depletions. And, alternative D FEIS may include project-level water depletions during the planning period. Therefore, if either Alternative A or D FEIS is implemented, then that action is ***likely to adversely affect*** the Bonytail. If specific projects that incorporate water depletions are proposed during the planning period, then the Forest Service will continue to consult with the U.S. Fish and Wildlife Service.

## Humpback chub - *Gila cypha*

**Status and Distribution of species**

The humpback chub is listed as endangered under the Endangered Species Act of 1973. In addition, the humpback chub is listed as endangered by the state of Colorado and it is legally protected by the state of Utah. Historically, the humpback chub was abundant in the canyons of the Colorado River and in the canyons of four tributaries: the Green River, the Yampa River, the White River, and the Little Colorado River. Presently, two stable populations of humpback chubs are known to exist, both near the Colorado/Utah border: Westwater Canyon (Utah) and Black Rocks (Colorado). The largest known population of Humpback chubs exists in the Little Colorado River in the Grand Canyon. Smaller populations of Humpback chubs can be found in the main stem of the Colorado River (Arizona) and in sections of its tributaries such as the Green River (Utah and Colorado) and the Yampa River near Dinosaur National Monument.

**Status and Distribution in the Medicine Bow NF**

The Humpback chub does not occur in the Medicine Bow National Forest.

### Habitat

The Humpback chub prefers fast waters in habitats such as the riffles and rapids of river canyons and their tributaries (canyon sections) in the Colorado River basin. The U.S. Fish and Wildlife Service has designated the following critical habitats for the Humpback chub: **Yampa River** (Moffat Co., CO) from the boundary of Dinosaur National Monument in T.6 N., R.103 W., sec. 27 (6th Principal Meridian) to its confluence with the Green River in T.7 N., R. 103 W., sec. 28 (6th Principal Meridian); **Green River** (Uintah Co., Utah and Moffat Co., CO) from its confluence with the Yampa River in T.7 N., R.103 W., sec.28 (6th Principal Meridian) to the southern boundary of Dinosaur National Monument in T.6 N., R. 24 E., sec.30 (Salt Lake Meridian); **Green River** (Uintah and Grand Co., UT)(Desolation and Gray Canyons) from Summers Amphitheater in T.12 S., R.18 E., sec.5 (Salt Lake Meridian) to Swasey's Rapid in T.20 S., R.18 E., sec.3 (Salt Lake Meridian); **Colorado River** (Grand Co., UT and Mesa Co., CO) from Black Rocks in T.10 S., R.104 W., sec.25 (6th Principal Meridian) to Fish Ford in T.21 S., R.24 E., sec.35 (Salt Lake Meridian); and, **Colorado River** (Garfield and San Juan Co., UT) from the Brown Betty Rapid in T.30 S., 18 E., sec.34 (Salt Lake Meridian) to Imperial Canyon in T.30 S., R.17 E., sec.28 (Salt Lake Meridian).

### Threats due to Human Activities

The humpback is not as abundant as it was historically. Water development and introduced trout have affected the abundance and distribution of the Humpback chub. Dams have altered the timing, duration, and magnitude of annual flows that provided suitable and preferable habitats for the humpback chub. Further, non-native trout have affected humpback chub abundance due to predation.

### Vulnerabilities due to Forest Service Management

It is uncertain to what extent activities occurring in the Medicine Bow National Forest can be directly implicated in impacts downstream that affect Humpback chub populations and habitats. The closest known Humpback chub population occurs in the Colorado River hundreds of river miles downstream from the Medicine Bow National Forest. Most of the likely impacts to Humpback chubs and their habitats, such as changes in water quantity, timing of flows, and water quality, occur on private land. However, when considered cumulatively, impacts that occur on Forest and on private lands are presumed to harm Humpback chub populations and their associated habitats.

### Threats, Limiting Factors, and Vulnerabilities

Water developments and introduced fishes are the primary threats to the viability of humpback chub populations. Providing adequate spring-runoff conditions, establishing additional populations, and the reducing the stocking of non-native trout are all conducive to maintaining viable populations of Humpback chubs.

**Environmental Consequences and Viability**

If implemented, both alternative A and alternative D FEIS may negatively affect the Humpback chub. Alternative A (No Action) includes historical water depletions. Alternative D FEIS, though it prescribes no water depletions at the planning level, may incorporate project-level water depletions. Both historical water depletions and any new water depletions are likely to negatively affect population and habitat conditions downstream, though assessing the effects on species viability may be difficult.

**Effects of the Proposed Management Action on Species Evaluated**

**Direct and indirect effects of the action:** Because the proposed actions (alternatives A and D FEIS) are far removed from the Humpback chub and its critical habitats, it is difficult to determine their direct and indirect direct effects on this species. The overwhelming majority of direct and indirect effects occur on lands other than those administered by the Medicine Bow National Forest. Additionally, the U.S. Fish and Wildlife Service consider water depletions that have occurred and those that will occur in the Medicine Bow National Forest de facto impacts to the Humpback chub.

**Cumulative effects:** The cumulative effects on the Humpback chub due to activities that occur on public and private lands in the upper Colorado River basin (Wyoming, only) are real and they may be measurable. Cumulative effects that may negatively impact this species are the result, primarily, of water developments and water uses in the basin. Also, introduced species such as rainbow trout, are an important component of the cumulative effects; exotic trout tend to prey on young age classes of Humpback chubs.

**Determination**

Alternative A incorporates historical water depletions. And, alternative D FEIS may include project-level water depletions during the planning period. Therefore, if either Alternative A or D FEIS is implemented, then that action is ***likely to adversely affect*** the Humpback chub. If specific projects that incorporate water depletions are proposed during the planning period, then the Forest Service will continue to consult with the U.S. Fish and Wildlife Service.

## V. Consultation History

The US Fish and Wildlife Service provided us with listed species in letters dated October 29, 2001, February 12, 2003 and July 22, 2003. Informal consultation since August 2001 has included meetings and phone calls on 10/1/2001, 2/12/2002, 2/13/2002, 3/28/2002, 5/28/2002, 7/8/2002,2/28/2003, 4/12/2003, 4/17/2003, 4/30/2003, 5/1/2003, 5/2/2003, 5/7/203, 5/12/2003, 5/19/203, 6/19/2003, 6/20/2003, and 8/7/2003. E-mails with comments on proposed standards and other aspects of making determinations were received from the FWS on 7/5/02, 7/22/02, 9/6/02, 10/8/02, 10/17/02, 4/17/2003, 4/18/2003, 4/21/2003, 5/21/2003, 5/28/2003, 6/19/2003, 6/20/2003, 6/25/2003, 7/10/2003, 7/18/2003, and 8/5/2003. In a letter dated March 26, 2003, the FWS sent extensive comments on the Draft Biological Assessment. We requested formal consultation on October 7, 2003 by submitting the Biological Assessment and appendices along with the request. The FWS requested additional information to assist them in preparing their biological opinion on November 7, 2003. We transmitted that additional information in a November 18, 2003 letter to the FWS. The following information was excerpted from the November 18 letter:

### 1. The location and extent of Preble's Meadow Jumping Mouse suitable habitat on the Forest

The estimates below are based on all drainages where the species has been found (include animals that were identified in the field) and, for the Laramie Peak Unit, the District Biologist's estimates of suitable habitat that has not been trapped yet. Federal land is very fragmented- these following areas may be the sum of area in several short (quarter mile) segments of stream separated by private land.

Table I-19 Location and extent of Preble's Meadow Jumping Mouse suitable habitat on the Forest

| | Critical Habitat Miles | Estimated other suitable habitat Miles | Area of Critical Habitat Acres | Area of other suitable habitat Acres |
|---|---|---|---|---|
| **Laramie Peak Unit** | | | | |
| Cottonwood Creek | 4.8 miles | 1.5 | | |
| Laramie River | | 1.9 | | |
| Horseshoe Cr including unnamed tributary, and Soldier Cr. and Trail Cr. | | 5.9 | | |
| Labonte Curtis Gulch, Prospector Cr, S Fk Labonte, Big Bear | | 7.1 | | |
| LaPrele including Roaring Fork, Meadow Cr, Campbell | | 2.1 | | |
| Box Elder including Gunnysack area | | 2.1 | | |

| | Critical Habitat Miles | Estimated other suitable habitat Miles | Area of Critical Habitat Acres | Area of other suitable habitat Acres |
|---|---|---|---|---|
| Medicine Bow River, Elkhorn Cr. | | 0.4 | | |
| **Total LPU** | **4.8** | **21.0** | **378** | **1,655** |
| | | | | |
| **Pole Mountain Unit** | | | | |
| Lodgepole Creek | 4.9 | 6.6 | | |
| Crow Creek | | 17.7 | | |
| **Total Pole Mtn** | **4.9** | **24.3** | **386** | **1,915** |

**2. Estimates of Preble's occurrence on the Forest**

Trapping was done in 1998 on the Laramie RD and in 1998-2001 on the Douglas RD. Trapping followed the USFWS protocol at that time. Traps were placed 5 m apart along two parallel transects for 400 trapnights or until the first jumping mouse was caught. Mice were weighed and measured. Ear punches were taken from some mice and sent to the Colorado Division of Wildlife for DNA analysis. Most mice were identified only by morphology. Because this trapping was designed to detect only presence/absence, we know only how many drainages are occupied (at least in part). We have no data that can be used to estimate density or population size.

**3. Estimations of the extent of Forest activities likely to occur in suitable habitat for Preble's**

Dropped. (The Forest Plan is a programmatic plan that does not contain future projects or locations of future projects.)

**4. Historic activities that have occurred in suitable habitat for Prebles's and within Lynx Analysis Units and connectivity corridors for the Canada Lynx**

Since the PMJM was listed, the districts have avoided any activities that would adversely affect the species and its habitat. No prescribed fire, timber sales, or road building has occurred in Preble's habitat on the MBNF. On-going activities include grazing and recreation.

**5. Determinations for the Forest LRMP revision effects on critical habitat for the 4 endangered Colorado River fishes.**

The determination is that implementation of any of the alternatives is *likely to adversely affect* Critical Habitat for Colorado Pikeminnow (*Ptychocheilus lucius),* Razorback Sucker (*Xyruachen texanus),* Bonytail (*Gila elegans), and* Humpback Chub (*Gila cypha)* in the Colorado River. "

The updated Preble's map and updated Section V – Species with Habitat Downstream from the BA are attachments to this document. The updated Section V 1) modifies the discussion on water yield to clarify that it is not a depletion, 2) Clarifies Table 15, Minor Water depletions in the Colorado River Basin are <100 acre feet, and 3) Modifies the discussion on Pallid Sturgeon.

## VI. Summary of Determinations

Determinations and outcomes are summarized in the following tables.

Table I-20 Summary of determinations for Endangered, Threatened, and Proposed Species for the MBNF.

| Species | Status | Determination |
|---|---|---|
| Canada lynx (*Lynx canadensis*) | Threatened | Not likely to adversely affect |
| Preble's meadow jumping mouse (*Zapus hudsonius preblei*) | Threatened | Likely to adversely affect |
| Critical Habitat for the Preble's meadow jumping mouse | | Likely to adversely affect Critical Habitat |
| Bald eagle (*Haliaeetus leucocephalus*) | Threatened | Not likely to adversely affect |
| Black-footed ferret (*Mustela nigripes*) | Endangered | No effect |
| Wyoming Toad (*Bufo baxteri*) | Endangered | No effect |
| Ute ladies' tresses (*Spiranthes diluvialis*) | Threatened | Not likely to adversely affect |
| Colorado butterfly plant (*Guara neomexicana ssp. coloradensis*) | Threatened | Not likely to adversely affect |

Table I-21 Summary of determinations for Downstream Species

| Species | Status | Determination |
|---|---|---|
| **Platte River (in Nebraska)** | | |
| Whooping Crane (*Grus Americana*) | Endangered | Likely to adversely affect |
| Critical Habitat for the Whooping Crane | | Likely to adversely affect |
| Bald Eagle (*Haliaeetus leucocephalus*) | Threatened | Likely to adversely affect |
| Eskimo Curlew (*Numenius borealis*) | Endangered | Likely to adversely affect |
| Piping Plover (*Charadrius melodus*) | Threatened | Likely to adversely affect |
| Critical Habitat for the Piping Plover | | Likely to adversely affect |
| Interior Least Tern (*Sterna antillarum*) | Endangered | Likely to adversely affect |
| Pallid sturgeon (*Scaphirhynchus albus*) | Endangered | Likely to adversely affect |
| Western prairie fringed orchid (*Platanthera praeclara)* | Threatened | Likely to adversely affect |
| **Colorado River (in Colorado)** | | |
| Bonytail (*Gila elegans*) | Endangered | Likely to adversely affect |
| Colorado pikeminnow (*Ptychocheilus lucius*) | Endangered | Likely to adversely affect |
| Humpback chub (*Gila cypha*) | Endangered | Likely to adversely affect |
| Razorback sucker (*Xyrauchen texanus*) | Endangered | Likely to adversely affect |

## VII. Signature Page

The following specialists prepared the analyses for this biological assessment and confirm that it contains their statements and biological conclusions.

_/s/ Patricia Dolan_____ 10/08/2003_____

Patricia Dolan, Wildlife Biologist Date

_/s/ John Proctor_____ 10/08/2003_____

John Proctor, Forest Botanist Date

_/s/ Greg Eaglin_____ _10/08/2003_____

Greg Eaglin, Fisheries Biologist Date

_/s/ Dave Gloss_____ 10/08/2003_____

Dave Gloss, Hydrologist Date

## VIII. Appendices

The following appendices are on file in the Forest Plan adminstrative record at the Forest Supervisor's office in Laramie, Wyoming.

**Appendix 1 Forest Goals, Objectives and Strategies**

**Appendix 2 Forestwide Standards and Guidelines**

**Appendix 3 Candidate Species** *( These species are R2 Sensitive Species and are also analyzed in the Biological Evaluation section of Appendix I )*

**Appendix 4. Crosswalk between the Lynx Conservation Assessment and Strategy (LCAS) and Medicine Bow National Forest Revised Plan Direction**

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# Part 2: Biological Evaluation of Sensitive Species

### Major Changes from the DEIS

The Regional Forester Sensitive Species list was revised in November 2003. This resulted in delisting some species from the list evaluated in the Draft Biological Evaluation and adding species to the list evaluated in this Final. Most of the newly listed sensitive animal and plant species were assessed in the DEIS. The exceptions to that statement are: Hudsonian emerald, yellow-billed cuckoo (both east and west subspecies), and white-tailed prairie dog.

### Introduction

Sensitive species are those animal and plant species, designated by the Regional Forester, whose population viability is a concern on National Forests within the Region. Sensitive species may also be those species whose current populations and/or associated habitats are reduced or restricted or their habitats and/or populations are considered vulnerable to various management activities, and special emphasis is needed to ensure they do not move towards listing as threatened or endangered. The Regional Sensitive Species list is updated periodically and was most recently updated in November 2003.

A description of each species and what is known of the current and historical distribution of that species on the Forest in included. Sighting locations on the Forest were mapped on the GIS computer mapping system with assistance from the Wyoming Natural Diversity Database (WYNDD) and the Wyoming Game and Fish Department.

Species on the Regional Sensitive Species List for which there are few or no confirmed records were assessed based on information obtained from biologists from the Regional Office, the Forest, and Districts, the Wyoming Game and Fish Department, WYNDD, the University of Wyoming and others knowledgeable about individual taxa.

The Biological Evaluation of Regional Forester Sensitive Species will address animals first and then plants.

## Sensitive Animal Species

There are eight mammals, nineteen birds, three amphibians, one insect, one mollusk, and five fishes on the R2 Sensitive Species List for the MBNF.

Eleven animals from the 1993 R2 Sensitive Species list no longer exist on the newly published 2003 R2 Sensitive Species list. Those species are:

Dwarf shrew, Ringtail, Common Loon, Osprey, Merlin, Greater Sandhill Crane, Golden-crowned Kinglet, Fox Sparrow, Brown Creeper, Pygmy Nuthatch, and Tiger salamander.

Fifteen animals are new to the November 2003 list. Those species are:

Black-tailed Prairie Dog, White-tailed Prairie Dog, Northern River Otter Peregrine falcon, Northern Harrier, Greater Sage-grouse, White tailed Ptarmigan, Mountain Plover, Short-eared Owl, Yellow-billed Cuckoo, Black-backed Woodpecker, Loggerhead Shrike, Brewer's Sparrow, Sage Sparrow, and Hudsonian emerald, Mountain Sucker, Flannelmouth Sucker, Hornyhead Chub, and Plains Minnow.

In the following evaluations, the effects of alternatives are expressed as (1) a viability outcome (likelihood of persistence of the species in the planning area); (2) the expected effect on individuals and populations of the species and (3) an estimate of the certainty with which these determination are made.

1. The expected viability of each species on the MBNF will be based on a combination of:
    - The species' characteristics (abundance, distribution, trend in population, trend in habitat, dispersal ability),
    - The species' sensitivity to activities and uses on the Forest, and
    - Management direction in the Plan.

The viability assessment is expressed in terms of likelihood of persistence and level of uncertainty in that estimate. It is based on the information available, relying especially on the R2 Species Assessments for the revision of the Sensitive Species list (which were written by experts on the species and reviewed by a team of biologists), on the species reports by WYNDD (Welp, Fertig et al. 2000), and on literature summaries by Patricia Hayward (commissioned by the MBNF). Recommendations for monitoring and research will also be noted where appropriate.

2. In expressing effects of alternatives on **sensitive** species, there are four standard outcomes:
    - No impact (NI)
    - May adversely impact individuals but is not likely to result in a viability loss on the planning area nor cause a trend toward Federal Listing or a loss of species viability rangewide. (MAII)
    - May cause loss of viability at the planning area or rangewide or a trend toward Federal listing. (LFL)
    - Beneficial impact. (BI)

3. Certainty. In determining the effects of activities on wildlife species, it is important to be aware of the level of certainty with which the outcomes are

determined. Available information is never perfect. Some facts and relationships are well understood; others are poorly understood. Since each decision relies on a large number of factors and predictions of effects, all decisions are made with some level of uncertainty. Options are evaluated based on both the magnitude of an effect and probability that it will occur. Therefore, even issues with some uncertainty may weigh in the overall decision if the effect (if it occurs) would impede achievement of an important Forest Service objective.

Sources of uncertainty in the determining the outcomes for the following species are (1) low population on the forest, which is subject to high fluctuation or loss; (2) lack of information on the status and distribution on the forest, and (3) uncertainty about whether our habitat management will provide for all the species' needs in the long-term.

A literature summary for most of the sensitive species (excluding the ones added to the Regional list in 2003) was prepared under a contract with Patricia Hayward. The Regional Office prepared summaries of species on or considered for addition to the recently approved Regional Sensitive Species list. Much of the description of habitat, range, and threats in the following species assessments is based on Hayward's summaries and these R2 reports. Contents and references cited are available from the MBNF.

Information on rankings, habitat, and status on the MBNF is given in the table below.

Table I-22. Ranking, Habitat, and Distribution of Animals From the R2 Sensitive Species List on the MBNF.

| Mammals | Ranking | Habitat | Distribution |
|---|---|---|---|
| Pygmy shrew *Sorex hoyi* | G5/S1, NSS2 | High elevation, especially borders of wetlands in spruce/fir forest. | Medicine Bow Range is only known location in Wyoming |
| Fringed myotis *Myotis thysanodes* | G5/S1B, S1N, NSS2 | Caves, abandoned mines; often in dry shrub and forest, but broad range of ecological settings. | Probably on Laramie Peak Unit |
| Townsend's big-eared bat *Corynorhinus townsendii* | G4/S1B, S2N, NSS2 | Caves, abandoned mines; broad range of ecological settings. | Probably on Laramie Peak Unit |
| Black-tailed Prairie Dog - *Cynomys ludovicianus* | G4/S2S3 | Large colonies in flat, open grassland | None on Forest Service Land |
| White-tailed prairie dog *Cynomys leucurus* | G4/S2S3 | Grassland | Small colony SW edge of Medicine Bow Range |
| American Marten *Martes americana* | G3/S3 | Mature spruce/fir and (to lesser extent) lodgepole forest with complex structure. | Medicine Bow and Sierra Madre. Low population on Laramie Peak Unit since 1960s. |

| | | | |
|---|---|---|---|
| Wolverine *Gulo gulo* | G4/S2, NSS3 | Generalist. Uses large areas, sensitive to disturbance. | Uncertain. Scattered sightings on forest. |
| Northern River Otter *Lontra canadensis* | | Rivers and large streams, usually where human disturbance can be avoided. | Rare, but sightings on larger rivers in wilderness, adjacent to forest, one recent breeding record. |
| **Birds** | **Ranking** | **Habitat** | **Distribution** |
| Northern Goshawk *Accipter gentiles* | G5/S3S4, NSS4, PIF1 | Older forest with mixture of structures. | Throughout forest. |
| Ferruginous Hawk *Buteo regalis* | G4S3B/S3N, NSS3, PIF1 | Open habitat, nests on high ground (rock outcrop, cliff) or tree. | Occurs on all units. |
| Peregrine falcon *Falco peregrinus anatum* | NSS3, PIF1 | Cliff nesting. Open country foraging. | Possible marginal nesting habitat in North Gate Canyon. Scattered non-breeding sightings in open country. |
| Northern Harrier *Circus cyaneus* | PIF3 | Grassland and wetland tall enough to provide some cover | Periphery of forest |
| Columbian Sharp-tailed Grouse *Tympanuchus phasianellus columbianus* | G4T3/S1 | Grass/shrub. | Western slope of Sierra Madre |
| Greater Sage-grouse *Centrocercus urophasianus* | PIF1 | Sagebrush mosaic of structure. | No leks on forest. May be use at edge of forest. WDGF says Forest lands do not contribute. |
| White tailed Ptarmigan *Lagopus leucourus* | G5/S1, PIF3 | Alpine (above treeline in summer). Willow. | Believed extirpated in Snowy Range in late 1970's. |
| Mountain Plover *Charadrius montanus* | G2/S3B SZN, NSS1, PIF1 | Open, relatively level short grassland | No suitable habitat on MBNF |
| Boreal Owl *Aegolius funereus* | G5/S2, NSS4, PIF2 | Spruce fir forest with snags (cavities for nest sites) and downed wood (for prey). | Laramie and BCH Districts. |
| Short-eared Owl Asio flammeus | G5/S2B, PIF1 | Grass with clumps of trees. | Probable on Laramie Peak Unit. |
| Flammulated Owl *Otus flammeolus* | G4 | Ponderosa pine, mosaic of structure. Adjacent open areas. | Probably on Laramie Peak Unit; sighting on Forest near Battle Creek in SW Sierra Madre. |

| | | | |
|---|---|---|---|
| Yellow-billed Cuckoo *Coccyzus americana* | G5/S2B, Western subspecies is a Candidate for Federal listing; whole species is sensitive in R2 | Riparian cottonwood with understory, willow | No observations on MBNF |
| Lewis's Woodpecker *Melanerpes lewis* | G5/S2B, SZN, NSS3, PIF2 | Burned pine, open ponderosa pine habitat, cottonwood. | Laramie Peak Unit |
| Black-backed Woodpecker, *Picoides arcticus* | G5/s2, NSS4, PIF2 | Mid-elevation conifer, abundant only in burns | One sighting in Medicine Bow range, one sighting in Sierra Madre |
| American Three-toed Woodpecker *Picoides dorsalis* American three-toed woodpecker | G5/S3, PIF2 | Burned forest, old spruce-fir forest with snags and downed wood, | Throughout forest. |
| Olive-sided Flycatcher *Contopus cooperi* | | Burned areas, high elevation forest with snags and openings. | Throughout forest. |
| Brewer's Sparrow *Spizella breweri* | G5/S3B, SZN, PIF1 | Open sagebrush | Probable in sagebrush throughout MBNF. |
| Sage Sparrow *Amphispiza belli* | G5/S3B, SZN, PIF1 | Primarily sagebrush, sometimes other shrubs. Large patches, little grass. | Uncertain. |
| Loggerhead Shrike *Lanius ludovicianus* | PIF2 | Open grassland and shrubs. | Possible |
| **Reptiles- none** | | | |
| **Amphibians** | **Ranking** | **Habitat** | **Distribution** |
| Northern leopard frog *Rana pipiens* | G5/S3, NSS4 | Wetlands, beaver ponds, lakes. | Throughout forest at lower elevation. |
| Wood frog *Rana sylvatica* | G5/S2, NSS3 | Ponds, wetlands, wet meadows, slow streams. | Medicine Bow and Sierra Madre. |
| Boreal toad *Bufo boreas boreas* | G4T1Q/S1,NSS1,candidate for federal listing | Breeding: shallow ponds. Non-breeding: females in forest up to 2 miles from breeding site. Males within ¼ mile of breeding site. Use burrows, woodpiles; hibernate. | Medicine Bow and Sierra Madre. |
| **Fish** | **Ranking** | **Habitat** | **Distribution** |
| Colorado River cutthroat trout *Oncorhynchus clarki pleuriticus* | G4T2T3/S2 | Streams | Headwaters of Colorado R. west slope Sierra Madre; one introduced population |

| | | | |
|---|---|---|---|
| Mountain Sucker - *Catostomous platyrhynchus* | NA | Wide range of habitats – montane lakes, streams, creeks, and large rivers at lower elevations. | Streams in the Sierra Madre west of the Continental Divide. |
| Flannelmouth Sucker - *Catostomous latipinnis* | NA | Prefers large rivers but will inhabit relatively small, tibutary streams. | Little Snake River drainage west of the Continental Divide |
| Hornyhead Chub - *Nocomis biguttatus* | NA | Clear streams with abundant gravel substrate. | North Laramie River |
| Plains Minnow - *Hybognathus placitus* | NA | Backwaters and side pools in turbin streams and rivers. | It is remotely possible that it could exist in Forest tributaries near their confluences with the North Platte River, downstream of Casper Wy |
| **Insects** | **Ranking** | **Habitat** | **Distribution** |
| Hudsonian emerald *Somatochlora hudsonica* | | Bog/fen | One record from "Medicine Bow Mountains" in 1937. |
| **Mollusks** | **Ranking** | **Habitat** | **Distribution** |
| Rocky Mountain capshell *Acroloxus coloradensis* | | Lakes | No known occurrences- found on Routt and disjunct populations across west |
| (Heritage rankings: Global ranks are G1 to G5 with G1 the most imperiled, State ranks are S1 to S5 with S1 the most imperiled, SB is breeding status, SN is non-breeding status, SZN indicates not of significant status in WY in winter or in migration, T status of subspecies. State Species of Concern: NSS1 to NSS5 with NSS 1 most imperiled. Partners in Flight: PIF level 1 (conservation concern), PIF2 (monitoring concern), PIF3 (local interest). | | | |

## Sensitive Mammals

## Pygmy Shrew - *subspecies S. hoyi montanus*

### Status and distribution of species

Pygmy shrews are widespread across Canada and northern U.S. with an isolated population (subspecies *S. hoyi montanus)* in Colorado and SE Wyoming.

### Status and distribution on the MBNF

Little information is available on population or trends. The subspecies is limited to high elevations in the Medicine Bow Range. The population may be declining (Clark and Stromberg 1987). Trap sites where pygmy shrews were found in 1969 yielded none during intensive trapping in 1979-1980. Pygmy shrews have been recorded at Green Rock picnic area, Centennial, Coon Creek, and the Encampment

River GA. The species is small and inconspicuous and would be detected only by trapping.

**Habitat and Natural History**

In Wyoming, the species is commonly associated with the edges of wetlands, especially sphagnum bogs in spruce-fir forests. These shrews are active beneath the snow all winter, feeding primarily on insects and carrion. As the smallest mammal in North America, pygmy shrews have high-energy demands per unit weight, and must consume considerable amounts of high-energy food to stay alive. (One estimate is over 1,500 spiders/day). Like all shrews, individuals need to hunt many hours a day to gather enough food to survive. In winter, insulation from adequate snow cover is necessary to buffer the extremes of cold found at high elevation. Pygmy shrews further conserve energy by resting in bulky nests. The shorter winter feeding-forays may allow them to return while the nest is still warm from the last visit. They need access to enough foraging space beneath the snow to gather adequate food.

**Changes from HRV in factors that may affect the species**

Climate change in the last 10,000 years has altered the distribution of habitat suitable for the pygmy shrew, isolating the southern population in Wyoming and Colorado (now a subspecies) from the continuous population in the northern United States and Canada. Snow compaction from recreational use may reduce sublimation at the base of the snowpack (reducing or fragmenting habitat) and may reduce insulation at the edge of wetlands so that subfreezing temperatures extend to (and below) the soil. The effect of disturbance is not known. However, as an extremely small endotherm that is active all winter, the pygmy shrew can be expected to have a slim energetic margin in winter.

**Threats, limiting factors, and vulnerabilities**

The patchy distribution of this subspecies makes it vulnerable to loss of local populations. Little is known about management effects. Loss of downed wood and disruption of habitat at the edge of wetlands may reduce habitat suitability. Recreation resulting in compaction of snow, especially near wetlands, may be a threat.

References used are Clark and Stromberg (1987), Welp (2000) Robitaille and Aubry (2000), Hayward, P (2001) and R2 Species Conservation Project (USDA Forest Service 2000).

**Environmental Consequences and Viability**

The subspecies *S. hoyi montanus* is a Pleistocene relict, separated by hundreds of miles from the rest of the species in the northern U.S. and Canada. Its lack of dispersal ability, restriction to boreal habitat (especially edges of wetlands in spruce/fir forest), and limited distribution (SE Wyoming and mountains of central

Colorado) make the species vulnerable. Effects of management are not well understood. Alteration in the physical structure of snow that reduces its insulation and passage of $O_2$ and $CO_2$ would reduce habitat suitability for this species. The species would be most vulnerable to compaction effects where compaction is most likely to occur, in open forest or in wet areas adjacent to forest, rather than in denser forest.

**Direct and indirect effects.** Logging of subalpine forest creates sites that may be too dry for Pygmy Shrews (depending on the type of harvest and loss of canopy cover). Logging alters the amount, arrangement and structure of dead downed wood essential to the species. Retention of dead downed wood after logging is well below HRV in the standards in Alternatives A and F, but F allows relatively little logging. Higher levels of dead downed wood are required in the other alternatives. Off trail snowmobiling and other recreation compacts the snowpack, reducing availability of subnivian space, fragmenting the spaces, and reducing the snow's insulative capacity. These changes may directly kill shrews, eliminate foraging and nesting habitat, and may force the animals to emerge to the snow surface to move between isolated patches (exposing them to freezing temperature and to predators).

**Cumulative effects.** Logging, loss of dead downed wood, and snow compacting activities in the past may have affected the population or distribution of the species on the MBNF, but no population data are available to confirm this suggestion. Similar activities have occurred on private land and on National Forests in Colorado. The only suitable habitat on adjacent land is on the Routt NF in Colorado. Conversion of suitable habitat to downhill ski runs has occurred on the MBNF and may occur in the future with expansion of the existing resort or development of new resorts.

Concern for the species arises from the population's isolation, suggestions of possible decline, and the occurrence of activities that did not occur in the past and may have possible (but speculative) effects on the shrew's habitat.

Evaluation criteria for the species are the amount of timber harvest planned in subalpine forest (which affects soil characteristics and downed wood abundance, distribution, and recruitment) and pattern of winter recreation (amount of area affected by snow compaction in the subalpine zone.) All alternatives prevent logging within 100 feet of water (300 feet if riparian dependent TES species are present) and provide for retention of downed wood in logged area.

All the conclusions below are tentative because of the lack of information on the current status of the species on the MBNF.

Table I-23 Viability and outcome conclusions for the Pygmy Shrew

| | Alts A, B, C | Alt D DEIS, D FEIS, E | Alt F |
|---|---|---|---|
| Abundance and distribution (within Snowy Range population) | Possible loss of habitat, individuals, and small populations in logged and in compacted areas especially along the edges of forest wetlands. Highest level of logging, most widespread snowmobiling | Possible loss of habitat, individuals, and small populations in logged and in compacted areas. Logging like current implemented level, more area non-motorized in winter. | Retention of current limited range. Little or no logging at high elevation, snowmobiles restricted to designated routes. |
| Likelihood of persistence-15 yr. | Likely | Likely | More likely |
| Likelihood of persistence-long-term | Likely | Likely | More likely |
| Effect on individuals and populations | MAII (need information on current status and location of occupied habitat). | MAII | MAII |
| Certainty | Low | Low | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Fringed myotis - *Myotis thysanodes*

### Status and distribution of species

Fringed myotis are widespread in western U.S. from southern Canada to Mexico. The species is never abundant, with only a few individuals are usually taken at a location. Little information is available to assess population or trends.

### Status and distribution on the MBNF

No records of occurrence have been documented by WYNDD or by the Wyoming Game and Fish Department. The species may occur on the Laramie Peak Unit. There is little information on occurrence or on location of sensitive sites on the MBNF.

### Habitat

Fringed myotis are found in a broad range of ecological settings, from grassland to coniferous forest, desert, riparian areas. It is typically found along riparian habitat in grassland or ponderosa pine (Fisher, Pattie et al. 2000). The species migrates and may also hibernate in caves (Finch and Stangel 1992). These bats share abandoned mines and cave with other bat species, roosting in maternal colonies, male summer colonies, and hibernacula. They are highly gregarious at these sites, which are shared with other bat species (Welp, Fertig et al. 2000).

**Changes from HRV in factors that may affect the species**

Unknown except disturbance and vandalism at roosts (cave and abandoned mines) and pesticide use.

**Threats, limiting factors, and vulnerabilities**

Colonies are very sensitive to disturbance in abandoned mines and caves and have high site fidelity. These gregarious bats are susceptible to vandalism and disturbance by humans visiting caves and abandoned mines. Disturbance in and near roost sites may cause abandonment of area and loss of local population. Habitat loss occurs with closure of abandoned mines that are dangerous to the public unless bat gates are installed and loss of large snags. Though this is an artificial habitat, if natural cave populations have been lost, the abandoned mine habitat should be protected.

Primary references used are Clark and Stromberg (Clark and Stromberg 1987), Welp (2000), and Region 2 Species Assessments (USDA Forest Service 2000).

**Environmental Consequences and Viability**

The forest currently installs bat gates on abandoned mines that are closed and will continue to do so.

All action alternatives provide protection for roost sites. However, the specific locations are not known. Sites may be discovered in pre-project surveys, in Forestwide bat surveys, or if a problem occurs because of conflict with people exploring caves. Gates are installed on abandoned mines.

The evaluation criterion for the fringed myotis is control of disturbance at caves. All alternatives have the same standards for protection of cave roosts. No timber harvest is scheduled in the Laramie Peak unit, where most of the Forest's ponderosa pine occurs. Alternatives B, C, D DEIS, D FEIS, and E protect snags along streams and lakes from being cut for firewood.

The conclusions below are tentative because of lack of information on the current status of the species on the MBNF.

Table I-24 Viability and outcome conclusions for the Fringed myotis

| | **All alternatives** |
|---|---|
| Abundance and distribution | Current abundance and distribution not known. |
| Likelihood of persistence-15 yr. | Likely |
| Likelihood of persistence-long-term | Likely |
| Effect on individuals and populations | MAII |
| Certainty | Low |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Townsend's Big-eared Bat - *Corynorhinus townsendii*

### Status and distribution of species

Townsend's big-eared bats are widespread across the western U.S and portions of Canada and Mexico. Rangewide, the population appears to be declining.

### Status and distribution on the MBNF

The Townsend's big-eared bat has been recorded on the MBNF by Wyoming Game and Fish. The most suitable habitat is in the Laramie Range. Little information is available on locations of caves or abandoned mines on the MBNF that are used for day or night roosts, maternal colonies, or hibernacula.

### Habitat and natural history

Roost sites are in caves and abandoned mines across a broad range of elevation and vegetation types, from dry shrub to coniferous forest. Foraging may occur within the forest canopy and along riparian corridors. The species relies most heavily on moths. The species does not seem to migrate.

### Threats, limiting factors, and vulnerabilities

Colonies are very sensitive to disturbance in abandoned mines and caves and have high site fidelity. Recreation and other disturbance in and near roost sites may cause abandonment of area and loss of local population (Finch 1992). Unless bat gates are installed, closure of abandoned mines in the interest of public safety can reduce the availability of sheltered roost sites. Though mines are a man-made habitat, if natural cave populations have been lost, the abandoned mine habitat should be protected. Day roosts may be located in trees and snags. Activity that converts moist forest and riparian zones to drier types has an adverse effect on prey.

### Environmental Consequences and Viability

The forest currently installs bat gates on abandoned mines that are closed and will continue to do so.

All action alternatives provide protection for roost sites. For this to be effective, surveys are needed to identify sensitive sites. Surveys will be done before projects in suitable habitat, but not prior to other activities on the Forest like recreation.

**Evaluation criteria** for Townsend's big-eared bat are control of disturbance at caves and emphasis on inventory. Lack of information on current status and the potential for increased recreation in caves makes predictions uncertain. All alternatives will have quite similar effects.

Table I-25 Viability and outcome conclusions for the Townsend's big-eared bat

| | All alternatives |
|---|---|
| Abundance and distribution | Current abundance and distribution not known. |
| Likelihood of persistence- 15 yr. | Likely |
| Likelihood of persistence- long-term | Likely |
| Effect on individuals and populations | MAII |
| Certainty | Low |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Black-tailed Prairie Dog - *Cynomys ludovicianus*

The Black-tailed prairie dog is a candidate for listing under the Endangered Species Act. It is a species of open county. The species was included by the USFWS as occurring on the MBNF (Letter, 7/22/03). Only the eastern side of the Laramie Peak Unit lies within its range.

Black-tailed prairie dogs occur in open country with low vegetation (preferable under 6") and low slope (over half of sites assessed were 0-4%, almost all under 10%) (USDI FWS 1989; Proctor, Beltz et al. 1998). Black-tailed prairie dogs are present in the grassland north of the MBNF, like Thunder Basin National Grassland. The Laramie Peak Unit is extensively fragmented by private land along bottoms and rivers. The land in Forest Service ownership begins where the hills rise or mid-slope. Tim Byer (biologist on the Laramie Peak Unit and Thunder Basin NG) estimates that there is no more than 25-30 acres on the LPU that has any potential at all as habitat for the Black-tailed prairie dog. At most, the Forest could provide a very small percentage of the very large towns created by this species; this would not be a sufficient area to support black-footed ferrets.

No records of this species or suitable habitat are known within the boundaries of the MBNF (based on the Wyoming Natural Diversity Database (WYNDD), the Wyoming state database of wildlife observations, and ranger district knowledge or records).

### Environmental Consequence and Viability

There are no known locations of these conspicuous animals on MBNF land, and the location of the Forest Service land in the Laramie Range uphill from valley bottoms suggests that no habitat. Surveys will be conducted prior to projects, and potentially harmful activities will be halted if black-tailed prairie dogs are found. Management direction for the species will be developed in consultation with the FWS and added to the Forest Plan.

All the revision alternatives are expected to have ***no impact*** on the black-tailed prairie dog.

## White-tailed Prairie Dog - *Cynomys leucurus*

### Status and distribution of species

The white-tailed prairie dog is found from southern Montana, through western and southern Wyoming, western Colorado, and into northeastern Utah. Wyoming makes up approximately 71% of its range.

### Status and distribution on the MBNF

Little information is available on population or trends. Currently there is only a portion of one colony on the Brush Creek-Hayden District. A colony of about 30 animals appeared in 2002 in an area that had recently burned. The species is limited to low elevations at the edge of the Forest. There is limited potential for expansion since adjacent Forest Service land is forested.

### Habitat

In Wyoming, this species is generally associated with intermountain valleys, benches, and plateaus, as well as prairie grasslands. During the late 1980's and early 1990's approximately 17 white-tailed colonies were identified and surveyed as a part of a state-wide inventory to identify potential black-footed ferret re-introduction habitat. These complexes represented nearly 340,000 acres of active white-tailed prairie dog colonies. These colonies tend to be on drier sites, with a grass component that is normally taller and more dense than found in black-tailed prairie dog colonies.

### Changes from HRV in factors that may affect the species

Pre-settlement populations for this species are basically unknown. It is suspected that the distribution in Wyoming is about the same, based on early records.

### Threats, limiting factors, and vulnerabilities

Threats to this species have been identified as poisoning, shooting, agricultural development, urbanization, and sylvatic plague. Poisoning and shooting have not been as great a threat to white-tailed prairie dogs as it has been to black-tailed prairie dogs. White-tailed prairie dogs have not been perceived as threatening grazing lands nearly as much as the black-tailed prairie dog. They do not normally remove tall vegetation from around their burrows and within their colony as black-tailed prairie dogs do.

### Environmental Consequences and Viability

Since this species only occurs at a single site on the periphery of the Forest, the Forest makes a very small contribution to the viability of the species overall. The chances of significantly impacting its viability or having significant environmental consequences is very slight.

Possible **direct and indirect effects** include reduction of existing population from recreational shooting and potentially modifying the existing habitat through development of additional facilities. **Cumulative effects** on the subspecies may result from similar activities on private land and on National Forests.

The white-tailed prairie dog is a marginal species on the MBNF. It is likely that historically there were intervals when the species did not occur on the Forest, and other intervals when a few animals would colonize the edge of the Forest, as happened recently. The population on the Forest is not independently "viable," but makes a very small contribution to a larger population.

Evaluation criteria for the species are the amount of open prairie available on the fringes of the Forest.

Table I-26 Viability and outcome conclusions for the white-tailed prairie dog

| | **All alternatives** |
|---|---|
| Abundance and distribution | No loss of habitat expected. Population may come and go. |
| Likelihood of persistence-15 yr. | Uncertain- not primarily due to FS activities |
| Likelihood of persistence-long-term | Uncertain- not primarily due to FS activities |
| Effect on individuals and populations | MAII |
| Certainty | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## American Marten - *Martes americana*

### Status and distribution of species

The American marten ranges from Alaska across Canada to the northeastern United States, and south as far as the boreal forest across the northern U.S. and south along the western mountain ranges (Strickland and Douglas 1987). The marten is abundant in much of its range, though populations have been subject to declines in the past from overtrapping. Habitat degradation (loss of complex structured mature-old forest) and severe fragmentation from logging have caused population declines and extirpation from some areas (Thompson 1991; Bissonette, Harrison et al. 1997).

### Status and distribution on the MBNF

Martens are abundant in the Medicine Bow Range and Sierra Madre and tracks are commonly seen in spruce-fir forest in winter. Past timber harvest has reduced snags and downed wood on some sites. In the Laramie Range, the small population present earlier in this century was apparently extirpated in the 1960's (Buskirk, pers. comm. 2003.)

**Habitat and Natural History**

Though martens may forage in adjacent meadows, they are primarily animals of dense, old forest with a complex structure of understory and downed wood. Late-successional multi-storied stands of spruce-fir forest are preferred, though multistoried lodgepole (usually with invading subalpine fir) and other forest types with downed wood are also used. Martens are found in dense forest with canopy cover of at least 30%. A complex arrangement of downed wood (large logs, tangles of smaller material, root wads, downed trees with branches, and sloping logs and branches) provides habitat for prey, cover from predators, dens, resting sites, and entry to subnivian habitat (Thompson and Harestad 1994). Squirrel middens, hollow logs, cavities in snags, and rock piles are used for dens (Ruggiero 1998). Partially arboreal, marten hunt and rest in trees, in cavities and on mistletoe brooms (Bull, Parks et al. 1997).

Young marten use forest adjacent to old spruce-fir that lacks these qualities. This is secondary habitat, and the young animals do not breed until a territory in primary habitat is available. On the MBNF, this secondary habitat is usually in lodgepole pine adjacent to spruce/fir forest or lodgepole with a spruce-fir component. If abundant downed wood is present, martens may use areas in burns and in young stands (Paragi, W. N. Johnson et al. 1996), but, again, these are primarily young animals.

Marten depend on old forest components like large snags and downed wood for maternal and natal dens. Though summer rest sites vary greatly, during winter, martens rest in large downed wood insulated by snow cover. The home range can have inclusions of mature forest and some openings as long as the old-forest features are abundant and well distributed.

Marten are apparently sensitive to fragmentation (perforation of a matrix of mature/old forest) at the scale produced by timber production. Loss of martens from fragmented forest has been found in Utah, Maine, and Quebec (Chapin, Harrison et al. 1998; Hargis, Bissonette et al. 1998; Potvin, Belanger et al. 2000). At a landscape scale, typical habitat had few or no marten when clearcuts under 40 years old occupied over 25%-35% of the area, even when the older forest patches were still connected (Hargis, Bissonette et al. 1998; Potvin, Belanger et al. 2000). In Maine and Quebec, martens positioned their home ranges to avoid heavily clearcut forest (Chapin, Harrison et al. 1998; Potvin, Belanger et al. 2000).

Martens strongly avoided patch cuts (approximately 1 to 5 acres in size) in the Coon Creek study area (on the MBNF). The few tracks detected in the cuts occurred only in the 1st or 2nd year following logging and hugged the edge (O'Doherty, pers. comm. 2003).

In a lightly-roaded area in Ontario, Robitaille and Aubry (2000) found that marten used habitat adjacent to roads significantly less than habitat at a distance from roads.

Martens rely on snow cover in the winter. Uncompacted snow over resting and denning sites provides essential insulation (Buskirk, Forrest et al. 1989). Suspended downed wood is needed to create patches of subnivian habitat large enough for winter foraging. A downed tree with intact branches, or a tangle of downed trees, supports a connected canopy of snow that intercepts almost all of the winter's snowfall. These snow-free areas, the size of the deadfall, provide subnivian foraging sites.

Martens are opportunistic feeders taking a wide array of mammals, birds, insects and vegetation (Martin 1994). In summer, marten eat bird eggs and young taken from nests in trees and shrubs. In parts of the range, they eat considerable amounts of fruit (like raspberries and huckleberries), but this food is not abundant in the mountains of southeastern Wyoming. In winter, martens prey on small mammals, especially voles, and on snowshoe hare, squirrels, mice and carrion. The presence of meadow voles in the diet, as well as the red-backed voles typical of the martens primary habitat, suggests that martens will overcome their aversion to openings to forage in habitats with high prey density (Martin, 1994).

**Threats, limiting factors, and vulnerabilities**

Loss in amount of primary habitat (late successional forest, especially spruce/fir but also lodgepole if structural elements are present) and fragmentation (perforation) of patches of late successional forest reduce habitat suitability for marten. Inadequate retention and provision of long-term gradual recruitment of downed wood reduces insulated subnivian winter resting sites, denning sites, and prey density. Large downed logs (from old trees with heartrot) are used for denning and for subnivian resting sites. Compaction of snow may allow larger mammalian predators to enter the marten's winter habitat. These predators may compete for the same prey and some also kill martens. Trapping is a continuing source of mortality. Fur prices are low at this writing, and few trappers are active, but a renewal of interest could have adverse effects on the Medicine Bow population because the extensive road network provides access to much of the suitable habitat by snowmobile.

Low population density, low reproductive rate, sensitivity to changes in landscape pattern (perforation or fragmentation of blocks of old/mature forest), and vulnerability to trapping make martens vulnerability to population decline (Ruggiero, Aubry et al. 1994). Marten home ranges on the MBNF are larger than those reported in other studies (O'Doherty, pers. comm.). This may reflect a limitation in productivity, a reduced prey density, or lack of key features like large snags and downed logs.

**Changes from HRV in factors that may affect the species**

The total area logged is estimated to be about the same as would have been affected by disturbance like fire and blowdown (Dillon and Knight 2000). However, the pattern, residual structure, and other conditions have changed considerably.

The patch size and spatial pattern of high elevation forest have changed greatly from the past. Compared to the spatial pattern created by natural processes, the present pattern has openings (early seral forest) that are smaller are more evenly scattered (Reed, Johnson-Barnard et al. 1996). Though there is currently debate on the relative effects of habitat loss and fragmentation, marten populations declined to near zero when 25% to 30% of a watershed was logged (Bissonette, Harrison et al. 1997), a decline that would not be expected until 60% of the mature forest was logged if the animals were responding to habitat loss alone. Where forest is fragmented by regeneration timber harvest, a marten must occupy a larger area to include adequate forest habitat in its home range.

There is less interior forest than in the past: though the species is not an interior forest obligate, this is an important component of its habitat.

In most previously logged areas, snag abundance is below HRV. Past logging has created some areas with little downed wood, a critical component for marten and their prey (Dillon and Knight 2000). Much of the downed wood left for wildlife was limbed, so that it lay on the forest floor to hasten decomposition and to reduce fire risk. Other logged areas have an abundance of downed wood. (See discussion of downed wood in the Wildlife section of Chapter 3). Where logging has occurred, removal of the tree trunks has reduced the potential for future downed wood.

Compaction of snow reduces small subnivian spaces used by prey species, larger spaces used by marten for foraging and resting, and insulation needed by both marten and their small mammal prey. (See the Wildlife Section of Chapter 3 and the Land Uses - Recreation section of Appendix D for a discussion on snow compaction.)

Primary references used are Clark and Stromberg (1987), Ruggiero et al (1994), Welp et al (2000), P. Hayward (2001), and Region 2 Species Assessments (USDA Forest Service 2000).

**Environmental Consequences and Viability**

Activities on Forest Service land that may adversely affect the American marten, **directly or indirectly**, include logging of old forest (removal or reduction of dense canopy, reduction of snags, reduction of large downed dead wood, and fragmentation of old/mature forest, especially in spruce/fir), access for trapping, snow compaction over resting sites, and snow compaction that adversely affects prey density, and snow compaction along linear routes that increases other predators.

In primary habitat (spruce-fir), there will be no clearcuts. However, most of the trees will be removed from harvested sites over time; by the final phase of the shelterwood, the deadwood retained will be the same as what is retained after clearcut, but there will be trees up to 40 years old on the site.

The effects of logging on marten depend in large part on the residual wood left in the last entry. Standards for snag retention and downed wood and for providing

structure in the downed wood (leaving branches on, leaving jackstrawed piles in SF), provide adequate habitat components in the short term.

However, this supply of large abundant snags and downed wood (in spruce-fir) is a legacy from the old, previously unharvested forest. In the long term, areas of MA 5.13 and 5.15 reentered at rotation period of 100-140 years would not be producing large enough trees and snags to provide legacy material to meet marten needs.

In the long-term, the objective for areas allocated to MA 5.13 and 5.15 is an even flow of timber from all suitable acres (though this flow is slower in the 5.15 areas). Following the final entry, the downed wood retained after harvest will be rotted before the stand begins to generate fallen dead wood. In stands that were cut for a **second time** at the rotation age of 100-120 years, few or no trees will be present that were large enough to provide the large snags and downed wood that are used by martens for natal dens, maternal dens, and subnivian resting sites (only the trees retained as recruitment snags in the first entry). Trees, snags, and logs that were retained after this entry would provide habitat for smaller birds and mammals, but not for larger species like martens. It is not possible to predict how much forest would actually be cut again at this minimum rotation interval.

Where MA 5.13 and other timber-emphasis allocations occur in large blocks, only riparian zones and patches retained for old growth and connectivity are expected to provide suitable marten habitat. (The assumption in discussions of MA 5.13 has been that management for old growth, security and other areas that will not be harvested will be minimized throughout the allocation, so these areas may provide little relief from the uniformity of harvest across the patches allocated as MA 5.13) On the rest of the area, over successive 120-year rotations, a cumulative loss will occur in the amount and quality of snags and dead downed wood. This will lead to a loss of fungi, lichen, soil organisms, insects, small mammals, and predators typical of a mature forest. Though martens are expected to persist in parts of the forest, the distribution or abundance maybe reduced where large blocks of timber emphasis allocations manage most of the land on a 120-year rotation. (See section on Downed Wood in the Wildlife section of Chapter 3.)

In the short-term, use of uneven management (like group selection) and thinning to retain large blocks of unharvested forest can provide marten habitat. In the long-term, a viable future population of marten will depend on whether large blocks of mature forest are managed to create the desired pattern of late-successional forest set in a matrix that provides cover for marten movement.

Winter recreation:

Martens feed along the edges of open meadows in winter because of the high density of prey there and these areas are the most likely off-trail sites to be affected by compaction. Other prey is available in forest that is too dense for snowmobile use. Reducing the prey available in open meadows and riparian areas would leave enough prey for martens to maintain a viable population, though it would be

somewhat reduced in size.

Most marten subnivian rest sites are protected from snowmobile compaction by density of forest and the complex structure on the forest floor, which exclude snowmobiles, skiing, and other winter recreation..

Martens may avoid habitat near snowmobiling areas, since they are known to avoid roads (Robitaille and Aubry 2000). This avoidance is not absolute, but on the MBNF would affect a large area since there are so many roads open in winter.

**Cumulative effects**. Past trapping mortality reduced the population, but martens recover well if not over-harvested. The spatial pattern inherited from the past logging on the MBNF is fragmented or perforated and may have reduced marten populations or distribution on parts of the Forest.

**Evaluation criteria** for the American marten are acres treated (since there is always a net loss of snags, CWD, and, in all alternatives but F, old growth),downed wood retention, protection of large blocks of old forest, recruitment of future blocks of old forest, retention of subnivian habitat in high elevation forest, reduction of roads (to provide less area that is easily accessible to trappers during the winter trapping season, and because of marten avoidance of roads.)

Alternatives with high acreages allotted to MA 5.13 may have large areas that are low in old growth, lack security areas, and have high road densities. Alternatives with relatively more MA 5.15 are expected to have better distribution of these features. However, because each acre is less intensively treated in MA 5.15, alternatives with a preponderance of MA 5.15 are expected to treat more acres (per board foot produced) than alternatives that are heavily MA 5.13. Acres expected to be harvested are broken out by harvest type (Supplemental S-2 Table at the end of Chapter 2), rather than by forest cover type, so it is not possible to estimate acres that will affect a species like the marten whose primary habitat is spruce-fir.

All alternatives restrict timber harvest in the marten's primary habitat (spruce/fir) to shelterwood, group selection, and individual tree selection techniques. The emphasis for timber harvest will be in the "age class bulge" in lodgepole about 100-120 years old, not in spruce-fir. It is not possible to accurately predict the seriousness of loss of downed wood over time (by the second rotation), changes in connectivity, reduction in resource density, and other possible effects of logging.

Alternative A would be least beneficial to the American marten, with the lowest retention of key habitat features (old growth, snags and downed wood). Alternative F has the same standards, but has little planned timber harvest, so the actual retention of these features will be highest of all alternatives. Alternative A also lacks potential for increased riparian buffers, protection of riparian snags, and protection of security areas found in the other alternatives.

Alternatives B and C have the higher snag, downed wood, and old growth standards and are better than Alternative A, but the strong timber emphasis (especially amount

of MA 5.13) is likely to result in sizable areas with little old growth.

In all alternatives, the lack of clearcutting in spruce-fir means that, per unit of timber produced, more acres are affected than if the area were clearcut. Shelterwoods do not provide overhead cover and, because of the second entry, the area will be cut again soon after it begins to provide marginal habitat (for summer foraging or travel), so that the duration of the "unsuitable" state is prolonged. As a result, alternatives most favorable to marten are those with low overall timber harvest (Alternatives F and E).

Alternative D FEIS has the highest retention standard for spruce-fir old growth (25%) of any alternative except F, which would not allow the cutting of any old growth. It also contains a new standard that would greatly increase the wildlife value of downed wood in spruce-fir by retaining complex structure.

Alternative F would provide the most connectivity, old growth, and natural processes. Natural processes destroy currently suitable marten habitat, but create snags and downed wood for the future. Burned areas would not be salvaged, retaining standing trees to be the next generation of snags and downed wood. High levels of snags would occur. The lack of clearcuts would provide for well distributed future downed wood. The restriction of snowmobiles to designated routes would reduce access for trapping and compaction over downed wood and in meadows and riparian areas (used by both marten and their prey).

Alternative A is least beneficial to martens. It has the lowest retention of key habitat features (old growth, snags and downed wood) and retention of only 10% old growth is not likely to provide adequate connectivity. Alternatives B, C, D DEIS, and E will retain 20% and Alternative D FEIS 25% of old growth. The more old growth is retained, the better the chance of retaining large patches, and patches that are close enough together to maintain connectivity. Alternative F is most beneficial, followed by Alternative E. Alternative D DEIS and D FEIS are intermediate and are similar- D DEIS has less MA 5.13, but D FEIS has higher old growth and retention of complex structure of downed wood.

In alternatives A, D FEIS, and F, the American marten is proposed as a Management Indicator Species.

Table I-27 Viability and outcome conclusions for the American Marten

| | Alt A | Alts B, C, D DEIS | Alt D FEIS | Alt. E | Alt F |
|---|---|---|---|---|---|
| Abundance and distribution | Reduced abundance and distribution in large blocks of timber emphasis MA. Reduction of habitat suitability in areas of high timber removal. Lowest retention of downed wood, snags and old growth. Old growth retention in spruce-fir = 10%. Patches of suitable habitat more isolated over time. | Distribution and population reduced. More total acres harvested than Alt A. Old growth retention in spruce-fir = 20%). Higher retention of snags, downed wood than Alt A. Downed wood retention standards includes "avoid crushing large downed wood with machinery." Guidelines for managing large blocks for future old growth, limiting old growth treatment to actions beneficial to old growth. | Distribution and population reduced. More total acres harvested than Alt A. Higher retention of snags, downed wood than Alt A. Highest spruce-fir old growth retention (25%) , objective for managing for recruitment old growth. Standard requiring retention of structure of downed wood in spruce-fir. No protection of structure of downed wood in other forest types. 300 foot riparian buffer for riparian dependent species. Selected as MIS. | Less harvest (less loss of mature forest and slower reduction of downed wood over time), so more marten habitat retained during life of the Plan . Reduced fragmentation with lower harvest and more emulation of natural pattern (in MA 5.15). Old growth retention in spruce-fir = 20%). Higher retention of snags, downed wood than Alt A. Downed wood retention standards includes "avoid crushing large downed wood with machinery." Guidelines for managing large blocks for future old growth, limiting old growth treatment to actions beneficial to old growth. More wildfire so retention of mature forest unpredictable | Most abundant, well-distributed, and well-connected population. No harvest of old growth. Mapped cores and corridors of mature and old forest. More wildfire so retention of this mature forest unpredictable. |
| Likelihood of persistence-15 yr. | Very Likely | Very likely | Very likely | Very Likely | Very likely |
| Likelihood of persistence-long-term | Unlikely | Marginally likely | Likely | More Likely | Very likely |
| Effect on individuals and populations | Loss of distribution and connectivity of mature spruce/fir. Only 10% spruce-fir old growth; not enough to maintain connectivity. MIS. May contribute to a trend to federal listing. | MAII, potential for downward trend, but uncertain. | MAII. As MIS, will be monitored. | MAII | MIS, MAII |
| Certainty | Low | Low | Low | Moderate | High |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Wolverine - *Gulo gulo*

### Status and distribution of species

The wolverine is an inhabitant of wilderness and other wildlands from southern Rockies to Alaska. The species is more common in the northern part of its range.

No occurrences of wolverine in the Southern Rockies have been recorded since the 1920's (except for a few animals released from captivity), though prior to that it was well known in the area (McKelvey, pers. comm. 2003) In the Bridger-Teton NF in NW Wyoming, Hoak et al (1982) compiled 37 new sightings made during the 1970's. Given the animal's ability to travel long distances, it is not improbable that wolverines could disperse to the northern edge of the Southern Rockies within the life of the Revised Plan..

### Status and distribution on the MBNF

The species is believed to have been extirpated in the whole Southern Rockies in the 1920's (McKelvey, pers. comm.) Scattered sightings of wolverine have been reported in the Sierra Madre, Medicine Bow Range, and adjacent Colorado. These recent sightings may be dispersers from a few captive animals released in Colorado (Cartwright, pers comm.) The Sierra Madre and Snowy Range were very likely part of the species' historic range.

If individuals from NW Wyoming were to disperse southwards , the species could appear in to SE Wyoming or to Colorado. If they arrived in western Colorado, they could then spread eastward. Though much of Colorado is highly disturbed, there are also many high elevation wilderness areas and high level of carrion available from the abundant ungulates, especially elk. The very high level of human winter activity on the Medicine Bow may preclude re-colonization by breeding females, but the area could provide habitat that would contribute to viability of a restored or recovering Colorado population.

Under ideal conditions, there is potential for one or two breeding females on the forest (Beauvais, pers. comm., Buskirk, pers. comm.). However, there is no recent evidence suggestive of presence or breeding.

### Habitat and Natural History

A habitat generalist, wolverines range from high alpine tundra to grass and shrub. In winter, a foraging individual may travel from a den in an avalanche chute to deer winter range many miles away. Highways are a partial barrier to wolverine movement and abundance falls as road density increases (Krebs 1998).

Home ranges are large, typically 400 to 600 $km^2$ for males (roughly 150 to 250 $mi^2$), though in Idaho, the mean was over 2,000 km (Copeland and Harris 1994). Female home ranges are much smaller, usually 15% to 20% of the males range (summariazed by Butts 1992).

During winter, female wolverines den and give birth at high elevation (alpine and subalpine zones). In contrast to the their lack of selectivity of vegetation type females seem to be behaviorally limited to denning only in remote areas (Krebs and Lewis 1997). Mature females (and dens) are found only in unroaded areas away from human disturbance (Krebs 1998). Den sites are associated with coarse talus, a complex of fallen trees, or a boulder pile, and are covered by at least 1 meter of snow (Magoun and Copeland 1998).

Young are born in "natal" dens, where they stay until spring thaw unless disturbed. They may leave the natal den as young as 13 days (when disturbed by researchers) or stay there up to 65 days (Magoun and Copeland 1998). The young are then moved to a series of "maternal" dens. Females with young in the den are also very sensitive to disturbance and moved young to a new den each time researchers entered the vicinity of the den (Magoun and Copeland 1998). Infrequent disturbance is not likely to impair reproduction since young are moved to new dens periodically in the absence of human disturbance,. However, regular human use of an area in winter does not provide the solitude females select for denning.

Foraging animals (especially males and young) may enter areas of human activity and occur around residences, though their presence is often overlooked. Even immatures and males avoid areas with high levels of disturbance (like resorts) and highways (Austin and Herrero 1998). Wolverines are scavengers, and ungulate carrion constitutes an important food source in late winter. They also dig up hibernating rodents. In summer, wolverines prey anything they can catch, including nestling birds and other young.

**Changes from HRV in factors that may affect the species**

Across the Southern Rockies, human development and activity in the forest are extensive and have probably altered the wolverine's potential habitat use and movement patterns. Human disturbance in winter is unlike anything experienced by wolverines in the past and is likely to have greatly reduced breeding habitat in Wyoming and Colorado.

Abundance of ungulates is near or above historic highs, providing a good supply of winter-killed carrion during the period of denning and rearing young.

**Threats, limiting factors, and vulnerabilities**

Road construction that increases human disturbance reduces the breeding range of wolverines. Winter recreation in previously remote areas reduces or eliminates the potential for adult females denning in the area.

Primary references used are Clark and Stromberg, (1987), Ruggiero at al (1994), Krebs (1998), Hayward (2001), Welp et al (2000), and Region 2 Species Assessments (USDA Forest Service 2000).

**Environmental Consequences and Viability**

The limited amount of potential breeding habitat and the wolverine's need for extremely large home ranges suggest that wolverines on the MBNF never constituted a viable population. If home ranges are near the species' average, only 3 or 4 males could coexist in the combined Sierra Madre and Medicine Bow Ranges. This is far smaller than an independently viable population. Rather, animals occurring here have been a small part of the larger Southern Rockies population.

Because of the rarity of the wolverine across its whole range (especially in the southern Rockies) and its vulnerability to human disturbance in areas under the jurisdiction of the Forest Service, it is concluded that there is concern for the reestablishment of the species on the forest.

A **direct** adverse effect of all alternatives is the reduction in the likelihood of breeding because of the level of winter disturbance. **Cumulative effects** include reduction in the number of wolverines in the Southern Rockies related to trapping (and other human caused mortality) early in the century and possibly loss of connectivity of habitats resulting from residential development and roading throughout the Southern Rockies. However, wolverines can disperse across highways and through residential areas, often without being detected by people. As habitat generalists outside of breeding season, they are not likely to have responded greatly to the changes in pattern or age of forest vegetation.

All alternatives provide protection for big game that provide winter-killed animals as food for scavenging wolverines. All alternatives provide adequate habitat for non-breeding wolverines, but all alternatives allow too much winter disturbance for breeding to be likely.

**Evaluation criteria** for the wolverine are amount of large blocks of security area provided by road eradication, increased wilderness, retention or improvement of connectivity to the mountains of Colorado, and retention roadless quality of existing Roadless areas. Because the MBNF is not large enough to support a viable population of wolverines, alternatives are assessed by their contribution to the viability of the larger population in the Southern Rockies, should such a population be reestablished by dispersal from NW Wyoming or by reintroduction by humans.

It is unlikely that any of the proposed alternatives would reduce winter disturbance enough to provide undisturbed areas large enough for wolverines to reproduce anywhere on the Forest.

Alternative F would provide the most reduction in roads and the most proposed wilderness (including suitable breeding habitat, though the continued human activity in the vicinity of those areas will probably still be incompatible with wolverine denning). Under this alternative, snowmobile use in proposed wilderness would be restricted to designated routes, which could be designed to create large security areas.

No alternative is likely to create conditions that are suitable for breeding by female wolverines. If Colorado had a flourishing population, the abandonment of perhaps 2 females breeding on the MBNF would not be considered a threat to viability. In Colorado, wolverine breeding habitat (at high) elevation) is mostly in wilderness where it is protected from motorized (and therefore frequent) human disturbance.

The MBNF is too small to have had a viable "population " in the past, and loss of breeding habitat will not preclude the re-establishment of a viable population in the Southern Rockies.

Evaluation criteria are emphasis on reduction of roads and the retention of roadless quality (by a non-motorized designation, including Wilderness). The location of the designated trails in Alternative F has not been determined, but there is no indication that these would avoid high elevation areas that draw snowmobilers to the forest.

Table I-28 Viability and outcome conclusions for the wolverine

| | Alts A, B, and C | Alts D DEIS , D FEIS and E | Alt F |
|---|---|---|---|
| Abundance and distribution | Least habitat for wolverines. Habitat for transients most limited. No breeding habitat. | More roadless character. Habitat for transients intermediate. No breeding habitat. | Most habitat for transients. Most habitat for transients. No breeding habitat. |
| Contribution to likelihood of persistence-15 yr. | Least contribution | More contribution | Most contribution |
| Contribution to likelihood of persistence-long-term | Least contribution | More contribution | Most contribution |
| Effect on individuals and populations | MAII | MAII | MAII |
| Certainty | Moderate | Moderate | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Northern River Otter - *Lontra canadensis*

### Status and distribution of species

Historically, otters occurred across much of the U.S. and Canada. Now reduced to 33% of historic range and lost from developed areas, otters persist along large rivers and lakes in sparsely populated areas.

### Status and distribution on the MBNF

Otters may be moving into the forest from Colorado (Beauvais, pers comm.) Individuals have been sighted on the Laramie, Encampment, and N. Platte Rivers. A pair bred and produced young on a private inholding on Boswell Creek on the

Laramie RD in 2001 (Kozwalski, pers comm.) Other reports come from Pass Creek and Pelton Creek. The otter population seems to be increasing, perhaps as animals disperse from re-introduced populations in Colorado. However, there has not been continuous monitoring that would detect any changes in population or in area used.

**Habitat**

Otters inhabit rivers, beaver ponds, and lakes (in summer), often selecting areas with limited human disturbance. Dens (resting and breeding) are under root wads, in hollow logs, in hollows in riverbank, or in abandoned beaver houses. The most commonly used sites are lodges or bank dens built by beaver, which provide a dry resting area with direct access to the water below the ice (Melquist and Hornocker 1983, cited inMarchand 1996).

**Changes from HRV in factors that may affect the species**

Past trapping extirpated the local population. Loss of large down wood in streams from tie drives, and loss of large trees as recruitment has occurred because of tie-cutting and other past logging. The great reduction in beavers, on which otters may rely for suitable den sites, may affect otters. Alteration of stream and riverbanks and changes in the water table may have occurred. Water quality decline (increased sedimentation and contamination) has altered productivity of insects and fish. Disturbance may affect breeding, and habitat has been lost to residential development in riparian areas.

**Threats, limiting factors, and vulnerabilities**

Winter habitat is believed to be limiting to populations. As a carnivore that must use a large area to encounter enough prey, the otter must travel over snow between fishing sites, and be able to get into the water despite the presence of ice. Disturbance from human presence may affect otter populations. Livestock may affect water quality and alter bank structure used for dens. Removal of trees and snags along rivers and streams reduces rest sites, den sites, and quality of fish habitat

Primary references used are Clark and Stromberg (1987), Welp et al (2000), Hayward (2001), and R2 Species Conservation Project species assessments (USDA Forest Service 2000).

**Environmental Consequences and Viability**

**Direct and indirect effects**. River habitat continues to be altered by sedimentation from roads and timber activities. Human access on recreation makes some habitat unsuitable now.

**Cumulative effects**. Past trapping of northern river otters and alteration of stream banks by grazing livestock and tie driving led to the past decline of the species. Reduction of beaver by tapping and removal of "nuisance" beavers and their dams may have contributed to the loss of otters by limiting favored den sites and feeding habitat. The extremely small size of the population (compared to the past) and the

species' vulnerability to Forest Service activities suggests that the viability of the population is of concern, despite its apparent increasing trend.

Evaluation criteria for the Northern River Otter are protection of secure areas (wilderness, maintaining roadless quality, backcountry non-motorized, retention of riparian snags, and grazing that would damage banks. Certainty is low because of lack of knowledge of the existing population.

All alternatives will result in similar restoration of beavers.

**Protection in Plan.** Limit activities in riparian zones where TES species are present to >300 feet from stream.

Table I-29 Viability conclusions for the Northern River Otter

| | Alt A | Alts B and C | Alt D DEIS, D FEIS, and E | Alt F |
|---|---|---|---|---|
| Abundance and distribution | Least suitable habitat because of lack of riparian snag protection, limited protection of suitable habitat from disturbance, | Few secure areas, less suitable habitat Continued development of motorized access. Protection of riparian snags. | More suitable habitat with wider distribution possible. Protection of riparian snags. | Most protected areas along rivers, most reduction in motorized access. Most conducive to spread across its former range. |
| Likelihood of persistence-15 yr. | Likely (because population is spreading now), but less likely than other alternatives. | Likely, but many threats remain | More Likely | Most likely |
| Likelihood of persistence-long-term | Uncertain because of small current population and level of future disturbance | Uncertain because of small current population and level of future disturbance | More Likely | Most likely |
| Effect on individuals and populations | MAII | MAII | MAII | MAII |
| Certainty | Low | Low | Moderate | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Sensitive Birds

### Northern Goshawk - *Accipter gentiles*

**Status and distribution of species**

The Northern Goshawk is globally secure (G5 ranking). In North America, it breeds primarily in forested habitat in Canada, Alaska, and the mountains of the western United States and Mexico. Goshawks also occur across northern Europe and Asia. Individuals may winter in the same area where they breed, may migrate to lower elevation valleys nearby, or may migrate a few hundred miles. The pattern may vary from year to year and is believed to be tied to available food (Squires and Reynolds 1997).

In 1997, the USFWS received a petition to list the Northern Goshawk. The Service's subsequent analysis gathered information on occurrence across the country and found no evidence that the species was declining, that habitat was limiting, that there were significant areas of extirpation, or that habitat or range was being curtailed. The Service determined that listing under the Endangered Species Act was not warranted.

**Status and distribution on the MBNF**

Northern Goshawks are found across the forest and are regular breeding birds (Welp, Fertig et al. 2000). The birds are found in ponderosa pine, lodgepole pine, and aspen forest. Though goshawks inhabit lodgepole with spruce-fir inclusions, they are not typically birds of the higher spruce-fir zone. Nests are frequently in larger trees in aspen inclusions.

Northern Goshawks are relatively abundant on the MBNF. On the Brush Creek-Hayden RD, there are 290 known active or inactive nests including 39 active nests and 74 inactive nests found by Squires (1996), or recorded in WYND database or in district survey records. There are 17 identified goshawk territories on the Laramie RD, and 25 on Forest Service land in the Laramie Peak Unit. (Another 51 nest sites are known on land in other ownership within the National Forest boundary in the LPU.)

**Habitat and Natural History**

In the goshawk's range, it nests in varied habitats, from willow in Alaska to eastern deciduous forest. In the western U. S., the species' territories are usually in coniferous forest, though the nest may be in a deciduous tree. Foraging may occur in open shrub-steppe, in forest openings, or in open-understory forest. A shrub understory does not preclude foraging, as goshawks will crash through brush when in pursuit of prey (Squires and Reynolds 1997). As sit-and-wait predators that locate prey by sight, goshawks may need open habitat for detecting prey. Prey includes small mammals like red squirrels (*Tamiasciurus hudsonicus*) and golden mantled ground squirrels (*Spermophilus lateralis*) and birds the size of American Robins.

Flickers and other woodpeckers are common in the diet (Squires 2000). Nesting habitat usually is in a stand of mature trees with a dense canopy and an open understory.

A study of goshawk habitat on the Medicine Bow Range and the Sierra Madre (Squires and Ruggiero 1996) found that nest trees are larger and taller than average. Nest stands ranged from about 1 acre to about 30 acres, and were located on flatter terrain than occurred on the study area. The species of tree seems to be selected for structural characteristics that will support the nest: lodgepole and aspen were used in proportion to availability, but subalpine fir was avoided. On the Laramie Peak Unit, suitable habitat is found in open ponderosa pine stands.

Given the variation in conditions under which goshawks nest, it is not surprising that there have been conflicting reports of the "needs" of the species. Nesting is tied to mature forest (whatever the tree species) but foraging may occur in a variety of structures (Reynolds et al 1992). Nest buffers alone are not effective in retaining Northern Goshawk breeding; a larger area with foraging habitat must be retained if the nest is to remain occupied (Crocker-Bedford 1990).

In winter, goshawks use a wider array of habitat and are often in open country at lower elevation, where they hunt along strips of riparian vegetation.

Nests are usually in stands with large trees and well-developed canopy cover (Hayward 1989). Nests are placed closer than random to breaks in the canopy, including roads and trails, which may be used as travelways or as foraging areas.

Unlike open-country raptors that nest on rock outcrops or cliffs, the Northern Goshawk is a forest species and has more options for finding nest sites. Unlike the relatively constant structure of grassland, forests burned and blew down, so that areas occupied by Northern Goshawks changed slowly over time. After a fire kills all the trees in the foraging area, breeding birds may return to breed and even raise young. However, the territory will be abandoned after a few years.

**Changes from HRV in factors that may affect the species**

In lodgepole, logging has targeted older stands. Though goshawks do not rely on interior forest old growth, they forage in open stands (which tend to be old in lodgepole) and nest in stands with interlocking crowns. Though the number of acres of mature forest is probably within HRV (Dillon and Knight 2000), these stands are fragmented at a finer scale than in the past, with clearcuts in small patches or strips interspersed with old lodgepole. Goshawks forage along the edges of clearcuts to a certain extent, but are primarily forest foragers. Roads increase the level of human disturbance. Roads are also used disproportionately for non-foraging flights. Since widespread fire at the turn of the last century, aspen has matured into a structure that provides good goshawk nesting habitat.

**Threats, limiting factors, and vulnerabilities**

Goshawks are sensitive to disturbance at nest sites. Development of an understory in a previously open forest (like ponderosa pine) reduces foraging habitat. Lost of stands of mature/old trees with interlocking crowns reduces nesting habitat. Loss of old aspen also reduces nesting habitats. Alternatives A through E emphasize regeneration of aspen- not necessarily the oldest aspen- to create a age class distribution more like that created by natural processes.

**References**. Von Ahlefeldt and Speas (Von Ahlefeldt and Speas 1996), Squires and Reynolds (1997), Welp et al. (2000), Cerovski et al (2001)

**Environmental Consequences**

Direct effects of activities under the Forest Plan include loss of foraging and nesting habitat by clearcutting of lodgepole forests and reduction of breeding success due to disturbance at nest sites. Forest Plan standards provide protection for three nest stands per territory and limit vegetation treatment in post-fledgling foraging habitat. However, during the life of the Plan, some stands that contain potential nest habitat or nests that were not discovered in surveys will probably be cut.

Human disturbance may occur near nests and reduce breeding success or lead to displacement to other (perhaps less suitable) habitat. For newly planned activities that undergo NEPA analysis, Plan standards provide a ½ mile buffer during nesting and rearing of the young. However, other on-going activities like recreation do not receive site-specific review and may occur near nests with a frequency or intensity that interferes with breeding.

Cumulative effects include the spatial pattern and age class distribution of mature forest in lodgepole pine created by past logging on the MBNF and the effects of similar past, present and future activities on adjacent National Forest land. Potential habitat was lost in the development of the Snowy Range ski area. Past, present and future vegetation management and disturbance on private inholdings may also contribute to effects on the Northern Goshawk.

Plan standards for the Northern Goshawk were based on the management direction proposed for the Southwest Region. The nest stand size and territory size for goshawks on the MBNF are similar to those recommended for the Southwest, so use of this document is biologically appropriate.

**Protection in plan**

Alternative A lacks the standards limiting treatment in nest stands and post-fledging foraging areas. Alternatives A and F protect a ¼ mile buffer around active nests; the other alternatives protect a ½ mile buffer.

Alternatives B, C, D DEIS, D FEIS, and E contain the following standards specific to protection of nesting birds, nest sites, and other goshawk habitat.

TES Standard 4: Within each occupied Northern Goshawk territory, select three nests in each occupied territory and protect 30 acres of dense vegetation surrounding each, defining the boundaries of each area based on habitat quality. If fewer than 3 nests are found within an occupied territory, substitute 30-acre areas with characteristics of nesting habitat.

TES Standard 5: Within each occupied Northern Goshawk territory, designate a Northern Goshawk post-fledging area (PFA) of at least 200 acres that includes the three 30-acre nest sites selected. The PFA may exceed 200 acres to encompass the identified nest sites. The large tree component within the PFA should include snags, down dead wood, and clumps of trees with interlocking crowns. Within the PFA, prohibit management activities that may degrade goshawk foraging habitat.

TES Standard 6: To help reduce disturbance to nesting goshawks, prohibit construction, drilling, timber harvest and fuel treatments, and other intensive management activities within proximity of active northern goshawk nests from April 1 to August 30. Set buffer at 1/4 mile from active nest unless site-specific conditions are such that a lesser distance can be shown to provide the same degree of protection.

Evaluation criteria for the Northern Goshawk are protection from disturbance at nests and retention of nesting and foraging habitat in current territories.

Table I-30 Viability and outcome conclusions for the Northern Goshawk

| | **Alt A** | **Alts B, C, D DEIS, D FEIS** | **Alt E** | **Alt F** |
|---|---|---|---|---|
| Abundance and distribution | Lacks standards for protection of nest and post-fledgling habitat. | Include protection of existing nest sites. Many acres affected (either the alt has high ASQ or much MA 5.15) | Cluster of timber harvest and reduction of area affected will retain more old lodgepole than Alts A, B, C, D DEIS and D FEIS. | Retains all most old growth aspen and lodgepole. |
| Likelihood of persistence-15 yr. | Very likely | Very likely | Very likely | Very likely |
| Likelihood of persistence-long-term | Likely | Likely | More likely | More Likely |
| Effect on individuals and populations | MAII (likely reduction in distribution) | MAII | MAII | MAII |
| Certainty | Moderate | Moderate | Moderate/High | Moderate/High |

*MAII, may adversely impact individuals but not lead to trend toward federal listing.*

The Northern Goshawk is proposed as a Management Indicator Species for mature/old components of aspen/lodgepole and structure in lodgepole pine.

## Ferruginous Hawk - *Buteo regalis*

### Status and distribution of species

The Ferruginous Hawk breeds in plains and deserts of the west from southern Alberta and Saskatchewan to central Arizona and New Mexico. The birds winter around concentrations of small mammals (like ground squirrels and rabbits) in open areas of California, the southwest, and the Great Plains from Colorado south to Mexico.

### Status and distribution on the MBNF

There are 3 recorded observations of Ferruginous Hawks on the MBNF (Pennock Mtn Cedar Creek Geo Area, South Savery Geo Area, and Pole Mountain). These are reports of individuals. There are no records nesting on the MBNF. The best habitat is in open country in adjacent basins.

### Habitat

Open habitat with vegetation that supports prey (ground squirrels, prairie dogs, rabbits). Inhabits open basins, grassland, and desert with a low structure. Ferruginous Hawks select broken terrain with scattered shrubs, trees, cliffs, outcrops, and other features that serve as outlooks. Nests are placed on rock out crops, high spots, and trees.

### Threats, limiting factors, and vulnerabilities

The species is sensitive to human activity near the nest. Habitat loss occurs in conversion of native grassland to agriculture or residential development. Consuming small mammals with residues of rodenticides may poison ferruginous hawks.

### Changes from HRV in factors that may affect the species

Human disturbance has increased, affecting nesting success. Foraging habitat has been lost to development agricultural and residential uses. Oil and gas operations create artificial nesting sites that may be occupied by ravens that are effective predators on raptor eggs and young.

Primary references used are Bechard and Schmutz (1995), Welp et al (2000), and Region 2 Species Assessments (USDA Forest Service 2000), Cerovski et al (2001).

### Environmental Consequences and Viability

The current population on the MBNF is too small to create a viable unit. Standards that protect nest sites from disturbance and vegetation managed to retain a low structure on a portion of grassland will contribute to viability of a larger population.

**Direct effect**s of activities under the Plan include disturbance at nest sites by activities that are not regulated by the standard providing a buffer disturbance, like recreation. **Indirect** effects include consumption of contaminated prey or alterations in prey numbers that may result from burning or changes in vegetation structure from

grazing. **Cumulative effects** include impacts of similar activities on other ownerships, conversion of habitat to agricultural use on private land, and effects on the wintering ground.

All alternatives except alternatives A and B provide security near nests (timing restrictions and no surface occupancy). Alternative F discourages buildings on sites in suitable habitat. All alternatives would provide a range of grassland conditions from low to high structure. However, the reduction of grazing in alternative F and lack of grazing in alternative G would make it difficult to maintain the low structure preferred by this species for foraging.

Evaluation criteria for the Ferruginous Hawk are maintenance of open, low structure on part of grassland, protection from disturbance at nests, and lack of structures associated with oil and gas development. Alternative A has no oil and gas development that might be tied to construction. In all the other alternatives, habitual nest sites will protected from disturbance and nearby surface occupancy. The alternatives do not vary greatly in their expected effect on the Ferruginous Hawk.

Table I-31 Viability and outcome conclusions for the Ferruginous Hawk

| | Alts A and B | Alts C, D DEIS, D FEIS, E and F |
|---|---|---|
| Abundance and distribution | No standards for protection of nests from disturbance- could result in unsuccessful breeding (no nest sites are known) | No change from present abundance and distribution |
| Likelihood of persistence-15 yr. | Likely | Somewhat More Likely |
| Likelihood of persistence-long-term | Likely | Somewhat More Likely |
| Effect on individuals and populations | MAII | MAII |
| Certainty | Moderate | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Peregrine Falcon - *Falco peregrinus*

### Status and distribution of species

After declines to near extinction due to chlorinated hydrocarbon contamination, the species has been recovering. Banning of DDE and related pesticides in the U.S. and a reintroduction program have been successful in restoring the bird. The species has been removed from the Endangered Species List. In 1997, 40 pairs fledged 77 young in Wyoming.

### Status and distribution on the MBNF

Three of the known occurrences are from North Gate Canyon, which may provide

suitable nesting sites. There have been six observations on Brush Creek Hayden RD (five from Platte River/Savage Run GA and one from South Savory) and 1 from Laramie RD (near Sheep Mountain in 1984). The small number of reports of this recognizable and high-profile bird suggests that the birds on the MBNF do not make up an independent, viable population, but are part of a larger population.

**Habitat**

Nesting occurs on mountain cliffs and river gorges. Some historic nest sites have been taken over by other raptors (like Prairie Falcons and Golden Eagles). Non-breeding birds occur in a range of open country that supports populations of prey (small to middle-sized birds). In migration, Peregrines congregate near wetlands where they prey on migrant shorebirds and waterfowl.

**Threats, limiting factors, and vulnerabilities**

Disturbance at nest sites by rock climbers. Taking of young by falconers. Predation on fledglings by Golden Eagles. Mortality from collisions with fences and powerlines. Contamination of prey with bioaccumulating pesticides (which are still used within the wintering range of the species).

Primary references used are Welp et al (2000), and R2 Species Conservation Project species assessments (USDA Forest Service 2000).

**Environmental Consequences and viability**

The failure of peregrines to recolonize all previous nesting habitat in R2, its continued small population, and uncertainty about its local status suggest that Peregrines should be treated as species of viability concern. All alternatives provide protection at nest sites.

**Direct effect**s include disturbance at nest sites by recreation and other activities not subject to disturbance buffer restrictions. **Indirect effects** include mortality from collisions with fences and powerlines and from ingestion of contaminated prey. **Cumulative** effects on the local Peregrines include factors that reduce the size and genetic diversity of the already small number of bird in the area: mortality from illegal shooting (past, present, and future); mortality on other ownerships from collisions and contaminated prey; and habitat alteration and contaminated prey on the wintering grounds.

Evaluation criterion for the Peregrine Falcon is provision of protection around nest sites.

Table I-32 Viability conclusions for the Peregrine Falcon

| | All Alternatives |
|---|---|
| Abundance and distribution | Rare and localized. Standard provides protection in plan from disturbance at nest site, contributing to viability of the larger genetic population. |
| Likelihood of persistence-15 yr. | Uncertain; no current viable population. |
| Likelihood of persistence-long-term | Uncertain; no current viable population. |
| Effects on individuals and populations | MAII |
| Certainty | Low |

*MAII, may adversely impact individuals but not lead to trend toward federal listing.*

## Northern Harrier - *Circus cyaneus*

### Status and Distribution of species

The northern harrier breeds from Alaska, northern Canada and Maritime Provinces south to Southern California, Arizona, Kansas, and Virginia. This species winters from South America north to British Columbia, the Great Lakes region, and New Brunswick (enature, 2002).

The Wyoming Game and Fish Atlas has records of nesting harriers located in most of Wyoming. Northern harriers are currently at secure populations in Wyoming, but a decline in population was observed in the Central region of the Breeding Bird Surveys (R2 Species Conservation Project species assessments (USDA Forest Service 2000)).

### Status and Distribution on the MBNF

Northern Harriers nest in open fields, meadows, and marshes around the edges of the MBNF. It is mostly a summer resident, arriving on the breeding grounds from between late March and early April, and nesting from April through July (Dechant, Sondreal et al. 2001). Some birds remain through the winter months (Wyoming Game and Fish Department 1997). There is one record of harriers in the same area at the northern edge of the Sierra Madre for several months that were possibly nesting: otherwise there are no records of nesting on the Forest.

### Habitat and natural history

Northern Harriers prefer open habitats characterized by tall, dense vegetation. They will use native or tame vegetation in dry or wet grasslands, wetlands, croplands, fallow fields, lightly grazed pastures, and brushy areas (Dechant 2001). Northern Harriers are generally known to return to the same general area to breed as the previous year, and are polygamous (Dechant 2001 and University of Minnesota

website, 2002). They don't however, nest at the same site every year, and females will move farther than males from the previous nest site (University of Minnesota 2002). Northern harriers forage over open habitats of moderate to heavy cover, and hunt by flying close to the ground and taking small animals by surprise (enature, 2002). The diet consists mainly of small mammals, including mice and voles, but they are also know to consume birds and occasionally reptiles and frogs (Dechant 2001) and (University of Minnesota, 2002).

**Threats, Limiting Factors, and Vulnerability**

Northern harriers have many predators, including great horned owls and coyotes, which eat nestlings, and raccoons and American crows, which eat the eggs. Harriers also compete with Short-eared Owls for the same prey, which can cause food shortages for the harrier because the short-eared owl will hunt anytime while the harrier only hunts during the day (University of Michigan 2002). Heavy grazing can also cause degradation in habitat, reducing quality nesting habitat and foraging areas (USDA Forest Service 2000). Northern harriers may use lightly grazed habitats, but do not use heavily grazed habitats (Dechant 2001). Another threat to harriers is the conversion of meadows, open fields, and hay fields to cropland. Areas that are burned, hayed or tilled annually are generally avoided by nesting harriers. Disturbances such as these should be avoided during nesting periods (Dechant 2001).

**Changes from HRV in factors that may affect the species**

Human disturbance has increased, affecting nesting success. Foraging habitat has been lost to development agricultural and residential uses. Oil and gas operations create artificial nesting sites that may be occupied by ravens that are effective predators on raptor eggs and young.

Primary references used are (National Geographic Society 1987; Wyoming Game and Fish Department 1997; USDA Forest Service 2000; Cerovski, Gorges et al. 2001; Dechant, Sondreal et al. 2001) and the following websites: enature (NatureServe 2002) University of Minnesota (University of Minnesota 2002), University of Michigan (University of Michigan 2002), Museum of Zoology (University of Michigan 2002).

**Environmental Consequences and Viability**

No known loss of habitat has occurred on the MBNF. **Direct effects** of actions allowed by the Plan include human disturbance near nest sites. Reduction of residual vegetation following grazing could result in grass that is too low to provide good nesting cover the following spring at some sites, but overall Plan standards will provide a variation of grass heights.

**Cumulative effects** of residential development (with increased disturbance from humans and pets) and habitat conversion on private land may be considerations in some areas. The continuation of the Conservation Reserve Program (CRP), Wetland Reserve Program, incentive for farmers to not till wetlands and discourage them

from breaking up pasture for cropland (Dechant 2001) will benefit Northern Harriers.

Evaluation criteria are maintenance of wetlands and meadows, protection from disturbance at active nests, and regulation of grazing to provide adequate cover for spring nesting.

Table I-33 Viability conclusions for the Northern Harriers

| | All alternatives |
|---|---|
| Abundance and distribution | Retain current abundance and distribution |
| Likelihood of persistence-15 yr. | Very likely |
| Likelihood of persistence-long-term | Very likely |
| Effect on individuals and populations | MAII |
| Certainty | Moderate/high |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Columbian Sharp-tailed Grouse - *Tympanuchus phasianellus columbianus*

### Status and distribution of subspecies

This subspecies of Sharp-tailed Grouse occurs in isolated pockets scattered across the western United States west of the continental divide (Welp, Fertig et al. 2000). Rangewide, the population has been declining.

### Status and distribution on the MBNF

Columbian Sharp-tailed Grouse breed at 8 leks on the western side of the Sierra Madre. Key areas are on Cottonwood Rim, east and northeast of Battle Mountain, below the Stock Drive, and in the lower portions of Big and Little Sandstone Canyons. This population, which extends south into Colorado, may be the only breeding population in Wyoming.

### Habitat

The species occurs in mid/tall grassland with shrubs including serviceberry, big sagebrush, and mountain snowberry. Bunchgrass and forbs are essential for nesting and brood rearing. In fall and winter, use is concentrated on ridges of mountain shrub and riparian areas (Welp et al 2000).

### Changes from HRV in factors that may affect the species

Conversion of habitat and isolation of breeding populations have made the

subspecies vulnerable.

**Threats, limiting factors, and vulnerabilities**

The small isolated populations are vulnerable to local extinctions and to loss of genetic variation. Disturbance at the lek (the site of display and breeding), overgrazing, fire suppression, conversion of habitat to agricultural use, and pesticide use are threats to the subspecies.

**Environmental Consequences and Viability**

Evaluation criteria for the subspecies are retention of adequate amounts and distribution of preferred habitat and protection from disturbance at leks. Current grazing standards maintain residual vegetation and timing can be set to minimize adverse effects. Burning will be used to maintain a variety of vegetation composition and spatial pattern.

Alternatives B, C, D DEIS, D FEIS, and E have disturbance buffer of 1 mile around leks during the breeding and nesting season.

Alternatives A and F contain (1) a ¼ mile buffer around leks for ground disturbing activities, (2) a ban on vegetation treatment (except timber sales) unless specifically to improve brooding habitat, and (3) a limit on size of treated blocks of sage brush where there is potential for sharptails to occur.

On the MBNF, habitat for Columbian Sharp-tailed Grouse is restricted to the southwest side of the Sierra Madres. Nesting, brood rearing, and wintering occurs. Leks (including those off-Forest) will be buffered by a 1-mile limit on disturbance in all Alternatives except A (1/4 mile) and F (2 miles). Forestwide standards for grazing utilization by livestock are the same for Alternatives A through E. Though Alternative F has somewhat reduced utilization standards, grazing in sharptail breeding habitat can be adjusted to meet the needs of the species. The subspecies is vulnerable to loss from genetic and demographic effects of the small population and its isolations from other Columbian sharp-tails. Based on activities controlled by the Forest Service, all alternatives are likely to result in persistence of the subspecies.

Table I-34 Viability and outcome conclusions for the Columbian Sharp-tailed Grouse.

| | **All Alternatives** |
|---|---|
| Abundance and distribution | Limited to west side of the Sierra Madre |
| Likelihood of persistence- 15 yr. | Likely |
| Likelihood of persistence- long-term | Likely unless current population proves to be too low to provide demographic resilience and adequate genetic variability, or other factors (like predation or disease) reduce the population. |
| Effect on individuals and populations | MAII |
| Certainty | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Greater Sage-grouse - *Centrocercus urophasianus*

### Status and distribution of species

The Sage Grouse occurs locally in arid areas from southern Canada south to southern Utah and from central California east to and western South and North Dakota. The species has been extirpated in Kansas, Nebraska, Oklahoma, Arizona, New Mexico, and British Columbia.

### Status and distribution on the MBNF

There are no known leks on the MBNF, though Sage Grouse do occur on the forest during the year. On the Brush Creek Hayden district there are 28 observations; though no leks are known, there is speculation that the number of observations in the area may suggest the presence of a lek in the South Savory GA.

According to the Wyoming Game and Fish Department, "… habitat (on the Forest) is of little if any importance for this species, as very few sage grouse regularly use Forest lands" (Wyoming Game and Fish Department 2001).

### Habitat

Sage Grouse are sagebrush obligates, inhabiting landscapes composed of a mosaic of tall sagebrush, low sagebrush, grass, and forbs. Breeding display grounds ("leks") are open areas surrounded by sagebrush. Nests are usually placed on the ground beneath big sagebrush. After the eggs hatch, the brood leaves the nest area. Preferred habitat for young includes moist areas with forbs and insects. Sage Grouse feed on sagebrush leaves in the winter. In summer, they also eat forb leaves and flowers, and insects (especially grasshoppers during irruptions).

### Threats, limiting factors, and vulnerabilities

Loss of sagebrush mosaic, fragmentation of large tracts of sagebrush, alteration of the grass/forb understory, and disturbance at leks have been the major threats to Sage Grouse. The declining range, reduced population, and increasing isolation of breeding populations make the species vulnerable to further local losses.

### Changes from HRV in factors that may affect the species

Much sagebrush has been converted to other cover types for farming or grazing of livestock. In other areas, fire suppression has reduced fire that would have created small openings, and resulted in large expanses of old sagebrush with little grass/forb understory. Overgrazing altered the grass/forb community and (by removing these plants reduced fuel) limiting the spread of fires. In much of the West, burned sagebrush habitat was taken over by cheatgrass, an invasive non-native.

The MBNF does not support a viable population of Sage Grouse, but it does provide non-breeding and possibly nesting habitat. Maintaining a mosaic of seral stages by burning in small patches, regulating grazing (especially following burns to promote a forb understory), and protection of leks if any are found on National Forest land

would benefit Sage Grouse.

**Environmental Consequences**

**Direct effects** include disturbance at leks and nests by people, and in extreme cases, by large concentrations of livestock. **Indirect effects** include a reduction of the forbs that are preferred for summer feeding and for raising the young that can result from deferring grazing too long after fire. Overgrazing can reduce the vegetation beneath the sagebrush, eliminating good nest sites and forage substrates; Plan standards should result in adequate retention of vegetation to prevent this effect, but it may occur at localized sites, especially during drought.

The indirect effect of burning is not clear. Big sage does not sprout from residual roots after burning. It takes up to 30 years for big sage to be re-established from seed on a burned site. Though this interval is long for a shrub, it is the natural pattern and does not suggest that sagebrush should never be burned. Depending on current structure, burning of small patches may enhance vegetative structural and species diversity. Without natural disturbance, sagebrush grows into thicker and denser stands than the mosaic preferred by Sage Grouse.

**Cumulative effects** include the past and present management of rangeland to maximize grass production for livestock, which removed sagebrush and shifted the understory composition from a grass-forb mixture to one with mostly grass. The reduction in size of leks and in population across the West means that fewer recruits to the next generation are being produced and that interchange between breeding populations within the metapopulation is declining. This effect is augmented by the fragmentation of suitable habitat by conversion to agricultural land. Whether this isolation has reduced genetic variation with adverse consequences to the species has not been determined. West Nile virus has killed Sage Grouse, and the sensitivity of the species to this disease is currently under study.

Table I-35 Viability conclusions for the Sage Grouse

| | **All Alternatives** |
|---|---|
| Abundance and distribution | Use on the MBNF may remain at the present level or may decline if populations centered at nearby leks decrease. No viable independent population exists on the Forest. MBNF contribution the viability of the larger population is from the presence of nesting, young-rearing, and possible winter habitat inside the MBNF boundary. |
| Likelihood of persistence- 15 yr. | Likely to still be individuals using MBNF land. |
| Likelihood of persistence-long-term | Uncertain; depends on actions on lands of other ownerships and broad scale population trends (there are currently no known leks on the Forest). |
| Effect on individuals and populations | MAII- consideration of the species' needs in planning prescribed fire and in management of livestock grazing should maintain current contribution to viability of the larger population. |
| Certainty | Low because of declines off forest |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## White-tailed Ptarmigan - *Lagopus leucourus*

### Status and distribution of species

The main distribution of the species is from the alpine regions of Montana north into Canada and Alaska. There are disjunct breeding centers in Wyoming and Colorado. Its status in NW Wyoming is uncertain. The species is ranked as S1 in Wyoming.

### Status and distribution on the MBNF

A resident of the Snowy Range in the past, the species appears to have been extirpated on the MBNF. Though there are anecdotal reports that the birds are still seen, there have been no confirmed records since the late 1970's. Clait Braun, who studied the birds in this area in the 1970's reported that he has not visited the area since the early 1980's and that species presence is not difficult to detect from the presence of droppings and feathers (personal communication). No intensive, systematic surveys have been done, but biologists from WGF have occasionally conducted searches for a day in winter (Stelter, pers. comm.) The area is heavily used for recreation in summer, and is visited by birdwatchers specifically looking for alpine species. It seems unlikely that there would be no observations in 20 years if the bird is a resident.

However, there is a strong population of White-tailed Ptarmigan in the Mount Zirkel Wilderness, on the adjacent Routt NF. It is possible that birds could reach the island of habitat on the MBNF (Beauvais, pers. comm., 2003). The habitat on the Snowy Range is limited and it is not clear whether the area is large enough to provide for an independently viable population. It is possible that this population came and went in the past, with local extirpations followed by subsequent reoccupation. In the absence of data on population numbers over time (for at least the entire 20$^{th}$ century), the causes of the population decline, and the likelihood of colonization , statements about the past and present status of the species on the MBNF are speculative.

### Habitat

White-tailed ptarmigan inhabit willow, grasses, and krummholtz in rocky, sparsely vegetated areas at or above timberline.

### Changes from HRV in factors that may affect the species

The reasons for the loss of the species are not known. The small, isolated population would have been vulnerable to declines whether caused by natural or human factors. The last sightings of ptarmigan on the Snowy Range occurred about the time that snowmobiling was becoming common in the area, but before the widespread occurrence of off-trail use. It seems unlikely that snowmobiling was the sole cause of loss of the species, though resulting disturbance or habitat alteration may have been a contributing factor. Past sheep grazing may have affected the willow community that is essential for winter food. However, this activity occurred in the early past of the 20$^{th}$ century and logically would have caused loss of the population

then, not 50 years after the intense grazing. Roads have increased human disturbance. Summer and winter off-road use may have altered the vegetation and created disturbance of nesting birds, broods of young, and wintering adults. Climate change may be reducing habitat suitability.

**Threats, limiting factors, and vulnerabilities**

Grazing and recreation are possible sources of stress on ptarmigan populations. The suitable habitat may be too isolated and the patch size to small to sustain a long-term population.

Primary references used are Braun et al (1993), von Ahlefeldt and Speas (1996), Cerovski et al (2000), Welp et al (2000), and R2 Species Conservation Project species assessments (USDA Forest Service 2000).

**Environmental Consequences and Viability**

The species is almost certainly absent from its historic range on the MBNF. However, this absence should be definitively established. If habitat seems suitable, there is a possibility of recolonization or reintroductions. In addition, there may be variation across alternatives in activities that could affect the feasibility of reintroduction.

If, as seems likely, no White-tailed Ptarmigan are currently present on the MBNF, there are no direct effects of the Revised Plan. **Indirect effects** on habitat are relevant only to the potential for recolonization or reintroduction. These include the possible but unproven effects of off-trail snowmobiling on snow compaction (eliminating access to and presence of insulated resting sites) and on vegetation. **Cumulative** effects include alteration of the vegetation above tree line by past grazing. Climate change may be limiting suitability.

Future resumption of grazing in the high elevation allotments could reduce willow below the needs of ptarmigan, though with regulated grazing that meets Forest Plan standards, it is not certain that grazing would have adverse effects. Standards and guidelines that limit the potential for contact between domestic sheep and bighorns affect the probability of reintroduction of sheep grazing in ptarmigan habitat. Grazing at these sites is most likely in Alternative A, less likely in Alternatives B, C, D DEIS and E, and still less likely (because of guidelines in the Geographic Areas surrounding those currently containing mapped bighorn range) in Alt D FEIS. Alternative F would not allow grazing in sensitive high elevation habitat.

Natural dispersion from the mountains to the south may occur. Individuals that disperse into the area may find conditions unsuitable and fail to reestablish a local population. The loss of this small, marginal peripheral population is unlikely to lead to a trend to federal listing of the Southern Rockies population. Viability will not be restored on the MBNF, but it is not known whether this population was persistent in the past, or just winked in and out.

Until an evaluation of existing habitat and feasibility of reintroduction or survival of dispersing birds are assessed, the effects of existing and proposed uses cannot be assessed. Though snowmobiles may not have been the sole cause of loss of ptarmigan from the area, the current widespread off-trail use is unlikely to be compatible with success of a future population.

Evaluation criteria for the White-tailed Ptarmigan include snowmobile restrictions and the possibility of grazing in the alpine section of the Snowy Range. However, the effects of compaction and regulated grazing are highly uncertain.

Table I-36 Viability conclusions for the White-tailed Ptarmigan

| | Alt A | Alts B, C, D DEIS, and E | Alt D FEIS | Alt F |
|---|---|---|---|---|
| Abundance and distribution | May be extirpated. (Limited by snow compaction beyond natural area and potential reduction of willow habitat quality by grazing.) | May be extirpated. More protection from grazing compared to Alt A. | May be extirpated. More protection from grazing compared to Alt A. | More likely to assess possibility of reintroduction in cooperation with state. Alt F restricts snowmobiles to designated routes, which may improve chances of success. |
| Likelihood of successful reintroduction/ dispersion in 15 yr. | Unlikely | Unlikely | Unlikely | Marginally possible- causes of population decline are not known, so likelihood of success is uncertain. |
| Effect on individuals and populations | Not likely to restore/recover this population: not critical to viability of the Southern Rockies population. | Not likely to restore/recover this population: not critical to viability of the Southern Rockies population. | Not likely to restore/recover this population: not critical to viability of the Southern Rockies population. | Slightly more likely to restore this population |
| Effect on individuals and populations | MAII | MAII | MAII | MAII |
| Certainty | Low | Low | Low | Low |

## Mountain Plover - *Charadrius montanus*

The Mountain Plover was proposed for federal listing under the Endangered Species Act; however, the proposal was withdrawn on 9/9/2003. Prior to this withdrawal, the Mountain Plover was included by the USFWS as occurring on the MBNF (Letter, 7/22/03). However, this is a bird of open level grassland. It breeds only in

relatively level areas with very low cover and is often associated with prairie dog towns. There are no records within the boundaries of the MBNF (based on the WYNDD, the Wyoming state database of wildlife observations, and ranger district knowledge or records) nor is any suitable habitat known.

**New TES standard:** If black-tailed prairie dogs are found on Forest land, activities that could have adverse effects will be halted. The area will be surveyed to determine the extent of the colony and to survey for the presence of Mountain Plover and/or black-footed ferret. If either of these species is found, mitigation consistent with standards in the Regional Deskguide will be adopted for the interim and mitigation will be applied to activities. Standards and guidelines will be modified or added to the Forest Plan, as needed. For Federally listed species, this will be done in cooperation with the USFWS.

**Conclusion.** There is not a current viable population of the Mountain Plover on the MBNF. In fact, the species is not known to occur on Forest Service land on the MBNF, nor is any suitable habitat believed to exist.

Table I-37 Viability conclusions for the Mountain Plover

| | **All alternatives** |
|---|---|
| Abundance and distribution | Not known to occur on Forest; no suitable habitat known or suspected. |
| Likelihood of successful | Because the forest does not contain flat short-grass prairie, no historic population can have occupied the Forest. |
| Effect on individuals and populations | No impact |
| Certainty | High |

## Boreal Owl - *Aegolius funereus*

### Status and distribution of species

Boreal owls are widespread at low density in boreal and subalpine forest across North America.

### Status and distribution on the MBNF

A year-long resident, known to breed on the forest in the Laramie Range (WYNDD record, not shown on map in Hayward and Verner 1994), Medicine Bow Range, and Sierra Madre. Nest boxes are occupied and reproduction has been confirmed.

### Habitat

Boreal Owls nest in cavities in aspen and old mixed conifer but could occur in a wide variety of sites if a cavity (or nest box) was available. They select nest sites with high basal area, large diameter trees, and a multistoried canopy. Boreal Owls forage mature and older spruce-fir most of the year. Prey is more available in this habitat in winter because the snow is less compacted, and in summer because there is

less herbaceous cover than in regenerating openings. In early spring, before herbaceous vegetation becomes dense, they forage in openings like clearcuts and agricultural land. Summer roost sites have high tree density, high crown closure, and high basal area. For this animal, so highly adapted to coping with winter cold, the limitation on the southern extent of its range may be availability of cool dense spruce for summer roosting.

**Changes from HRV in factors that may affect the species**

Large trees are less abundant than in the past in high elevation forests (Dillon and Knight 2000). In harvested areas, snags and downed wood (essential for prey) are less abundant than in the past (Dillon and Knight 2000).

**Threats, limiting factors, and vulnerabilities**

Boreal owls are limited in the MBNF by the abundance of large snags with cavities (Hayward, pers. comm.), by the amount of old forest with complex structures, and possibly by prey density. Snags are lost by firewood collection and in timber harvest. Lack of dead downed wood recruitment over time would reduce habitat suitability for the Boreal Owl's prey.

Primary references used are Hayward (1993) , Hayward (1994; 1994), Hayward (2001), Welp et al (2000), and Region 2 Species Assessments (USDA Forest Service 2000).

**Environmental Consequences**

**Direct and indirect** effects include loss of large snags (nest sites) in timber harvest or to firewood collection, loss of downed wood (because tree boles are removed in timber harvest), and loss of dense old spruce stands used in summer roosting. **Cumulative effects** include past reductions in snags and downed wood and effects of similar past, present and future activities on adjacent National Forest and state-owned land. Apart from small private inholdings, there is no suitable habitat on private land.

All alternatives other than Alternatives A and F increase the amount of retained old forest in spruce-fir, protect snags in riparian zones, and increase retention of snags and snag recruits compared to the current plan levels. Old forest retention in spruce-fir increases from 10% in Alternative A to 20% in alternatives B, C, D DEIS, and E, and to 25% in Alternative D FEIS. Alternative F retains the 10% old growth standard and snag retention standards found in Alternative A, but proposes little timber harvest compared to the other Alternatives. Loss of snags in this alternative will be relatively low despite the lower retention standards, and no old growth will be harvested. Alternatives A, B and C contain large continuous expanses of timber-emphasis MAs (especially 5.13). Depending on the amount of logging that is actually done in these MAs, over the course of several rotations, these alternatives may produce continuous areas with reduced snag and downed wood densities. Old growth will be unlikely to exceed the minimum standard in this area, reducing the

abundance and distribution of dense spruce stands used as cool refuges in summer. These alternatives have the least area where natural processes are tolerated (20.1%, 27.9%, and 36.7% respectively), but high harvest, higher salvage and reduction of old growth make Alternatives A, B, and C least beneficial to the Boreal Owl.

If stands are managed on a 100-120-year rotation, trees in the stands will not age enough to produce large snags and will not produce fallen material (on which the species' prey relies) from the current cohort of trees. Boreal Owl populations may still be viable, but may occur on a reduced percentage of the forest. The species could be limited to non-timber emphasis land (including inclusions of unsuitable land within timber-emphasis MAs) unless patches of timber-emphasis MAs are retained as old growth or security areas.

Alternatives D DEIS, D FEIS and E allocated less area as MA 5.13 than Alternatives A, B, and C, and a large amount of 5.15 (combined timber an ecological restoration objective). Both MAs have a timber emphasis, but retention of old growth and security areas is more likely in MA 5.15. Natural processes are allowed to proceed within the limits of safety on 45%-to 47.8% of the Forest in these three alternatives.

No existing old growth would be cut in Alternative F. Alternative F would allow the most natural processes like fire and insect-kill (73.9% of the Forest) and retain substantial amounts of the post-disturbance forest (rather than salvaging the dead trees) which would will reduce Boreal Owl habitat in the short-term, but increase it in the long run.

Evaluation criteria are retention of snags at high elevation (spruce-fir forest), retention of old forest for cool roosting sites in summer, retention of mature aspen and conifer snags for nest sites, retention and long-term recruitment of downed wood, and spatial distribution of timber-emphasis MAs in high elevation forest. Access by motorized vehicle in high-elevation forest facilitates firewood collection.

Table I-38 Viability and outcome conclusions for the Boreal Owl

| | Alts A, B and C | Alts D DEIS, D FEIS and E | Alt F |
|---|---|---|---|
| Abundance and distribution | Large patches of 5.13 will reduce habitat for prey over time and leave only patches of old forest in a matrix of young forest. Reduction of distribution on the MBNF. | The smaller areas of 5.13 and larger areas of 5.15 will maintain habitat for Boreal Owls and their prey over a wider distribution across the forest. | Minimal harvest and allowing natural disturbance will reduce habitat in the short-term (by fire) but increase in the long run; assuming enough fire will occur. Most retention of old growth and snags. |
| Likelihood of persistence-15 yr. | Very likely (long-lived species likely to persist) | Very likely | Very Likely |

| | Alts A, B and C | Alts D DEIS, D FEIS and E | Alt F |
|---|---|---|---|
| Likelihood of persistence-long-term | Viability concern related to loss of distribution and related loss of abundance- likely loss from large blocks of timber emphasis MAs. | Likely | Likely |
| Effect on individuals and populations | MAII (reduced distribution) | MAII | MAII |
| Certainty | Low/Moderate | Moderate | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Short-eared Owl - *Asio flammeus*

### Status and distribution of species

The Short-eared Owl has a large global range, including cold temperate regions of Europe and North America. It is less widespread in eastern North America (where it breeds only north of Pennsylvania and Massachusetts) than in the West. The species also occurs in some Pacific Islands (including the Hawaiian Islands) and the Greater Antilles.

A declining trend has been found across the species' range in North America in both Breeding Bird Survey and Christmas Bird Count data.

### Status and distribution on the MBNF

The only known occurrences on the MBNF are on the Laramie Peak Unit (Welp, Fertig et al. 2000), which has the best potential habitat. Other suitable habitat may occur in open country on the fringes of the three other units. (The upper elevational limit is about 7,000 feet) However, none of the BBS routes on the MBNF detected Short-eared Owls from 1968 to 1998.

### Habitat

Open grassland with abundant prey (small mammals) and shelter (shrub or conifer inclusions). The species nests on the ground. Nests are usually associated with some cover (next to a small shrub or in taller grass (similar to the vertical structure used by grouse and waterfowl). The birds may roost on the ground, in shrubs or in short conifers. Breeding may be loosely colonial (or this may be an aggregation in an area with high density of prey). In winter, communal roosts in sheltered areas near sites with high prey may include dozens (rarely hundreds) of individuals.

### Changes from HRV in factors that may affect the species

Conversion of grassland to agriculture has probably been the greatest change rangewide. Increased predator populations near human development greatly affect these ground nesters. Overgrazing has removed grass cover for nest sites.

**Threats, limiting factors, and vulnerabilities**

Overgrazing could adversely affect the species.

**Conclusion on viability concern on the MBNF**

The threat of conversion of habitat to agriculture or residential development does not exist on National Forest land. Vertical structure for nesting and cover for rodent prey is maintained by grazing standards that provide a mixture variety of rangeland seral stages and height. Primary references used are Welp et al (2000), Cerovski et al (2001), and the R2 Species Conservation Project species assessments (USDA Forest Service 2000).

**Environmental Consequences and Viability**

**Direct and indirect effects** of Forest Service actions under the Revised Plan result from the disturbance and habitat alterations resulting from recreation, grazing (and activity associated with grazing management) and prescribed fire. Grazing retention standards should provide adequate nesting habitat, except perhaps during severe drought. Prescribed fire can enhance grass and forb growth, improving long-term habitat. Prior to prescribed fire, sensitive species inventory should identify the presence of nesting owls and active nests can be avoided.

**Cumulative effects** include loss of habitat on private land.

The threat of conversion of habitat to agriculture or residential development does not exist on National Forest land. Vertical structure for nesting and cover for rodent prey is maintained by grazing standards which provides a variety of structures. Burning may be beneficial. Forest Service activities are not expected to contribute to loss of viability.

Short-eared Owls occur only around the periphery of the MBNF and do not make up an independent viable population, but are part of a larger population that uses other land ownerships in the valleys surrounding the MBNF. All alternatives have the same effect and are very likely to maintain persistent populations of the Short-eared Owl.

Table I-39 Viability and outcome conclusions for the Short-eared Owl

| | **All alternatives** |
|---|---|
| Abundance and distribution | No change from present |
| Likelihood of persistence- 15 yr. | Very likely |
| Likelihood of persistence- long-term | Likely- may decline if whole population on all ownerships declines and the territories on the MBNF become isolated. |
| Effect on individuals and populations | MAII |
| Certainty | Moderate- little current information |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Flammulated Owl - Otus flammeolus

### Status and distribution of species

The Flammulated Owl ranges from southern BC to the mountains of Mexico. It is found in the mountains of the western United States. Unlike many forest owls of the western U.S. that breed in winter, the Flammulated Owl migrates to Mexico, returning to breed in late spring.

### Status and distribution on the MBNF

There are few records from ponderosa pine on the MBNF- 2 on the Laramie Range and one in the southwestern part of the Sierra Madre. The species is often undetected even where it is abundant because it breeds and calls at night in late spring. As a result, the species is often missed both by night-time surveys for owls (mostly done in winter, when most owls breed) and by spring bird surveys (done after sunrise, when most songbirds are singing.) The species may be more widespread in the limited ponderosa pine found on the MBNF than recorded sightings indicate.

### Habitat

Flammulated Owls inhabit low elevation forest with an open structure and dense inclusions. Usually this habitat is ponderosa pine, though the birds also breed in other forest types as long as the structure is similar to that of a typical old ponderosa forest with frequent ground burns. The birds feed at night primarily on grasshoppers taken from the ground early in the season and on moths later in the summer. Foraging occurs along the edge of forest/grassland, or in an open stands. The birds do not occupy the centers of dense ponderosa pine, but select naturally fragmented stands with abundant open grassland (Wright 1992).

Roost sites are in denser patches within the home range. Nests are always in snag cavities created by woodpeckers. In the northern Rockies, large cavities created by Pileated Woodpeckers and Northern Flickers are available and may be used for many years. In the southern Rockies, the absence of the Pileated Woodpecker may reduce the number or quality of cavities. Flammulated Owls may supplement cavities created by flickers with the smaller cavities created by Hairy Woodpeckers and sapsuckers .

### Changes from HRV in factors that may affect the species

The stand structure of some mature-old ponderosa pine has changed with fire suppression, becoming denser and more uniform. Neither of these changes in structures creates good habitat for Flammulated Owls. Where ponderosa pine understory has increased, the probability of a stand-replacing fire is higher and would create a loss of habitat for the Flammulated Owl.

In the Laramie Range, little timber harvest has occurred and the rough terrain has protected much of the pine from removal for firewood. Harvest of ponderosa pine

for use as telegraph poles occurred early in the 20th century.

**Threats, limiting factors, and vulnerabilities**

Fire suppression, which has allowed increase in the density of ponderosa pine, has affected the most area, eliminating foraging habitat. Felling of snags with cavities removes limited and essential nesting habitat. Logging of old ponderosa pine reduced recruitment of large snags and the preferred open old growth structure for foraging habitat.
Primary references used are

Richmond (1980), Howle and Ritcey (1987), Reynolds and Linkhart (1987), Wright (1992), McCallum (1994; McCallum 1994), Welp et al (2000), and Region 2 Species Assessments (USDA Forest Service 2000).

**Environmental Consequences**

**Direct and indirect effects.** No timber harvest is scheduled in the Laramie Peak Unit, which contains most of the habitat for this species, on the forest. Timber harvest in the southwestern corner of the Sierra Madre (the other site where the species has occurred) is mostly allocated to MAs that do not include timber sales. NEPA analysis would focus on ponderosa pine related species because this is a rare cover type on the forest and protection would be applied at the project level.

**Cumulative effects**. Fire suppression and large stand-replacing fires in ponderosa pine have created a uniform pattern instead of the species' preferred mosaic of open and dense mature/old ponderosa pine. Timber harvest has removed large ponderosa pine. Large snags (nesting sites) have been removed in timber harvest and for firewood.

All alternatives except Alternative A and F provide for retention of more snags, more snag recruits, and more old growth in ponderosa pine forest than the 1985 plan. Alternative F permits less timber harvest, so that fewer snags would be removed in that activity than in Alternative A and less old growth forest would be removed or fragmented.

Evaluation criteria are snag standards and emphasis on restoration of ecological conditions. Most of the potential habitat is on the Laramie Peak Unit, where there is no scheduled timber harvest or planned road-building under any of the alternatives, and much of the suitable habitat has recently burned. Little of the suitable habitat in the southwestern Sierra Madre is in timber emphasis allocations. As a result, there is little difference in expected effects on Flammulated Owls among the alternatives.

Table I-40 Viability and outcome conclusions for Flammulated Owl

| | Alts A, B, C, D DEIS, D FEIS | Alt E | Alt F |
|---|---|---|---|
| Abundance and distribution | Less emphasis on active restoration and removal of understory trees with low commercial value. Suitable habitat declines over time with fire suppression. Timber harvest and associated roads would open areas for firewood collection. | The emphasis on active restoration benefits open habitat for this species and reduces fire risk. Retains or increases current abundance and distribution. | Fire without thinning stands will kill old trees and reduce habitat. Possible loss of open habitat. |
| Likelihood of persistence-15 yr. | Likely | More likely | Likely |
| Likelihood of persistence-long-term | Likely | More likely | Likely |
| Effect on individuals and populations | MAII | MAII/BI | MAII |
| Certainty | Moderate | Moderate | Moderate |

*BI, beneficial impact*

*MAII, may adversely impact individuals but not lead to trend toward federal listing;*

## Yellow-billed Cuckoo - *Coccyzus americana*

### Status and Distribution of the Species

The eastern subspecies of the Yellow-billed Cuckoo is widespread in the whole United State east of eastern Wyoming, north to southern Ontario and Quebec and south to northern and mountainous Mexico. Though widespread, it is believed to be declining (Hughes 1999). It also breed in the Greater Antilles. However the western subspecies occurs only in scattered patches across the western United States. The bird has been extirpated from British Columbia (in the 1920's), Washington, Oregon, Northern California and possibly from Nevada. The birds winter in NE South America (Hughes 1999). The whole species is considered "sensitive" by Region 2 of the Forest Service. The western subspecies is also a candidate for Federal listing. Biologists estimate that more than 90 percent of the western subspecies' riparian habitat has been lost or degraded (USDI FWS 2000).

### Status and distribution on the MBNF

There are no records for the Yellow-billed Cuckoo on the MBNF (based on the WYNDD, the Wyoming state database of wildlife observations, and ranger district knowledge or records). Cottonwood forest occupies 408 acres (<0.04% of the MBNF). Of this, 286 acres (<0.03% of the Forest) is on the west slope of the Sierra

Madre (in the range of the western subspecies). The species occurs as a migrant and rare breeding birds in SE Wyoming.

**Habitat**

Western Yellow-billed Cuckoos breed in willow and cottonwood forests along rivers (USDI FWS 2000). Cottonwood forest occupies 408 acres (<0.04% of the MBNF). Of this, 286 acres (<0.03% of the Forest) is on the west slope of the Sierra Madre (in the range of the western subspecies).

**Changes from HRV in factors that may affect the species**

Cottonwood riparian forest has been reduced on private land across the West.

**Threats, limiting factors, and vulnerabilities**

Loss of cottonwood riparian forest with understory shrub in the Western U. S. and Canada is believed to be responsible for the decline in the western subspecies. In addition to removal of the overstory trees, this change is associated with altered water flow due to dams and irrigation diversions, to grazing of this habitat which prevents establishment of seeding cottonwoods, and to conversion to agriculture and other development (Hughes 1999; USDA Forest Service 2000).

**Environmental consequences**

**Direct and indirect effects**. The Revised Plan will allow grazing to continue in cottonwood/shrub habitat in all alternatives. Alternative F would reduce grazing and protect riparian areas from grazing.

**Cumulative effects**. Water flow in cottonwood riparian forest has been altered by water diversions and dams, reducing regeneration of cottonwood. Most of this effect has been on private land and other, low-elevation, valley-bottom habitat, rather than on the MBNF which naturally has little of the species' habitat. Grazing has reduced shrub along streams and has prevented regeneration of cottonwood.

Given the very small amount of potentially suitable habitat and the rarity of the species, it is very unlikely that a Yellow-billed Cuckoo would occur on the MBNF, even in migration.

Table I-41 Viability and outcome conclusions for the Yellow-billed Cuckoo

| | All alternatives |
|---|---|
| Abundance and distribution | Species is unlikely to occur on Forest. |
| Likelihood of persistence- 15 yr. | Species is unlikely to occur on Forest. |
| Likelihood of persistence- long-term | Species is unlikely to develop a viable population in MBNF. |
| Effect on individuals and populations | MAII |
| Certainty | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing;*

## Lewis's Woodpecker - *Melanerpes lewis*

### Status and distribution of species

The main breeding range is in the mountains of the western US and southern Canada.

### Status and distribution on the MBNF

WYNDD has 7 recorded sightings in the Laramie Peak Unit, where the most suitable habitat is located. The rugged terrain and lack of extensive harvest of ponderosa pine in the Laramie Peak Unit retain good habitat and potential habitat. The 2002 Hensel wildfire burned 12,794 acres on the MBNF (and an additional 2,061 acres on adjacent State or privately-owned land). This should have created good habitat for Lewis' Woodpecker**.**

### Habitat

Lewis' Woodpeckers are birds of open forest, typically open ponderosa pine, burned forest, and riparian stringers of cottonwood. Reproduction is much higher in burned areas than in cottonwood (Saab and Vierling 2001), suggesting that this is the primary habitat for the species. Other habitat includes open old lodgepole pine and aspen.

On the MBNF, there are 408 acres of cottonwood. The Lewis' Woodpecker on the Forest lives in open ponderosa pine and in recently burned areas. At low elevation, stands of ponderosa pine that were open in the past may not have a dense understory, making them unsuitable for this species. Removal of this understory (by logging or burning) improves habitat for the species. The furrowed bark on old trees provides sites for storage of winter food. Stand-replacing burns create habitat that is very productive in the short term, but when the insect outbreak falls off the area declines in suitability for the Lewis' Woodpecker.

The species nests in snags, using old flicker cavities or natural cavities. It only occasionally excavates its own nest.

### Threats, limiting factors, and vulnerabilities

Fire suppression reduces the abundance of open-structured ponderosa pine by allowing the invasion of an understory in ponderosa pine stands that historically experienced fir frequently enough to burn off invading shrub and conifers. . Removal of snags and old forest and post-burn salvage sales reduce the amount and quality of habitat. Firewood collection of snags from low elevation forest and riparian cottonwood removes nesting habitat.

### Changes from HRV in factors that may affect the species

The increased density of ponderosa pine stands, reduction of snags, and removal of large old trees. In some areas, lack of recent fire has reduced open habitat.

Primary references used are Anderson (Anderson and Linder 1997), Tobalske (1997), Welp et al (Welp, Fertig et al. 2000), and Region 2 Species Assessments

(USDA Forest Service 2000).

**Environmental Consequences and Viability**

**Direct and indirect effects.** Timber harvest may remove overstory pine and snags in most of the alternatives. Alternative D FEIS has no scheduled timber harvest in the Laramie Peak Unit, the only part of the MBNF where this species occurs. Firewood collection would continue to remove snags under any of the alternatives, though all alternative (except alternative A) prohibit felling snags in riparian areas. Areas burned by wildfire would be subject to salvage sales that would remove the post-fire habitat that is prime breeding and foraging habitat for this species. Continued fire suppression and on adjacent ownerships will contribute to the on-going trend toward denser understories in low-elevation ponderosa pine.

Restoration activities, mechanically removing the understory from the low-elevation stands, and re-introducing low-intensity fire that remains close to the ground, is emphasized in alternative E, and to a lesser extent in alternative D. These activities would provide good habitat for this species. However, in many cases the understory trees are too small to be commercially desirable, and removal of this material is labor-intensive and expensive. Until a market develops for this small material, restoration is expected to be limited by funding to fuel reduction near structures and the forest boundary. Given these factors and the lack of motorized access to much of the area, these actions are not expected to be extensive under any alternative.

Some alternatives (E, F, and G) will "allow natural processes to occur." However, with fire, it is not clear how much of this is possible and will be consistent with safety, protection of property, and other forest uses. In this habitat, allowing wildfire without mechanical treatment of the understory would be detrimental to the Lewis' Woodpecker.

**Cumulative effects.** Past fire suppression on all ownerships has allowed development of a taller and denser understory in low-elevation ponderosa pine than typically occurred at a broad scale under the natural pattern of fire. Stands have gradually become less open than habitat selected by Lewis' Woodpecker. In addition, the understory will be very likely to carry a fire that reaches the stand up into the canopy, killing the large, older ponderosa pine. Fire suppression has also reduced the frequency of the patchy burns typical of a naturally-functioning ponderosa pine community. Combined with salvage logging, this has reduced the very productive post-burn habitat favored by these woodpeckers.

Past grazing on all ownerships has reduced the regeneration of cottonwoods, the other commonly used habitat for Lewis' Woodpecker.

**Protection in the Alternatives.** All alternatives except Alternative A and F provide for protection of snags in riparian zones, retention of more snags, more snag recruits, and more old growth in ponderosa pine forest than the 1985 plan. Alternatives E and F allow natural disturbance and will salvage little or no burned forest.

Evaluation criteria for the Lewis' Woodpecker are restoration emphasis, retention of post-burned low elevation forest, and level of tolerance of fire and insects. Most of the suitable habitat and all known sightings are in the Laramie Peak Unit. Much of the potential habitat has burned in the last few years. This area is not scheduled for timber harvest. Post-fire salvage may occur, but much of the area is rough and unroaded. The differences among the alternatives are not great.

Table I-42 Viability and outcome conclusions for the Lewis Woodpecker

| | Alt A, B, C, D DEIS, D FEIS | Alt E | Alt F |
|---|---|---|---|
| Abundance and distribution | Reduction of habitat to fire suppression and salvage of burned forest at low elevation | Limited opportunity for thinning to reduce risk of stand replacing fire; more tolerance of natural process retains and creates habitat. | Loss of open ponderosa pine (long-term habitat) to stand replacing fires if wildfire allowed to burn without preceding removal ladder fuel in understory; however, increase in but short-term (used for 5 to 10 years) habitat with retention of post-burn and insect-killed trees. |
| Likelihood of persistence-15 yr. | Very likely | Very likely | Very likely |
| Likelihood of persistence-long-term | Likely | More likely | More likely |
| Effect on individuals and populations | MAII | MAII | MAII |
| Certainty | Moderate | Moderate | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing;*

## Black-backed Woodpecker - *Picoides arcticus*

### Status and distribution of species

Black-backed Woodpeckers are widespread at low density in coniferous forest across North America. Reed (1995) rated 74 bird species in the Great Basin for vulnerability to local extirpation. In that setting (isolated mountain-top islands of suitable habitat, with only one of these patches currently occupied) the Black-backed Woodpecker (tied with the Three-toed) ranked 6$^{th}$ in vulnerability score, based on its specialized habitat and diet and its low population where it occurs (though this vulnerability is also because it was already missing from most of the ranges).

Abundant in recent burns (1 to 6 years post-burn), the species is also found in areas of insect-killed forest (Lester 1980) and in old forest (Hoyt and Hannon 2002)

### Status and distribution on the MBNF

The Black-backed Woodpecker has been on the Regional sensitive species list, but

has not been considered a resident of the MBNF. There are no historic records that indicate whether the bird was a regular breeder here in the past.

The species is very uncommon on the forest (2 sightings by Steve Loose and possible sighting(s) on the Laramie Range). However, good habitat (areas burned by lethal fire in the preceding 1-8 years) has been lacking. There may be a dispersed, inconspicuous population.

In 2003, the Gramm fire occurred on the MBNF near Foxpark. The area was surveyed for woodpeckers several times in August-early November. Numerous Hairy and American Three-toed Woodpeckers were found concentrated in the area, but no Black-backed Woodpeckers were found. Since the Black-backed Woodpeckers specialize on a later developmental stage of beetle than the other species, it is possible that the species could appear in 2004. Most studies on post-fire woodpeckers do not survey immediately after the fire. However, in one study a pair was not only present but initiated nesting within two weeks following a June fire. Another found the species present in November, four months after a fire. Whether a delay in shifting to burned habitat is typical is not known.

MBNF lands may not have supported a viable population under natural patterns of disturbance. In most years, only 50 to 500 acres burned on the MBNF (von Ahlefeldt and Speas 1996). Every few decades this acreage might increase substantially for a few years, and very infrequently (every few hundred years), extensive acrages would burn during a warm, dry interval (Dillon et al 2003). This pattern of creation of prime habitat (forests that burned in a lethal fire 1-6 years before) may not have sustained a consistent viable population of Black-backed Woodpeckers even before the environmental changes that followed European settlement. If the area has always been unsuitable habitat, a persistent reproducing population is not expected to occur today. The species may have had a continuous breeding population that fluctuated with its ephemeral habitat, or it may always have occurred only as a vagrant.

**Habitat and natural history**

Black-backed Woodpeckers are yearlong residents in coniferous forest. They may be found at low density in lodgepole and other pines and in mixed conifer forest (Bock and Bock 1974) and in patches of trees that have been killed by insects or by flooding. In Alberta, they were found in old growth if no burned areas were available nearby, but none were found in old growth within 50 km of a recent burn: density in old forest was less than half that found in burns (Hoyt and Hannon 2002). In the western U.S., Black-backed Woodpeckers are regularly found and are abundant only in recently burned forest with dead or damaged trees over 9" dbh. (Hutto 1995; Murphy and Lehnhausen 1998). In the first few years after a fire, the numbers of many woodpeckers rise dramatically (Koplin 1969; Apfelbaum and Haney 1981; Raphael, Morrison et al. 1987). Though the Black-backed is never common, it is regularly seen in burns, with the population rising to peak about 5-6

years after the fire. Black-backed Woodpeckers select larger trees than Three-toed Woodpeckers, do not use early successional stands, and remain longer in burns than Three-toed Woodpeckers (Hoyt and Hannon 2002). Little is known of how the birds locate patches of this ephemeral habitat.

Black-backed Woodpeckers specializes on large wood-boring beetle larvae typical of beetles that are attracted to fires and start to lay eggs while the trees are still smoldering (Powell 2000). The woodpeckers spend a majority of foraging time "scaling" bark (Bull, S.R. Peterson et al. 1986), but the bulk of their food is composed of large larvae extracted from chambers within the trunk obtained by drilling (Powell 2000). As a result, unlike other woodpeckers, the Black-backed is not abundant in insect infestations like mountain pine beetle outbreaks. A few pairs may be present, but abundance is far lower than in burned areas (Lester 1980).

This species uses unsalvaged burned areas but not adjacent burned areas that have been thinned by salvage logging (Hitchcox 1996). Of the woodpecker species inhabiting a burned forest, the Black-backed Woodpecker was the most sensitive to the removal of standing burned trees, nesting only in the densest (unsalvaged) stands. (Hitchcox 1996; Saab and Dudley 1998). Nest trees are larger than those used by Three-toed Woodpeckers (averaging 14.6" in the Northwest, (Marshall 1992)), but they will use smaller trees than many other woodpeckers, sometimes as small as 8". These woodpeckers excavate nesting cavities in snags (trees that were dead prior to the fire); in subsequent years, these cavities are used by secondary nesters and by birds and small mammals using communal winter roosts.

**Threats, limiting factors, and vulnerabilities**

The primary threats are from fire suppression, salvage logging, and removal of snags. Unlike many woodpeckers, which forage opportunistically on burned forest, in the western United States this species rarely nests outside of burns (Hutto 1995). The Black-backed Woodpecker is one of the most fire-dependent species known (Powell 2000). Removal of snags and old forest, fragmentation of blocks of mature/old forest, and salvage sales reduce the amount and quality of habitat. The stand characteristics that are preferred by this species (larger trees, moderate intensity of burn that leaves bark on the trees) are the same as those preferred for salvage logging. Firewood collection of snags removes potential nesting habitat.

**Changes from HRV in factors that may affect the species**

Burned stands are rarer than in the past because of fire suppression and salvage logging. The area burned annually on the Medicine Bow varied tremendously during recent centuries. During wet, cooler periods, the recently-burned acreage may have been too small to support a consistent population. The limited area of burned forest may also be because lower probability of fires in the existing large area of even-aged relatively young forest (100-120 yrs old). At a broad scale, two habitat types that are becoming rare in boreal forest are post-burn early-successional stands and old growth (Schmiegelow and M 2002), the two types used by this species.

Primary references used are Welp et al (2000) and those cited above.

**Environmental Consequences and Viability**

Given the apparent rarity of this species and the lack of information about its abundance on the forest in the past, it is not clear whether there was ever a viable population of Black-backed Woodpeckers on the MBNF.

**Direct and indirect effects**. Salvage and fire suppression will continue in all alternatives and will reduce the habitat potential for this species. Even in Alternative F (which allows most natural processes), fires will be suppressed to protect structures and provide for public safety.

Table I-43 Stand replacing fire by alternative

| | A | B | C | D DEIS | D FEIS | E | F |
|---|---|---|---|---|---|---|---|
| 50 yr cumulative stand replacing fire (acres). | 13,065 | 18,135 | 23,855 | 31,070 | 29,250 | 31,005 | 48,035 |

Alternatives A and B would have the least wildfire (unless conditions are dry and hot, when fire suppression would be ineffective) and a heavy emphasis on salvage. Recently burn forest is expected to be highest in Alternative F, which also would retain the most from salvage. (Salvage might occur in Alternative F, probably only to reduce fuel to provide human safety.) Alternatives C, D DEIS, D FEIS and E are intermediate.

**Cumulative effects**. Fire suppression, salvage logging, and efforts to restrict the spread of insect and disease have prevented the creation of habitat suitable for the Black-backed Woodpecker in the past and on adjacent private and public land. Lack of burned habitat can be reversed within a few years, by designing prescribed fires to burn some standing fire or by allowing wildfire to burn in areas where this does not threaten property or safety. Therefore the necessary duration of past and present activities detrimental to the Black-backed Woodpecker can be short. However, recovery may be slow if the current population has been greatly reduced from the past (this is not known).

**Protection in the Alternatives.**

All alternatives except Alternative A and F provide for protection of snags in riparian zones, retention of more snags, more snag recruits, and more old growth in spruce fir forest than the 1985 plan. Alternative F allows natural disturbance and will salvage little or no burned forest, creating good foraging habitat after fire and insect epidemics. To a lesser extent, Alternatives D FEIS, D DEIS, and E will allow natural processes. These alternatives will salvage less burned forest than Alternatives A, B, and C, retaining valuable habitat for the species.

In the absence of information on the presence of a historic population, making viability predictions is not meaningful. The sightings of two birds (S. Loose) suggest that either there is an inconspicuous low-density population on the Forest, or the

birds move widely looking for high-qualtiy habitat and could increase if recntly burned forest were available. Monitoring of burns (including the 2003 Gramm burn on the Laramie RD) will include surveys of woodpeckers.

Evaluation criteria for the Black-backed Woodpecker are availability of post-burn habitat, abundance of insect killed trees, and protection of snags.

Table I-44 Viability conclusions for the Black-backed Woodpecker

| | Alts A, B and C | Alts D FEIS, D DEIS, E | Alt F |
|---|---|---|---|
| Abundance and distribution | Very rare; little burned habitat is likely because much of the forest is in timber management emphasis, with likely loss of snags and salvage of burns, | More area with natural process. Especially in E, more ecological emphasis. Less salvage. | Most area with natural process and little or no salvage. Most abundant and broadest distribution. |
| Likelihood of persistence- 15 yr. | Uncertain whether a self-sustaining population occurs now. Least provision for burned forest habitat | Likely, if there are enough birds present to colonize burned areas, and enough wildfires. | More likely, if there are enough birds present to colonize burned areas and enough wildfires. |
| Likelihood of persistence-long-term | Uncertain | Likely, if there are enough birds present to colonize burned areas, and enough burns. | Likely, if there are enough birds present to colonize burned areas and enough fires. |
| Effect on individuals and populations | Assuming that natural processes supported a viable population these alternatives may cause loss of viability at the planning area or rangewide or a trend toward Federal listing. However, there may not have been an historic viable population. | MAII | MAII – may be beneficial compared to 1985 Plan, depending on achieved extent of fire. |
| Certainty | Low | Low | Low |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## American Three-toed Woodpecker - *Picoides dorsalis*

### Status and distribution of species

The species is widespread at low density in boreal and subalpine forest across North America. Reed (Reed 1995) rated 74 bird species in the Great Basin for vulnerability to local extirpation. In this setting (mountaintop islands of suitable habitat with only one site occupied) the American Three-toed Woodpecker (tied with the Black-backed) ranked 6$^{th}$ in vulnerability score, based on its specialized habitat and diet and its low population where it occurs (though this vulnerability is also because it was already missing from most of the ranges).

### Status and distribution on the MBNF

The species is a yearlong resident, known to breed on the forest.

**Habitat and natural history**

American three-toed Woodpeckers are yearlong residents in old forest, primarily spruce-fir (and other subalpine or boreal forest) (Bock and Bock 1974), (Hoyt and Hannon 2002), or in any burned forest. Their reliance on insects that inhabit bark may link them to old stands (with a high incidence of dying trees that provide habitat for prey), areas of bark-beetle kill, and recently burned stands. Population density increases greatly following fire (Koplin 1969). Three-toed woodpeckers observed in a stand that had burned 2 years before spent 97% of the time (of 72 hours of observation) on fire-killed trees (Koplin 1969).

American three-toed Woodpeckers excavate cavities for nesting in snags; in subsequent years, these cavities are used by secondary nesters and by animals using communal winter roosts. On the MBNF, nests were primarily in aspen and foraging was primarily in spruce-fir (Loose 1993).

**Threats, limiting factors, and vulnerabilities**

The primary threats are from logging activities. Removal of snags and old forest, fragmentation of blocks of mature/old forest, and salvage sales reduce the amount and quality of habitat.

**Changes from HRV in factors that may affect the species**

Reduction in amount of post-fire habitat has removed prime habitat. Removal of snags (in harvested areas) has reduced potential nest sites. The amount of old forest is believed to be within the range typical of the past; but patch size and interior forest have been reduced. At a broad scale, two habitat types that are becoming rare in boreal forest are post-burn early-successional stands and old growth (Schmiegelow and M 2002), the two types used by this species. Old forest have declined in area on the Medicine Bow. Though the current area may not be outside of HRV, it is at the low end; maintaining old growth at the low end of the range over long periods would be out of HRV in terms of long-term patterns (Dillon, Knight et al. 2003).

Primary references used are Finch (Finch and Stangel 1992), Welp et al (Welp, Fertig et al. 2000), and Region 2 Species Assessments.

**Environmental Consequences**

**Direct and indirect effects.** Logging in old growth spruce fir forest will remove existing foraging habitat. Removal of snags by firewood collectors, in timber harvest, and for safety, removes nesting habitat. Regeneration of aspen would remove nest sites. Fire suppression, salvage logging, and efforts to restrict the spread of insect and disease reduce foraging habitat.

**Cumulative effects.** Past logging in old growth spruce fir forest has removed foraging habitat. Removal of snags for firewood, in timber harvest, and for safety, has removed nesting habitat. Regeneration of aspen may have remove nest sites.

Fire suppression, salvage logging, and efforts to restrict the spread of insect and disease have reduced potential foraging habitat. Similar activities on the adjacent Routt NF and on other ownerships have had the same effects. Removal or fragmentation of old forest and felling of large snags have had effects that will persist for centuries. Removal of trees in advance of insect infestation defers the development of good foraging on the site for at least a century. Salvage logging of burned stands removes a flush of food and a related 5 to 10- year pulse of breeding at high local density on the site for at least a century.

**Protection in the Alternatives**

Alternative F allows natural disturbance, creating good foraging habitat after fire and insect epidemics. This alternatives will salvage little or no burned forest, retaining valuable habitat for the species.

Evaluation criteria for the American Three-toed Woodpecker are the retention of snags and late successional spruce-fir forest, emphasis on natural disturbance, and retention of burned forest.

Predicted wildfire is least in alternatives A, B, and E. It is intermediate in Alternative C, D DEIS, and D FEIS, and most in Alternative F. However, less of the post-fire habitat would be retained in alternative C than in Alternative D DEIS, D-DFEIS, and E because of the much greater acreage allocated to strong timber emphasis, MA 5.13, (over twice as much in C as in D DEIS or E). Based on predicted fire, retention of old forest (related to lower ASQ and difference in standards) and likelihood of retention of burned forest (and inverse of amount of MA 5.13) the alternatives most favorable to the American Three-toed Woodpecker are, in order F, E, D DEIS, and D FEIS.

Table I-45 Viability and outcome conclusions for the American Three-toed Woodpecker

| | Alt A | Alts B and C | Alts D FEIS, D DEIS, E | Alt F |
|---|---|---|---|---|
| Abundance and distribution | Habitat reduced and less continuous than present. Decrease in population and distribution with removal of old growth. Lowest retention of old growth spruce fir (10%) and snags. | More retention of old growth spruce-fir (20%) and snags than Alt A. Reduced abundance and distribution. | Allow some fire and insect kill (beneficial to TTWO). Old growth in spruce-fir 20% in D DEIS and E, 25% in D_FEIS. | Burns, little or no salvage, no cutting or existing old growth, and reduced overall harvest provide mosaic of burned and old forest. |
| Likelihood of persistence-15 yr. | Very likely | Very likely | Very likely | Very likely |

| | Alt A | Alts B and C | Alts D FEIS, D DEIS, E | Alt F |
|---|---|---|---|---|
| Likelihood of persistence-long-term | Likely, but populations reduced and more isolated | Likely | More likely | Very likely |
| Effect on individuals and populations | MAII | MAII | MAII | MAII |
| Certainty | Moderate | Moderate/High | Moderate/High | Moderate/High |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

The Three-toed Woodpecker is proposed as a Management Indicator species for old growth, snags, and recently burned forest.

## Olive-sided Flycatcher - *Contopus cooperi*

### Status and distribution of species

The Olive-sided Flycatcher is a widespread breeding bird in spruce fir forests of Canada, Alaska, and the mountains of the western U.S. Breeding Bird Survey data indicate a population decline of 70% since 1966. The Olive-sided Flycatcher is not a species of extreme concern in Wyoming, with a heritage ranking of S3/S4. The species winters in Central and South America. The cause of the decline in population is not known and may be related to effects on the wintering ground. However, Reed (Reed 1995) rated 74 bird species in the Great Basin for vulnerability to local extirpation and gave the Olive-sided Flycatcher the highest vulnerability of any species, based on its specialized habitat and diet, its low population where it occurs, its susceptibility to cowbird parasitism, as well as its migratory habit.

### Status and distribution on the MBNF

The species is found in appropriate habitat across the forest.

### Habitat and natural history

The species is associated with older spruce-fir forest with abundant snags that are used as a perch for flycatching. Olive-sided Flycatchers prefer edges and openings with scattered trees, where they perch on treetops, flying up to capture passing insects from the air. Population increase following fire (Raphael, Morrison et al. 1987). Burned areas support high densities of these flycatchers compared to other sites (Apfelbaum and Haney 1981), as do natural openings around ponds, beaver ponds, and windfall (Peterson and Fichtel 1999).

### Changes from HRV in factors that may affect the species

Lack of burned areas in spruce-fir and lodgepole would remove the pulses in population that historically resulted from the high density and productivity following

burns. However, whether the edge created by logging is used in a similar way to edges along bogs, meadows, and other natural openings is not known. A study in Oregon (cited in R2 Sensitive Sp reports) showed higher nesting success in post-fire than in post-logging habitat.

**Threats, limiting factors, and vulnerabilities**

Fire suppression reduces forest openings. Salvage logging removes habitat that is highly productive for the species prey and is and structurally suitable (many foraging perches in an open habitat) (USDA Forest Service 2000). Snags are cut in forested areas along edges of units to reduce safety hazard to loggers, reducing perches adjacent to created openings.

Primary references used are von Ahlefeldt (Von Ahlefeldt and Speas 1996), Cerovski (Cerovski, Gorges et al. 2001), and Region 2 Species Assessments.

**Environmental Consequences and Viability**

Evaluation criteria for the Olive-sided Flycatcher include retention of snags, acceptance of natural processes, retention of burned stands, retention of insect and disease-killed stands (open structure with perches). Logging that creates small openings creates edge favored for foraging, but removes a larger number of snags per area of forest harvested, including those used as foraging perches along the edge of created openings. Lack of information on the reasons for rangewide decline makes predictions uncertain.

Table I-46 Viability and outcome conclusions for the Olive-sided Flycatcher

| | Alts A, B, C | Alts D DEIS, D FEIS, E, | Alt F |
|---|---|---|---|
| Abundance and distribution | Reduced population in timber emphasis MAs | Acceptance of fire and insect outbreaks on more acres increases abundance and distribution. | Acceptance of fire and insect outbreaks on still more acres increases abundance and distribution. |
| Likelihood of persistence-15 yr. | Very likely | Very likely | Very likely |
| Likelihood of persistence-long-term | Likely | More likely | Most likely |
| Effect on individuals and populations | MAII | MAII | MAII/BI |
| Certainty | Low | Low | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing; BI, beneficial impact.*

## Brewer's Sparrow - *Spizella breweri*

### Status and distribution of species

Brewer's Sparrows are widespread in the intermountain West and Great Basin. The species population is declining nationwide, possibly related to loss of habitat.

### Status and distribution on the MBNF

Brewer's Sparrow is a common summer resident that is closely associated with sagebrush. They are abundant in sagebrush that is tall and vigorous, but no quantitative surveys have been conducted. The species has been reported in the Pole Mountain, Encampment River, and Brush Creek GAs. There is no information on local population trend.

### Habitat

Brewer's Sparrows inhabit open shrubland, primarily sagebrush. Nests are located low in a shrub (sagebrush, mountain mahogany). Territories may be found far from open water because the birds obtain necessary water from food (insects in the summer).

### Changes from HRV in factors that may affect the species

Reduction of sagebrush in conversion to agriculture and alteration in habitat structure (thinning and burning to promote livestock forage) has affected the Brewer's Sparrow across much of its range in the United States. On the MBNF, there is no information on the historic variety of structural types in grass/shrub/sagebrush habitat.

### Threats, limiting factors, and vulnerabilities

Grazing and prescribed burning in sagebrush affect the amount and quality of habitat for the Brewer's Sparrow.

Primary references used are Paige and Ritter (Paige and Ritter 1999), P. Hayward (Hayward 2000), Welp et al (Welp, Fertig et al. 2000), Cerovski et al (Cerovski, Gorges et al. 2001), and the Species Conservation Project, and the R2 Species Conservation Project species assessments (USDA FS 2001).

### Environmental Consequences and Viability

### Direct effects

Spring prescribed burns may destroy nests and adversely alter habitat at the site for several decades. Lack of fire and/or grazing can result in stands too dense to be optimal for the Brewer's Sparrow.

### Cumulative effects

The Brewer's Sparrow's widespread decline and its dependence on sagebrush with

certain structure indicate that is of concern. However, information on its local status and distribution is needed. The RMBO bird monitoring program may provide some information on current occurrence and trend.

All alternatives have a similar burning program and are likely to provide habitat for the Brewer's Sparrow. Effects of burning on the species' habitat will be assessed prior to prescribed fires.

Table I-47 Viability and outcome conclusions for the Brewer's Sparrow

| | **All alternatives** |
|---|---|
| Abundance and distribution | Abundant in suitable habitat |
| Likelihood of persistence- 15 yr. | Very likely |
| Likelihood of persistence-long-term | Very likely unless cumulative effects from removal of sagebrush on other ownerships depress the population |
| Effect on individuals and populations | MAII |
| Certainty | Moderate |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Sage Sparrow - *Amphispiza belli*

### Status and distribution of species

Sage Sparrows occur in the intermountain west from Idaho and Washington south to Baja and northwestern Mexico. BBS data showed a decline from 1966 to 1979, but an increase from 1980 to 1996. Over the whole interval, there was no significant change. However, Christmas Bird Counts show a decline during the interval 1959-1988.

### Status and distribution on the MBNF

Uncertain. According to Paige and Ritter (Paige and Ritter 1999), the upper elevational range is 6,500 feet. However, the species has been recorded in low numbers on a Breeding Bird Survey route about half of which was on the Laramie RD; whether the occurrence was inside the Forest is not given with the data (stop-by-stop data were not available for this BBS route.).

### Habitat

The Sage Sparrow is a sagebrush obligate, nesting in dense, tall stands of big sagebrush and low grass cover. Sage Sparrow nests are usually low in a shrub but may be on the ground or, with overhead cover, higher in tall shrubs.

### Changes from HRV in factors that may affect the species

Reduction of sagebrush in conversion to agriculture and alteration in habitat structure (thinning and burning to promote livestock forage) has affected the Sage Sparrow across much of its range.

### Threats, limiting factors, and vulnerabilities

The amount and quality of habitat for the Sage Sparrow is affected by grazing and prescribed burning in sagebrush. Conversion of sagebrush to agricultural land and removal of old dense stands of sagebrush are major threats across the species' range.

Primary references used are Paige and Ritter (Paige and Ritter 1999), Cerovski et al (Cerovski, Gorges et al. 2001), and the R2 Species Conservation Project species assessments (USDA FS 2001).

### Environmental consequences and viability

**Direct effects**. Burning of dense tall sagebrush would adversely affect habitat suitability for the Sage Sparrow. The Forest does not have data on the age and structure class distribution on shrub communities, but most of the sagebrush is low and patchy.

**Cumulative effects.** Habitat conversion to agriculture and burning to increase ungulate forage (for livestock and big game) on other ownerships have decreased the rangewide population. Whether the bird was ever abundant on any part of the MBNF is unclear.

Information on its local status and distribution is needed. The RMBO bird monitoring program may provide some information on current occurrence and trend. Prior to prescribed burning and other projects, surveys for this newly listed Sensitive species will be needed. Effects of burning on the species' habitat will be assessed prior to prescribed fires.

Table I-48 Viability and outcome conclusions for the Sage Sparrow

| | All Alternatives |
|---|---|
| Abundance and distribution | Current status unknown. Little suitable habitat probably available. |
| Likelihood of persistence- 15 yr. | If currently present, likely to persist. Increase likelihood since listed as Sensitive. |
| Likelihood of persistence- long-term | Unknown |
| Effect on individuals and populations | MAII – expected to be rare, and will be managed for where detected. |
| Certainty | Low |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

## Loggerhead Shrike - *Lanius ludovicianus*

### Status and distribution of species

Loggerhead Shrikes are summer residents in southern Canada, and the western, central, and southeastern U.S. Population decline began in the 1930's and accelerated beginning in the 1960's. This is one of the few species for which BBS data show a significant decline over most of the states and provinces in which it

occurs (3.5 to 5% loss per year). The species winters in the southern U.S. and Mexico. Its range has remained constant, but the numbers of birds are declining.

**Status and distribution on the MBNF**

Loggerhead shrikes occur in the Laramie and Sherman Mountains and may occur along the periphery of the other mountain ranges. No nesting has been recorded.

**Habitat**

Loggerhead Shrikes are residents of open country with scattered perch sites. Like raptors, they prey on small mammals, small birds, and large insects. However, lacking talons to hold the prey while it is eaten, they secure captured animals on thorns or barbed wire while they tear off flesh. Impaled food may be stored and eaten later.

**Changes from HRV in factors that may affect the species**

Across the species range, conversion of breeding habitat to agricultural use is suspected as the main cause of the sharp decline. Overgrazing and management to increase forage has reduced habitat quality by removing shrubs (Welp 2000).

**Threats, limiting factors, and vulnerabilities**

Prescribed burning and grazing are activities that affect the species habitat.

Primary references used are Ehrlich et al (Ehrlich and Daily 1988), von Ahlefeldt (Von Ahlefeldt and Speas 1996), Welp et al (Welp, Fertig et al. 2000) and Region 2 Species Assessments.

**Environmental Consequences and Viability**

The Loggerhead Shrike's rarity in most of Wyoming and dramatic national declines suggest the species is of viability concern. However, the lack of local information on occurrence and breeding make it impossible to assess the contribution of Forest Service actions on the MBNF to species viability. Effects of burning on the species' habitat will be assessed prior to prescribed fires.

**Direct and indirect effects**. Livestock management and prescribed burning of open shrub/grass habitat affect shrikes.

**Cumulative effects**. Past management of range has removed vertical structure (shrubs), introduced vertical structure (fences), or modified vegetation from HRV by grazing and burning. Land use conversions from rangeland to agriculture or residential use have also reduced available habitat.

Evaluation Criteria for the Loggerhead Shrike are grazing practices and use of prescribed burning. Although different, the alternatives do not have distinguishable effects on viability or effects on individuals or populations. Without a more certain understanding of the reasons for the species' decline, certainty on viability estimates is low.

Table I-49 Viability and outcome conclusions for the Loggerhead Shrike

| | Alts A, B, C, D DEIS, D FEIS | Alts E and F |
|---|---|---|
| Abundance and distribution | Grass/shrub treatments designed for grazing and ecological restoration | Grass/shrub objectives driven by ecological restoration |
| Likelihood of persistence-15 yr. | No change from present | No change from present |
| Likelihood of persistence-long-term | No change from present related to MBNF actions | No change from present related to MBNF actions |
| Effect on individuals and populations | MAII | MAII |
| Certainty | Low | Low |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

# Sensitive Amphibians

## Northern Leopard Frog - *Rana pipiens*

### Status and distribution of species

Northern leopard frogs are common throughout Canada and the northern U.S, extending south along the Rockies into Wyoming and Colorado. However, the species is declining portions of their historical range and some populations have disappeared. In Montana, many northern leopard frog populations disappeared during the 1970's and 1980's.

### Status and distribution on the MBNF

Northern leopard frogs are present on the Medicine Bow Range but numbers are low and declining. The species has been found in beaver ponds and wetlands in the Sherman Mountains, Foxpark, and Lake Owen. The population in the Laramie Basin has declined since the 1970's. This species appears to be widespread but less common in the Sierra Madre, Medicine Bow Mountains, and Laramie Range. Most sightings of northern leopard frog in the Forest (montane habitats) have occurred during surveys for other amphibian surveys or during planning for proposed land management activities. There are insufficient available data to describe population dynamics or to predict species persistence in the Forest.

### Habitat

The northern leopard frog is typically found in foothill and montane habitats to about 9,000 feet elevation in Wyoming (Baxter and Stone 1985). Northern leopard frogs breed in small ponds and marshes that have abundant wetland and riparian vegetation. In the MBNF, breeding and rearing habitats are often beaver ponds that have emergent vegetation along well-developed shorelines. Often, the northern

leopard frog can be found along the edges of marshes and wetlands associated with lakes and reservoirs. Sometimes, northern leopard frogs are found in wet meadows. Northern leopard frogs hibernate in mud at the bottom of ponds and emerge in late spring.

**Changes from HRV in factors that may affect the species**

Introductions of non-native, predatory fish and alteration of natural ponds may have affected the abundance and distribution of northern leopard frogs.

**Threats, limiting factors, and vulnerabilities**

The northern leopard frog is vulnerable to a variety of threats, limiting factors, and vulnerabilities. Pathogenic threats, such as bacterial infections and chytrid fungus can cause mortality in juveniles and adults. In addition, predation due to mammals, snakes and birds can cause excessive mortality, especially when suitable habitats are concentrated in a relatively small area. Alterations in groundwater and surface-water hydrology due to well development, irrigation, and climate change can adversely impact the abundance, distribution, and quality of wetlands and ponds. Other multiple-use activities such as logging (timber harvest and associated road construction adjacent to breeding sites), livestock grazing (animals trampling riparian and wetland areas), and recreation (collecting frogs) can adversely affect this species and its habitats. Finally, there may be unknown factors (e.g., environmental, biological) acting synergistically with known factors to sustain continued declines in populations of northern leopard frogs.

**Environmental Consequences and Viability**

Northern leopard frogs are still found throughout much of the MBNF. Until factors suspected of causing amphibian decline across the United States are better understood, Forest managers may not be able to affect abundance and distribution of the species.

Evaluation criteria for the northern leopard frog are water quality and presence of predatory fish. All alternatives will affect the northern leopard frog in the same way. The species is of viability concern because of widespread decline across the country. In the absence of knowledge of the causative factors, a "high likelihood" of persistence cannot be ensured. However, standards and guidelines protecting water quality and riparian zones along with restoration of beaver are contributions to the species viability on the MBNF.

The preferred alternative (D FEIS) and the other revision alternatives are expected to have similar effects the northern leopard frog habitats and populations: negligible.

**Effects of Proposed Management Actions**

Given the Forestwide standard that proscribes habitat alterations within 300 feet of riparian areas and wetlands, none of the Forest Plan revision alternatives should adversely impact northern leopard frog populations and habitats. Additionally,

because of the wood frog's limited distribution in the Forest, their habitats and populations are well known and can be protected at the project scale of analysis as well as Forestwide scale.

**Direct Effects:** Neither the preferred alternative (D FEIS) nor the other alternatives are expected to have deleterious effects on northern leopard frogs and their habitats in the MBNF. Substantial protection to all Forest amphibians is provided by the standards (300-feet buffer) and guidelines; the wetland and riparian area standard offers unprecedented protection for Forest amphibians.

**Indirect Effects:** Indirect effects to northern leopard frogs and their habitats are expected to be negligible given implementation of the preferred alternative (D FEIS) or any of the other revision alternatives. None of the management prescriptions in northern leopard frog habitats (Geographic areas located in the Medicine Bow Mountains) should adversely impact wood frogs provided the riparian/wetland standard is in force.

**Cumulative Effects:** Local climate change and drought could adversely affect northern leopard frog populations in ponds (natural and man-made) and reservoirs. Wetlands, stock ponds, and beaver ponds provide northern leopard frogs with important breeding and rearing habitats. As long as the riparian/wetland standard is in force, Forest management and multiple-use activities should not adversely impact northern leopard frogs and their habitats. An exception to the aforementioned statement could be the inadvertent spread of pathogens such as chytrid fungus by Forest users. As more people use the Forest, it is reasonable to assume that some adverse impacts to this species will occur.

**Determination of Effects and Rationale**

Implementing the preferred alternative (D FEIS) or any of the other alternatives "may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, or cause a trend to federal listing or a loss of species viability rangewide". Northern leopard frog populations and distributions have declined in the MBNF in the past twenty years or so; amphibian surveys conducted by Forest personnel have not located many montane populations of northern leopard frogs. The revision riparian/wetland standard (Forestwide) is much more stringent than the standard in effect under the 1985 Forest Plan; the revision standard provides for a 300-feet buffer versus a 100-feet buffer specified in the 1985 plan.

## Wood Frog - *Rana sylvatica*

**Status and distribution of species**

Wood frogs distribution is patchy in Canada and in the northern U.S. In Region 2 (U.S. Forest Service), a single isolated population is restricted to montane and subalpine habitats in the Medicine Bow Mountains (WY) and north central Colorado (in the vicinity of North Park CO.).

**Status and distribution on the MBNF**

An isolated, glacial relict wood frog population occupies a relatively small area of the MBNF. This population may have declined in the 1970's but, presently, seems be increasing; perhaps these population fluctuations are somehow related to the decline of the boreal toad (G. Beauvais, pers. comm.). Wood frogs appear to be common on some parts of the Medicine Bow Mountains, though they are less common in other areas. The Medicine Bow Mountains have robust population densities of wood frogs, and certain areas appear to be especially productive for this species: Stillwater Park, Long Lake, and Fox Park. While available data about wood frog distribution in the Medicine Bow Mountains are good, there are insufficient data to fully describe population dynamics or population persistence.

M. Anders Halverson, a Yale University Ph.D. candidate, is investigating the genetic relations between wood frog populations in Colorado and Wyoming. Preliminary genetic analysis suggests that the two populations are not closely related, although the genetic markers (alleles) used to make that determination were weakly polymorphic and may not justify the aforementioned supposition. Different alleles are being identified to refine the genetic analysis between the two wood frog populations. (Personal Communication with Halverson 2003).

**Habitat**

Wood frogs occupy shallow glacial kettlehole ponds and high elevation beaver ponds without fish. The wood frog breeds in cooler water than other frogs, allowing it to occupy habitat farther north and at higher elevation than other frogs. Most wood frogs are found in emergent vegetation on the north side of the pond. The frogs are tolerant of freezing temperatures. Glycogen is mobilized from the liver creating a high concentration of sugar in the cells. Ice forms in the interstitial spaces, but the cell membranes remain intact since intracellular fluid does not freeze (Halfpenny and Ozanne 1989). Unlike many amphibians, which need hibernations site that are above freezing (like the bottom of ponds or deeper burrows), wood frogs overwinter in stumps, under decomposing logs, and in shallow leaf litter.

**Changes from HRV in factors that may affect the species**

Introductions of non-native, predatory fish and alterations of breeding and rearing habitats may have affected the abundance of this species. However, present abundance and distribution may be more reflective of environmental changes that have occurred since the last glacial events.

**Threats, limiting factors, and vulnerabilities**

The restricted range of this population and its separation by hundreds of miles from other wood frog populations puts it at risk. With such a small population, an extreme natural event or disease could reduce the local numbers below a level likely to sustain a viable population. The widespread decline of amphibians worldwide and the lack of a known cause are further causes of concern. Threats include presence of

predatory non-native fish and poisoning of ponds in fish management. Possible impacts may arise from alteration of shoreline by logging and livestock. Removal of canopy near breeding ponds may reduce reproduction by raising water temperature and exposing eggs to sunlight (which increases their susceptibility to mold).

Primary references used are von Ahlefeldt and Speas (Von Ahlefeldt and Speas 1996), Welp et al (Welp, Fertig et al. 2000), and Region 2 Species Assessments.

**Environmental Consequences and Viability**

All alternatives prevent logging in riparian zones around ponds, thus retaining shade and downed wood along pond shores in subalpine forest.

The future of the wood frog on the MBNF is uncertain because of its very restricted range and likelihood of susceptibility to the causes of declines of other amphibians. Though the population seems to have increased recently, without knowing the reason for population change, the MBNF can only protect water quality and riparian areas. Eradication of existing roads and proscription of new-road construction near kettle ponds, beaver ponds, and flood-prone areas in montane subalpine forest would benefit the wood frog and its habitats.

There is no difference in effects to wood frog among alternatives. The species is of viability concern. Forestwide standards protecting riparian areas and water quality contribute to its viability, but uncertainty about its future makes it impossible to predict the likelihood of its persistence.

**Effects of Proposed Management Actions**

Given the Forestwide standard that proscribes habitat alterations within 300 feet of riparian areas and wetlands, none of the Forest Plan revision alternatives should adversely impact wood frog populations and habitats. Additionally, because of the wood frog's limited distribution in the Forest, their habitats and populations are well known and can be protected at the project scale of analysis as well as Forestwide scale.

**Direct Effects:** Neither the preferred alternative (D FEIS) nor the other alternatives are expected to have deleterious effects on wood frogs and their habitats in the MBNF. Substantial protection to all Forest amphibians is provided by the standards (300-feet buffer) and guidelines; the wetland and riparian area standard offers unprecedented protection for Forest amphibians.

**Indirect Effects:** Indirect effects to wood frogs and their habitats are expected to be negligible given implementation of the preferred alternative (D FEIS) or any of the other alternatives. None of the management prescriptions in wood frog habitats (Geographic areas located in the Medicine Bow Mountains) should adversely impact wood frogs provided the riparian/wetland standard is in force.

**Cumulative Effects:** Local climate change and drought could adversely affect wood frog habitats in kettle ponds. Kettle ponds provide wood frogs with important

breeding and rearing habitats. As long as the riparian/wetland standard is in force, Forest management and multiple-use activities should not adversely impact wood frogs and their habitats. An exception to the aforementioned statement could be the inadvertent spread of pathogens by Forest users. As more people use the Forest, it is reasonable to assume that some adverse impacts to this species will occur.

**Determination of Effects and Rationale**

Implementing the preferred alternative (D FEIS) or any of the other alternatives "may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, or cause a trend to federal listing or a loss of species viability rangewide". Wood frog populations and distribution have not materially changed in the past twenty years or so; amphibian surveys conducted by Forest personnel have not detected much change. The revision Forestwide riparian/wetland standard is much more stringent than the standard in effect under the 1985 Forest Plan; the revision standard provides for a 300-feet buffer versus a 100-feet buffer.

## Boreal Toad - *Bufo boreas boreas*

**Status and Distribution of species**

For approximately the past fifteen to twenty years, the Southern Rocky Mountain population (SRMP) of the boreal toad has been in precipitous decline in Wyoming (Livo and Loeffler 2003). Accordingly, in 1999, the SRMP was petitioned for listing under the Endangered Species Act. After reviewing the petition, USFWS determined that the species was warranted for listing but precluded because of priorities of other listings; the boreal toad is categorized as a "Candidate Species". Prior to 2002, only one known breeding site existed in the Forest. And to date, only three known active breeding sites are extant in the Forest; two presumed new breeding sites were found in 2002 based on the presence of juvenile toadlets. It is presumed that successful breeding has occurred at this site in 2002. An additional breeding site was found in 2003. All known breeding sites are located in the Medicine Bow Mountains.

In the MBNF, boreal toads have been found and positively identified in their preferred habitats. Usually, a single adult toad is found during amphibian surveys or a toad is found, inadvertently, during the execution of other fieldwork. Occasionally, more than one toad is found at a site, but these sites usually constitute active breeding habitats. Within the past decade or so, boreal toads have been collected from the Forest and submitted to the Saratoga National Fish Hatchery for captive breeding; specimens have been collected from the Medicine Bow Mountains and from the Sierra Madre, east of the Continental Divide.

The SRMP of boreal toads extends southward from southeastern Wyoming through Colorado and into northern New Mexico. Typically, boreal toads extant in southeast Wyoming appear to prefer wetland habitats –especially those created by beaver dam complexes – situated between 8,000 feet to 11,500 feet elevation (Baxter and Stone

1985). Boreal toads are included in the Regional Forester's (USFS, Region 2) Sensitive Species List; as a matter of policy and FS regulation, sensitive species warrant and receive special consideration for protection (populations and habitats) during project analysis.

**Status and Distribution in the MBNF**

Boreal toads are occasionally found in association with beaver-pond complexes in the Medicine Bow mountains and in the Sierra Madre east of the Continental Divide; boreal toads have been collected in the Sierra Madre, west of the Divide, but to my knowledge, not in several decades. Also, unconfirmed boreal toad sightings from the Laramie Range have been reported in the last decade. Presently, there are three known active breeding sites in the MBNF, both of which are located in the Medicine Bow Mountains; although neither egg masses nor tadpoles have been found at these locations, breeding is inferred because of the presence of toadlets. An additional breeding site located in the Medicine Bow Mountains has not been active in several years.

**Habitat**

In the MBNF, boreal toads appear to prefer riparian and wetland habitats (palustrine) associated with beaver pond complexes in mountain meadows and montane forests. Historical boreal toad sightings in montane kettle ponds and subalpine ponds are extant in the records. As with other amphibians, ponds and lakes that have shallow, well-developed littoral areas with abundant emergent vegetation seem to be habitats preferred by boreal toads, especially for breeding.

**Threats due to Human Activities**

Although multiple-use activities such as logging, road construction, mining, livestock grazing, and recreation can pose threats to boreal toad habitats and populations, the primary threat to the southern population appears to be the inadvertent spread of the chytrid fungus (*Batrachochytrium dendrobatidis*) into uncontaminated habitats by resource managers, anglers, hikers, and other Forest users. In addition, chytrid fungus can be spread by wildlife, and livestock. At present, little is known about the natural history and epidemiology of this fungus in the southern Rocky Mountains.

Other environmental factors such as ultraviolet radiation, acid precipitation, and predation may be important factors in the diminution of boreal toad populations in the MBNF. But, because the spread of chytrid fungus is known to cause mortality in boreal toads, at least in Colorado (Livo and Loeffler 2003), it may also be a major factor causing population declines in the MBNF. Finally, the Wyoming Game and Fish Department has suggested that boreal toads found in the MBNF be collected and turned in to the captive breeding facility at the Saratoga Fish Hatchery (USFWS facility). Total compliance with this suggestion could adversely affect wild populations in the Forest.

Although captive-breeding programs can benefit species that are declining in the wild – such as the boreal toad - there are risks to removing these species from their native habitats into captive breeding facilities. For example, it is difficult, if not impossible, to replicate natural and varying habitat conditions and associated responses by boreal toads (e.g. weather, photoperiod, predator avoidance and other behaviors) in a captive-breeding facility. Additionally, when the environmental factors that may be mediating population dynamics in boreal toads are not completely understood, successful reintroductions and translocations of captive-bred toads becomes problematic; when is it safe to reintroduce toads in the wild? Finally, boreal toads are concentrated, albeit in several holding units, in each captive breeding facility where they are held, making them hypothetically susceptible to diseases and pathogens en masse.

Boreal toads (SRMP) are being captively bred at the Saratoga Fish Hatchery and other facilities to eventually be introduced in the wild.

**Vulnerabilities due to Forest Management**

Boreal toad populations and habitats are vulnerable to the potential impacts of multiple-use activities. Typical multiple-uses and other activities such as timber harvest, road construction, livestock grazing, mining, residential development, and recreation (especially motorized, off-road travel and fishing), hypothetically, can result in adverse impacts to boreal toads and their habitats. In addition, prescribed fire and fire suppression activities can inadvertently result in adverse impacts to boreal toads and their habitats. A few more detailed examples of the hypothetical impacts to boreal toads and their habitats due to multiple-use activities are provided in the following paragraphs.

**Timber harvest** and associated activities could adversely impact boreal toads and their habitats if protections for their habitats are not undertaken. For example, timber harvest adjacent to boreal toad habitats that does not incorporate adequate buffers could reduce canopy cover that is important in moderating water temperature (for egg incubation) at breeding sites. Landings – where logs are decked – that are situated on or immediately adjacent to perennial or ephemeral ponds could inundate these habitats or pose obstacles to toads traveling among ponds. Also, road construction/reconstruction activities and road traffic could crush boreal toads and degrade their habitats due to rutting, sedimentation, and chemical spills (e.g. fuel, oil, hydraulic fluid). Finally, timber-sale roads, even closed roads, can make sale areas more easily accessible to humans and animals (wild and domestic). Humans and animals can serve as vectors that spread pathogens in boreal toad habitats, some of which can cause mortality in boreal toads.

**Livestock grazing**, especially overgrazing, can adversely affect boreal toads and their habitats. Overgrazing can result in loss of riparian and emergent vegetation. Riparian and emergent vegetation provide boreal toads with hiding and breeding cover; hiding cover is especially important to the survival of toadlets because they

are more vulnerable to predation than are the adults. Additionally, livestock (and wild ungulates) can inadvertently trample young and adult boreal toads as they graze in or adjacent to toad habitats. Finally, livestock feces and urine can degrade water quality by increasing the organic and bacterial loads in toad habitats. Increased inputs of organic material in breeding sites could result in increased local biochemical oxygen demand (BOD). An increase in local BOD could result in reduced dissolved oxygen for incubating eggs, a condition that could affect successful metamorphosis. Bacterial contaminations in breeding habitats could also adversely affect metamorphosis as well as pose a hazard to juvenile and adult toads.

**Recreation** activities can adversely affect boreal toads and their habitats. Campground construction and undeveloped camp sites adjacent to riparian areas and wetlands can alter these habitats and displace boreal toads; vegetation disturbance, compacted soils, and soil disturbance due to anglers digging for worms are typical impacts in these areas; the aforementioned disturbances could adversely impact boreal toad hibernacula. Anglers, and other Forest users can easily, though unwittingly, spread chytrid fungus among streams, ponds and lakes; the fungus readily attaches to footware, especially to felt-soled wading boots. Chytrid fungus is known to cause mortality in boreal toads. Also, hikers can inadvertently spread this fungus as they travel to near-road and backcountry locales. Anglers, hikers, managers, and other Forest users can inadvertently trample juvenile and adult toads, especially as they traverse brushy areas adjacent to streams, ponds, and wetlands. Non-native fishes, especially trout, have been stocked and continue to be stocked in lakes that were once fishless and suitable boreal toad habitats; anecdotal evidence (random eviscerations) from one breeding site in the MBNF, however, suggests that brook trout may not consume boreal toad tadpoles or toadlets, at least at that site. Last, but certainly not least, off-road, motorized travel can have devastating impacts to boreal toads and their habitats. These activities can result in crushed toads and rutted and compacted riparian and wetland habitats; soils and vegetation in these habitats can be materially degraded by off-road, motorized travel.

**Oil and gas** development can adversely impact boreal toads and their habitats. During the exploration phase of oil and gas development, seismic testing, if conducted near occupied habitats, could disturb boreal toad behaviors, especially resting and breeding; ground vibrations that result from these tests may be easily detectable by toads. Also, heavy equipment use associated with oil and gas development could impact toads and their habitats by crushing individuals, causing soil erosion leading to sedimentation, causing soil compaction, exposing individuals and habitats to chemical contamination (oil, hydraulic fluid, etc.), and by creating road access into sensitive riparian and wetland ecosystems. Moreover, depletion of local groundwater supplies due to well development could adversely affect the character and function of adjacent wetlands and riparian areas. The result of which, could be a diminution the abundance, distribution, and quality of boreal toad habitats.

Application of forest chemicals for dust abatement, eradication of noxious weeds, eradication of insect pests, and eradication of non-native species can adversely affect boreal toad abundance (early life stages) and habitat quality. Chemical compounds such as magnesium chloride (dust abatement), Roundup (herbicide), carbaryl (insects), and rotenone/antimycin can have lethal and profound sublethal effects on boreal toad tadpoles; sublethal effects include delayed metamorphosis, reduced growth rates, and delayed maturation. Further, chemical compounds of copper, cadmium, manganese, and zinc can have lethal and sublethal effects on boreal toad tadpoles (Jones: CDOW website). Examples of sublethal effects of chemical exposures to boreal toads include: incomplete metamorphosis; morphological and anatomical deformities and malformations; and attenuated growth and maturation rates (Jones: CDOW website). Lethal effects to boreal toads due to chemical exposure are self explanatory.

Finally**,** prescribed fire could conceivably impact boreal toads and their habitats. Occasionally, even the most well-planned and strictly-supervised prescribed burns go awry. Most of the prescribed fire projects that are implemented in the MBNF occur in the sagebrush-dominated uplands. Although these burn areas can contain riparian areas associated with perennial streams and certain wetland types, most do not contain beaver dam complexes, the preferred habitats of boreal toads in the MBNF. Also, riparian areas and wetlands tend to have enough vegetation, soil moisture, and relative humidity to withstand total destruction in all but the most devasting fires. Careful planning and implementation should substantially reduce the possibility that prescribed fire projects will adversely impact boreal toads and their habitats.

**Threats, Limiting Factors, and Vulnerabilities**

There are several likely impediments to the persistence of boreal toads (southern population) in the MBNF. Among these impediments are: loss of genetic variability, habitat fragmentation and degradation; loss and degradation of riparian and wetland habitats; infestations of pathogens (fungal and bacterial infections); degradation of water quality conditions (chemical contamination); ultraviolet radiation (UVB); and predation. In addition, small population size, especially among breeding populations, may pose a material impediment to the persistence of boreal toads in the MBNF. Considering the aforementioned factors, predation - and other causes of natural mortality - is probably the most pervasive factor affecting boreal toad abundance, especially given the relatively small populations extant in the MBNF.

**Predation** can profoundly affect annual survival rates, recruitment, and abundance in boreal toad populations. Predators such as predacious diving beetle larvae (*Dytiscus sp.*), tiger salamander larvae (*Ambystoma tigrinum*), and the western garter snake (*Thamnophis elegans*) consume boreal toad tadpoles. Additionally, large western garter snakes are probably able to consume juvenile boreal toads. Small population size, especially in breeding populations, may pose a serious impediment to the long-term persistence of the boreal toad in the MBNF. Loss of genetic

variability among surviving boreal toad populations because of decreases in abundance and distribution is a threat to their persistence in the Forest. Factors other than predation can adversely affect boreal toad abundance and distribution.

Laboratory experiments in Colorado suggest that boreal toad tadpoles – the same phylogenetic clade as southern Wyoming boreal toads - are sensitive to some changes in water quality and less sensitive to others.

In the MBNF, there are scant available data about how the aforementioned threats, limiting factors, and vulnerabilities affect boreal toads and their habitats.

**Environmental Consequences and Viability**

According to the available survey data, the long-term persistence of boreal toads appears bleak in the MBNF. The survey data, however, are incomplete, and it is conceivable that populations could rebound, especially if existing habitats are protected. For all Forest Plan revision alternatives there is a stringent Forestwide buffer standard (300 feet buffer protection for streams, riparian areas, and wetlands is an unprecedented standard among state and federal land-management agencies in the Rocky Mountains.), proposed timber harvest and associated road construction/reconstruction should not pose a general or immediate threat to the distribution, abundance, and quality of boreal toad populations and habitats; timber harvest should make some amount of additional water available that may benefit riparian areas and wetlands through groundwater/stream interactions, but, the extent to which timber sales will generally benefit boreal toads and their habitats during the planning period is uncertain.

Additionally, there are no water-depletion projects identified in the Supplemental Tables (these tables are used as tools to project what can be accomplished given experienced budget levels), so water depletions attributable to the MBNF are not expected to occur at this analysis scale (planning area); proposed projects (project scale) that may constitute a water depletion will be addressed in consultation with the USFWS.

**Determination**

All alternatives provide protection of water quality, protection of riparian areas, and retention of downed wood. Road reduction might benefit (less transmission of disease, mortality on roads) boreal toads. All these may be minor factors contributing to a decline of unknown cause.

Evaluation criteria for the boreal toad are retention of downed wood (for hibernation sites), reduction of road density (along riparian areas) and lack of disturbance on travelways. Differences between alternatives are slight relative to the dramatic declines of unknown cause. Regardless of the alternative chosen, there is a low likelihood of persistence in the short or long-term and there is a viability concern for the boreal toad. Forestwide standards and guidelines protecting riparian areas and wetland habitats contribute to its viability, but uncertainty about its future makes it

impossible to predict the likelihood of its persistence.

## Sensitive Fish

### Colorado River cutthroat trout - *Oncorhynchus clarki pleuriticus*

#### Status and Distribution of Species

The Colorado River cutthroat trout (CRCT) has been petitioned for listing as threatened or endangered under the Endangered Species Act. In addition, CRCT are included in the Regional Forester's (USFS, Region 2) Sensitive Species List. Presently, the species is distributed throughout selected watershed in three states (Colorado, Utah, and Wyoming) within its historic range. In the MBNF, CRCT are primarily found in the Little Snake River headwater streams. Interestingly, CRCT have been transplanted by the Wyoming Game and Fish Department (WG&FD) in a few streams in the North Platte River drainage; it is uncertain to what extent, if any, these transplants persist.

#### Status and Distribution in the MBNF

Wild, genetically-pure, self-sustaining populations of CRCT exist in headwater streams in the Sierra Madre (Little Snake River drainage), west of the Continental Divide in the MBNF. Colorado River cutthroat trout are the only trout – though, not the only salmonid- native to the MBNF (see next map).

#### Habitat

CRCT prefer subalpine, montane, and foothills rivers, streams, and lakes above about 7,000 feet elevation (Baxter and Stone 1995). CRCT prefer deep pools that contain abundant cover elements (wood, boulders, etc.), though they typically occupy a variety of other habitat types. The historical distribution of the species is much smaller today than it was 150 years ago; much of its former river habitats (mainstem) has been lost due to non-native trout introductions.

#### Threats due to Human Activities

Human impacts that include recreational activities (e.g. fishing, camping) and agricultural and municipal water development projects can affect and have adversely affected the abundance, distribution, and viability of CRCT populations throughout its historic range. Recreational fishing can cause intended and unintended mortality to individual fish due to the stress experienced during capture and release; a one fish per day creel limit is in effect in Wyoming. In addition, stocking non-native trout, especially brook trout and rainbow trout, have diminished CRCT populations (competition and hybridization) and in some cases excluded them. Finally, humans have introduced and spread whirling disease into some CRCT habitats and the introductions may portend trouble for the species in the future.

**Vulnerabilities due to Forest Service Management Activities**

CRCT populations and habitats are vulnerable to a variety of multiple-use activities. Overgrazing by livestock and wild ungulates can reduce the abundance riparian vegetation. Reduced riparian vegetation can result in active erosion of streambanks and loss of streamside shading and cover. In addition, timber harvest and associated road construction that does not incorporate adequate riparian buffers and Best Management Practices (BMPs) can adversely impact CRCT populations and habitats; sedimentation that results from these activities can materially degrade aquatic habitats. Hikers and other Forest users can inadvertently spread pathogens when hiking among drainages on and off the Forest. The "bucket brigade" can intentionally introduce non-native organisms into aquatic ecosystems, some of which compete for resources with CRCT. Finally, poorly-regulated commercial mining operations and recreational dredging can disturb streambeds and degrade water quality, the result of which can adversely impact CRCT populations and habitats.

**Environmental Consequences and Viability**

The most serious threats to CRCT populations and habitats are: 1) competition from non-native species; 2) hybridization with rainbow trout; and 3) introgression with other subspecies of cutthroat trout. None of the alternatives is likely to exacerbate the aforementioned factors. The preferred alternative (D FEIS) and the other alternatives, if implemented, will be subject to compliance with Forestwide standards and guidelines. Because the Forest has adopted a stringent Forestwide, buffer standard (300 feet, maximum protection for streams, riparian areas, and wetlands.), multiple-use activities such as proposed timber harvest and associated road construction/reconstruction are not likely to pose a general or immediate threat to the quality, distribution, and abundance of CRCT population and habitats; timber harvest may make additional water available for aquatic biota, but, the extent to which timber sales will benefit CRCT during the planning period is uncertain. Additionally, there are no water-depletion projects identified in any of the alternatives, so depletions attributable to the MBNF are not expected to occur at the planning scale; proposed projects (project scale) that may constitute a water depletion will be addressed in project biological evaluations.

Map I-6 Streams with populations of Colorado River cutthroat trout on the Medicine Bow National Forest

**Effects of Proposed Management Actions**

Given the Forestwide standard that proscribes riparian/wetland habitat alterations within 300 feet (maximum extent) of riparian areas and wetlands, none of the Forest Plan revision alternatives should adversely impact CRCT populations and habitats, given compliance with the standard. Additionally, because of the CRCT's limited distribution in the Forest, their habitats and populations are well known and can be protected at the project scale of analysis as well as Forestwide scale; proactive efforts to conserve CRCT populations and habitats by the FS and WG&FD have expanded allopatric populations of wild, genetically-pure CRCT in the Sierra Madre.

**Direct Effects:** Neither the preferred alternative (D FEIS) nor the other alternatives are expected to have deleterious effects on CRCT and their habitats in the MBNF. Substantial protection to all Forest fish populations is provided by the standards (300-feet buffer) and guidelines; the riparian area standard offers unprecedented protection for Forest fish populations.

**Indirect Effects:** Indirect effects to CRCT and their habitats are expected to be negligible given implementation of the preferred alternative (D FEIS) or any of the other revision alternatives, so long as the riparian standard is in force. None of the management prescriptions in CRCT habitats (Geographic areas located in the Medicine Bow Mountains) should adversely impact CRCT provided the riparian/wetland standard is in force.

**Cumulative Effects:** Local climate change, water developments, pathogens, and drought could adversely affect CRCT populations in streams within the Little Snake River drainage. Essentially all of the CRCT streams in the MBNF are affected by water developments such as diversion ditches and pipeline diversions for municipal water supplies. However, as long as the riparian/wetland standard is in force, Forest management and multiple-use activities should not adversely impact CRCT populations and their habitats. An exception to the aforementioned statement could be the inadvertent spread of pathogens such as the whirling-disease protozoan by Forest users. Further, a private landowner in the Little Snake River valley maintains a commercial fishery for rainbow trout. If rainbow trout escape from private waters to connected Forest streams, then rainbow trout could threaten the integrity of the CRCT gene pool. As more people use the Forest and adjacent private lands, it is reasonable to assume that some adverse impacts to this species and its habitats will occur.

**Determination of Effects and Rationale**

Implementing the preferred alternative (D FEIS) or any of the other revision alternatives ***"may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, or cause a trend to federal listing or a loss of species viability rangewide".*** CRCT populations and distributions have improved in the MBNF within the past twelve years or so due to proactive and cooperative

management actions by the FS and WG&FD; the revision riparian/wetland standard (Forestwide) is much more stringent than the standard in effect under the original Forest Plan. The revision standard provides for a 300-feet buffer versus a 100-feet buffer specified in the 1985 plan and that change in buffer width should benefit CRCT populations and habitats.

**Primary reference used:** Baxter, G.T. and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming. 290 pp.

### Mountain Sucker - *Catostomous platyrhynchus*

**Status and Distribution of Species:** The mountain sucker is considered to be a "sensitive" species in Region 2 (USFS). The range of the mountain sucker extends from California to western South Dakota and Nebraska. Also, this species is found from Alberta and Saskatchewan to southern Utah. In Wyoming, the species is absent from the South Platte and Niobrara River drainages and it may be extirpated from the North Platte River drainage. West of the Continental Divide (Wyoming), the mountain sucker is found in most, if not all drainages. This species is found in drainages in northern and northeastern Wyoming (Baxter and Stone 1995).

**Status and Distribution in the MBNF:** In the Forest, the mountain sucker is found in streams in the Sierra Madre, west of the Continental Divide.

**Habitat:** The mountain sucker lives in a wide range of habitats from montane lakes and streams to creeks and large rivers at lower elevations. The mountain sucker is primarily a herbivore, although it will feed on aquatic insects as well as plants (Baxter and Stone 1995).

**Threats due to Human Activities:** Habitat alterations (water developments and habitat fragmentation) and introductions of non-native, predatory fish are the predominant threats to the mountain sucker due to human activities.

**Vulnerabilities due to Forest Service Management Activities:** Multiple-use activities that affect water quantity and quality and habitat continuity can impact mountain suckers. Water diversions and water impoundments are the most likely activities to adversely impact this species where it occurs in the Forest. Road construction and road reconstruction, to lesser extents, are likely to adversely impact mountain sucker habitats where roads are chronically contributing sediments into Forest streams that support the species.

**Environmental Consequences and Viability:** The greatest threat to the persistence of this species is probably introductions of non-native, predatory fish and habitat fragmentation. Presently, the species appears to be persisting in the Forest (Oberholtzer 1987).

**Effects of Proposed Management Actions**

**Direct Effects:** Neither the preferred alternative (D FEIS) nor the other revision

alternatives are expected to have deleterious effects on mountain sucker populations and their habitats in the MBNF. Substantial protection to all Forest fish populations is provided by the standards (300-feet riparian buffer, maximum width) and guidelines; the riparian area standard offers unprecedented protection for Forest fish populations. Additionally, the preferred alternative – and the other alternatives – does not prescribe activities that will either fragment existing populations and habitats or introduce non-native predatory fish in the Forest.

**Indirect Effects:** Indirect effects to mountain suckers and their habitats are expected to be negligible given implementation of the preferred alternative (D FEIS) or given implementation of any of the other revision alternatives, so long as the riparian standard is in force. None of the indirect effects due to management prescriptions in existing mountain sucker habitats (Geographic areas located in the Medicine Bow Mountains) are expected to adversely impact mountain sucker populations, providing the riparian/wetland standard is in force and that Best Management Practices (BMPs) are applied as mitigation to projects that could result in chronic water quality degradation.

**Cumulative Effects:** Local climate change, water developments, pathogens, and drought could adversely affect mountain suckers populations in streams within the Little Snake River drainage. The High Savory Dam and its associated reservoir may fragment mountain sucker habitats and populations that exist near the Forest boundary: East Fork, Savory Creek and Dirtyman Fork (Oberholtzer 1987). It is uncertain how and to what extent the High Savory Dam may affect mountain sucker populations in the Forest, assuming they will be affected by this project. Historical introductions of non-native trout have probably diminished the abundance and distribution of mountain suckers in the Forest, but it probably unknowable to what extend this activity has affected the species.

**Determination of Effects and Rationale**

Implementing the preferred alternative (D FEIS) or implementing any of the other revision alternatives ***"may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, or cause a trend to federal listing or a loss of species viability rangewide".*** Mountain sucker abundance and distributions, as far as is known, are sufficient to support viable populations where they exist. The revision riparian/wetland standard (Forestwide) is much more stringent than the standard that was in effect under the 1985 Forest Plan. The revision standard provides for a maximum 300-feet buffer versus a 100-feet buffer specified in the existing plan and that change in maximum buffer width is expected to benefit mountain sucker populations and habitats.

**Primary references used**: Baxter, G.T. and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming. 290 pp.

Oberholtzer, M. 1987. A fisheries survey of the Little Snake River drainage, Carbon County, Wyoming. Fish Division Administrative Report. Wyoming Game

and Fish Department, Cheyenne, Wyoming. 110pp.

## Flannelmouth Sucker - *Catostomous latipinnis*

**Status and Distribution of Species:** In Region 2, the Flannelmouth sucker is considered to be a "sensitive" species. The Flannelmouth sucker is native to the Colorado River basin. In Wyoming, this species is found in the Green River and in the Little Snake River drainages (Baxter and Stone 1995).

**Status and Distribution in the MBNF:** In the Forest, the Flannelmouth sucker is found in the Sierra Madre, west of the Continental Divide (Little Snake River drainage).

**Habitat:** The Flannelmouth sucker prefers large rivers, but it will inhabit relatively small, tributary streams. Additionally, the Flannelmouth sucker can sometimes be found in lakes and reservoirs(Baxter and Stone 1995).

**Threats due to Human Activities:** Because the Flannelmouth sucker utilizes spawning habitats in small, tributary streams, it is important that large-river, stream, lake, and reservoir habitats remain as unfragmented as possible so that successful spawning is possible. Activities that adversely impact water quantity and quantity as well fragment habitats essential to the species survival threaten its persistence.

**Vulnerabilities due to Forest Service Management Activities:** Almost all of the documented occurrences of flannelmouth suckers in the Little Snake River drainage have come from individuals collected from private lands and lands administered by the Bureau of Land Management (BLM) in proximity to and removed from the Forest boundary (Oberholtzer 1987).

**Environmental Consequences and Viability:** The greatest threats to the persistence of this species is probably introductions of non-native, predatory fish and habitat fragmentation. Presently, the species appears to be persisting in streams adjacent to and in the vicinity of the Forest boundary (Oberholtzer 1987).

**Effects of Proposed Management Actions**

**Direct Effects:** Neither the preferred alternative (D FEIS) nor the other alternatives are expected to have deleterious effects on flannelmouth sucker populations and their habitats in and proximate to the MBNF. Substantial protection to all Forest fish populations is provided by the standards (300-feet, maximum buffer) and guidelines; the riparian area standard offers potential, unprecedented protection for Forest fish populations and their habitats.

**Indirect Effects:** Indirect effects to flannelmouth suckers and their habitats are expected to be negligible given implementation of either the preferred alternative (D FEIS) or any of the other revision alternatives, so long as the Forestwide riparian standard is in force. None of the management prescriptions in the Forest Plan revision (Geographic areas located in the Medicine Bow Mountains) are expected to

adversely impact flannelmouth sucker populations and habitats in and adjacent to the Forest provided the riparian/wetland standard is in force.

**Cumulative Effects:** Local climate change, water developments, pathogens, and drought could adversely affect flannelmouth suckers and their habitats that exist in streams within the Little Snake River drainage. The High Savory dam and reservoir project may fragment flannelmouth sucker habitats in the Savory Creek drainage. Additionally, predation by non-native trout is likely to continue to affect the abundance and distribution of this species in the Little Snake river drainage.

**Determination of Effects and Rationale**

Implementing the preferred alternative (D FEIS) or any of the other revision alternatives ***"may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, or cause a trend to federal listing or a loss of species viability rangewide".*** Presently, flannelmouth sucker abundance and distributions appear to be sufficient for the species to persist. The revision riparian/wetland standard (Forestwide) is much more stringent than the standard that was in effect under the 1985 Forest Plan. The revision standard provides for a maximum, 300-feet buffer versus a 100-feet buffer specified in the existing plan and that change in buffer width is expected to benefit flannelmouth sucker populations and habitats that exist in the Forest.

**Primary reference used**: Baxter, G.T. and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming. 290 pp.

Oberholtzer, M. 1987. A fisheries survey of the Little Snake River drainage, Carbon County, Wyoming. Fish Division Administrative Report. Wyoming Game and Fish Department, Cheyenne, Wyoming. 110pp.

## Hornyhead Chub - *Nocomis biguttatus*

**Status and Distribution of Species:** The hornyhead chub is considered a "sensitive "species in Region 2 (USFS). Hornyhead chub populations range from New York State to the Rocky Mountains and south to Arkansas. In the upper Midwestern U.S., the hornyhead chub is found in southern Michigan, southern Wisconsin, and southern Minnesota. In the MBNF, the hornyhead chub is found in the North Laramie River and other tributaries to the Laramie River (Platte County), but is rare; this species is rare throughout the entire North Platte River basin in Wyoming. (Baxter and Stone 1995).

**Status and Distribution in the MBNF:** The hornyhead chub can be found in the North Laramie River, though it is rare in abundance and distribution.

**Habitat:** Hornyhead chubs prefer clear streams with abundant gravel substrate. Hornyhead chubs forage on aquatic insects, crustaceans, and mollusks (Baxter and Stone 1995).

**Threats due to Human Activities:** Activities that adversely impact water quality and water quantity are problematic for the persistence of honyhead chub populations. In addition, habitat fragmentation and introductions of non-native trout have probably affected the abundance and distribution of this species in the Forest.

**Vulnerabilities due to Forest Management Activities:** Because of the limited distribution of hornyhead chubs in and adjacent to the Forest, it is unlikely that multiple-use activities conducted in the Forest directly affect this species. However, multiple-use activities that cause or exacerbate rates of erosion and sedimentation can adversely affect existing habitats. Non-native trout that exist in the Forest and off Forest probably affect the ability of the hornyhead chub to increase its abundance and expand its distribution.

**Environmental Consequences and Viability:** The persistence of the hornyhead chub in the North Laramie River and other Laramie River tributaries may be in doubt. Habitat fragmentation, alterations in water quality, and predation by non-native trout may prevent the hornyhead chub – in Wyoming – from persisting past the next several scores of years.

**Effects of Proposed Management Actions**

**Direct Effects:** Neither the prescriptions in the preferred alternative (D FEIS) nor the prescriptions in the other revision alternative are expected to have deleterious effects on hornyhead chub and their potential habitats in the MBNF. It is likely that this species does not occur within or proximate to the Forest boundary.

**Indirect Effects:** It is unlikely that multiple-use activities that occur in the Forest will indirectly affect the hornyhead chub and their habitats for the reason previously given.

**Cumulative Effects:** Local climate change, water developments, pathogens, and drought could adversely affect hornyhead chub populations and their habitats in the North Laramie River and other tributaries of the Laramie River. Non-native trout are likely to prevent hornyhead chubs from expanding their distributions and increasing their abundance. Demands for agricultural, industrial, and municipal water will almost certainly affect hornyhead chub populations and their habitats, especially considering their rarity in Wyoming.

**Determination of Effects and Rationale**

Implementing the preferred alternative (D FEIS) or implementing any of the other revision alternatives is expected to have ***"may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, or cause a trend to federal listing or a loss of species viability rangewide"*** on the hornyhead chub. It is unlikely that the hornyhead chub exists in the MBNF.

**Primary reference used:** Baxter, G.T. and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming. 290 pp.

## Plains Minnow - *Hybognathus placitus*

**Status and Distribution of Species:** The plains minnow is considered a "sensitive "species in Region 2 (USFS). Plains Minnow populations range primarily from the plains west of the Missouri River from Montana and North Dakota south to central Texas. In Wyoming, the plains minnow is found in the Cheyenne River, the Belle Fouche River, the Little Missouri River, the Powder, and Bighorn River drainages. Once, the species was found in the North Platte River, downstream from Casper, Wyoming; the plains minnow is probably extirpated from the North Platte River (Baxter and Stone 1995).

**Status and Distribution in the MBNF:** It is unlikely that the plains minnow exists in the MBNF. It is remotely possibility that the plains minnow could exist in Forest tributaries near their confluences (Douglas ranger district) to the North Platte River downstream of Casper, Wyoming.

**Habitat:** Plains minnows prefer backwaters and side pools in turbid streams and rivers. Plains minnows are primarily herbivorous and appear to prefer feeding on algae and vegetative detritus in relatively slow-moving waters (Baxter and Stone 1995).

**Threats due to Human Activities:** Activities that adversely affect water quantity are problematic for the persistence of plains minnow populations. In addition, habitat fragmentations due to water development and introductions of non-native trout have probably affected the abundance and distribution of this species throughout its historic range in Wyoming. Finally, the plains minnow is easily seined and used as a baitfish. Overexploitation by baitfish anglers may adversely impact populations of plains minnows in Wyoming.

**Vulnerabilities due to Forest Management Activities:** Because of the low probability that plains minnow exist within the Forest boundary, it is unlikely that multiple-use activities conducted in the Forest will directly affect this species. However, multiple-use activities that may fragment existing habitats could impact this species if it does exist in streams located either in or adjacent to the Forest. Non-native trout that exist in streams in the Forest and off Forest probably affect the ability of the plains minnow to increase its abundance and expand its distribution where their distributions overlap.

**Environmental Consequences and Viability:** The persistence of the plains minnow in the North Platte River- if the species still exists there - and in associated tributaries may be in doubt. It is likely that the species has been extirpated from its historical distributions in the North Platte drainage, downstream of Casper, Wyoming. Predation by non-native trout and other predatory fish may have helped to extirpate the plains minnow from the North Platte River. In addition, exploitation by bait anglers may have contributed to the decline of this species.

**Effects of Proposed Management Actions**

**Direct Effects:** Neither the prescriptions in the preferred alternative (D FEIS) nor the prescriptions in the other revision alternative are expected to have deleterious effects on plains minnow and their potential habitats in the MBNF. It is likely that this species does not occur within or proximate to the Forest boundary.

**Indirect Effects:** It is unlikely that multiple-use activities that occur in the Forest will indirectly affect the plains minnow and their habitats for the reason previously given.

**Cumulative Effects:** Local climate change, water developments, pathogens, and drought could adversely affect plains minnow populations and their habitats in the North Platte River and other tributaries of the Platte River. Non-native trout are likely to prevent plains minnow from expanding their distributions and increasing their abundance. Demands for agricultural, industrial, and municipal water will almost certainly affect plains minnow populations and their habitats, especially considering their rarity in Wyoming.

**Determination of Effects and Rationale**

Implementing the preferred alternative (D FEIS) or implementing any of the other revision alternatives is expected to have ***"No impact"*** on the plains minnow. It is unlikely that the plains minnow exists in the MBNF.

**Primary reference used:** Baxter, G.T. and M.D. Stone. 1995. Fishes of Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming. 290 pp.

## Sensitive Insects

### Hudsonian Emerald- *Somatochlora hudsonica*

**Status and distribution of species**

The Hudsonian emerald is widespread and abundant in the northern part of its range (boreal forest and muskeg of Canada), but far less common in Colorado, the southernmost part of its range (Walker and Corbet 1975).

**Status and distribution on the MBNF**

A single record of this dragonfly was reported in 1937, in a location given only as "Medicine Bow mountains" (University of Wyoming Agricultural Station 1979). In surveys of dragonflies in the Snowy Range, other emeralds were found, but not the Hudsonian (Kondratieff, pers. comm.).

The species could be present and undetected, because identification and capture are difficult. The larvae are cryptically-colored and are difficult to catch in the dense bog vegetation they inhabit. Adults cannot be separated from other emeralds on the wing. They are very agile fliers and are very difficult to catch in an insect net.

Finally, adults are active for only a short time and, in locations where they are uncommon, they can easily be missed (Kondratieff, pers. comm.).

On the other hand, the species may not be present at all- the single record from 1937 is not very strong evidence of continuous occupation of habitat or past or present abundance.

Habitat that is apparently suitable is present, so management will assume the presence of the species at least until surveys are conducted.

**Habitat**

The larvae of the species live in bogs and fens and adults are found around "slow streams and bog-margined ponds" (Walker and Corbet 1975). Cannings and Cannings (1985) also found it on deep, sedge-bordered lakes and ponds in the Yukon.

**Changes from HRV in factors that may affect the species**

Intensive sheep grazing in the early 20th century may have affected fen vegetation and water quality. Compaction of snow over fens resulting from winter recreation would lead to much deeper freezing and could cause mortality in larvae.

**Threats, limiting factors, and vulnerabilities**

Alteration of habitat by trampling, organic enrichment, siltation, or changes in winter temperature regimes could affect larval survival and abundance. No information on effects on the MBNF is available.

**Environmental Consequences and Viability**

**Direct effects**. Trampling by permitted livestock could directly kill larvae.

**Indirect effects**. Contamination of water (in suitable habitat, this would most likely come from livestock tramping of banks or erosion associated with sediment from roads or logging) reduces the quality of larval habitat. Snowmobile compaction over fens would allow deeper freezing of the boggy habitat and may adversely affect larval survival.

**Cumulative effects**. No cumulative effects are known.

In alternatives D FEIS, and F sheep grazing will be restricted in the high-elevation grazing allotments on the Medicine Bow Range that are currently (and in Alternative A) restricted to sheep and goats. These allotments are currently vacant. In alternative F, there is less risk of freezing of bogs because snowmobiles are restricted to roads and trails.

Table I-50 Viability and outcome conclusions for the Hudsonian Emerald

| | Alternative A | Alts B, C, D DEIS, D FEIS, E | Alt F |
|---|---|---|---|
| Abundance and distribution | Unknown- high elevation fens are suitable habitat. Sheep grazing in suitable habitat may adversely affect water quality. | Unknown- high elevation fens are suitable habitat | Unknown- high elevation fens are suitable habitat. Lack of off-trail snowmobiling may be beneficial (If the species is here and is adversely affected by snow compaction). |
| Likelihood of persistence-15 yr. | Unknown | Unknown | Unknown |
| Likelihood of persistence-long-term | Unknown | Unknown | Unknown |
| Effect on individuals and populations | MAII | MAII | MAI I |
| Certainty | Very low | Very low | Very low |

*MAII, may adversely impact individuals but not lead to trend toward federal listing*

# Sensitive Mollusks

## Rocky Mountain Capshell Snail - *Acrolaxus coloradensis*

### Status and distribution of species

The Rocky Mountain capshell snail exists in widely disjunct populations in the Rocky Mountains. In the 1960s, this species was found to exist in Lost Lake in Glacier National Park. In addition, a population is known to exist in Peterson Lake in Colorado, though it appears that it is in decline (Pioneer Environmental Services, Inc. 1993). In 1993, three of twenty seven lakes surveyed in Colorado supported populations of Rocky Mountain capshell snails: Teal Lake (Jackson Co.), Upper Big Creek Lake (Jackson Co.), and Lost Lake (Boulder Co.) (PES, Inc.1993). Finally, several capshell snail populations are extant in Canada (PES, Inc. 1993).

### Status and distribution on the MBNF

The Rocky Mountain capshell snail has not been found in the MBNF; neither the FS nor the WG&FD has conducted surveys for this species in the MBNF.

There are no available data about the environmental baseline conditions of the Rocky Mountain capshell snail in the MBNF. Speculation is, that the extant Rocky Mountain capshell snail populations may be relics from the last glaciation, given the disjunct nature of their known distribution. Interestingly, the closest existing population – as far as is known – of capshell snails is located near the Colorado/Wyoming border in Big Creek Lakes. No Rocky Mountain capshell snails have been found in the MBNF.

**Habitat and natural history**

The Rocky Mountain capshell snail prefers relatively shallow, rocky, littoral zones of oligotrophic to mesotrophic montane and subalpine lakes and ponds (PES, Inc. 1993).

**Changes from HRV in factors that may affect the species**

There is a paucity of available data about the Rocky Mountain capshell snail. Very little is known about the snail's biology, life history, or natural history.

**Threats, limiting factors, and vulnerabilities**

Given the disjunct and relatively small number of extant populations in the Rocky Mountains, the long-term (100 years) persistence of the Rocky Mountain capshell snail appears to be uncertain. Water quality conditions appears to be a limiting factor in the persistence of the species; the snails require moderately warm (16-21 degrees C), alkaline (between pH 7.0 and 8.0), well-oxygenated (7.0-8.0 mg/L) water that contains bound carbonates (CaCo3).

**Environmental Consequences**

Snail surveys conducted in the context of project-level activities would have to occur to determine environmental consequences to this species. Because this species is an R2 Sensitive species, it will be addressed (potential impacts to habitats) at the project level.

**Direct and Indirect Effects:** Cannot be reasonably determined at this time due to lack of available data about the presence of the species in the Forest and its available habitats. Typically, Forest activities do not adversely affect potential snail habitats in the MBNF because of the existing standards and guidelines that offer protections: subalpine lakes. Changes to air quality due to activities that occur off Forest may affect potential snail habitats in montane and subalpine lakes (water quality), but that condition has not been documented to date.

**Cumulative Effects:** Not reasonably determinable at this time due to lack of available data about the occurrence of populations and suitable habitats.

**Protection Provided in Revised Forest Plan**

The Forest Plan standard (Forestwide) that provides for a 300-feet buffer around riparian zones and wetlands may provide protection for the snail. Other Plan direction include protections for bogs, wetlands and peatlands and for R2 Sensitive Species.

**Determination**

Because little is known about the Rocky Mountain capshell snail in the MBNF, it is difficult to assess the potential impacts to this species and its habitats due revision alternatives. Therefore, implementing the preferred revision alternative or any of the

other alternatives "may adversely impact individuals, but is not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide".

## Summary of Impacts – Sensitive Animals

The following table displays a summary of effects on the R2 Sensitive Species on the MBNF.

Table I-51 Impact Determinations for R2 Sensitive Animal Species on the MBNF.

| | Alternatives | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sensitive Species** | **A** | **B** | **C** | **D DEIS** | **D FEIS** | **E** | **F** |
| **Mammals** | | | | | | | |
| Pygmy shrew | MAII* | MAII* | MAII* | MAII | MAII | MAII | MAII |
| Fringed myotis | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Townsend's big-eared bat | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Black-tailed Prairie Dog | NI | NI | NI | NI | NI | NI | NI |
| White-tailed Prairie Dog | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| American marten | LFL | MAII* | MAII* | MAII | MAII | MAII | MAII |
| Wolverine | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Northern River Otter | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| **Birds** | | | | | | | |
| Northern goshawk | MAII* | MAII | MAII* | MAII | MAII | MAII | MAII |
| Ferruginous hawk | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Peregrine Falcon | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Northern Harrier | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Columbian sharp-tailed grouse | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Greater Sage Grouse | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| White tailed Ptarmigan | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Mountain plover | NI | NI | NI | NI | NI | NI | NI |
| Boreal owl | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Short-eared Owl | MAII | MAII | MAII | MAII | MAII | MAII | MAII |

| | Alternatives | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sensitive Species** | **A** | **B** | **C** | **D DEIS** | **D FEIS** | **E** | **F** |
| Flammulated owl | MAII | MAII | MAII | MAII | MAII | MAII/BI | MAII |
| Yellow-billed Cuckoo | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Lewis' woodpecker | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Black Backed Woodpecker | MAII* | MAII* | MAII* | MAII | MAII | MAII | MAII |
| American Three-toed woodpecker | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Olive-sided flycatcher | MAII | MAII | MAII | MAII | MAII | MAII | MAII/BI |
| Brewer's Sparrow | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Sage Sparrow | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Loggerhead Shrike | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| **Amphibians** | | | | | | | |
| Northern leopard frog | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Wood frog | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Boreal Toad | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| **Fish** | | | | | | | |
| Colorado River cutthroat trout | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Mountain Sucker | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Flannelmouth Sucker | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Hornyhead Chub | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Plains Minnow | NI | NI | NI | NI | NI | NI | NI |
| **Insects** | | | | | | | |
| Hudsonian emerald | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| **Mollusks** | | | | | | | |
| Rocky Mountain capshell | MAII | MAII | MAII | MAII | MAII | MAII | MAII |

*PVC – potential viability concern; NI – no impact; BI – beneficial impact; MAII – May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide; LFL- Likely to result in a loss of viability on the planning area, in a trend to federal listing, or in a loss of species viability rangewide. NP -- Not present.*

* *Very high levels of uncertainty are associated with the outcome.*

## Sensitive Plants

Information on occurrence and distribution of plants and plant habitat on the MBNF was derived from Burke (Burke 2000) Hartman and Nelson (Hartman and Nelson 2002), Chumley *et al*. (Chumley, Nelson et al. 1998), Kastning (Kastning 1990), Mills and Neighbors (Mills and Neighbours 1995), Jankovsky-Jones *et al.* (Jankovsky-Jones, G. P. Jones et al. 1996), Packer (Packer 1999a) and Packer (Packer 1999b).

Species were considered sensitive for the DEIS based on the 1993 Regional Forester's Sensitive Species List. In 2003, a new Regional Forester's Sensitive Species List was compiled (USDA Forest Service 2003). This new list used a systematic process to determine risks to each species based upon the habitat and distribution of each species through-out Region 2. The following species are no longer included on the Regional Forester's Sensitive Species List and are not analyzed in the FEIS:

- Larimer Aletes (Aletes humilis (Heidel and W. Fertig 2001).
- Clustered Lady's-Slipper Orchid (Cypripedium fasciculatum) (Laursen and B. Heidel 2002).
- Sidesaddle Bladder Pod (Lesquerella arenosa var argillosa) (Handley, Heidel et al. 2002).
- Alpine Feverfew/Wyoming Feverfew (Parthenium alpinum) (Fertig and B. Heidel 2002).(Fertig 2000)
- Laramie False Sagebrush (Sphaeromeria simplex) (Heidel, J. Handley et al. 2002).

There are 25 plant species from the 2003 Regional Forester's Sensitive Species List that are known to occur or have potential habitat on the MBNF.

Table I-52 Ranking, Habitat, and Distribution of R2 Sensitive Plant Species for the MBNF.

| Plants | Ranking | Habitat | Distribution on MBNF |
|---|---|---|---|
| Laramie Columbine<br>*Aquilegia laramiensis* | G2<br>S2<br>High | Shady areas within granite boulders and cliffs with pockets of weathered rock and soil at 6,250-10,000 feet. | Proctor documented populations and locations on Laramie Peak in 2003.<br>Strauss noted occurrence in 1996. |
| Park milkvetch<br>*Astragalus leptaleus* | G4<br>SH<br>Med | Occurs in sedge-grass meadows, swales, hummocks, and among streamside willows | Historical documentation for in Sierra Madre. May be extirpated. |
| Slender Moonwart - *Botrychium lineare* | G1<br>--<br>-- | Grassy slopes among medium height grasses, along edges of streamside forests at elevations of 7,900 – 9,500 feet | Potential habitat |

| | | | |
|---|---|---|---|
| Leathery grape-fern<br>*Botrychium multifidum* | G5<br>S2 | Moist or wet, open or shaded places in the mountains | Documented as occurring in Sierra Madre. |
| Lesser panicled sedge<br>*Carex diandra* | G5<br>S1S2<br>Low | Floating and non-floating mats of peat, at pond edges, mossy floating logs and on hummocks in open shrub and sedge meadows at 6,100-9,600 feet | Documented population on top of Snowy Range. |
| Bristly-stalked sedge<br>*Carex leptalea* | G5<br>S2<br>Low | Wet meadows, bogs, and swamp forests | Documented on Sheep Mountain in 2002-2003. |
| Livid sedge<br>*Carex livida* | G5<br>S1<br>Medium | Floating mats, in bogs, fens, and marls dominated by sedge species, often on wet hummocks | Potential habitat on Snowy Range and Sierra Madre. Documented for Big Creek Park Area adjacent to MBNF. |
| Yellow ladies' slipper<br>*Cypripedium parviflorum* | G5<br>--<br>-- | Aspen forests, white spruce/paper birch, ponderosa pine/Douglas fir forests, 4,000 to 8,500 feet in elevation. | Potential habitat near in aspen, Douglas-fir and ponderosa pine. |
| Round leaf sundew<br>*Drosera rotundifolia* | G5<br>S2<br>-- | Margins of acidic ponds and fens, 9,100-9,800 feet in elevation | Potential habitat in fens. Documented adjacent to MBNF in Colorado. |
| Boreal spikerush<br>*Eleocharis elliptica* | G5T5<br>S1<br>Peripheral, low | Thermally influenced seeps and springs, may also occur in non-thermal seepage areas, 6,200-7,250 feet in elevation | Documented on Laramie Peak Range. |
| Slender-leaved buckwheat<br>*Eriogonum exilifolium* | G3<br>S2<br>Med | Found on semi-bare sandy-clay gumbo flats, white shaley-gypsum ridges, red clay hills, and limestone or limey-sandstone outcrops in cushion plant-bunchgrass communities with low plant cover. | Documented on Sierra Madre and Snowy Range |
| Slender cotton-grass<br>*Eriophorum gracile* | G5<br>S1<br>Peripheral, low | Sedge meadows, floating bogs, saturated soil, shallow standing water 6,900 - 9,300 feet in elevation. | Documented on Sheep Mountain 2003-2003. |
| Hall's Fescue<br>*Festuca hallii* | G4<br>S1<br>Peripheral Medium | Montane meadows, on slopes, and at the edge of open coniferous woods and meadows at 6,900-11,000 feet | Documented on Snowy Range. |

| | | | |
|---|---|---|---|
| Rabbit Ears Gilia, Weber's Scarlet Gilia<br>*Ipomopsis aggregata ssp. weberi* | G5<br>T2<br>S1<br>High | Openings in coniferous forest, south-facing slopes and ridge dominated by Big sagebrush or other shrubs on gravelly, clay-loam soils at 7,200-8,300 feet in elevation. | Documented on Sierra Madre. |
| Simple kobresia<br>*Kobresia simpliciuscula* | G5<br>S1<br>Disjunct, Medium | Flooded marl wetlands dominated by quaking mats, stable tundra communities in moist, peaty soil, in bogs, in wet meadows, and along the edges of beaver ponds. | Potential habitat peatlands, fens and tundra. |
| Colorado Tansy Aster (*Machaeranthera coloradoensis var. coloradoensis)* | G2?<br>S1<br>High | Barren cushion plant and sparse grassland communities on limey-sandstone, shaley-gypsum, or redbed slopes and outcrops at 8,100 to 7,800 feet | Documented on Sierra Madre, Snowy Range, Sheep Mountain and Laramie Peak Range. |
| Kotzebue grass of parnassus<br>Parnassia kotzebueii | G4<br>S2<br>-- | Moist seeps, grassy, wet tundra, thin clay soil, moist ledges below steep talus slopes, 9,400 and 11,200 feet in elevation | Potential habitat in tundra and talus. |
| White larchleaf beardtongue<br>*Penstemon laricifolius ssp. exifolius* | G4T2Q<br>S2<br>-- | on rocky, calcareous slopes with sagebrush and/or limber pine, 6,300-7,800 feet in elevation | Documented on Snowy Range, Laramie Peak Range and Pole Mountain. |
| Rocky Mountain cinquefoil<br>*Potentilla rupincola* | G5?T2<br>--<br>-- | Granitic outcrops or thin, gravelly granitic soils with west or north exposure, with ponderosa or limber pine, 6,900-10,500 feet in elevation. | Potential habitat southern Laramie Peak Range, Pole Mountain or in the eastern foothills of the Snowy Range |
| Nagoon berry<br>*Rubus arcticus ssp. acaulis* | G5T5<br>S1<br>Peripheral, low | understory of moderate to dense canopy covers in spruce, spruce/willow, and occasionally willow dominated communities, boggy woods, marshes, mountain meadows, and alpine tundra at 7,000 to 9,000 feet | Potential habitat peatlands and fens. |
| Silver willow<br>*Salix candida* | G5<br>S2<br>Low | Bogs, fens, peatlands and willow thickets around ponds on wet to saturated histic soils, also soils derived from limestone 6,600 to 9,200 feet in elevation. | Documented on Pole Mountain, Sheep Mountain and Snowy Range. |

| | | | |
|---|---|---|---|
| Autumn Willow<br>*Salix serissima* | G4<br>S1<br>Disjunct, Medium | Montane swamps and bogs at 7,900 | Documented on Pole Mountain. |
| Low spike-moss<br>*Selaginella selaginoide*s | G5<br>S1<br>Peripheral, low | Mossy banks and saturated moss-covered zones in wet meadows at 7,700 to 8.000 feet | Potential habitat in wet meadows. |
| Lesser bladderwort<br>*Utricularia minor* | G5<br>S2<br>-- | Submerged in shallow ponds, lakes, and slow-moving streams, often in open water of alkaline fens at 6,600 to 9,600 feet, | Documented on Snowy Range and Laramie Peak Range in 2002-2003. |
| Great spurred violet<br>*Viola selkirkii* | G5<br>--<br>-- | Ravines or on north-facing slopes in the spruce/fir zone, white spruce habitat found in localized areas on the Snowy Range and Laramie Peak Range | Potential habitat Snowy Range and Laramie Peak Range. |

TNC NATURAL HERITAGE RANKING: GLOBAL RANK (G): based on range-wide status of a species.

G1 -- Critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically endangered throughout its range).

G2 -- Imperiled globally because of rarity (6 to 20 occurrences) or because of other factors demonstrably making it very vulnerable to extinction throughout its range. (Endangered throughout its range).

G3 -- Very rare or local throughout its range or found locally in a restricted range (21 to 100 occurrences). (Threatened throughout its range).

G4 -- Apparently secure globally, though it might be quite rare in parts of its range. especially at the periphery.

G5 -- Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.GQ -- Indicates uncertainty about taxonomic status.

G? -- Indicates uncertainty about an assigned global rank.

TRINOMIAL RANK (T):

Used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.

STATE RANK (S): based on the status of a species in an individual state ranks may differ between Wyoming and neighboring states based on the relative abundance of a species in each state.

S1 -- Critically imperiled in state because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extirpation from the state. (Critically endangered in state).

S2 -- Imperiled in state because of rarity (6 to 20 occurrences) or because of other factors demonstrably making it very vulnerable to extirpation from the state (Endangered or threatened in state).

S3 -- Rare in state (21 to 100 occurrences).

S? -- Indicates uncertainty about an assigned state rank.

SH -- Of historical occurrence, not documented in Wyoming since 1920.

--No State rank available at this time.

Wyoming Natural Diversity Database (WYNDD) Conservation Priority

Low, Med – Medium, High

Watch – Watch list

-- -- No WYNDD conservation priority available at this time.

WYNDD Intrinsic Vulnerability H – high, M – medium, L – low

## Laramie Columbine *(Aquilegia laramiensis)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

Status: USFWS: None (formerly a C2 candidate for listing under the Endangered Species Act). Agency Status: USFS Region 2 Sensitive (Heidel, J. Handley et al. 2002); Heritage Rank: Global G2 (NatureServe 2003); State: S2; WYNDD Plant List: State Endemic (High conservation priority) (Fertig 2000).

#### *Distribution and Status*

Laramie columbine is endemic to the Laramie Range of southeast Wyoming (Albany and Converse Counties). It is known from the MBNF, state lands and private lands. It was also identified as possibly occurring on BLM administered lands. In Wyoming, it was known from 8 extant occurrences and 3 historical records (Fertig 2000).

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species.

### Status and Distribution on the MBNF

Laramie columbine is endemic to the Laramie Range of southeast Wyoming (Albany and Converse Counties) (Fertig 2000). It is known from the MBNF, state lands and private lands. In 2000, there were 50 –100 plants observed near the Friend Park campground. WYNDD (WYNDD 2002) indicates that there were 9 known sites with 5 of those on the MBNF. In June of 2003, an intensive inventory documented 30 occurrences of Laramie columbine (Marriott 2003) with 21 of those new occurrences. There were documented range extensions to the west (20km). Dorn (Dorn 1979) indicated that the species' range could extend to rocky areas of Larimer County, Colorado and is possibly occurring on the Roosevelt National Forest. No trend data are available, but populations are likely to be stable due to the low degree of threat.

### Habitat and Natural History

#### *Habitat*

Laramie columbine is found in shady areas within granite boulders and cliffs with pockets of weathered rock and soil at 6,250-10,000 feet. The microhabitat is highly discontinuous on the landscape (Fertig 2000). The species is reported extending down into forested habitats and has been located in areas proposed for timber harvest (Beyer 2002). Where found, it can be locally abundant to very sparse. The species is typically in partial or full shade on north-facing slopes, and at some sites, the surrounding forest canopy may help determine the light regime and microhabitat conditions.

### *Species Description*

Laramie columbine is a perennial, leafy, many-stemmed herb 10-20 cm tall. It flowers and fruits from June-August. It reproduces by 1 mm long seeds that are released from erupting follicles. Pollinators and seed dispersal mechanisms are poorly understood for this species. It produces a showy flower with spurs that contain nectaries that can be highly attractive to various pollinators (Fertig 2000).

### Threats from Human Activity

The species' primary habitat on ledges and crevices in granite cliffs is largely inaccessible and resilient. The species is reported extending down into forested habitats and has been located in areas proposed for timber harvest (Beyer 2002). Some populations could also potentially be threatened by over-harvest for garden use.

### Environmental Baseline

In 2000, there were 50 –100 plants observed near the Friend Park campground. WYNDD (WYNDD 2002) indicates that there were 9 known sites with 5 of those on the MBNF. In June of 2003, an intensive inventory documented 30 occurrences of Laramie columbine (Marriott 2003) with 21 of those new occurrences. There were documented range extensions to the west (20km). Dorn (Dorn 1979; Fertig and Beauvais 1999) indicated that the species' range could extend to rocky areas of Larimer County, Colorado and is possibly occurring on the Roosevelt National Forest. No trend data are available, but populations are likely to be stable due to the low degree of threat.

### Protection in the Plan

Standards and guidelines for the protection of sensitive plants apply to the conservation of Laramie columbine. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for Laramie columbine.

The Forest Service maintains discretion to modify projects or contracts if Laramie columbine is determined to occur within a project or contract area.

### Direct and Indirect Effects on Populations on NFS Lands

### *Direct Effects on Populations on NFS Lands*

Due to the ruggedness of its habitat, populations of Laramie columbine are largely inaccessible. Recreation activities such as hiking and climbing could threaten some populations. Some populations could be threatened by over-harvest for garden use.

Standards for botanical collection permits do not allow collection of sensitive plants. Illegal collection activities are difficult to control, however area closures can be used to regulate access, if needed. The documented habitat occurs within grazing allotments. The ruggedness of the habitat discourages livestock but occasional trampling or consumption could occur.

Laramie columbine occurs within forested lands where there were frequent fire return intervals historically. In this area, the fire regimes may have been significantly altered from their historical range through fire suppression. The risk of losing key ecosystem components is high where fire regimes have been altered. Fire frequencies may have departed from historical frequencies by multiple return intervals in some areas. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes may have been significantly altered from their historical range. Under an extreme wildfire event, the rugged, rocky cliffs may not provide protection from wildfire effects.

Individuals and/or habitat are not likely to be affected by proposed land management actions or management area allocations under any alternatives.

Alternative F has the lowest levels of management actions and the least allocation to renewable resource uses. This alternative also has the highest predicted levels of stand replacement wildfire and stand replacement insect and disease attacks. The impacts of wildfires, insects and diseases are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities. If fire return intervals are restored to near historical levels, fire size, intensity, severity, and landscape patterns will be more likely to be with the historic range of variation. All alternatives have opportunities for prescribed fire or wildfire to be used to restore historic fire regimes.

One occurrence is within the Ashenfelder Area (Alternatives A, B and D FEIS: SIA and back country recreation area; Alternative C: proposed back country recreation area; Alternative D DEIS recommended wilderness; Alternative E: Research Natural Area and back country recreation area; Alternative F: Research Natural Area and recommended Wilderness). Part of this area is designated as a Research Natural Area in Alternative E (2,062 acres) and Alternative F (7,151 acres). It is currently designated a Special Interest Area at 2,062 acres. Alternative F would provide the least risk to the Laramie columbine.

### *Indirect Effects*

Neither management actions, nor management area allocations are likely to create any changes in existing threats to Laramie Columbine on NFS lands. Additionally, neither management actions, nor management area allocations are likely to create any effects on any populations on private lands within the Laramie range.

### Cumulative Effects

Some of the habitat for this species occurs on private and state lands. The ruggedness of the habitat discourages land uses in these areas and provides protection for this species. Some development activities such as road building and other construction on private lands will continue resulting in some loss of suitable habitat for the plant species and some possible mortality of sensitive plants and population loss. Livestock grazing practices that are unfavorable for the conservation of this plant species are likely to continue on some private lands.

On NFS lands, determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The ruggedness of the habitat discourages grazing by domestic livestock.

Any effects to a single population are unlikely to influence the status of other populations. Seeds are released from erupting follicles, so there is potential for colonization of new habitat.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve sensitive species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. The areas of the MBNF that have populations or potential habitat for Laramie columbine have not been identified as having Oil and Gas leasing potential as part of the Forest Plan Revision. Any Oil and Gas leasing in these areas would be subject to site specific analysis at the time a project is proposed.

### Biological Determinations, Risk Assessments, and Rationale

Based on standards and guidelines and administrative feasibility discussed previously, management actions on the MBNF under the preferred alternative (D FEIS) and other alternatives can be controlled to provide *no effect* on populations of Laramie columbine, all alternatives are likely to contribute to *high viability*.

## Park Milkvetch *(Astragalus leptaleus)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: None; Agency Status: USFS Region 2: Sensitive (Heidel, J. Handley et al. 2002), USFS Region 4 Sensitive Species Challis NF; Idaho BLM Sensitive Species; Heritage Rank: Global: G4 (NatureServe 2003); State WY: SH; WYNDD Plant List: Regional endemic (Medium conservation concern) (Fertig 1999)

### *Distribution and Status*

This species is endemic to the Rocky Mountains, where it occurs sporadically. It is most widespread in Colorado, with several disjunct occurrences in south-central Wyoming, east-central Idaho, western Montana and, reportedly, from Alberta (Hitchcock and A. Cronquist 1961), (Barneby 1964), (Isley 1985). In Wyoming, it is known from two historical records in southeastern Carbon County. Barneby (Barneby 1964) hypothesized that the species could also be expected to occur in western Wyoming.

### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species.

### Status and Distribution on the MBNF

In Wyoming, park milkvetch is known from two historical records in southeastern Carbon County. One site is within the MBNF, but may be on either National Forest or private land, since the reported location contains both ownerships. Rare plant surveys were conducted in the vicinity of the MBNF site in 2002 and 2003, but to date the species has not been relocated. The Wyoming State Heritage ranking (SH) indicates there is speculation that this species may have been extirpated in the state since the 1951 reports (Fertig 1999).

### Habitat and Natural History

### *Species Description*

Park milkvetch is a perennial herb with scattered, delicate stems arising from a slender, branching caudex. Flowering and fruiting occur from June through September (Barneby 1964), (Dorn and J. Dorn 1992). Additional information on the species, including life history stages, population structure, longevity, mortality, seed biology and pollinators, is not available.

### *Habitat*

Park milkvetch occurs in sedge-grass meadows, swales and hummocks, and among streamside willows. In Wyoming, it was reported at an elevation of 8,400 feet (Fertig 1999). In Idaho and Montana the habitat was characterized as the mesic ecotone between saturated riparian communities and dry, upland sagebrush-steppe. This type of habitat can occur on the sides of hummocks or on the dry fringe of willow or graminoid dominated riparian areas. Associated species reported from Idaho include *Poa pratensis*, *Juncus balticus*, *Hordeum brachyantherum*, *Trifolium longipes*, *Iris missouriensis*, *Deschampsia cesptitosa*, *Potentilla fruticosa*, *Betula glandulosa*, *Salix geyeriana* and *Salix boothii* (Moseley 1991). Mosley (Moseley 1991) also reports this species as growing in fens.

### Threats from Human Activity

Threats from human activities include livestock grazing on both National Forest and

private lands, disturbance associated with actions on nearby forestlands such as road construction for timber harvest and development on private lands. Due to the fact that park milkvetch occurs in riparian areas and riparian/upland ecotones and is palatable to livestock, it may be threatened by livestock grazing and/or trampling (Moseley 1991). Since this species occupies riparian and riparian ecotone habitats, it would generally not be directly affected by timber harvest activity, except in instances where a road or skid trail associated with timber harvest might cross a riparian area. Competition from non-native invasive plants constitutes a potential threat to this plant species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

**Environmental Baseline**

Rare plant surveys were conducted in the vicinity of the MBNF site in 2002 and 2003, but to date the species has not been relocated. The Wyoming State Heritage ranking (SH) indicates there is speculation that this species may have been extirpated in the state since the 1951 reports (Fertig 1999).

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of park milkvetch. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for park milkvetch.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if park milkvetch is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Riparian areas and adjacent ecotones where park milkvetch occurs are normally key

grazing areas for livestock, particularly cattle, and therefore often receive moderate to heavy use. However, effects of grazing on long-term abundance and vigor of this species have not been documented, and anecdotal information is inconclusive. Park milkvetch has been observed to have been heavily grazed by cattle frequently or annually in some Idaho locations (Moseley 1991), but one of those populations was described as "very dense and vigorous" despite the high level of grazing use. On some grazed sites it was noted that flower and fruit production was poor. In addition, this species may be extirpated from Wyoming, with grazing or other forest management actions, then, having no direct effect on this species.

The Wyoming occurrence reported on the MBNF, whether on the privately owned in-holding or on National Forest land, is subject to grazing by cattle, elk and deer. Livestock grazing seasons on the National Forest lands are shorter and the forage utilization levels lower than on the fenced private land. Elk populations are presently very high on the Sierra Madre and Snowy Range portions of the MBNF. It is not known whether elk or other herbivorous wildlife species have much affect upon park milkvetch.

Current grazing allotments and utilization percentages are maintained in Alternatives A through E. Alternative F would produce a slight reduction in permitted animal months, but this reduction would not likely occur in the area where park milkvetch habitat is known to exist. All alternatives include the same standards and guidelines for management of riparian areas and other rangelands as well as maximum allowable livestock grazing and trampling guidelines. Changes in livestock grazing management which are most likely to directly affect this species (if it still occurs on the MBNF) are made at the project level, as allotment management plans are revised or modified. Allotment management plans on National Forest allotments can be modified to contain considerations for park milkvetch. Alternative F would likely provide the greatest recovery of vegetation within riparian areas over time as it allow for the least human activity over the forest.

Road and skid trail locations associated with timber harvesting can be modified to avoid park milkvetch populations during project planning.

Recreational use along streams, particularly in well-used fishing areas, may result in some trampling of this species. Recreational activities and effects can be managed through educational efforts and/or closure orders.

Exclosures for livestock or humans can be constructed, if needed to maintain viable populations.

### *Indirect Effects*

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting park milkvetch or potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and D FEIS, (in descending order) have the most potential for increasing invasive plant populations. Alternatives C, D DEIS, A and E have slightly lower amounts of total ground disturbing management activities. The plan includes goals, objectives and strategies for treatment of invasive plants.

**Cumulative Effects**

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service.

Any effects to a single population are unlikely to influence the status of other populations.

Some of the potential habitat for this species occurs on private and state lands. Any reduction of populations on private lands would increase the contribution of populations on NFS lands to the continued viability of this species.

There are no other predicted effects from management actions or management area allocations on the MBNF for populations or habitat on private or state lands.

**Biological Determinations, Risk Assessments, and Rationale**

Because park milkvetch may be difficult to locate in project level surveys, alternatives that propose higher levels of management actions pose a higher risk of affecting unknown populations (Johnston 2002). Alternative F, which proposes the lowest levels of management activities and results in the greatest recovery of riparian vegetation would provide the greatest opportunity for colonization of existing habitat by park milkvetch from populations in Colorado.

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the park milkvetch. Based on standards and guidelines and administrative feasibility, management actions on the MBNF can be controlled to

reduce impacts to this species. However, management actions ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

If this species has been extirpated in the state since the 1951 reports (Fertig 1999), then there will be no effect from management actions on populations.

Alternative F has the lowest level of domestic livestock stocking and poses the lowest risk to this species. This alternative is most likely to contribute to high viability. All other alternatives contribute to moderate viability for this species.

## Slender Moonwort – (*Botrychium lineare*)

### Distribution and Status

#### *ESA Status and Other Organization Rankings*

USFWS: Candidate species for CA, CO, ID, MT, OR, WA (Fish and Wildlife Service (FWS) 2002). Agency Status: USFS Region 2: Sensitive. Heritage Rank: Global: G1; State WY: no status, WYNDD Plant List: no status (Fertig and B Heidel 2002).

#### *Distribution and Status*

The plant once was found in Idaho (Bonner or Boundary County), Oregon (Wallowa County), Montana (Glacier and Lake Counties), California (Fresno County), and Colorado (Boulder and El Paso counties). Slender moonwort has also been documented in Quebec and New Brunswick, Canada. Populations in Idaho; Lake County, Montana; Fresno County, California; Boulder County, Colorado; and Canada are thought to be extirpated. Plants at some of these sites have not been seen since the early 1900s (Vizgirdas 2001).

Today, nine sites are known to support slender moonwort. Two populations are in the Pike-San Isabel National Forest, El Paso County, Colorado. Another population exists near Leadville in Lake County, Colorado. Two sites are found at Glacier National Park in Glacier County, Montana, and another south of St. Mary's, Montana, on the Blackfeet Indian Reservation. Eastern Oregon has two sites: one in the Eagle Cap Wilderness (Wallowa-Whitman National Forest) and another on private land in Wallowa County. This is the type locality and the largest extant population west of Colorado (Wagner and Wagner 1994) (Zika, Brainerd et al. 1995). One site exists in the Colville National Forest, Ferry County, Washington. Remaining populations of this plant are extremely small, ranging in size from 2 to 100 individuals (Vizgirdas 2001). The total population size is extremely small -- less than 200 individuals exist throughout the range of the species. However, since the number of plants below ground is generally much larger than the number that's visible above ground, this is likely an underestimate of the actual population size (Vizgirdas 2001).

### *Recovery and Conservation Planning*

The USFWS prepared a 12-month finding (06/06/01) for a petition to list the slender moonwort, under the Endangered Species Act of 1973, as amended. The FWS believes that sufficient information is currently available to support a finding that listing slender moonwort is warranted, but a proposed rule is precluded at this time by work on other higher priority listing actions (Fish and Wildlife Service (FWS) 2000b). This species will be added to the Service's candidate species list upon publication of this finding. Candidate species are those for which sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened is on file. The Service anticipates developing and publishing proposed rules for candidate species in the future, and encourages state and Federal agencies as well as other parties to give consideration to these species in environmental planning. A national interagency MOU for the conservation of species tending towards federal listing was signed on January 25, 1994 (94-SMU-058) (FWS, USDA FS et al. 1994) that provides for cooperation and participation among cooperators in the conservation of species. An additional MOA on the section 7 consultation process was signed August 20, 2000 by the Bureau of Land Management, Forest Service, National Marine Fisheries Service and USFWS (FWS, USDA FS et al. 2000). Federal agencies have discretion on whether they accept the USFWS recommendations for candidate species.

## Status and Distribution on the MBNF

In Wyoming, there are no reported occurrences of the slender moonwort. Habitat similar to that described for Colorado, Montana and Idaho is relatively abundant as are many of the common associates listed for Idaho. In addition, historic occurrences of slender moonwort in Boulder County are from the southern end of a continuous mountain range that stretches northward through the Routt National Forest to the MBNF. As off-site colonizers, moonworts are well-adapted to the colonization of new habitats and the bridging of habitat gaps (Kolb and T. Spribille 2001).

## Habitat and Natural History

### *Species Description*

Slender moonwort is a small perennial fern with a pale green leaf about 2 to 7 inches long. Fertile fronds probably mature in August (Idaho Fish and Game 2003). It was described for the first time in 1994, and is considered to be one of the more distinctive moonworts (Fish and Wildlife Service (FWS) 2002). Moonwort spores appear to be spread by wind and gravity (Buell 2001). Moonworts are dependent on mycorrhizal fungi throughout their life cycle. The specialized fungi provide them with water and nutrients. A fungal associate is present within the plant at the earliest stages of development, and there are no reports of successful completion of the life cycle without mycorrhizae. Very little information exists regarding the specificity or habitat requirements of the mycorrhizal fungi that are associated with moonworts.

The fungal association allows moonwort species to remain dormant for perhaps several years, similar to orchids. Such prolonged dormancy can be advantageous during periods of drought or adverse conditions. However, this attribute can seriously complicate surveys and monitoring efforts. Spores germinate underground and develop into subterranean, non-photosynthetic gametophytes, which produce gametes (sperm and egg). The fertilized zygote then develops roots, stem, and the aboveground fern-like structure, the sporophyte, which produces the spores. The growth rate is so slow that ordinarily a single leaf is produced per year. Leaf primordia for several years are present just below the surface, and only one primordium matures each season (Vizgirdas 2001). Populations of moonwort are fundamentally different from those of the average wildflower, since even widely separated individuals can be connected genetically by wind dispersal of spores (Zika, Brainerd et al. 1995). Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

***Habitat***

Habitat across the range for slender moonwort is quite variable with its range stretching from sea level in Quebec to over 10,000 feet in Colorado. In Colorado, Spackman (Spackman, Jennings et al. 1997) describes the habitat as grassy slopes among medium height grasses, along edges of streamside forests at elevations of 7,900 – 9,500 feet. In Montana, the one documented occurrence is along a steep forest trail Montana Natural Heritage Program 2003. In Oregon, Wagner (Wagner 1995) described the habitat for slender moonwort as grassy areas in the subalpine zone. Slender moonwort is entirely restricted to limestone basins in the Wallowa Mountains of Oregon. In Alberta, slender moonworts were found on a road cutbank with loose gravel, no surface organic layer and poor soil development (Williston 2003). In Idaho, it typically occurs in montane forest or meadow habitats with a variety of herbaceous species including *Fragaria virginiana* (wild strawberry), *F. vesca* (wood strawberry), *Potentilla* spp. (cinquefoil), *Antennaria* spp. (pussy-toes), *Vaccinium* spp. (huckleberry), and *Festuca* spp. (fescue). Trees such as *Picea engelmanii* (Engelmann spruce), *Thuja plicata* (western red cedar), *Pseudotsuga menziesii* (Douglas-fir), *Pinus contorta* (lodgepole pine) and *Populus tremuloides* (aspen) may also be present in or near slender moonwort habitat (Idaho Fish and Game 2003). Other moonwort species can also occur with slender moonwort (Vizgirdas 2001).

In Wyoming, there are no reported occurrences of the slender moonwort. Habitat similar to that described for Colorado, Montana and Idaho is relatively abundant as are many of the common associates listed for Idaho. In addition, historic occurrences of slender moonwort in Boulder County are from the southern end of a continuous mountain range that stretches northward through the Routt National Forest to the MBNF. Across the range of slender moonwort, not all habitat that meets the descriptions above is occupied, with populations generally discontinuous across the landscape.

**Threats from Human Activity**

Threats may include activities that change the canopy cover, soil temperature, or soil moisture of moonwort habitat (Potash 1998). The effects of management activities such as prescribed fire on moonwort species are not well understood. In some areas, fire could possibly benefit moonwort habitat by reducing the litter accumulation and competition from other plants. Repeated removal of the spores, e.g., by grazing, can cause a population to eventually die out (Vizgirdas 2001)

**Environmental Baseline**

Remaining populations of this plant are extremely small, ranging in size from 2 to 100 individuals (Vizgirdas 2001). The total population size is extremely small -- less than 200 individuals exist throughout the range of the species. In Wyoming, there are no reported occurrences of the slender moonwort. Habitat similar to that described for Colorado, Montana and Idaho is relatively abundant as are many of the common associates listed for Idaho. In addition, historic occurrences of slender moonwort in Boulder County are from the southern end of a continuous mountain range that stretches northward through the Routt National Forest to the MBNF. As off-site colonizers, moonworts are well-adapted to the colonization of new habitats and the bridging of habitat gaps (Kolb and T. Spribille 2001).

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants, aquatic standards and guidelines apply to the conservation of slender moonwort.

The Fire Plan that specifies fire suppression strategies will include conservation measures if slender moonwort is found. Project implementation will assess site-specific risks and strategies.

Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened, endangered or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The goals, objectives, standards and guidelines regarding noxious and non-native species will limit the introduction and spread of these species within the MBNF. Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies. Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Forest Service maintains discretion to modify projects or contracts if slender

moonwort is determined to occur within a project or contract area.

**Direct and Indirect Effects**

***Direct Effects on Populations on NFS Lands***

In Wyoming, there are no reported occurrences of the slender moonwort but there is habitat similar to occupied habitat. If slender moonworts were found on the MBNF, it is likely that populations would be small and discontinuous as it is elsewhere. The slender moonwort may respond differently to different disturbances given its wide range of habitat (Vizgirdas 2001). Threats may include activities that change the canopy cover, soil temperature, or soil moisture of moonwort habitat (Potash 1998). The effects of management activities such as prescribed fire on moonwort species are not well understood. In some areas, fire could possibly benefit moonwort habitat by reducing the litter accumulation and competition from other plants. Repeated removal of the spores, e.g., by grazing, can cause a population to eventually die out (Vizgirdas 2001). Based on population modeling, natural events such as severe drought could potentially cause small or even moderate-sized populations to go extinct (Vizgirdas 2001). Conservation measures can involve actions such as fencing, maintaining the current hydrologic regime, avoiding excessive siltation or soil deposition, avoiding ground-disturbing activities and associated soil compaction from trampling or vehicle use, etc. Long-term monitoring is also recommended for assessing population dynamics (Vizgirdas 2001). Allotment management plans can be modified to contain considerations for slender moonwort and exclosures constructed, if needed to maintain viable populations. Competition from non-native invasive plants can be a threat to slender moonwort. Invasive species are often spread by livestock grazing and recreational activities but can also be spread by other forest management activities. Impacts from timber harvesting would mostly be associated with road construction or other ground disturbances associated with logging as most sites are on grassy slopes and not within timber stands. Similarly impacts from recreation would be from facility construction or development. Moonworts are known to occur and persist on developed ski area recreation sites. (Buell 2001; Kolb and T. Spribille 2001)

By identifying the possibility of potential habitat at the Forest Planning level even though the species has not been known to occur in Wyoming, project level surveys and biological evaluations can help to determine the presence or absence of potential habitat and occupancy by slender moonwort. Since this species is not visible above ground every year, surveys during project planning may not detect all the existing populations. The Forest Service maintains discretion to modify projects or contracts if the slender moonwort is determined to occur within a project or contract area.

***Indirect Effects***

Habitat and populations in Colorado occur within forested landscapes contiguous with forested areas of the MBNF. A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado.

Alternative F has the highest predicted levels of stand replacement wildfire. The impacts of wildfires are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

**Cumulative Effects**

Some of the potential habitat for this species occurs on private and state lands. There are no predicted effects from management actions or management area allocations on the MBNF for potential habitat on private or state lands except as discussed above for wildfires. Since there is very little known about interactions among disjunct populations, it is difficult to predict how effects to a single population might influence the status of other populations.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service.

**Biological Determinations, Risk Assessments, and Rationale**

Based upon goals, objectives and strategies in the plan, none of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the slender moonwort. All of the activities can be planned at the project level to have no effect on the slender moonwort. Any project that could not limit effects to the no effect level on slender moonwort would be subject to informal consultation with the FWS under the interagency MOUs (unnumbered MOA of 08/30/00 and 94-SMU-058 of 01/25/94) that specify consultation procedures for the conservation of species tending towards federal listing.

Because the presence of this plant can not always be determined in project planning surveys, alternatives that propose higher levels of management actions pose a higher risk of affecting unknown populations. All alternatives maintain most of the forest in grazing allotments. Alternative F has lower levels of stocking and poses the lowest risk to this species. Alternatives F and E have the lowest levels of proposed timber harvest and would pose the least risk to unknown populations.

By identifying the possibility of potential habitat at the Forest Planning level even though the species has not been known to occur on the MBNF, project level surveys and biological evaluations can help to determine the presence or absence of potential

habitat and occupancy by slender moonwort.

If slender moonwort is found to occur on the MBNF, management actions can be controlled to provide no effect on populations of slender moonwort, however since the presence of this plant can not always be determined in project planning surveys management actions or recreational activities ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability for slender moonwort.***

## Leathery grapefern (*Botrychium multifidum, Botrychium multifidum var coulteri)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: None; Agency Status: USFS Region 2: Sensitive; Heritage Rank: Global: G5 (NatureServe 2003); State WY: S2, WYNDD Plant List: not tracked as a species of special concern; Heritage ranking of SH in South Dakota and S1 in Colorado (Fertig W 2002), (Ode 2001).

#### *Distribution and Status*

The species ranges from southern Alaska to Greenland and Labrador, south to California, northern Arizona, South Dakota, Wisconsin, and Virginia (Wagner and F.S. Wagner 1993). At least 11 populations are known in Wyoming, of which 9 are protected in national parks and wilderness areas. The species is more widespread in Wyoming outside of Region 2 and is not tracked as a species of special concern by the Wyoming state heritage program. Additional basic life history information is needed for this species is needed to better assess its conservation status (Fertig W 2002), (Ode 2001).

#### *Recovery and Conservation Planning*

A number of *Botrychium* species have attracted substantial interest over the last decade because they are rare, have restricted distributions and have the potential to be affected by National Forest management activities. Fourteen species, including *Botrychium multifidum*, have been designated as National Forest Sensitive Species. One species, *Botrychium lineare*, has been classified by the USFWS as warranted for federal listing as either threatened or endangered, but was precluded from listing by other higher priority actions.

In response to concerns about a number of species within this genus, The Forest Service is developing an Inventory and Monitoring Technical Guide for *Botrychium* species. Because several species of locally rare *Botrychium* often occur together on a site, measures to conserve the habitat of one species may benefit multiple species.

Conservation measures can involve actions such as fencing, maintaining the current hydrologic regime, avoiding excessive siltation or soil deposition, avoiding ground-

disturbing activities and associated soil compaction from trampling or vehicle use, etc. Long-term monitoring is also recommended for assessing population dynamics (Vizgirdas 2001).

**Status and Distribution on the MBNF**

On the MBNF, the leathery grapefern is known from the Sierra Madre Range and it also occurs on the adjacent Routt National Forest in Colorado. There is one documented population on the MBNF with an unknown number of individuals. There are 2 populations nearby on the Routt NF and one additional population adjacent to the Routt NF in Jackson County, Colorado (Colorado Natural Heritage Program (CONHP) 2000), (Colorado Natural Heritage Program (CONHP) 2003), (Proctor 2002), (Proctor 2003), (Haas 2003).

There were 76 stems counted in the Sierra Madre Range in 2003 (Proctor 2003), (Haas 2003). Previous surveys by Dorn documented presence but did not document population numbers.

**Habitat and Natural History**

***Species Description***

Leathery grapefern is a perennial, evergreen fern. Its life cycle is characterized by alternating generations of gametophyes (underground, non-photosynthetic forms) and sporophytes (green leaf structures that appears aboveground). The sporophyte stem is a fleshy, slow-growing structure located entirely underground. Only one frond is produced each year. It forks near the junction of the petiole and blade into a fertile sporangia-bearing segment and a sterile blade which photosynthesizes (Zika, Brainerd et al. 1995). The frond can be up to 40 cm in height, is deltoid in overall outline, mostly 3 times compound and 3-25 cm long and about as wide (Dorn 1977). The frond is produced in spring, and overwinters, withering the following spring or summer (Zika, Brainerd et al. 1995). Grapefern spores appear to be spread by wind and gravity (Buell 2001), and the plants are dependent on mycorrhizal fungi for water and nutrients throughout their life cycle. Very little information exists regarding the specificity or habitat requirements of the mycorrhizal fungi that are associated with grapeferns. The fungal association allows *Botrychium* species (moonworts and grapeferns) to remain dormant for perhaps several years, similar to orchids. Such prolonged dormancy can be advantageous during periods of drought or adverse conditions, but it can seriously complicate surveys and monitoring efforts. The lifespan of individual plants is unknown, but estimated to be approximately 10 years (USFS 2003). Svenson (Svenson 1975) indicates that plants may live to be 100 years old. Based on population modeling, natural events such as severe drought could potentially cause small or even moderate-sized populations to go extinct (Vizgirdas 2001).

***Habitat***

Habitat across the range for leathery grape fern is quite variable. Zika *et. al*. (Zika,

Brainerd et al. 1995)list it as occurring in meadows and other open habitats, marshes, and forests; and it ranges from sea level to alpine meadows. In Region 2, it inhabits moist or wet, open or shaded places in the mountains, however not all habitat that meets this description is occupied. Populations are generally discontinuous across the landscape (Wagner and F.S. Wagner 1993), (Dorn and J.L. Dorn 1972), (Hitchcock and A. Cronquist 1973). This may be a function of its mycorrhizal associate needs. *Botrychium* is one of the few genera known where it is common to find large mixes of locally rare species in a single site (Zika, Brainerd et al. 1995).

Documented habitat on the MBNF is beaver ponds and open meadows with *Sibbaldia* spp. and *Antennaria* spp.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of leathery grapefern. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

The Fire Plan that specifies fire suppression strategies will include conservation measures for leathery grapefern.

Allotment management plans can be modified to contain considerations for leathery grapefern and exclosures constructed, if needed to maintain viable populations.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if leathery grapefern is determined to occur within a project or contract area.

**Threats from Human Activity**

Threats from human activities include livestock grazing on both National Forest and private lands, disturbance associated with actions on nearby forestlands such as road construction for timber harvest and development on private lands.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

Threats may include activities that change the canopy cover, soil temperature, or soil moisture of *Botrychium* habitat. Fires, except where exceptionally hot, pose no

threat to *Botrychium* species (Johnson-Groh and D. R. Farrar 1993) because of their ability to forego emergence above ground some years. Loss of the vegetative frond to fire is similar to a year of non-emergence. However, very hot fires that desiccate the soil and kill the underground parts or the associated mycorrhizae would be harmful.

Recreational activities (especially off-road vehicle use) and road construction and maintenance activities, can adversely affect this species through either soil churning or soil compaction.

European earthworms can have a adverse impact on moonworts by removing or reducing the natural litter layer that conserves moisture and provides nutrients. This can especially affect plants such as grapeferns that are mycorrhizal. Earthworms were not present in northern North American landscapes after glaciation occurred. European earthworms have been introduced by people through horticultural and fishing practices. Effects of the introduced worms have been documented in New York and Minnesota (USFS 2003). It is not known whether the effects of earthworms will be fatal to *Botrychium* populations over the long term or how much of an effect they do or could have in moist habitats on the MBNF.

**Environmental Baseline**

There is one documented population on the MBNF with an undocumented number of individuals. There are 2 populations near by on the Routt NF and one additional population adjacent to the Routt National Forest in Jackson County, Colorado.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Surveys on the MBNF in 2003(Haas 2003) documented a population with 76 stems with in the Encampment allotment with 10 cow/calf pairs that graze from July to October. There were 2 plants observed that had been grazed.

The impacts of disturbance on *Botrychium* species is poorly understood. Some species of *Botrychium* clearly prefer old disturbance sites, whereas others do not. Sites which were disturbed approximately 10 years ago seem ideal habitat for many species. Roadside ditches, campgrounds, ski hill runs, avalanche shoots, railroad rights-of-way and old logging roads are common habitat for them (USFS 2003). The *Botrychium* species known to occur in areas of past disturbance have not been monitored long enough to demonstrate whether populations thrive, endure or decline in the presence of human-caused disturbances (Zika, Brainerd et al. 1995).

No formal studies have been conducted on the impacts of grazing though there are numerous anecdotal observations. *Botrychium* clearly tolerates some degree of grazing. The removal of leaf tissue likely has little impact on the plant in a particular year (USFS 2003), but the impact of repeated annual harvest of the leaves is unknown. Early grazing would remove the annual input of spores, and repeated

removal of the spores can cause a population to eventually die out (Vizgirdas 2001). The tolerance of grapeferns and moonworts to soil compaction associated with grazing is unknown (USFS 2003).

No studies on the impact of timber harvest on grapeferns have been completed, although Casson *et al.* (Casson, I. Shackleford et al. 2001) reports several anecdotal observations of the adverse response of plants following harvest. Potential impacts from timber harvest include soil compaction, churning of the topsoil layer, changes in light, and loss of soil nutrients and/or moisture.

It is currently unknown if there are any established populations of earthworms on the MBNF. It is not known whether the effects of earthworms will be fatal to *Botrychium* popoulations over the long term or how much of an effect they do or could have in moist habitats on the MBNF.

***Indirect Effects***

Sedimentation resulting from burns, timber harvest, excessive livestock use, off-road vehicle use or other such disturbances to the natural ground cover can cause sedimentation in *Botrychium* habitat. Such sediment deposits can have a significant effect on the plants. Recovery from burial is slow and depends on the depth of burial (Johnson-Groh and D. R. Farrar 1993).

There are no data on the impact of invasive plants on moonwort species. Many species of moonwort grow alongside invasive plants (USFS 2003), however, some species of invasive plants, particularly allelopathic types or those that change the moisture regime of a site, could significantly alter moonwort habitat.

Herbicide application to control invasive plants can have a adverse affect on this species. In one study, *Botrychium* plants sprayed directly with herbicide did not return, while plants missed by the herbicide, or only lightly sprayed, returned (USFS 2003).

**Cumulative Effects**

Since there is very little known about interactions among disjunct populations, it is difficult to predict how effects to a single population might influence the status of other populations.

Effects from climatic cycles, such as prolonged drought, and from introduced exotic species (noxious weeds, European earthworms) would be cumulative to any impacts from management activities and recreational uses that might occur on MBNF.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also

conducted at the time applications for permits to drill are considered by the Forest Service.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the leathery grapefern or its habitat. Based on standards and guidelines and administrative feasibility, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning.

All alternatives maintain most of the forest in grazing allotments. Alternative F has the lowest levels of stocking and poses the lowest risk to this species from domestic stock grazing. This alternative is likely to contribute to high viability. All other alternatives contribute to moderately high viability for this species.

## Lesser Panicled Sedge (*Carex diandra*)

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2 Sensitive (Handley, Heidel et al. 2002); Heritage Rank: Global: G5; State WY: S2; WYNDD Plant List: Peripheral (Low conservation priority) (WYNDD 2002).

***Distribution and Status***

This species is circumpolar (Handley, Heidel et al. 2002). In North America, it is found from Newfoundland to the Yukon and south to Maryland, Tennessee, Nebraska, Colorado and California. In Wyoming, it is also known outside Region 2 on the Yellowstone Plateau in Teton County. Within Region 2, it is known from approximately 13 locations including 2 new records (Proctor 2003), 7-9 fairly recent records (all observed since 1985) and 2 older reports prior to 1963. Locations within Region 2 include the Medicine Bow-Routt, Shoshone and Arapaho Roosevelt National Forests. Lesser panicled sedge is also known to occur in Nebraska on McElvie National Forest (Handley, Heidel et al. 2002).

There are 13 populations of lesser panicled sedge documented on Region 2 lands

(Handley, Heidel et al. 2002). Of these 13 populations, one is protected in the Absaroka Beartooth Wilderness and one is protected in the Swamp Lake Special Botanical Area of the Shoshone National Forest. Four additional populations are on lands managed by Grand Teton and Yellowstone National Parks. The other seven populations are on lands managed for multiple-use by the Medicine Bow-Routt, Arapaho-Roosevelt and Shoshone National Forests. Two populations of lesser panicled sedge are known to occur on the MBNF (WYNDD 2002), (Proctor 2003).

***Recovery and Conservation Planning***

There is no documentation of recovery or conservation planning for this species. However, habitat for this and other fen obligate plant species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002). There is documentation of this species occurring in the Boston Peak Fen RNA on the Arapahoe-Roosevelt National Forest at the headwaters of the Laramie River (Coles and K. Carsey 1998).

**Status and Distribution on the MBNF**

Two populations of lesser panicled sedge are known to occur on the MBNF (WYNDD 2002), (Proctor 2003). Prior to 2002, only one site of lesser panicled sedge was documented on the MBNF (WYNDD 2002). Two additional survey sites were found on the planning unit during the 2003 field season including one new site in Colorado and one new site in Wyoming (Proctor 2003). Both MBNF populations occur on the Laramie Ranger District within the North Fork Allotment.

**Habitat and Natural History**

***Species Description***

Lesser panicled sedge is a densely tufted perennial graminoid from fibrous roots with sharply triangular, rough-edged stems (culms) 30-70 cm high (WYNDD 2002). Flowering and fruiting occur from July-August. The achenes are reportedly eaten by waterfowl (U.S. Department of Agriculture No date) and it may be inferred that water and aquatic animals aid in seed dispersal across unsuitable habitats (Handley, Heidel et al. 2002).

One of the known MBNF populations is reported from the boggy margins of a pond within the lodgepole pine zone within an active livestock cattle pasture. The other MBNF population occurs within the Three Mile wildlife refuge in a narrow band of peat habitat which transitions quickly to terrestrial upland. Populations here would only be subject to grazing by wildlife.

***Habitat***

This species is found on floating and non-floating mats of peat, at pond edges, mossy floating logs and on hummocks in open shrub and sedge meadows at 6,100-9,600 feet (Handley, Heidel et al. 2002), (Proctor 2003). The water chemistry is often

influenced by limestone. This peatland habitat is isolated and uncommon in the state. Individual populations are often locally abundant within small areas of suitable habitat.

**Threats from Human Activity**

Since this species occupies narrow bands within the riparian/upland ecotone it is feasible that its habitat could be utilized by livestock including cattle and sheep. Sedges are often palatable to both livestock and big game therefore lesser panicled sedge sites could be subject to browsing and/or trampling impacts. Other threats from human activity could include wetland development on both NFS lands and private lands. Extant populations appear to be stable to partly declining due to habitat loss. Recreational use within riparian areas could remove and/or injure plants, alter soil properties, disturb floating coniferous log habitat, change the hydrologic regime and/or reduce the overall vigor of sedges.

**Environmental Baseline**

Prior to 2002, only one site of lesser panicled sedge was documented on the MBNF (WYNDD 2002). Two additional survey sites were found on the planning unit during the 2003 field season including one new site in Colorado and one new site in Wyoming (Proctor 2003). One of the new lesser panicled sedge records resulted from an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park) (Heidel and S. Laursen 2003). Within the Snowy Range, lesser panicled sedge was found in a greater floating mat basin peatland setting on the margin of a small lake but it occurred within a narrow band of non-floating peat which transitioned quickly to terrestrial upland. The new Colorado record was found as a result of a rare plant survey conducted for the California Park Allotment Management Plan Revision on the Routt National Forest. Here the species was recently found growing on the margins of two small lakes on mossy banks and from floating coniferous logs (Proctor 2003). This site also transitioned quickly from riparian to upland.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of lesser panicled sedge. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for lesser panicled sedge.

Watershed conservation practices are required to be implemented during project

level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if lesser panicled sedge is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Since this species occupies riparian/ peat and lake margin habitats, it would also generally not be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils. Activities that introduce or insure sustained recruitment of downed woody material to lakes and ponds may provide future habitat for lesser panicled sedge.

Recreational use within riparian areas could remove and/or injure plants, alter soil properties, disturb floating coniferous log habitat, change the hydrologic regime and/or reduce the overall vigor of sedges. In particular, well-used fishing areas may result in some trampling of this species. Recreational activities and effects can be managed through educational efforts and/or closure orders. However, these populations are generally remote and quite difficult to access, therefore recreation impacts are likely to remain low.

This species generally occurs in wet peatland, lake and other riparian settings where fire frequency intervals and intensities are usually low. High intensity fires could adversely impact individuals or whole populations of lesser panicled sedge. Especially where there are abrupt riparian/upland ecotones.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

The North Fork Grazing Allotment and Three Mile Wildlife Refuge are allocated differently in different alternatives: Alternative A dispersed recreation, forested flora and fauna and timber products; Alternative B backcountry recreation, ecological maintenance and forest products; Alternative C Back country recreation, dispersed recreation and ecological maintenance; Alternative D DEIS and Alternative D FEIS recommended wilderness and backcountry recreation, ecological maintenance and

forest products; Alternative E forested flora and fauna limited management, deer and elk winter range and ecological maintenance; Alternative F recommended wilderness, research natural area, corridor and forested flora and fauna.

Under all alternatives the populations of lesser panicled sedge in the Three Mile wildlife refuge would not be within active grazing allotments, while the other populations would be within active grazing allotments. Alternative F has the lowest levels of stocking and poses the lowest grazing and/or trampling risk to this species for those populations within active grazing allotments.

***Indirect Effects***

Competition from non-native invasive plants constitutes a potential threat to this plant species based on habitat characteristics. Invasive species are introduced and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting lesser panicled sedge or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the greatest potential threat to lesser panicled sedge habitat due to its preference for marshy, saturated sites (Lym 1997). Canada thistle (*Cirsium arvense*) is a more common but less aggressive noxious weed which can thrive where lesser panicled sedge finds habitat.

**Cumulative Effects**

In general, any activity that alters water levels or water quality may adversely affect this species. Since this species often occurs near the head of the watershed, other activities that alter water levels are rare.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service.

As for other populations on the MBNF, there are no other predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the lesser panicled sedge or its habitat. Based on standards and guidelines and administrative feasibility, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning.

## Bristly-stalk sedge/delicate sedge *(Carex leptalea)*

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2 Sensitive; Heritage Rank: Global: G5; State WY: S2; WYNDD Plant List: Wide spread edge (Low conservation priority) (WYNDD 2002). It is ranked S2 in South Dakota, and S1 in Colorado.

***Distribution and Status***

Bristly-stalk sedge is a boreal/sub-arctic species found across North America from Labrador to Alaska and south to Florida, Texas, Utah, Colorado, and northern California (Handley, Heidel et al. 2002), (Ode 2001). It is also known outside of Region 2 in Wyoming, including the Teton Range, Yellowstone Plateau, and Jackson Hole in Teton County.

Within Region 2, bristly-stalk sedge occurs in the Absaroka and Beartooth ranges on the Shoshone National Forest in Park County, and in the Snowy Range on the MBNF. It also occurs in Colorado on the Arapaho-Roosevelt National Forest and in South Dakota on Black Hills National Forest.

It is known from 1 new record on the MBNF (Heidel and S. Laursen 2003), (Proctor 2003) and at least 11 extant occurrences and one historical record in Wyoming, 9 of which have been observed since 1992 (Handley, Heidel et al. 2002). It is reported from 4 occurrences in Colorado and 8 extant and 1 historical occurrences in the central and northern Black Hills (Ode 2001). Because this species is rather small in relation to its associated vegetation and habitat it is probably somewhat under collected but very habitat specific. Census data are lacking for most occurrences (Handley, Heidel et al. 2002). Recently observed colonies in the Beartooth Range

consist of widely scattered, but densely clustered tussocks restricted to small areas.

**Recovery and Conservation Planning**

There is no documentation of recovery or conservation planning for this species. However, eight of the known populations of delicate sedge in Wyoming occur in wilderness areas or special status lands managed by Shoshone and Targhee National Forests and Grand Teton and Yellowstone National Parks (Handley, Heidel et al. 2002). The MBNF population occurs in Sheep Mountain Game refuge.

Habitat for this and other fen obligate plant species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002).

**Status and Distribution on the MBNF**

Prior to 2002, there were no populations of bristly stalk sedge known to occur on the MBNF or Routt National Forest (WYNDD 2002), (CNHP 2002). During the 2002 field season, one population of was found on the MBNF (Heidel and S. Laursen 2003), (Proctor 2003). This new record resulted from an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park). The new site is situated in a peatland at the headwaters of Fence Creek within the Snowy Range on Sheep Mountain in Albany County. The plants occur in scattered patches among the hummocks with willows and sedges (*Carex gynocrates*, *Carex aurea*, *Carex norvegica* and *Triglochin maritima*). In addition to bristly stalk sedge, the Sheep Mountain fen provides habitat for three other Wyoming rare plant species including silver willow (*Salix candida*), *Trichophorum pumilum*, and *Eriophorum gracile*. The site is located within the Sheep Mountain Game Refuge, approximately 22 miles west of Laramie. Populations here would primarily be subject to grazing by wildlife.

**Habitat and Natural History**

***Species Description***

Bristly stalk sedge is perennial and has slender, weakly ascending to arching triangular stems (WYNDD 2002), (Handley, Heidel et al. 2002). It is densely tufted to rhizomatous. Flowering and fruiting occur from June through August. There are no obvious dispersal mechanisms but they are very habitat specific in a region where suitable habitats are scattered (Ode 2001). It has often been interpreted as a Pleistocene relict. Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

***Habitat***

Bristly stalk sedge occurs in wet meadows, bogs, and swamp forests (Handley,

Heidel et al. 2002). In Wyoming, populations are known to occur in white spruce or Engelmann spruce swamp forests on mossy hummocks or in *Carex rostrata/C. aquatilis* and *Carex buxbaumii* swamps at 6,500-8,120 feet. Habitat for the new MBNF population on Sheep Mountain occurs at the ecotone between exceptionally well developed shrub and graminoid peatland associations where the plant occurs in scattered patches among hummocks of willow and sedge (Heidel and S. Laursen 2003), (Proctor 2003). Ode (Ode 2001) describes this species as an obligate wetland inhabitant from saturated organic substrates (peat) of rich fens, bogs, conifer swamps at 5,000 to 10,000 ft. Ode (Ode 2001) states that it requires pH > 5.4, and prefers some shade (in MN). This habitat is rare and isolated in the state and Region 2.

**Threats from Human Activity**

Populations of bristly-stalk sedge may be threatened by logging, grazing, trampling, road construction, wetland development or recreational impacts on its wetland habitat (Handley, Heidel et al. 2002), (Ode 2001). Ode (Ode 2001) conjectures that there has likely been some decline to this species because of hydrologic modification, road construction, etc. but states that these habitats are usually not targeted for logging or development, and that livestock often ignore them except for shade. Recreational use within riparian areas could remove and/or injure plants, alter soil properties, change the hydrologic regime and/or reduce the overall vigor of bristly stalk sedge.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

**Environmental Baseline**

Prior to 2002, there were no populations of bristly stalk sedge known to occur on the MBNF or Routt National Forest (WYNDD 2002), (CNHP 2002). During the 2002 field season, one population of was found on Sheep Mountain on the MBNF (Heidel and S. Laursen 2003), (Proctor 2003). No other sites are currently known from the MBNF.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of bristly-stalk sedge. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for bristly stalked sedge.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies. Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Forest Service maintains discretion to modify projects or contracts if bristly stalk sedge is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Timber harvest does not occur in the Sheep Mountain Game Refuge where this species is known to occur but timber harvest may occur in other areas of suitable habitat. However, bristly stalked sedge occupies saturated soils in the ecotone between hummocky low shrub peatland and graminoid /quaking mat peatland, where it would not generally be affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils.

The Sheep Mountain Game Refuge is maintained in management areas that emphasize wildlife habitat management and that maintain limited access in all alternatives. Intermittent or occasional livestock grazing is allowed to manage resource conditions. Populations of bristly stalked sedge in the Sheep Mountain Game Refuge could be subject to this intermittent or occasional livestock grazing as well as wildlife grazing. Alternative F has the lowest levels of stocking and poses the lowest grazing and/or trampling risk to this species for those populations within active grazing allotments.

Recreational activities and effects can be managed through educational efforts and/or closure orders. However, this population is remote and can only be accessed by non-motorized means, therefore recreation impacts are likely to remain low.

This species generally occurs in open riparian settings where fire frequency intervals and intensities are usually low. High intensity fires could adversely impact individuals or whole populations of bristly stalked sedge, especially where abrupt riparian/upland ecotones occur.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

### *Indirect Effects*

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting bristly stalked sedge or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria),* though not known from on the MBNF, probably presents the greatest potential threat to bristly stalk sedge habitat due to its preference for marshy, saturated sites (Lym 1997).

### Cumulative Effects

In general, any activity that alters water levels or water quality may adversely affect this species. Since this species occurs near the head of the watershed, activities that alter water levels are rare.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet. Standard stipulations provide for relocation of facilities up to 250 feet. The Sheep Mountain Area has “No Surface Occupancy” in all alternatives.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service.

There are no other predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

### Biological Determinations, Risk Assessments, and Rationale

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the bristly stalk sedge. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions

or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning.

## Livid sedge (*Carex livida*)

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: None; Agency Status: USFS Region 2 Sensitive; Heritage Rank: Global: G5; State WY: S1; WYNDD Plant List: Disjunct (Medium conservation priority) (WYNDD 2002).

#### *Distribution and Status*

This species is interruptedly circumboreal. In North America, it is found from southern Alaska to Newfoundland, south to California, northwest Montana, Michigan, and New Jersey)(Handley, Heidel et al. 2002). It is disjunct in Colorado and the Absaroka Mountains and Yellowstone Plateau of Wyoming (Park and Teton counties).

Livid sedge is known from 5 extant occurrences in Wyoming, all of which have been discovered or relocated since 1991 (most recently in 1999). Within Region 2 lands, one known population of livid sedge occurs on the Shoshone National Forest in Park County, Wyoming (Handley, Heidel et al. 2002).

This species also occurs in Colorado on the Routt National Forest in Jackson County, in Boston Peak Fen in Larimer County and in High Creek Fen and East Lost Park Fen, both located in Park County (CNAP 2003) (Coles and K. Carsey 1998).

Populations can be locally abundant, although suitable habitat is often limited.

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. However, habitat for this and other fen obligate species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002). One population is protected on Shoshone National Forest in the Swamp Lake Special Botanical Area and at least four other occurrences are protected within Yellowstone National Park (Handley, Heidel et al. 2002). The population at High Creek Fen in Colorado is also protected. There is also documentation of this species occurring in the Boston Peak Fen RNA on the Arapahoe-Roosevelt National Forest near the headwaters of the Laramie River

(Coles and K. Carsey 1998)

**Status and Distribution on the MBNF**

There are no populations of livid sedge known to occur on the MBNF (WYNDD 2002). However, one population is known to occur on the Routt National Forest in Colorado within 6 air miles of the MBNF (CNHP 2002). The site is situated in a dispersed recreation land allocation which borders wilderness to the west and an RNA to the southwest. Suitable habitat does occur on the MBNF but it is uncommon (Proctor 2003).

**Habitat and Natural History**

***Species Description***

This perennial sedge spreads by long, slender rhizomes, forming small clumps (Handley, Heidel et al. 2002). Flowering and fruiting occur from June through August. Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

***Habitat***

Handley and Laursen (Handley, Heidel et al. 2002) report livid sedge from floating mats, in bogs, fens, and marls dominated by sedge species, often occurring on wet hummocks. Its documented elevational range in Wyoming is 6,460-6,600 ft. In Colorado, livid sedge is found in rich fens; graminoid-dominated mineral-rich wetlands between 9,000-10,000 feet. The Big Creek Lake population on the Routt National Forest occurs in a sphagnum moss and graminoid (*Carex lasiocarpa/Carex livida*) dominated peatland setting where it shares habitat with round leaf sundew (*Drosera rotundifolia)*, another Region 2 sensitive plant species. This habitat is among the rarest wetland types at temperate latitudes (Cowardin, V. Carter et al. 1979).

**Threats from Human Activity**

The peatland habitat that this and other obligate fen plant species require is sensitive to hydrologic change and there is no known method for creating or restoring peatlands, therefore it is not possible to mitigate for their loss (USDI Fish and Wildlife Service 1998). Activities which could cause hydrologic change include wetland development, concentrated livestock use, road building, logging, motorized recreation and peat mining. Ode (Ode 2001) agrees that there has been hydrologic modification and road construction associated with fen habitats in the past but states that these habitats are usually not targeted for logging or development, and that livestock often ignore them except when seeking shade.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

**Environmental Baseline**

There are no populations of livid sedge known to occur on the MBNF (WYNDD 2002). However, one population is known on the Routt National Forest in Colorado within 6 air miles of the MBNF (CNHP 2002). This population occurs in a sphagnum moss and graminoid dominated quaking mat peatland setting at Big Creek Lake. The dominant graminoid in the peatland is *Carex lasiocarpa*. During the 2002 and 2003 field season, nearby habitat on the MBNF was intensively inventoried for livid sedge while analyzing the North Platte River Allotment for its Management Plan Revision (Proctor 2003). None were found. In a separate effort, this and other rare peatland obligate plant species were searched for, in an intensive remote sensing/GIS effort, which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain, and the Sierra Madre Range (Huston Park) (Heidel and S. Laursen 2003). None were found.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of livid sedge. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies. Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Fire Management Plan that specifies fire suppression strategies will include conservation measures for livid sedge.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if livid sedge is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Since this species occupies open fen/peatland/ habitats, it would not generally be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils.

Sedges are often palatable to livestock, packstock and big game, therefore livid sedge sites could be subject to browsing and/or trampling impacts. Concentrated livestock use in fen habitat could alter the hydrology and water quality of its habitat.

Recreational use within riparian areas could remove and/or injure plants, alter soil properties, change the hydrologic regime and/or reduce the overall vigor of sedges. Recreational activities and effects can be managed through educational efforts and/or closure orders.

This species generally occurs in open fen/peatland settings where fire frequency intervals and intensities are low. High intensity fires could adversely impact individuals or whole populations of livid sedge, especially where there are abrupt riparian/upland ecotones.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

***Indirect Effects***

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting livid sedge or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the greatest potential threat to livid sedge habitat due to its preference for marshy, saturated sites (Lym 1997).

**Cumulative Effects**

In general, any activity that alters water levels or water quality may adversely affect this species. Since this species generally is found near the head of the watersheds. Activities that alter water levels here are rare.

There are no predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the

decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the livid sedge. Based on standards and guidelines and administrative feasibility discussed previously, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning.

## Yellow Ladies' Slipper (*Cypripedium parviflorum*)

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2: Sensitive; Heritage Rank: Global: G5; State WY: None; WYNDD Plant List: none (WYNDD 2002).

***Distribution and Status***

Yellow ladies' slipper is known from across Canada from Newfoundland to British Columbia, south to Georgia, Iowa, Nebraska, Colorado, Utah (Ode 2001). The North American yellow-flowered ladies' slippers have undergone numerous nomenclatural changes in the last century. Researchers agree that more than one recognizable form exists, but differ in what names they apply to forms (Sheviak 1994). Some workers, such as Fernald (Fernald 1950) considered the yellow-flowered Cypripedium to be part of a wide-ranging, circumboreal taxon. Other authors believed these orchids were endemic species of North America. In the latter case, either a single species was recognized with infraspecific taxa (Haines 2001), (Gleason and A.C. Cronquist 1991) or multiple species without infraspecific taxa (Magee and H.E. Ahles 1999). Research by Sheviak (Sheviak 1994) has helped

answer many of the nomenclatural questions. New taxonomic interpretation of yellow flowered Cypripediums may alter the varietal distributions (Sheviak 1994).

There are about 20 occurrences of yellow ladies' slipper in Colorado. For the South Dakota Black Hills, there are about 12 historic occurrences with 10 of those recent. For Nebraska, there are a few populations in Pine Ridge area of northwest Nebraska.

### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. However, it does occur in Rocky Mountain National Park (UC Davis 2003).

### Status and Distribution on the MBNF

No populations of yellow ladies' slipper are currently known to occur on the MBNF (WYNDD 2002). Williams *et al.* (Williams, Patterson et al. 1992) include this species on a list of flora for the Medicine Bow-Routt National Forests and Thunder Basin National Grassland but without identification of locale. Spackman *et al.* (Spackman, B. Jennings et al. 1997) indicate documented populations in Larimer county Colorado from a continuous mountain range that stretches northward through the Routt National Forest to the MBNF.

### Habitat and Natural History

### *Species Description*

Yellow ladies' slipper is a perennial with leafy stems 15-40 cm tall that arise from short rhizomes (Ode 2001). Flowering occurs in May-June, fruiting in July. This species has tiny, lightweight seeds that are dependent on mycorrhizal fungi for seedling establishment. The first aerial leaf appears approximately 3 years after germination, followed by another seven to thirteen years until the first mature flowering shoot is observed (Curtis 1943), (Kull and Kull 1991), (Shefferson, R.P. Sandercock et al. 2001). Yellow ladies' slipper exhibits dormancy. It has been suggested that the buds of a dormant rhizome in this species may live as long as up to 10 years, with an increasingly smaller chance of resprouting with time (Kull and Kull 1991) (Shefferson, R.P. Sandercock et al. 2001). In a study by Shefferson (Shefferson, R.P. Sandercock et al. 2001), large proportions of the population (19-67%) became dormant each year, although dormant periods lasting longer than one year were rare. Survival rates in the population would have been severely underestimated if dormant plants had been considered extinct. Dormancy periods as long as four years were observed. Dormancy periods from other *Cypripedium* orchids typically show dormancy lengths from one to five years (Gill 1989). The functional dormancy period in the Shefferson (Shefferson, R.P. Sandercock et al. 2001) study appears to be one to two years, after which the probability of re-growth becomes very small. A high variability in dormancy occurrence in the population may suggest some influence of environmental conditions on the occurrence of dormancy. The number of freezing days in spring, precipitation, and mean spring temperature appear to be influential. Pollen moved a maximum distance of 23 m in

one population of yellow ladies' slipper which is far short of the distances separating demes in the study by Tremblay (Tremblay 1994). This suggests that most pollen flow in yellow ladies' slipper is limited to individuals within demes. Yellow ladies' slipper is a long-lived perennial. A lateral rhizome can initiate the growth of multiple stems (ramets) from plants (genets) (Harper and White 1974) (Shefferson, R.P. Sandercock et al. 2001). Kull and Kull (Kull and Kull 1991) estimate that a typical rhizome may have as many as 20 annual growth increments. Yellow ladies' slipper is a colony forming species (i.e. forms clonal patches) (Great Plains Flora Association 1986), so counting methods need to account for this. The Cypripedium genus is adapted for pollination by small bees, with a lip that forms a deep pouch with nectar (Proctor 1972).

Additional information on the species, including life (Great Plains Flora Association 1986) history stages, population structure, longevity, mortality, and seed biology, are not available.

### *Habitat*

In Region 2, yellow ladies' slipper inhabits aspen forests, white spruce/paper birch, paper birch/hazelnut, Ponderosa pine/Douglas fir forests, 4,000 to 8,500 ft. In the Black Hills of South Dakota, much of the historic aspen has been converted to pine or spruce. The associated decline in yellow ladies' slipper has been in terms of quality more than quantity (Ode 2001).

### Threats from Human Activity

Yellow ladies' slipper is vulnerable to habitat loss, horticultural collecting, and medicinal collecting range wide. Ode (Ode 2001) reports that the plant itself is more vulnerable than its habitat from such things as wildcrafting and collectors. Its response to canopy removals is uncertain, but it is likely that it would not tolerate significant overstory removals or soil and hydrological changes (Allen 2002). Yellow ladies' slipper is also vulnerable to changes in cover types from aspen to conifers. This species may be impacted by road construction or other ground disturbances associated with logging, recreation or development. Habitat may occur on lands designated as suitable for timber harvest where aspen is successional to conifers.

### Environmental Baseline

No populations of yellow ladies' slipper are currently known to occur on the MBNF (WYNDD 2002). Williams (Williams, Patterson et al. 1992) include this species on a list of flora for the Medicine Bow-Routt National Forests and Thunder Basin National Grassland without specifying locale. The MBNF has aspen forests, localized populations of white spruce, ponderosa pine and Douglas fir forests that would be classified as potential habitat.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of yellow ladies' slipper. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened, endangered, or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Allotment management plans can be modified to contain considerations for yellow ladies' slipper and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Fire Management Plan specifies fire suppression strategies will include conservation measures for yellow ladies' slipper, if populations are identified.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if lesser yellow ladies' slipper is determined to occur within a project or contract area. Project implementation will assess site-specific risks and strategies.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Since this species may be impacted by road construction or other ground disturbances associated with logging, recreation or development and since habitat may occur on lands designated as suitable for timber harvest where aspen is successional to conifers, Alternatives B, and A, in decreasing order, harvest timber on the greatest number of acres and would pose the greatest risks to this species. Since this species is not visible above ground every year, sensitive plant surveys during project planning may not detect all existing populations. Timber sale contracts contain provisions that provide for modifications to be made, if new information on locations of sensitive plants becomes available during project implementation. Alternatives F and E have fewest number of acres of timber harvest and would pose a lower risk to this species.

Plants may also be susceptible to over-harvest by people seeking roots or garden plantings. Botanical collection permits prohibit collection of sensitive plants. Illegal collection activities are difficult to control, however area closures can be used to regulate access, if needed.

If populations were to occur and habitat were to occur within livestock grazing allotments, grazing and stock trampling could affect individuals. All alternatives maintain most of the forest in grazing allotments. Alternative F has lowest levels of domestic livestock stocking and poses the lowest risk to this species.

Application of insecticides for grasshopper or other insect control has the potential to impact insect pollinator populations. The Cypripedium genus is adapted for pollination by small bees, with a lip that forms a deep pouch with nectar (Proctor 1972). Specific pollinator information for this plant species is not well known. The best available information will be used to assess the risks to pollinator's of this species during project planning as required by 40 CFR §1502.22 and FSH 1909.15.

Potential habitat for yellow ladies' slipper occurs within forested lands where historic fire suppression may have altered fire return intervals. Under an extreme wildfire event, a wildfire could pose a risk to habitat for this species on the MBNF. All alternatives have opportunities for prescribed fire or wildfire to be used to restore historic fire regimes. Prescribed fire could be used to restore un-occupied habitat to provide for population increases under all alternatives.

**Indirect Effects**

Habitat and populations of yellow ladies' slipper in Colorado occur within forested landscapes contiguous with forested areas of the MBNF. A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado. The impacts of wildfires, are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

Alternative F has the highest predicted levels of stand replacement wildfire. The impacts of wildfires are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

**Cumulative Effects**

Historical timber harvest and road construction may have impacted habitat and or populations of this species. Fire suppression may have increased the conversion of aspen to conifer habitat and reduced potential habitat for this species.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve sensitive species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would

programmatically affect the yellow ladies' slipper or its habitat. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to potential habitat for yellow ladies' slipper. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can not always be determined in project planning surveys, alternatives that propose higher levels of management actions pose a higher risk of affecting unknown populations.

Alternative F provides for high viability for this species. All other alternative provide for moderately high viability for yellow ladies' slipper.

By identifying the possibility of potential habitat at the Forest Planning level even though the species has not been known to occur on the MBNF, project level surveys and biological evaluations can help to determine the presence or absence of potential habitat and occupancy by yellow ladies' slipper.

## Round leaf sundew (*Drosera rotundifolia*)

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: None; Agency Status: USFS Region 2 Sensitive; Heritage Rank: Global: G5; State WY: none, CO: S2 (Matthews 1994); WYNDD Plant List: None (WYNDD 2002).

#### *Distribution and Status*

Round leaf sundew is distributed from Greenland and Newfoundland west to Alaska eastern Montana and western Colorado (Matthews 1994), (Rook J. S 2002). In the east, round leaf sundew is found from Nova Scotia south to Georgia, Florida, and Alabama and west to the Mississippi River, Iowa, and Minnesota. Populations also occur in Europe and Asia. Within Region 2, populations are known to occur on the Routt, Arapaho-Roosevelt and Gunnison National Forests (CNHP 2002), (Austin 2003). Round leaf sundew is not currently known to occur in Wyoming (WYNDD 2002). Suitable habitat is often limited in Region 2.

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. However habitat for this and other rare fen obligate species would be conserved through regional direction under the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002). In Colorado, it is known from one fen in Gunnison County on the Gunnison National Forest where it is afforded special

protection because it is in a botanical special interest area. The Gunnison site does not occur in an active grazing allotment (Matthews 1994), (Austin 2003).

**Status and Distribution on the MBNF**

No populations of round leaf sundew are currently known to occur on the MBNF (WYNDD 2002). However, one population is known to occur on the Routt National Forest in Colorado within 6 air miles of the MBNF (CNHP 2002). The site is situated in a dispersed recreation land allocation which borders wilderness to the west and an RNA to the southwest. Suitable habitat does occur on the MBNF but it is uncommon (Proctor 2003).

**Habitat and Natural History**

***Species Description***

Round leaf sundew is an insectivorous, short-lived perennial forb arising from a basal rosette of leaves (Matthews 1994), (Rook J. S 2002). The upper surface of the leaf blades are covered with reddish, glandular hairs tipped with a sticky, glutinous secretion that traps insects. Round leaf sundew compensates for the low available nutrients (low in nitrogen, phosphorus and calcium) in the habitat by catching and digesting insects. Ants are often opportunistic predators of insects trapped in the leaves of round leaf sundew, scavenging up to two-thirds of the prey caught by the plant (Matthews 1994), (Austin 2003).

The root system of round leaf sundew is usually shallow (usually less then 6 cm). It consists of a taproot, which are functional for less than a year. The taproot is then replaced by mostly horizontal and adventitious roots with a few root hairs.

Rook (Rook J. S 2002) reports the species to be very shade intolerant and because it is so small, even sedges, grasses, and small shrubs may limit light. On the contrary, Austin (Austin 2003) has observed round leaf sundew in the partial shade of lodgepole pine at the Gunnison site. Rook (Rook J. S 2002) notes that shaded plants may not develop a rosette but instead had a more spindly habit.

Reproduction is both sexual and vegetative (Rook J. S 2002). Flowering and fruiting occur from July through August. Cross pollination results from wind or insects while flowers are open during the day. The resulting fruits are capsules which often persist unopened, and seeds are released when the fruit rots. The seeds have inflated testa allowing the seeds to be buoyant and capable of dispersing on water surfaces during flooding or snowmelt. The seeds require cold stratification to germinate. Root division is reported as the most successful mode of vegetative reproduction. Vegetative reproduction also takes place when leaf buds form plantlets, or when axillary buds below the rosette form a secondary rosette (Matthews 1994). As the stem decays, the two separate. Adventitious plants develop in the autumn. Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

### *Habitat*

Spackman *et al.* (Spackman, B. Jennings et al. 1997), reports round leaf sundew from floating mats and from the margins of acidic ponds and fens, where it occurs from 9,100 to 9,800 feet in elevation. On the Routt National Forest, round leaf sundew is found in sphagnum moss and graminoid (*Carex lasiocarpa*) dominated peatland settings. In one site, it shares habitat with *Carex livida*, another Region 2 sensitive plant species. The adaptations of round leaf sundew to nutrient poor conditions allow it to be very competitive and persistent in acidic wetlands (Matthews 1994). This habitat is among the rarest wetland types at temperate latitudes (Cowardin, V. Carter et al. 1979).

**Threats from Human Activity**

The peatland habitat that this and other rare obligate fen plant species require is sensitive to hydrologic change (localized or within watersheds) and there is no known method for creating or restoring peatlands, therefore it is not possible to mitigate for their loss (USDA FS Routt National Forest 1998). Some data indicate round leaf sundew tolerates and/or is competitive or can at least persist in peatland habitats that have been disturbed (Matthews 1994). "It has invaded disturbed sites in bogs after peat mining, ditching, and burning." Activities which could cause hydrologic change to peatlands include wetland development, concentrated livestock use, road building, logging, motorized recreation, ditching and peat mining. Ode (Ode 1988) agrees that there has been hydrologic modification and road construction associated with fen habitats in the past but states that these habitats are usually not targeted for logging or development, and that livestock often ignore them except when seeking shade.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

This plant is known to have medicinal properties and could be subject to collection for personal or commercial use.

**Environmental Baseline**

There are currently no populations of round leaf sundew known to occur on the MBNF (WYNDD 2002). However, four populations are known on the Routt National Forest in Colorado including one site that is within 6 air miles of the MBNF (CNHP 2002). This population occurs in a sphagnum moss and graminoid dominated quaking mat peatland setting at Big Creek Lake. The dominant graminoid in the peatland is *Carex lasiocarpa*. During the 2002 and 2003 field season, nearby habitat on the MBNF was intensively inventoried for round leaf sundew and other rare fen obligate plant species while analyzing the Beaver Creek, Blackhall and McNulty proposed timber sales, the Pearl fuels reduction project, the

Grizzly Helena trail improvement project and the Upper North Platte River Allotment Plan Revision (Proctor 2003). None were found. In a separate effort, this and other rare peatland obligate plant species were searched for in an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park) (Heidel and S. Laursen 2003), (Proctor 2003). None were found.

Because droughts lasting several years or more can affect the floating mats and the margins of acidic ponds and fens, populations of round leaf sundew may be more difficult to locate in some years over other years.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of round leaf sundew. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or endangered species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Fire Management Plan that specifies fire suppression strategies will include conservation measures for round leaf sundew.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if round leaf sundew is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Since this species occupies open fen/peatland habitats, it would not generally be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils.

Round leaf sundew occurs in sedge dominated fens. Sedges are often palatable to livestock, packstock and big game, therefore this species could be indirectly subject to browsing and/or trampling impacts. In general, livestock avoid fens, especially

those with quaking mat components and would preferably choose other riparian places to forage if available. Concentrated livestock use in fen habitat could alter the hydrology and water quality of this habitat.

Recreational use within riparian areas could remove and/or injure plants, alter soil properties, change the hydrologic regime and/or reduce the overall vigor of round leaf sundew. Recreational activities and effects can be managed through educational efforts and/or closure orders.

This species generally occurs in open riparian settings where fire frequency intervals and intensities are low. Round-leaf sundew is documented to have invaded sites in bogs after seasonal burning (Matthews 1994). Encroachment of upland species may be occurring in some peatlands as a result of fire suppression. Rook (Rook J. S 2002) reports the species to be very shade intolerant and because it is so small, even sedges, grasses, and small shrubs may limit light. On the contrary, Austin (Austin 2003) has observed round leaf sundew in the partial shade of lodgepole pine at the Gunnison site. Low severity fires may benefit the species (Matthews 1994). High intensity fires could adversely impact individuals or whole populations of round leaf sundew, especially where there are abrupt riparian/upland ecotones.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

### *Indirect Effects*

Competition from non-native invasive plants constitutes a potential threat to this or any native plant species. Invasive species are introduced and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting round leaf sundew or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the greatest potential threat to peatland habitat due to its preference for marshy, saturated sites (Lym 1997).

### Cumulative Effects

In general, any activity that alters water levels or water quality may adversely affect this species. Since this species generally is found near the head of the watersheds. Activities that alter water levels here are rare.

There are no predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the round leaf sundew or its habitat. Based on standards and guidelines and administrative feasibility, management actions on the MBNF can be controlled to reduce impacts to potential habitat for this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

The presence of this plant can be determined in project planning surveys only during a narrow window, however riparian/wetlands habitat are easily recognized and protected, thus all alternatives pose a low level risk for management actions that involve project planning.

All alternatives contribute to moderately high viability for round-leaf sundew.

By identifying the possibility of potential habitat at the Forest Planning level even though the species has not been known to occur on the MBNF, project level surveys and biological evaluations can help to determine the presence or absence of potential habitat and occupancy by the round-leaf sundew.

## Boreal spikerush *(Eleocharis tenuis var borealis)*

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2 Sensitive; Heritage Rank: Global: G5T5 (NatureServe 2003); State WY: S1; WYNDD Plant List: Peripheral (Low conservation priority) (Fertig 2000), (WYNDD 2002).

### *Distribution and Status*

Boreal spikerush ranges from Newfoundland to British Columbia and south to Montana, Wyoming, Illinois, and Pennsylvania (Laursen and B. Heidel 2002). In Wyoming, this species occurs on the Yellowstone Plateau in Teton County and on the Laramie Range in Platte County. It is known from at least 4 extant records in Wyoming, all observed since 1993 (most recently in 1997). Only one site is known from Region 2 where it occurs in the MBNF. The Yellowstone National Park botanist estimated 100-200 stems at one site in Yellowstone National Park in 1993 (Fertig 2000). Estimates are unavailable for other populations.

### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. However, it does occur in Yellowstone National Park.

### *Status and Distribution on the Medicine Bow NF*

One population of boreal spikerush is documented on the MBNF in the Laramie Range in Platte County.

## Habitat and Natural History

### *Species Description*

Boreal spikerush is a perennial graminoid with slender culms 5-40 cm tall that are loosely clustered along a creeping rhizome (Laursen and B. Heidel 2002). Flowering occurs from June to August. The spikerush genus is generally wind-pollinated. Life history information on this species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

### *Habitat*

In Wyoming, this species is often associated with thermally influenced seeps and springs, although populations may also occur in non-thermal seepage areas. It is found at 6,200-7,250 feet elevation. Its habitats are small and isolated on the landscape.

### *Threats from Human Activity*

Boreal spikerush may be impacted by degradation of wetland habitats by road building. This species is fairly well protected within Yellowstone National Park; however, the single Region 2 population is within the MBNF which is managed for multiple use.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

**Environmental Baseline**

One population of boreal spikerush is known to occur on the MBNF (WYNDD 2002). It is the only population known to occur in Region 2, therefore this population is extremely important to the viability of this species on the MBNF and the region.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of boreal spikerush. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for boreal spikerush and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Fire Management Plan that specifies fire suppression strategies will include conservation measures for boreal spikerush.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if boreal spikerush is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Degradation of wetland habitats by road building is listed as the primary threat to this species (Fertig 2000). Since this species occupies seeps and springs, it would not generally be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils.

Boreal spikerush occurs in seeps and springs with sedges and other riparian plant species which are often palatable to livestock, packstock and big game. Therefore this species could be indirectly subject to browsing and/or trampling impacts. Concentrated livestock use in wetland habitat could remove and/or injure plants, alter soil properties, change the hydrologic regime and/or reduce the overall vigor of boreal spikerush. The timing, extent and intensity of grazing can be controlled by the Forest Service.

Recreational use within riparian areas could remove and/or injure plants, alter soil properties, change the hydrologic regime and/or reduce the overall vigor of boreal spikerush. Recreational activities and effects can be managed through educational efforts and/or closure orders.

This species generally occurs in seep and spring settings where fire frequency intervals and intensities are low.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

### *Indirect Effects*

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting boreal spikerush or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the greatest potential threat to wetland habitat due to its preference for marshy, saturated sites (Lym 1997).

### Cumulative Effects

In general, any activity that alters water levels or water quality may adversely affect this species. Since this species generally is found near the head of the watersheds. Activities that alter water levels here are rare.

There are no predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the boreal spikerush. Based on standards and guidelines and administrative feasibility, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning.

## Slender-leaved buckwheat (*Eriogonum exilifolium)*

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

Status: USFWS: None; Agency Status: USFS R2 Sensitive; Heritage Rank: Global: G3 (NatureServe 2003); WY State: S2; WYNDD Plant List: Regional endemic (Medium conservation priority) (Fertig 2000d.).

***Distribution and Status***

Slender-leaved buckwheat is a regional endemic of south-central Wyoming (Albany and Carbon counties) and adjacent north-central Colorado (Grant, Jackson and Larimer counties). In Wyoming, it is restricted to the Laramie and Shirley basins and foothills of the Snowy, Laramie and Sierra Madre ranges, with a total of seven known occurrences (Fertig 2000d.), (Handley, Heidel et al. 2002).

***Recovery and Conservation Planning***

There is no documentation of recovery or conservation planning for this species.

**Status and Distribution on the MBNF**

There are two known occurrences on the MBNF. One is on the eastern edge of the Sierra Madre Range in the Big Creek Park area; the other is on the northern end of the Snowy Range in the Pass Creek area. Botanical inventory work done in the Big Creek Park area by Forest Service specialists in 2002 (Proctor 2003), (Haas 2003) has shown that slender-leaved buckwheat occurs over a slightly larger area than previously documented, occurring in at least one other section than previously reported in that vicinity.

## Habitat and Natural History

### *Species Description*

Slender-leaved buckwheat is a small tap-rooted perennial herb forming dense mats 10-20 cm across. Leaf blades are narrow and linear, with a dense white-wooly coating on the underside. The flowers are small, white to rose colored, and are clustered in compact heads on leafless, woolly stems. Flowering and fruiting occur from mid June to late August. Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, is not available (Fertig 2000d.), (Handley, Heidel et al. 2002).

### *Habitat*

This species is found on semi-bare sandy-clay gumbo flats, white shaley-gypsum ridges, red clay hills, and limestone or limey-sandstone outcrops in cushion plant-bunchgrass communities with low plant cover. This type of habitat is naturally patchy across the landscape. Elevational range is 6,900 to 8,600 feet. Some associated species on the MBNF include *Chrysothamnus nauseosus*, *Arenaria hookeri*, *Astragalus kentrophyta*, *Machaeranthera coloradoensis* (Big Creek site), and *Artemisia arbuscula* var. *longiloba*, *Elymus smithii* and *Pseudoroegneria spicata* (Pass Creek site)(Fertig 2000d.), (WYNDD 2002),(Proctor 2003),(Haas 2003).

## Threats from Human Activity

Documented threats to Slender-leaved buckwheat include trampling by livestock and/or humans, road construction and maintenance, and illegal off-road ATV and motorcycle traffic (Proctor 2002). Interestingly, this species appears to benefit from some disturbance, since it has been observed to colonize road-cuts with exposed bare soil. Some habitat on private land has been lost to subdivision in the Laramie, Wyoming area (Fertig 2000d.).

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

## Environmental Baseline

Extant populations are mostly small and restricted in area, largely because of the restricted size and patchy nature of the habitats they occupy. However, as mentioned above, recent survey work done at the Big Creek site has revealed plants over a slightly larger area than previously reported (Proctor 2003),(Haas 2003).

## Protection in the Plan

Standards and guidelines for the protection of sensitive plants apply to the conservation of slender-leaved buckwheat. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to

authorize collection of plants or plant parts for other than threatened, endangered or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for this species, though its habitat has low susceptibility to fire due to lack of vegetative material (fine fuels) that would carry a fire.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

Allotment management plans can be modified to contain considerations for this species and exclosures constructed, if needed to maintain viable populations. Area closures can be used to exclude recreation and/or other uses if needed.

The Forest Service maintains discretion to modify projects or contracts if slender-leaved buckwheat is determined to occur within a project or contract area. Project implementation will assess site-specific risks and strategies.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Slender-leaved buckwheat appears to tolerate some trampling from grazing livestock (personal qualitative observations John Proctor), though repeated trailing on the loose substrate upon which this species grows can dislodge plants and accelerate erosion. It has also been suggested that slender-leaved buckwheat responds positively to some types of disturbance since it has been observed growing on cut banks created from road construction (Fertig 2000d.). There are no quantitative monitoring data to indicate what levels and types of disturbances might benefit this species, and which are detrimental. Both slender-leaved buckwheat occurrences known on the MBNF are within active cattle grazing allotments. Alternative F has the lowest levels of stocking and poses the lowest grazing and/or trampling risk to this species for those populations.

Off-road motorized and mechanized (mountain bike) travel restrictions are largely the same at both known Slender-leaved buckwheat sites under all alternatives, with some minor differences under Alternative F. Alternative F differs slightly from the other alternatives in the amount of off-road activity that might occur on the buckwheat sites since part of the Big Creek population would fall within Recommended Wilderness and the Pass Creek population would fall within the management area for Deer and Elk Winter Range, Limited Management. Recommended Wilderness would not be open to mechanized equipment such as mountain bikes. The roads within the management area for Deer and Elk Winter Range, Limited Management could be closed to motorized use for winter and/or early spring seasons, thus reducing the number of months each year the buckwheat habitat would be subject to illegal off-road motorized use.

### *Indirect Effects*

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most ground-disturbing management activities have the greater chance of increasing populations of invasive plants and thereby adversely affecting slender-leaved buckwheat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while alternatives B, and A (in descending order) have the most potential for increasing invasive plant populations. The plan includes goals, objectives, and strategies for treatment of invasive plants.

### Cumulative Effects

Some of the potential habitat for this species occurs on private lands. There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on private lands. Livestock grazing on private land in the Big Creek Park area could reduce populations in this area. Any reduction of populations on private lands increases the contribution of populations on NFS lands to the continued viability of this species.

Any effects to a single population are unlikely to influence the status of other populations except as noted above.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service.

### Biological Determinations, Risk Assessments, and Rationale

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the slender-leaved buckwheat or its habitat. Based on standards and guidelines and administrative feasibility, management actions on the MBNF can be controlled to reduce impacts to slender-leaved buckwheat. Management actions ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning. All alternatives maintain most of the MBNF in grazing allotments.

Alternative F has the lowest levels of stocking and poses the lowest risk to Slender-leaved buckwheat. This alternative is likely to contribute to high viability. All other alternatives contribute to moderately high viability for this species.

## Slender Cotton-grass (*Eriophorum gracile*)

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: None; Agency Status: USFS Region 2 Sensitive; Heritage Rank: Global: G5; State WY: S1; WYNDD Plant List: Peripheral (Low conservation priority) (WYNDD 2002), (Ode 2001), (Handley, Heidel et al. 2002). This species is ranked S2 in Colorado, S1 in South Dakota, and S2 in Nebraska (Handley, Heidel et al. 2002).

#### *Distribution and Status*

Slender cotton-grass is a circumboreal species. In North America it occurs across Canada, south to Pennsylvania, Iowa, Colorado, Idaho, and central California (Handley, Heidel et al. 2002), (Ode 2001), (Spackman, B. Jennings et al. 1997). In Wyoming, it is known from outside of Region 2 in the Jackson Hole area in Teton County.

Within Region 2, slender cotton-grass occurs in the Beartooth Mountains in Park County on the Shoshone National Forest in Wyoming. It has recently been found on Sheep Mountain in Albany County on the MBNF in Wyoming (Heidel and S. Laursen 2003), (Proctor 2003). In Colorado, it is known from the Arapaho-Roosevelt, Routt, San Juan, Rio Grande, Pike-San Isabel, and Grand Mesa, Uncompahgre and Gunnison National Forests (Handley, Heidel et al. 2002). In South Dakota, it is known from the Fort Pierre National Grassland. In Nebraska, it is known from the Nebraska National Forest and may be in the Samuel R. McKelvie National Forest.

Slender cotton-grass is known from 1 new site (Heidel and S. Laursen 2003), (Proctor 2003) and 5-6 extant records and 1 historical record in Wyoming. All of the extant populations have been located since 1991 (most recently in 1999). Four of these populations are on the Shoshone National Forest. The known populations in Wyoming range in size from 30 to nearly 1000 stems in a total area of about 12 acres. In Colorado, it is known from 11 occurrences including 6 recent and 5 historical (Ode 2001). In South Dakota, it is known from one extant site at LaCreek National Wildlife Refuge and one historic site in northeast South Dakota. In Nebraska it is known from on or two sites in Cherry and Tomas Counties (Ode 2001), (Handley, Heidel et al. 2002).

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for slender cotton-

grass. On the Shoshone National Forest, it occurs in the Absaroka Beartooth Wilderness. On the Routt National Forest it occurs in the Mount Zirkel Wilderness (Handley, Heidel et al. 2002). Habitat for this and other fen obligate plant species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002).

**Status and Distribution on the MBNF**

Prior to 2002, there were no populations of slender cotton-grass known to occur on the MBNF (WYNDD 2002). However, there were sites known to occur just over the Wyoming/Colorado border on the Routt NF (Colorado Natural Heritage Program (CONHP) 2003). During the 2002 field season, one population of slender cotton-grass was found on the MBNF (Heidel and S. Laursen 2003), (Proctor 2003). This new record resulted from an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park). The new slender cotton-grass site is situated in a drainage fen at the headwaters of Fence Creek on Sheep Mountain in Albany County. The plants occur in a quaking mat setting with other Wyoming rare plant species including silver willow (*Salix candida*), *Trichophorum pumilum*, and bristly stalk sedge (*Carex leptalea)*. The site is located within the Sheep Mountain Game Refuge, approximately 22 miles west of Laramie. Populations here would primarily be subject to grazing by wildlife (Jankovsky-Jones, G. P. Jones et al. 1996).

**Habitat and Natural History**

***Species Description***

Slender cotton-grass is a rhizomatous perennial graminoid (Handley, Heidel et al. 2002), (Ode 2001). Flowering and fruiting occur from July through September. It has small seeds (2mm long) with long, fine bristles and it may be inferred that the bristly perianth is appropriate for wind dispersal across unsuitable habitat. It reproduces by seed and vegetatively from tillers. Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

***Habitat***

In Wyoming, slender cotton-grass is found in sedge meadows and floating bogs in saturated soil to shallow standing water at 6,900 to 9,300 feet (Handley, Heidel et al. 2002), (Heidel and S. Laursen 2003), (Proctor 2003). In Colorado, it is reported to inhabit fens, bogs, peatlands, and other open saturated areas with organic substrates (Ode 2001).

**Threats from Human Activity**

Slender cotton-grass may be threatened by livestock grazing, trampling, and recreational use in its habitat (Handley, Heidel et al. 2002). Weeds spread by pack stock could infest slender cotton-grass habitat. Slender cotton-grass is also vulnerable to hydrologic modification for water development, road construction, as well as peat mining and bog iron mining, (Ode 2001). Apparently two sites in Colorado have been destroyed (Weber and R.C. Wittman 2001). At least one historic site in South Dakota at LaCreek National Wildlife Refuge in South Dakota was destroyed by construction of ponds.

**Environmental Baseline**

During the 2002 and 2003 field season, this and other rare peatland obligate plant species were searched for in an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park) (Heidel and S. Laursen 2003), (Proctor 2003).

Prior to 2002, there were no populations of slender cotton-grass known to occur on the MBNF (WYNDD 2002). During the 2002 field season one population of slender cotton-grass was found on the MBNF (Heidel and S. Laursen 2003), (Proctor 2003).

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of slender cotton-grass. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for slender cotton-grass.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if slender cotton-grass is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Because this species occupies saturated soils in open quaking mat/peatland settings, it would not generally be affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils.

Recreational use within riparian areas could remove and/or injure plants, alter soil properties, change the hydrologic regime and/or reduce the overall vigor of slender cotton-grass. Because this species can also occur in basin peatland settings around open water, well-used fishing areas may result in some trampling of this species. Recreational activities and effects can be managed through educational efforts and/or closure orders. However, this populations is remote and can only be accessed by non-motorized means, therefore recreation impacts are likely to remain low.

This species generally occurs in wet peatland or other riparian settings where fire frequency intervals and intensities are usually low. High intensity fires could adversely impact individuals or whole populations of slender cotton-grass. Especially where there are abrupt riparian/upland ecotones.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

The Sheep Mountain Game Refuge is maintained in management areas that emphasize wildlife habitat management and that maintain limited access in all alternatives. Intermittent or occasional livestock grazing is allowed to manage resource conditions. Populations of slender cotton-grass in the Sheep Mountain Game Refuge could be subject to this intermittent or occasional livestock grazing (Jankovsky-Jones, G. P. Jones et al. 1996). Alternative F has the lowest levels of stocking and poses the lowest grazing and/or trampling risk to this species for those populations within active grazing allotments.

***Indirect Effects***

Competition from non-native invasive plants constitutes a potential threat to this or any native plant species. Invasive species are introduced and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting slender cotton-grass or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending

order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the greatest potential threat to slender cotton-grass habitat due to its preference for marshy, saturated sites (Lym 1997).

**Cumulative Effects**

There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on lands outside the National Forest. Any effects to a single population are unlikely to influence the status of other populations.

In general, any activity that alters water levels or water quality may adversely affect this species. Since this species occurs near the head of the watershed, activities that alter water levels are rare.

There are no predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet. The Sheep Mountain Area has "No Surface Occupancy" in all alternatives.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service. The Sheep Mountain Game Refuge is maintained in management areas that emphasize wildlife habitat management and that maintain limited access in all alternatives.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the slender cotton-grass. Based on standards and guidelines and administrative feasibility, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

The presence of this plant can be determined in project planning surveys. In addition

riparian/wetlands habitat are easily recognized and protected, thus all alternatives pose a low level risk for management actions that involve project planning.

Alternative F contributes to high viability for slender cotton-grass. All other alternatives contribute to moderately high viability for this species.

## Hall's Fescue (*Festuca hallii)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: none; Agency Status: USFS Region 2: Sensitive (Handley, Heidel et al. 2002); Heritage Rank: Global: G4; State WY: S1; WYNDD Plant List: Peripheral (Medium conservation priority) (Fertig 2000c). It is not ranked in Colorado (Handley, Heidel et al. 2002).

#### *Distribution and Status*

The species is known from northern Alberta to Ontario, south to North Dakota and Colorado. In Wyoming, Hall's Fescue occurs is known from the Bighorn, Shoshone, and MBNF. It is also known from lands managed by the state and BLM. In Colorado, it is known to occur on the Arapaho-Roosevelt National Forest. It does not seem to be common anywhere in its range. It is known from 10 confirmed records in Wyoming and one vague, historical record (Jones 1992), (Fertig 2000c), (Handley, Heidel et al. 2002). Census data are lacking for most populations.

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. This plant occurs within the Cinnabar Park Special Interest Area (204 acres) that is included in all alternatives. There is a botanical emphasis for this Special Interest Area (Jones 1992).

Three occurrences are within the North Absaroka Wilderness Area. Populations also occur in the potential Pat O'Hara Mountain and Line Creek/Twin Lakes Research Natural Areas in northwestern Wyoming.

### Status and Distribution on the MBNF

The one documented location is in the Cinnabar park area of the MBNF (Fertig 2000c), (Jones 1992).

### Habitat and Natural History

#### *Species Description*

Hall's fescue is a tufted perennial grass up to 20-80 cm tall. Flowering and fruiting occur from May through July. Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

### *Habitat*

In Wyoming, Hall's Fescue is found in montane meadows, on slopes, and at the edge of open coniferous woods and meadows at 6,900-11,000 feet (Fertig 2000c). It is usually on soils derived from calcareous parent material. Evert (Evert 1991) also reports this species on volcanic soils. It can occur in the edge between open meadows and *Pinus contorta - Picea engelmanni* forests or in tundra. Known associates are *Potentilla fruticosa, Artemisia tridentata, Danthonia intermedia, Lupinus wyethii, Geum triflorum, Zigadenus elegans,* and *Penstemon spp*. The habitat is discontinuous across the landscape.

### Threats from Human Activity

Hall's Fescue may be threatened by grazing (Fertig 2000c). Suitable habitat is located in areas available for timber harvest. Competition from non-native plants could threaten Hall's fescue. The spread of non-native plants is associated with higher levels of human activities. A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado.

### Environmental Baseline

The one documented location is in the Cinnabar park area of the MBNF (Fertig 2000c).

### Protection in the Plan

Standards and guidelines for the protection of sensitive plants and guidelines apply to the conservation of Hall's fescue. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for Hall's fescue.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if Hall's fescue is determined to occur within a project or contract area. Project implementation will assess site-specific risks and strategies.

### Direct and Indirect Effects on Populations on NFS Lands

### *Direct Effects on Populations on NFS Lands*

For populations and habitat that occur within livestock grazing allotments, grazing and stock trampling could affect individuals and reproductive status. Hall's fescue grows at the edges of forest stands in areas that provide high forage values for

livestock and receive moderate to high use by livestock. Under conditions of heavy range use, it could decrease. Allotment management plans can be modified to contain considerations for this species and exclosures constructed, if needed to maintain viable populations.

All alternatives maintain most of the forest in grazing allotments. Alternative F has the lowest levels of stocking and poses the lowest risk to this species.

Competition from non-native invasive plants can be a threat to Hall's fescue. Invasive species are often spread by livestock grazing and recreational activities but can also be spread by other forest management activities.

This species may be impacted by road construction or other ground disturbances associated with logging, recreation or development. Habitat occurs on lands designated as suitable for timber harvest.

Alternatives B and A in decreasing order harvest timber on the greatest number of acres and would pose the greatest risks to this species. Timber sale contracts contain provisions that provide for modifications to be made, if new information on locations of sensitive plants becomes available during project implementation. Alternatives F and E (in descending order) have fewest number of acres of timber harvest and would pose a lower risk to this species.

This species is wind pollinated (as are all grasses). This wind pollination may provide genetic dispersal and interaction among disjunct populations depending upon wind directions at the time of pollen dispersal.

One population is present with the Cinnabar Park Special Interest Area. This is included in all alternatives as a Special Interest Area of 204 acres. This special interest area has a botanical theme and should provide protection for populations of Hall's Fescue from human activities.

***Indirect Effects***

Habitat and populations in Colorado occur within forested landscapes contiguous with forested areas of the MBNF. A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado. The impacts of wildfires, are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting Hall's fescue or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has

the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations.

**Cumulative Effects**

Historical timber harvest and road construction may have impacted habitat and or population of this species.

Some of the potential habitat for this species occurs on private and state lands. There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on private or state lands. Any reduction of populations on private lands would increase the contribution of populations on NFS lands to the continued viability of this species.

Interactions among disjunct populations is unlikely except for pollination effects noted above. Any effects to a single population are unlikely to influence the status of other populations.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve sensitive species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the Hall's fescue. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve projects planning.

Alternative F is likely to contribute to high viability based upon the low domestic stock grazing. All other alternative contributes to moderately high viability for this species based upon higher levels of human activities associated with identified

threats.

## Rabbit Ears Gilia, Weber's Scarlet Gilia (*Ipomopsis aggregata ssp. weberi)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

Status: USFWS: None (former Category 2 Candidate for listing under the endangered Species Act); Agency Status: Forest Service Region 2 Sensitive; WY BLM Sensitive; Heritage Rank: Global: G5T1T2Q (NatureServe 2003); WY State: S1; WYNDD Plant List: Regional Endemic (High Conservation Priority) (WYNDD 2002), (Fertig 1999).

#### *Distribution and Status*

Rabbit ears gilia is a recently described taxon and a narrow endemic of south central Wyoming and north-central Colorado. It is also reportedly disjunct in northern Idaho where there is one collection station in a state park (Grant and Wilken 1986). Rabbit ears gilia is only known from the Sierra Madre Range in Carbon County on the MBNF as it occurs in Wyoming. It also occurs in north-central Colorado around the " Rabbit Ears" (Weber and R.C. Wittman 2001) on the Routt national Forest. In both Colorado and Wyoming, it exhibits secondary inter-gradation with a neighboring red flowered taxon, a case of hybridization. The mongraphers hypothesized that it is an ancient species that has been swamped out by *I. a*. var *aggregata* over much of its former range (Grant and Wilken 1986).

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. Parts of the Battle Mountain population occur within the proposed Battle Mountain Research Natural Area or within the existing Gamble Oak on Battle Mountain Special Interest Area.

### Status and Distribution on the MBNF

All known occurrences in Wyoming are on the MBNF on Battle Mountain. The Battle Mountain population appeared to drop sharply after 1991 spraying to control shrubs, as determined by a 1994 revisit (Haas undated). Other parts of the Battle Mountain population occur within the proposed Battle Mountain Research Natural Area or within the existing Gamble Oak on Battle Mountain Special Interest Area.

The population at Battle Mountain was originally estimated at several thousand by Nancy Kastning in 1989 (Kastning 1990). There were only about 20 plants (flowering and vegetative) observed in follow-up survey in 1994 after herbicide treatment but the original location was not mapped in detail so it is not known if this reflects population trends and herbicide treatment affects.

## Habitat and Natural History

### *Species Description*

Rabbit ears gilia is a tap-rooted biennial herb that forms basal rosettes of leaves, followed by flowering, fruiting and dying in their second to sixth year. Its stems grow 15-60 cm tall. It flowers and fruits from June-August. In general, the red-flowered varieties of the species are frequently visited by hummingbirds, which are effective pollinators (Waser 1983). Grant and Grant (Grant and Grant 1968) also note that the presence of suites of hummingbird-pollinated species may determine the effectiveness of the hummingbird pollination for an individual species. The white flowers of this species are likely to have other pollen vectors that are attracted be their sweet nectaries rather than their color. Information on seedling recruitment, survivorship, longevity and seed production for plants of the southern Park range are available in Wilken (Wilken 1995).

### *Habitat*

It is reported from "openings in coniferous forest" by Grant and Wilken (Grant and Wilken 1986). Wyoming populations occur on south-facing slopes and ridge dominated by *Artemisia tridentata* or brushy *Amelanchier/Chrysothamnus/Puurshia/Prunus* stands on gravelly, clay-loam soils at 7,200-8,300 feet (Fertig 1999).

## Threats from Human Activity

Rabbit ears gilia may be impacted by herbicide spraying, grazing, timber harvest, road construction and maintenance, and other ground disturbing activities. The habitat in Wyoming may be susceptible to fire suppression and the resulting shrub encroachment. Competition from non-native plants could threaten rabbit ears gilia. The spread of non-native plants is associated with higher levels of human activities.

## Environmental Baseline

All known occurrences in Wyoming are on the MBNF on Battle Mountain. The Battle Mountain population appeared to drop sharply after 1991 spraying to control shrubs, as determined by a 1994 revisit. The population at Battle Mountain was originally estimated at several thousand by Nancy Kastning in 1989 (Kastning 1990). There were only about 20 plants (flowering and vegetative) observed in follow-up survey in 1994 after herbicide treatment but the original location was not mapped in detail so it is not known if this reflects population trends and herbicide treatment affects.

## Protection in the Plan

Standards and guidelines for the protection of sensitive plants and aquatic standards and guidelines apply to the conservation of rabbit ears gilia. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for

other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Allotment management plans can be modified to contain considerations for rabbit ears gilia and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Fire Management Plan that specifies fire suppression strategies will include conservation measures for rabbit ears gilia.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if rabbit ears gilia is determined to occur within a project or contract area. Project implementation will assess site-specific risks and strategies.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Populations and habitat occur within livestock grazing allotments. Grazing and stock trampling could affect individuals and reproductive status. Rabbit ears gilia grows at the edges of forest stands in areas that provide high forage values for livestock and receive moderate to high use by livestock. Under conditions of heavy range use, it could decrease. Allotment management plans can be modified to contain considerations for this species and exclosures constructed, if needed to maintain viable populations.

Competition from non-native invasive plants can be a threat to rabbit ears gilia. Invasive species are often spread by livestock grazing and recreational activities but can also be spread by other forest management activities. Efforts to control non-native invasive plants with chemicals can pose a direct threat to the species.

This species may be impacted by road construction or other ground disturbances associated with logging, recreation or development. Habitat occurs on lands designated as suitable for timber harvest.

Other parts of the Battle Mountain population occur within the proposed Battle Mountain Research Natural Area or within the existing Gamble Oak on Battle Mountain Special Interest Area. Alternatives A, E and F maintain or increase the size of the SIA in the area of the current Gamble Oak on Battle Mountain (Alternative A: SIA Gambel Oak on Battle Mountain, Alternative E and F: As Cottonwood Rim SIA). Alternatives D FEIS, E and F include a Research Natural Area at Battle Mountain. Alternative D DEIS includes a Special Interest Area at Battle Mountain.

Alternatives B and A in decreasing order harvest timber on the greatest number of acres and would pose the greatest risks to this species. Timber sale contracts contain

provisions that provide for modifications to be made, if new information on locations of sensitive plants becomes available during project implementation.

Alternatives F and E have fewest number of acres of timber harvest and would pose a lower risk to this species.

Rabbit ears gilia occurs within forested lands where historic fire suppression may have altered fire return intervals. Because populations of this species are all located in one small area of the forest, under an extreme wildfire event, a wildfire could pose a risk to this species on the MBNF. Prescribed fire could be used to restore un-occupied habitat to provide for population increases under all alternatives.

***Indirect Effects***

Habitat and populations in Colorado occur within forested landscapes contiguous with forested areas of the MBNF. A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado. The impacts of wildfires, are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting rabbit ears gilia or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations.

**Cumulative Effects**

Historical timber harvest and road construction may have impacted habitat and or population of this species.

Some of the potential habitat for this species occurs on private and state lands. There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on private or state lands. Any reduction of populations on private lands would increase the contribution of populations on NFS lands to the continued viability of this species.

Interactions among disjunct populations is unlikely. There are not expected to be any effects to populations on the MBNF from activities on private lands.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-

ground activities, oil and gas stipulations to protect and conserve sensitive species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the rabbit ears gilia. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of rabbit ears gilia can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning. All alternatives maintain most of the MBNF in grazing allotments. Alternative F has the lowest levels of domestic livestock stocking and poses the lowest risk to this species. Alternatives E and F have both a Special Interest Area and a Research Natural Area that encompass most of the known population. These alternatives are likely to contribute to high viability. All other alternatives contribute to moderately high viability for this species.

## Simple Kobresia *(Kobresia simpliciuscula)*

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2 Sensitive; Heritage Rank: Global: G5; State WY: S1; WYNDD Plant List: Disjunct (Medium conservation priority) (Fertig 2000), (WYNDD 2002). This species is ranked SR in Colorado.

***Distribution and Status***

Simple kobresia is circumpolar (Handley, Heidel et al. 2002). In North America, it is known from Alaska to Greenland south in Canada to New Brunswick, northern Ontario, Alberta, and Manitoba (Manitoba Conservation Data Centre 2003) and in the Rocky Mountains south to Montana, Utah, and central Colorado. It is disjunct in Colorado compared to its nearest Wyoming population.

According to Fertig (Fertig 2000), within Region 2, simple kobresia is known from a single occurrence in the Clarks Fork Valley in the northern Absaroka Range in Park

County, Wyoming, on the Shoshone National Forest. This site was discovered in 1984 and was last observed in 1999. The entire population is restricted to a wetland covering about 1.5 square miles. The actual area of occupied or suitable habitat may be limited to 20 acres. However, Hartman and Nelson (Hartman and Nelson 1998.)display three populations all in northwest Wyoming. It also occurs in Colorado within Park county (High Creek Fen Natural Area) (Raab 1999), in the Niwot Ridge Long Term Ecological Research Site (Komarkova 1979) and in Grand County (Weber and R.C. Wittman 2000). It is also known from Lemhi and Custer counties in Idaho (Idaho Fish and Game 2003) and from Glacier National Park (Lesica and D. McNeil 2003).

### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. However habitat for this and other fen obligate plant species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002). On the Shoshone National Forest it is protected in the Swamp Lake Special Botanical Area (Handley, Heidel et al. 2002). It is also found at the High Creek Fen Natural Area in Park County, Colorado, at the Niwot Ridge Long Term Ecological Research Site in Boulder County, Colorado and in Glacier National Park which are all protected sites.

## Status and Distribution on the MBNF

Simple kobresia is suspected, but not currently known to occur on the MBNF. Its distribution is similar to several other circumboreal plant species that are disjunct in peatlands on the MBNF.

## Habitat and Natural History

### *Species Description*

Simple kobresia is a densely tufted perennial. It grows in clumps and does not have rhizomes (Williams 1990). There are 10 to 28 achenes per inflorescence. Flowering and fruiting occur from June to August. Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

### *Habitat*

In Wyoming, simple kobresia occurs in flooded marl wetlands dominated by quaking mats of *Carex simulata* or *Triglochin maritimum* at 6,000 feet. Its range is very limited in the state (Handley, Heidel et al. 2002). Outside of Wyoming, simple kobresia is known as a member of stable tundra communities where it grows in the tundra-alpine zone, in moist, peaty soil, in bogs, in wet meadows, and along the edges of beaver ponds (Williams 1990). It does well in calcareous habitats having pH 5.8 to 7.2. It also grows well in frost-shattered limestone, limestone grassland,

boggy calcareous meadows, sugar limestone, and calcareous springs. Simple kobresia also occurs in ericacous tundra heath, algal marsh habitats, frost-sorted till, calcareous rocky slopes, and phosphorus-poor sites. It occurs at elevations of 11,000 to 12,800 feet (3,350-3,900 m) in Colorado, at 7,600 to 8,000 (2,320-2,240 m) in Montana, and at 8,030 to 8,700 feet (2,590-2,805 m) in Utah. In Colorado, the Colorado Natural Heritage Program lists *Kobresia simplicuiscula* / *Scirpus pumila* (Extreme Rich Fen) as a tracked natural plant community (Colorado Natural Heritage Program (CONHP) 2003).

**Threats from Human Activity**

Relict populations of boreal disjuncts are often found in peatlands setting on the MBNF where those habitats have been remarkably stable through geologic time. The peatland habitat that this and other obligate fen plant species require is sensitive to hydrologic change and there is no known method for creating or restoring peatlands, therefore it is not possible to mitigate for their loss (Cowardin, V. Carter et al. 1979), (USDI Fish and Wildlife Service 1998). Activities which could cause hydrologic change to peatlands include wetland development, concentrated livestock use, road building, logging, motorized recreation and peat mining. Ode (Ode 2001) agrees that there has been hydrologic modification and road construction associated with fen habitats in the past but states that these habitats are usually not targeted for logging or development, and that livestock often ignore them except when other foraging areas are unavailable.

**Environmental Baseline**

Simple kobresia is suspected to, but not known to; occur on the MBNF (WYNDD 2002) (Fertig 2000). Its distribution is similar to several other circumboreal plant species that are disjunct in peatlands on the MBNF. During the 2002 and 2003 field season, this and other rare peatland obligate plant species were searched for in an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park) (Heidel and S. Laursen 2003), (Proctor 2003). None were found.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of simple kobresia. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened endangered or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific

risks and strategies.

Allotment management plans can be modified to contain considerations for simple kobresia and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

If simple kobresia were found on the MBNF, the Fire Plan that specify fire suppression strategies would include conservation measures for it.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if simple kobresia is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Because this species occupies saturated soils in quaking mat/peatland settings, it would not generally be affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils.

Any activity that causes loss or deterioration of wetland habitat could adversely affect this species due to its aquatic nature. Watershed conservation practices (also known as best management practices) control management practices that influence hydrology and streams. Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Simple kobresia is not documented as a palatable species to livestock, however it occurs in sedge dominated communites which offer forage palatable to livestock, packstock and big game, therefore simple kobresia sites could be subject to browsing and/or trampling impacts within its community. Concentrated livestock use in and around fen habitat could alter the hydrology and water quality of its habitat. Livestock generally avoid quaking mat/peatland settings, especially if other riparian habitats are available.

Recreational use within riparian areas could remove and/or injure plants, alter soil properties, change the hydrologic regime and/or reduce the overall vigor of slender simple kobresia. Recreational activities and effects can be managed through educational efforts and/or closure orders.

This species generally occurs in very wet and open peatland settings where fire frequency intervals and intensities are usually low. High intensity fires could adversely impact individuals or whole populations of simple kobresia. Especially where there are abrupt riparian/upland ecotones. Its post fire response strategy is discussed as “Tussock graminoid” (Williams 1990).

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

***Indirect Effects***

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting slender cotton-grass or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the greatest potential threat to simple kobresia habitat due to its preference for marshy, saturated sites (Lym 1997). Other non-native aquatic plants could also present a threat if introduced.

**Cumulative Effects**

In general, any activity that alters water levels or water quality may adversely affect simple kobresia. Since this species occurs near the head of the watershed, activities that alter water levels are rare.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement. The timing, extent and intensity of grazing can be controlled by the Forest Service.

There are no other predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

### Biological Determinations, Risk Assessments, and Rationale

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the simple kobresia or its potential habitat. Based on standards and guidelines and administrative feasibility, nearly all of the activities can be planned at the project level to have no effect on simple kobresia or its potential habitat. Management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning. In addition, riparian/wetlands habitat are easily recognized and protected.

Alternative F contributes to high viability for simple kobresia. All other alternatives contribute to moderately high viability for this species.

## Colorado Tansy Aster *(Machaeranthera coloradoensis var. coloradoensis)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

Status: USFWS: None; Agency Status: USFS R2 Sensitive; Heritage Rank: Global: G2? (NatureServe 2003); WY State: S1; WYNDD Plant List: Regional endemic (High conservation priority) (Fertig 2000d). This species is ranked S2 in Colorado (Handley, Heidel et al. 2002)

#### *Distribution and Status*

Colorado tansy aster is a regional endemic of southeastern Wyoming and central Colorado (Handley, Heidel et al. 2002). In Wyoming, it occurs in the Sierra Madre of Carbon County on the MBNF. It is also known from the MBNF on the Laramie and Snowy ranges in Albany County. In Colorado, it occurs on the San Juan, Rio Grande, Pike San Isabel, and Grand Mesa, Uncompahgre, Gunnison National Forests. In Wyoming, it is only known from 4 extant occurrences. It is also known from vague, historical record near Bridger Peak. This population has not been relocated despite several attempts and is thought to be an erroneous report.

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. One occurrence in on Sheep Mountain which is a game refuge with limited management (Jankovsky-Jones, G. P. Jones et al. 1996). There is additional potential habitat in or on a nearby Nature Conservancy conservation easement.

### Status and Distribution on the MBNF

Colorado tansy aster occurs in the Sierra Madre of Carbon County and on the

Laramie and Snowy ranges in Albany County. One location is on Sheep Mountain. One of the extant occurrences and the historical record are on the MBNF. Extant populations are mostly small (often numbering in the low hundreds) and restricted in area (Handley, Heidel et al. 2002).

**Habitat and Natural History**

***Species Description***

Colorado tansy aster is a tap-rooted perennial herb with grayish-white pubescent stems 4-10 cm high. Flowering and fruiting occur from June through September. It may be inferred that the bristly pappus is appropriate for wind dispersal of seed across unsuitable habitat (Hartman 1990). Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

***Habitat***

This species is found in barren cushion plant and sparse grassland communities on limey-sandstone, shaley-gypsum, or redbed slopes and outcrops at 8,100 to 7,800 feet (Handley, Heidel et al. 2002). Historical Wyoming reports from dry tundra at 10,800 feet have not been corroborated. Associated taxa are Slender-leaved buckwheat (*Eriogonum exilifolium), Lesquerella alpina, Artesmisia spp. Senecio canus, Astragalus kentrophyta*, and *Erigeron nematophyllus*. Its habitat is patchy across the landscape.

**Threats from Human Activity**

Documented threats to Colorado tansy aster include trampling by livestock, road construction and road maintenance, off-trail ATV and motorcycle traffic and musk thistle (Proctor 2003).

**Environmental Baseline**

One of the extant occurrences and the historical record are on the MBNF in Big Creek Park (population numbering more than low hundreds). Other extant populations are mostly small (often numbering in the low hundreds) and restricted in area (Fertig 2000d). Proctor (Proctor 2002) and Proctor (Proctor 2003) indicate that some of these populations may number more than the low hundreds.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of Colorado tansy aster. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation

measures for Colorado tansy aster.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

Allotment management plans can be modified to contain considerations for this species and exclosures constructed, if needed to maintain viable populations. Area closures can be used to exclude recreation and/or other uses if needed.

The Forest Service maintains discretion to modify projects or contracts if Colorado tansy aster is determined to occur within a project or contract area. Project implementation will assess site-specific risks and strategies.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Colorado tansy aster appears to tolerate trampling impacts from grazing livestock (personal qualitative observations John Proctor) (Johnston 2002). It has also been suggested that Colorado tansy aster responds positively to disturbance. While populations of Colorado tansy aster have persisted in areas of heavy grazing pressure, there are no quantitative data to support a trend.

Sheep Mountain, which provides some habitat for Colorado tansy aster (Jankovsky-Jones, G. P. Jones et al. 1996), is maintained in management areas that emphasize wildlife habitat management and that maintain limited access in all alternatives. Intermittent or occasional livestock grazing is allowed to manage resource conditions. Populations of Colorado tansy aster in the Sheep Mountain Game Refuge could be subject to this intermittent or occasional grazing. In Alternative E, 13,536 acres of Sheep Mountain are designated as a Research Natural Area. Alternative F has the lowest levels of stocking and poses the lowest grazing and/or trampling risk to this species for those populations within active grazing allotments.

***Indirect Effects***

All known populations are on state or public land managed for multiple-use. Some habitat may occur within the potential Sheep Mountain Research Natural Area (Alternative E) or on a nearby Nature Conservancy conservation easement.

Neither management actions, nor management area allocations are likely to create any effects on the populations near the Laramie range.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting Colorado tansy aster or its potential habitat. Thus,

Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations.

**Cumulative Effects**

Historical timber harvest and road construction may have impacted habitat and or populations of this species.

Some of the potential habitat for this species occurs on private lands near Sheep Mountain. There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on private lands. Any reduction of populations on private lands would increase the contribution of populations on NFS lands to the continued viability of this species.

Interactions among disjunct populations is unlikely. Any effects to a single population are unlikely to influence the status of other populations. Seeds are wind dispersed, so there is potential for colonization of new habitat.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve sensitive species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet. The Sheep Mountain Area has "No Surface Occupancy" in all alternatives.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the Colorado tansy aster or its habitat. Based on standards and guidelines and administrative feasibility, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning. Alternatives that allow for the greatest amount of off highway vehicles and motorcycle use (Alternatives B, A, C and E in decreasing order) pose the

greatest risk to this species from motorized recreation use. These alternatives contribute to moderate viability for Colorado Tansy Aster. All alternatives maintain most of the MBNF in grazing allotments. Alternative F has the lowest levels of stocking and poses the lowest risk to Colorado tansy aster. This alternative is likely to contribute to high viability. All other alternatives contribute to moderately high viability for this species.

## Kotzebue's Grass-of-parnassus (*Parnassia kotzebuei)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: none; Agency Status: USFS Region 2: Sensitive (Heidel and Laursen 2002); Heritage Rank: Global: G4 (NatureServe 2003); State WY: S2; WYNDD Plant List: tracked. It is ranked S2 in Colorado (Heidel and Laursen 2002).

#### *Distribution and Status*

Kotzebue's grass-of-parnassus is a circumboreal species that occurs from Alaska to Labrador and Greenland, extending south in the Rocky Mountains to Colorado and with a few locations to the west of the Region 2 border as far south as Nevada. It is also present in Wyoming outside of the Region 2 borders, in the Wind River Range of Sublette County and in the Teton Range of Teton County (Heidel and Laursen 2002). It is known from at least 10 recent collections in Wyoming, 7 of which are in Park County and mostly on the Shoshone National Forest, and 1 in Johnson County on the Bighorn National Forest. Information on population size and extent is not available.

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. This plant occurs in Rocky Mountain National Park and Glacier National Park but it is not recorded for Yellowstone National Park (UC Davis 2003).

### Status and Distribution on the MBNF

Kotzebue's grass-of-parnassus is suspected, but not currently known to occur on the MBNF. Its distribution is similar to several other circumboreal plant species that are disjunct on the MBNF (Weber 2003) (Hooker 1862). Documented populations in Colorado are from the southern end of a continuous mountain range that stretches northward through the Routt National Forest to the MBNF.

### Habitat and Natural History

#### *Species Description*

Kotzebue's grass-of-parnassus is an herbaceous perennial with nectaries (Heidel and Laursen 2002). It produces seeds (approximately 100–120); with smooth surfaces and wings (Aiken, M.J. Dallwitz et al. 1999). This species appears always to flower

and ripen seed plentifully (Polunin 1940a). Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

### *Habitat*

In Wyoming, Kotzebue's grass-of-parnassus is commonly found between 9,400 and 11,200 feet in elevation on moist seeps, grassy, wet tundra on thin clay soil, and moist ledges below steep talus slopes. Such moist habitats are discontinuous on the landscape, resulting in a patchy distribution (Heidel and Laursen 2002). Spackman et al. (Spackman, B. Jennings et al. 1997) describes the habitat in Colorado as subalpine and alpine wet, rocky ledges, in streamlets and moss mats at elevations of 10,000-12,000 feet. Aiken et al. (Aiken, M.J. Dallwitz et al. 1999) describes the habitat in the Canadian arctic as imperfectly drained moist areas (often beside lakes and creeks), or dry.

### Threats from Human Activity

Kotzebue's grass-of-parnassus may be threatened by grazing. Suitable habitat is not located in areas available for timber harvest and would not need to be available for harvest access. Competition from non-native plants could threaten Kotzebue's grass-of-parnassus. The spread of non-native plants is associated with higher levels of human activities.

This species generally occurs in tundra and other high elevation moist areas where fire frequency intervals and intensities are usually low. Under an extreme wildfire event, the tundra and/or rugged, rocky cliffs may not provide protection from wildfire effects. High intensity fires could adversely impact individuals or whole populations of Kotzebue's grass-of-parnassus.

Management actions that compact or move snow can change water distributions and timing and change growing conditions for vegetation (Bilbrough C.B., J.M. et al. 2000), (Williams, Brooks et al. 1998), (Neumann and H. G. Merriam 1972) and affect wildlife habitat , (Jarvinen and Schmid W. D 1971), (Schmid 1972), (Keddy, Spavold et al. 1979). Changes in snowmelt affect the growth of vegetation at high elevations where snowpack is controlling factor for vegetation growth (Knight, Anderson et al. 1975), (Bell and C. Blis 1979). Summer recreational use, in alpine areas could remove and/or injure plants and/or alter soil properties. Winter recreation use could change the hydrologic and/or thermal regime and reduce the overall vigor of Kotzebue's grass-of-parnassus.

### Environmental Baseline

Kotzebue's grass-of-parnassus is suspected, but not currently known to occur on the MBNF. Its distribution is similar to several other circumboreal plant species that are disjunct on the MBNF (Weber 2003), (Hooker 1862). Documented populations in Colorado are from the southern end of a continuous mountain range that stretches northward through the Routt National Forest to the MBNF.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants and guidelines apply to the conservation of Kotzebue's grass-of-parnassus. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

The Fire Plan that specifies fire suppression strategies will include conservation measures for Kotzebue's grass-of-parnassus.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if Kotzebue's grass-of-parnassus is determined to occur within a project or contract area. Project implementation will assess site-specific risks and strategies.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Kotzebue's grass-of-parnassus may be threatened by grazing. Grazing allotments above timberline on the Snowy Range are currently vacant but could be filled during the life of the plan (10-15 years) (Kerpan 2003; Wiggins and S. Kerpan 2003). There are active grazing allotments above timberline on the Sierra Madre. Grazing pressure on the lands above timberline is light (Kerpan 2003).

Management actions that compact or move snow can change water distributions and timing and change growing conditions for vegetation (Bilbrough C.B., J.M. et al. 2000), (Williams, Brooks et al. 1998), (Neumann and H. G. Merriam 1972) and affect wildlife habitat , (Jarvinen and Schmid W. D 1971), (Schmid 1972), (Keddy, Spavold et al. 1979). Changes in snowmelt affect the growth of vegetation at high elevations where snowpack is controlling factor for vegetation growth (Knight, Anderson et al. 1975). Management actions of this type include snow grooming for recreational trails, snow plowing, and over snow travel.

Table I-53. Management Area Designations for Areas above timberline by alternative.

| | Alternatives | | | | | | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D DEIS | D FEIS | E | F |
| Snowy Range | 3.32<br>4.31<br>4.22<br>2.1 | 1.33<br>3.31<br>2.1 | 1.33<br>4.3<br>2.1<br>3.5 | 1.33<br>2.1<br>3.31<br>4.2 | 1.33<br>3.31<br>2.1<br>2.2<br>4.2 | 1.33<br>2.1<br>2.2<br>3.5<br>4.2 | 1.2<br>2.2<br>4.2 |
| Sierra Madre | 3.32<br>4.31<br>4.2 | 3.31<br>1.33<br>4.2 | 3.31<br>4.3<br>4.2 | 1.33<br>3.5<br>4.3<br>4.2 | 3.31<br>4.2 | 3.5<br>4.2 | 1.2 |

Alternatives providing the least motorized access both summer and winter are likely to produce the least effects on Kotzebue's grass-of-parnassus. Alternative F allocates the areas above timberline to management areas with the least motorized access. Alternatives E, D DEIS, D FEIS (in order) provide increasing amounts of motorized access. Alternatives A and B provide the greatest amount of motorized access.

Summer recreational use, in alpine areas can remove and/or injure plants and/or alter soil properties. Greater motorized access is associated with greater numbers of visitors and greater number of visitors is associated with more frequent and more intense effects.

Winter recreation use (primarily motorized use – snowmobiles) could change the hydrologic and/or thermal regime and reduce the overall vigor of Kotzebue's grass-of-parnassus.

This species generally occurs in tundra, other high elevation moist areas and rugged, rocky cliffs where fire frequency intervals and intensities are usually low. Under an extreme wildfire event, the tundra and/or rugged, rocky cliffs may not provide protection from wildfire effects. High intensity fires could adversely impact individuals or whole populations of Kotzebue's grass-of-parnassus. Arseneault and Payette (Arseneault and S. Payette 1992), Knight (Knight 1994) and Stahelin (Stahelin 1943) document changes in treeline and shifts to grass/tundra vegetation following fires at high elevations. Large fire events could potentially create additional tundra type habitat for Kotzebue's grass-of-parnassus.

### *Indirect Effects*

Habitat and populations in Colorado occur within landscapes contiguous with areas of the MBNF. However, since this species generally occurs in tundra and other high elevation moist areas where fire frequency intervals and intensities are usually low there is a low risk of wildfire spreading from forested areas on the MBNF to high elevation tundra habitats in Colorado. The impacts of wildfires are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

Competition from non-native invasive plants constitutes a potential threat to Kotzebue's grass-of-parnassus based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction. For this reason, those alternatives (A and B) that include the most motorized access pose the greatest threat to Kotzebue's grass-of-parnassus. Alternative D FEIS poses an intermediate risk (see previous discussion of recreation effects).

**Cumulative Effects**

Historical road construction, grazing and recreation use may have impacted habitat and or population of this species.

Some of the potential habitat for this species may occur on private lands. There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on private or state lands. Any reduction of populations on private lands would increase the contribution of populations on NFS lands to the continued viability of this species.

Interactions among disjunct populations is unlikely as these population are relicts of tertiary flora that has been fragmented by climatic changes (Weber 2003), (Hooker 1862). Any effects to a single population are unlikely to influence the status of other populations.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve sensitive species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet. The areas of the MBNF that have potential habitat for Kotzebue's grass-of-parnassus have not been identified as having Oil and Gas leasing potential as part of the Forest Plan Revision. Any Oil and Gas leasing in these areas would be subject to site specific analysis at the time a project is proposed.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the potential habitat for Kotzebue's grass-of-parnassus. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions ***may adversely affect individuals but are not***

***likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve projects planning.

Alternative F is likely to contribute to high viability based upon the low domestic stock grazing and low motorized access to potential habitat. All other alternative contributes to moderately high viability for this species based upon higher levels of human activities associated with identified threats.

## White larch leaf beardtongue (*Penstemon laricifolius* ssp. *exilifolius*)

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: None; Agency Status: USFS Region 2: Sensitive; Heritage Rank: Global: G4T2Q (NatureServe 2003); State WY: S2 (not tracked); WYNDD Plant List: Not tracked. It is ranked S2 in Colorado (NatureServe 2003).

#### *Distribution and Status*

Region 2 harbors nearly the entire range of larch-leaf beardtongue's distribution. Within Wyoming, this species is found in scattered locations on the Laramie Range, foothills of the Bighorn and Snowy ranges, and isolated ridges. It occurs in Colorado within Larimer County, in the North Park area of Arapaho National Forest. In Wyoming, white larch-leaf beardtongue is found between 6,300-7,800 feet in elevation on rocky, calcareous slopes with sagebrush (*Artemisia*) and/or limber pine (*Pinus flexilis*). Such habitats are more widespread on the landscape than the known species' distribution. White larch-leaf beardtongue is not known outside of Region 2 except for a single collection in Sublette County, Wyoming (Heidel, J. Handley et al. 2002).

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. It is currently not tracked in Wyoming. It is not currently reported from Rocky Mountain National Park or Yellowstone National Park (UC Davis 2003).

### Status and Distribution on the MBNF

White larch-leaf beardtongue is currently reported from the Snowy Range and the Laramie Peak/Pole Mountain areas of the MBNF (Hartman and B.E. Nelson 2002a), (Hartman and B.E. Nelson 2002b), (Hartman and B.E. Nelson 2002c) and (Hartman and Nelson 1998.). White larch-leaf beardtongue is known from at least 10 recent collections in the state, 4 of which are on the MBNF.

## Habitat and Natural History

### *Species Description*

White larch-leaf beardtongue is an herbaceous perennial that flowers in June (Heidel, J. Handley et al. 2002). This subspecies is distinguished from the typical subspecies only by flower color. There are questions whether it is distinct (Heidel, J. Handley et al. 2002), though it is accepted by Dorn (2001) and Weber (2001). *Penstemon* (tribe *Cheloneae*: *Scrophulariaceae*) is a large genus (about 275 species) of perennial plants endemic to North America, ranging from Alaska to Guatemala and from coast-to-coast, exclusive of the Canadian shield. The flowers are pollinated by bees, wasps, moths, butterflies, flies, and hummingbirds (Wolfe 1999). Additional information on the species, including life history stages, population structure, longevity, mortality, pollination biology and seed biology, are not available.

### *Habitat*

In Wyoming, white larch-leaf beardtongue is found between 6,300-7,800 feet in elevation on rocky, calcareous slopes with sagebrush (*Artemisia*) and/or limber pine (*Pinus flexilis)*. Such habitats are more widespread on the landscape than known species' distribution.

## Threats from Human Activity

Threats to white larch-leaf beardtongue from human activities include livestock grazing on both National Forest and private lands, disturbance associated with actions on nearby forestlands such as road construction for timber harvest and development on private lands.

Due to the fact that white larch-leaf beardtongue occurs in sagebrush and limber pine where forage is generally available, it may be threatened by livestock grazing and/or trampling. It would generally not be directly affected by timber harvest activity, except in instances where a road or skid trail associated with timber harvest might cross a sagebrush and limber pine area. Road and/or trail construction associated with oil and gas leasing or recreation development would pose similar threats.

There is some potential for impact to likely habitat from trampling by wildlife or recreational hikers, invasion by noxious or other aggressive non-native weeds, wildfire, or flood, but the risks are considered low, except where a population might occur next to a popular site.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

## Environmental Baseline

White larch-leaf beardtongue is currently reported from the Snowy Range, Laramie

Peak and Pole Mountain areas of the MBNF (Hartman and B.E. Nelson 2002a), (Hartman and B.E. Nelson 2002b), (Hartman and B.E. Nelson 2002c) and (Hartman and Nelson 1998.). White larch-leaf beardtongue is known from at least 4 recent collections on the MBNF.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of white larch-leaf beardtongue. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for white larch-leaf beardtongue.

Allotment management plans can be modified to contain considerations for white larch-leaf beardtongue and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if white larch-leaf beardtongue is determined to occur within a project or contract area. Project implementation will assess site-specific risks and strategies.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

For populations and habitat that occur within livestock grazing allotments, grazing and stock trampling could affect individuals and reproductive status. White larch-leaf beardtongue grows at the edges of forest stands in areas that provide high forage values for livestock and receive moderate to high use by livestock. Under conditions of heavy range use, it could decrease. Allotment management plans can be modified to contain considerations for this species and exclosures constructed, if needed to maintain viable populations. All alternatives maintain most of the forest in grazing allotments. Alternative F has the lowest levels of domestic stocking and poses the lowest risk to this species.

Competition from non-native invasive plants can be a threat to white larch-leaf beardtongue. Invasive species are often spread by livestock grazing and recreational activities but can also be spread by other forest management activities.

This species may be impacted by road construction or other ground disturbances associated with logging, recreation or development. Alternatives B and A (in

decreasing order) harvest timber on the greatest number of acres and would pose the greatest risks to this species. Timber sale contracts contain provisions that provide for modifications to be made, if new information on locations of sensitive plants becomes available during project implementation. Alternatives F and E (in descending order) have fewest number of acres of timber harvest and would pose a lower risk to this species.

**Indirect Effects**

Competition from non-native invasive plants constitutes a potential threat to this or any native plant species. Invasive species are introduced and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting white larch-leaf beardtongue or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while alternatives B and A (in descending order) have the most potential for increasing invasive plant populations.

**Cumulative Effects**

Some of the potential habitat for this species occurs on private and state lands. There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on private or state lands. Any reduction of populations on private lands would increase the contribution of populations on NFS lands to the continued viability of this species.

Interactions among disjunct populations is unlikely except for pollination effects noted above. Any effects to a single population are unlikely to influence the status of other populations.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would

programmatically affect the white larch-leaf beardtongue. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning.

Alternative F contributes to high viability for white larch-leaf beardtongue. All other alternatives contribute to moderately high viability for this species.

## Rocky Mountain Cinquefoil (*Potentilla rupincola)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: none Agency Status: USFS Region 2 Sensitive (McKee 2002); Heritage Rank: Global: G5?T2 (NatureServe 2003), WY State: not tracked or reported to occur; WYNDD Plant List: not tracked. This species is ranked S2 in Colorado (Spackman, Jennings et al. 1997) (McKee 2002).

#### *Distribution and Status*

This species is currently known as a Colorado endemic (Boulder and Clear Creek, Larimer and Park Counties) (CNHP 2002), (McKee 2002). Several populations are located very near the Colorado-Wyoming Border, southeast of the MBNF boundary.

### Recovery and Conservation Planning

There is no recovery or conservation planning documented for this species. There are no known occurrences of this species on the MBNF. If the species is eventually found on the MBNF or potential and suitable habitat is identified, conservation measures will be initiated. This species occurs within Rocky Mountain National Park (USDI NPS RMNP 2002) (UC Davis 2003).

### Habitat and Natural History

#### *Species Description*

Rocky Mountain cinquefoil is a tap-rooted, perennial herb that grows 15-30 cm high. Flowers mid-June-August (Osterhout 1899), (Spackman, Jennings et al. 1997), (USDA 2002). Breeding systems, pollinators, and seed dispersal are poorly documented for this species. It is probably grazed by wildlife.

#### *Habitat*

Rocky Mountain cinquefoil occurs in granitic outcrops or thin, gravelly granitic soils

with west or north exposure (McKee 2002), (Spackman, Jennings et al. 1997). It is often associated with ponderosa or limber pine. It may occur with *Aletes humilis*, a previous Region 2 sensitive plant species. It is known to occur at elevations between 6,900-10,500 feet.

**Status and Distribution on the MBNF**

There are currently no documented populations of this plant on the MBNF (WYNDD 2002), (McKee 2002). Potential habitat may occur on the MBNF in the southern Laramie Range, Pole Mountain area or in the eastern foothills of the Snowy Range. Several populations in Colorado are located very near the Colorado-Wyoming Border, southeast of the MBNF boundary in the vicinity of Sheep Mountain.

**Threats from Human Activity**

Rocky Mountain cinquefoil may be vulnerable to horticultural collecting range wide. Habitat may occur on lands designated as suitable for timber harvest. This species may be threatened by grazing (Spackman, Jennings et al. 1997), (NatureServe 2003).

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado.

**Environmental Baseline**

There are currently no documented populations of this plant on the MBNF (WYNDD 2002). Potential habitat may occur on the MBNF in the southern Laramie Range, Pole Mountain area or in the eastern foothills of the Snowy Range. Several populations in Colorado are located very near the Colorado-Wyoming Border, southeast of the MBNF boundary in the vicinity of Sheep Mountain.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of Rocky Mountain cinquefoil. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened, endangered, or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

Allotment management plans can be modified to contain considerations for Rocky Mountain cinquefoil and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Fire Management Plan that specifies fire suppression strategies and will include conservation measures for Rocky Mountain cinquefoil, if populations are identified.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if Rocky Mountain cinquefoil is determined to occur within a project or contract area. Project implementation will assess site-specific risks and strategies.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

The potential habitat is mostly located in areas that are allocated to wildlife habitat management, recreation uses and general forest with rangeland vegetation emphasis and varies little by alternative except for Alternative B that allocates some of Pole Mountain area to Ecological Restoration. Most of the potential habitat has not been identified as having oil and gas leasing potential. Any oil or gas leasing in these areas would require site-specific analysis. Due to ruggedness of its habitat, this species' potential habitat is not likely to be affected by proposed land management actions or management area allocations. Recreation activities such as hiking and climbing provide the most probable threats. The potential habitat occurs within domestic stock grazing allotments. Grazing and stock trampling could affect individuals, if they occurred on the MBNF.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

***Indirect Effects***

Neither management actions, nor management area allocations are likely to create any effects on the documented location of Rocky Mountain cinquefoil near the Wyoming Colorado border.

Habitat and populations in Colorado occur within forested landscapes contiguous with forested areas of the MBNF. A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado. Alternative F has the highest predicted levels of stand replacement wildfire. The impacts of wildfires are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road

maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting Rocky Mountain cinquefoil or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while alternatives B and A (in descending order) have the most potential for increasing invasive plant populations.

**Cumulative Effects**

The largest, most extensive documented habitat occurs in Colorado on Federal Lands of the Arapaho-Roosevelt National Forests (Spackman, Jennings et al. 1997). Both the Arapaho-Roosevelt National Forests and the MBNF are required to maintain viability for plant species during forest plan implementation and project planning.

Some of the potential habitat for this species occurs on private and/or state lands. There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on private or state lands. Any reduction of populations on private lands would increase the contribution of populations on NFS lands to the continued viability of this species.

Interactions among disjunct populations are unlikely. Any effects to a single population are unlikely to influence the status of other populations. Suitable habitat and known populations occur on inaccessible promontories (McKee 2002). It is reported to be fairly resistance to disturbance, but no detailed information is available. Based on its restricted distribution, this species and its habitats are considered somewhat vulnerable. A large wildfire (extreme event) could burn over all know habitat in one incident.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet. Most of the potential habitat has not been identified as having oil and gas leasing potential. Any oil or gas leasing in these areas would require site specific analysis.

Determining range as suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

***Biological Determinations, Risk Assessments, and Rationale***

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the Rocky Mountain cinquefoil or its habitat. Nearly all of the activities can be planned at the project level to have no effect on the Rocky

Mountain cinquefoil or its habitat. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can not always be determined in project planning surveys (due to its similarity to other cinquefoils), alternatives that propose higher levels of management actions pose a higher risk of affecting unknown populations. All alternatives maintain most of the forest in grazing allotments. Alternative F has lowest levels of domestic livestock stocking and poses the lowest risk to this species. Alternatives F and E have the lowest levels of proposed timber harvest and would pose the least risk to unknown populations. These alternatives are likely to contribute to high viability. All other alternatives are likely to contribute to moderately high viability.

## Nagoon Berry, Northern Blackberry (*Rubus arcticus spp. acaulis*)
*(also known as Cylactis arctica ssp. acaulis*)

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2: Sensitive; Heritage Rank: Global: G5T5 (NatureServe 2003); State WY: S1; WYNDD Plant List: Peripheral (Low Conservation Priority) (Fertig 2000c) (Heidel, J. Handley et al. 2002). It is also ranked in Alaska (SR), Colorado (S1), Maine (SR), Michigan (S?), Minnesota (SR), Montana (SR), Oregon (SR), and Washington (SR) (NatureServe 2003).

***Distribution and Status***

Nagoon berry is a circumboreal species that is known from Alaska to Newfoundland, south to British Columbia and Minnesota and in the Rocky Mountains from Montana to Colorado. In Wyoming, it is known from outside of Region 2 on the Yellowstone Plateau in Teton County. In Wyoming, nagoon berry is known from 3 extant records (all observed since 1995) and 1 vague historical report in Wyoming (Hartman and Nelson 1998.). Two of the extant records are on the Bighorn National Forest. The Bighorn Range population contained hundreds of thousands of stems (representing an unknown number of genetically distinct individuals, due to the plants clonal nature) within a small geographic area in 1999. According to Fertig (Fertig 2000c), it is reported as "relatively abundant" at one site in Yellowstone National Park by the botanist there. In Colorado, it is known from the Arapaho-Roosevelt National Forest (Grand County) (Weber and R.C. Wittman 2000)and from the Pike-San Isabel National Forest (Bornong and A. Petterson 2001).

### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. However, habitat for this and other fen obligate plant species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002). This species occurs within Yellowstone National Park (UC Davis 2003).

### Status and Distribution on the MBNF

Nagoon berry is not known from the MBNF. Its distribution is similar to several other circumboreal plant species that are disjunct in peatlands on the MBNF. It is found on the Arapaho-Roosevelt National Forest in Grand County Colorado (Weber and R.C. Wittman 2000) and on the Bighorn National Forest in Wyoming (Fertig 2000c), (Bornong and A. Petterson 2001), (Heidel, J. Handley et al. 2002) in habitat that is similar to that found on the MBNF.

### Habitat and Natural History

#### *Species Description*

Nagoon berry is a low, rhizomatous, perennial herb with non-bristly/ prickly stems to 15 cm high. Its flowering and fruiting period is mid June to July. Fruits are red, globose raspberries (Hitchcock and A. Cronquist 1961; Fertig, C. Refsdal et al. 1994). Some birds and small mammals are known to eat the fruit, therefore, it may be inferred that there is some animal dispersal across unsuitable habitat. Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, is not available. In Colorado and Wyoming, this species has a very limited dispersal capability because of isolated nature of known populations and primarily rhizomatous method of reproduction. It seldom produces fruit in Colorado.

#### *Habitat*

Nagoon Berry is found in the understory of moderate to dense canopy covers in spruce, spruce/willow, and occasionally willow dominated communities (Fertig 2000c), (Bornong and A. Petterson 2001), (Heidel, J. Handley et al. 2002). In Wyoming, it has been found in boggy woods and marshes, mountain meadows, and alpine tundra at 7,000 to 9,000 feet. Its range is very limited in the state of Wyoming.

### Threats from Human Activity

Habitat for nagoon berry is potentially impacted by grazing, logging, recreation use. The berry is edible. Since some of the described habitat for this species occupies very wet fen/bog type and/or riparian habitats, that habitat would generally not be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. Recreational use with riparian areas can remove

and/or injure plants, alter soil properties and reduce the overall vigor of plants. In general, any activity that alters water levels may adversely affect this habitat.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

**Environmental Baseline**

Nagoon berry is not currently found on the MBNF. However, it is found on the Arapaho-Roosevelt National Forest in Grand County Colorado (Weber and R.C. Wittman 2000) and on the Bighorn National Forest in Wyoming (Fertig 2000c) in habitat that is similar to that found on the MBNF.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of nagoon berry. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for nagoon berry.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for nagoon berry if populations are identified and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if nagoon berry is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Because the potential habitat for this species on the MBNF would likely consist of localized microhabitats within the spruce/fir zone or within willow or tundra communities or fens, threats from land management activities would generally be low. Most of the spruce/fir forest on the MBNF is within active grazing allotments;

but livestock seldom forage within spruce/fir forest, preferring open meadows and slopes where forage is more abundant and palatable. Timber harvest and associated road building generally do not occur in the specialized wet micro-sites described as typical habitat of this species in the Rocky Mountains. In general, livestock avoid fens, especially those with quaking mat components and would preferably choose other riparian places to forage if available. Concentrated livestock use in fen habitat could alter the hydrology and water quality of this habitat.

The presence of potential habitat for this species would be evaluated as part of any project planning in the spruce/fir zone. Riparian or wet areas and would be subject to riparian and aquatic standards and guidelines.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

Recreational use within riparian areas could remove and/or injure plants, alter soil properties, disturb habitat, change the hydrologic regime and/or reduce the overall vigor of this plant. In particular, well-used fishing areas may result in some trampling of this species. Recreational activities and effects can be managed through educational efforts and/or closure orders. However, these populations are generally remote and quite difficult to access, therefore recreation impacts are likely to remain low.

This species generally occurs in wet peatland and other wetland settings where fire frequency intervals and intensities are usually low. High intensity fires could adversely impact individuals or whole populations of nagoon berry. Especially where there are abrupt riparian/upland ecotones.

**Indirect Effects**

Climatic warming and drought may post the greatest potential risk to this species by altering the temperature and moisture regimes of its specialized microhabitats in the Rocky Mountains (Bornong and A. Petterson 2001).

Habitat and populations in Colorado occur within forested landscapes contiguous with forested areas of the MBNF. A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado. Alternative F has the highest predicted levels of stand replacement wildfire. The impacts of wildfires are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those

alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting nagoon berry or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the greatest potential threat to nagoon berry habitat due to its preference for marshy, saturated sites (Lym 1997).

**Cumulative Effects**

There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on lands outside the National Forest. Any effects to a single population are unlikely to influence the status of other populations.

In general, any activity that alters water levels or water quality may adversely affect a portion of the potential habitat for this species. Since this potential habitat occurs near the head of the watershed, activities that alter water levels are rare.

There are no predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect population or potential habitat for nagoon berry. Nearly all of the activities can be planned at the project level to have no effect on the nagoon berry potential habitat. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to minimize impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a***

***loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning.

By identifying the possibility of potential habitat at the Forest Planning level even though the species has not been known to occur in Wyoming, project level surveys and biological evaluations can help to determine the presence or absence of potential habitat and occupancy by nagoon berry.

## Silver Willow, Hoary Willow (*Salix candida*)

### Status and Distribution of Species

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2: Sensitive. Heritage Rank: Global: G5; State WY: S2; WYNDD Plant List: Sparse (Low conservation priority) (WYNDD 2002). It is ranked S2 in Colorado (Spackman, B. Jennings et al. 1997) (Crook 2001), (Handley, Heidel et al. 2002).

***Distribution and Status***

The species is known from Labrador to Alaska and south to the Great Lakes states, South Dakota, Colorado, and Idaho (Fertig 2000). It does not seem to be common anywhere in its range. There are 10 widely scattered populations in Colorado and 6 occurrences in South Dakota (two are sub-populations).

In Wyoming, silver willow is known from the Absaroka, Beartooth, Laramie, and Medicine Bow ranges, Yellowstone Plateau, and upper Green River Basin. It is known to occur in the Laramie Basin and the Laramie, Absaroka, Beartooth, and Medicine Bow ranges in Albany and Park Counties.

It is known from 10 extant occurrences and 1 historical record in Wyoming (8 of these populations have been found since 1994) (WYNDD 2002). It is known from lands managed by the U.S. Forest Service, National Park Service, USFWS, and Bureau of Land Management in Wyoming (WYNDD 2002). At least 5 Wyoming populations are located in national parks, national wildlife refuges, or designated special interest areas.

From the MBNF, it is known from Sherman (Pole) Mountain near the Happy Jack Road and from one sites on Sheep Mountain and one site near Lake Owen (Proctor 2003), (Heidel and S. Laursen 2003).

***Recovery and Conservation Planning***

There is no documentation of recovery or conservation planning for this species. However habitat for this and other fen obligate plant species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes

the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002).

At least 5 occurrences are found in national parks, national wildlife refuges, or designated special interest areas (Yellowstone NP, National Elk Refuge, Swamp Lake SBA, Sheep Mountain Wildlife Refuge). Three other occurrences are within potential Research Natural Areas or Special Interest Areas on National Forest lands in Wyoming (Lake Creek Bogs, Sheep Mountain, Kendall Warms Springs) (Fertig 2000). This plant occurs at High Creek Fen in Colorado which is a protected natural area (CNAP 2003). There are also documented populations at Boston Peak Fen RNA on the Arapaho-Roosevelt National Forest near the headwaters of the Laramie River (Coles and K. Carsey 1998).

**Status and Distribution on the MBNF**

It is known to occur in the Laramie Basin and the Laramie, and Snowy ranges in Albany and Park Counties in Wyoming. It does not seem to be common anywhere in its range. One documented occurrence of silver willow on the MBNF is in a riparian area near the Happy Jack Road (State Highway 210) on Pole Mountain. There are additional occurrences documented in 2002-2003 on Sheep Mountain and near Lake Owen (Proctor 2003), (Heidel and S. Laursen 2003).

This and other rare peatland (obligate) plant species were searched for in an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of Pole Mountain, the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park) (Heidel and S. Laursen 2003).

**Habitat and Natural History**

***Species Description***

Silver willow is a dioecious, low shrub 50 to 120 cm tall. Flowering and fruiting occur from early June through late July (Fertig 2000). It is apparently adapted to saturated soils, and reportedly has a high tolerance to fire. Seeds are wind-dispersed and the shrub is able to sprout from suckers (Glisson 2002). Additional information on the species, including life history stages, population structure, longevity, mortality, and seed biology, are not available.

***Habitat***

In Wyoming, silver willow is found in bogs, fens, and willow thickets around ponds on wet to saturated histic soils (Fertig 2000). It sometimes is associated with soils derived from limestone parent material. Silver willow occurs in elevations ranging from 6,600 to 9,200 feet, and its peatland habitat is patchy and discontinuous on the landscape. Known associates are other *Salix* and *Carex* species (Spackman, B. Jennings et al. 1997).

**Threats from Human Activity**

Since this species occupies very wet fen/bog type riparian habitats, it would generally not be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. It could be subject to browsing and/or trampling impacts from domestic livestock. Recreational use within riparian areas can remove and/or injure plants, alter soil properties and reduce the overall vigor of willows. In general, any activity that alters water levels may adversely affect any willow species.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

**Environmental Baseline**

One known population of silver willow on the MBNF is within the Sheep Mountain Game Refuge which has little or no use by domestic livestock. The other MBNF populations are within active cattle grazing allotments. One documented occurrence of silver willow on the MBNF is in a riparian area near the Happy Jack Road (State Highway 210) on Sherman (Pole) Mountain. One other documented occurrence is along the Sand Lake Road on the Snowy Range.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of silver willow. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Management Plan specifies fire suppression strategies will include conservation measures for silver willow.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for silver willow and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if silver willow is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

One known population of silver willow on the MBNF is within the Sheep Mountain Game Refuge, which has little or no use by domestic livestock. The other Medicine Bow populations are within active cattle grazing allotments. Because this species occurs in riparian habitats often utilized by livestock and because willows are usually palatable to both livestock and big game, it could be subject to browsing and/or trampling impacts. However, since silver willow occurs mostly extremely wet, peaty sites, it may only be subject to light or occasional use by cattle. This is because cattle often avoid deep bogs and fens when other foraging areas are unavailable. The Sheep Mountain Game Refuge is maintained in management areas that emphasize wildlife habitat management and that maintain limited access in all alternatives. Intermittent or occasional livestock grazing is allowed to manage resource conditions. Populations of silver willow in the Sheep Mountain Game Refuge could be subject to this intermittent or occasional livestock grazing as well as wildlife grazing. Alternative F has the lowest levels of stocking and poses the lowest grazing and/or trampling risk to this species for those populations within active grazing allotments.

Since this species occupies very wet fen/bog type riparian habitats, it would also generally not be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils.

Recreational use within riparian areas can remove and/or injure plants, alter soil properties and reduce the overall vigor of willows. The riparian area near the Happy Jack Road (State Highway 210) on Pole Mountain (Sherman Mountain) with a documented population, is subject to recreational impacts. Other populations of this species occur on very wet sites that are not generally on the immediate margin of lakes or streams, the recreational impact is likely to remain low in most cases. Such sites are generally too wet to be considered desirable for hiking, horseback-riding, picnicking, etc. Area closures can be used to regulate recreational use at silver willow sites, if needed. Levels, amounts and types of recreation uses in these areas are similar among all the alternatives. All alternatives would continue the existing pattern of uses and disturbances to this species.

In general, any activity that alters water levels may adversely affect any willow species. The documented populations occur near the head of the watersheds, so other forest management activities that alter water levels are rare.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform with the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

### *Indirect Effects*

Neither management actions, nor management area allocations are likely to create any effects on any other populations. The interaction mechanisms of disjunct populations is unknown.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting silver willow or potential habitat. Thus, alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while alternatives B, and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*) probably presents the greatest potential threat to silver willow habitat due to its preference for marshy, saturated sites (Lym 1997).

### Cumulative Effects

One documented occurrence of silver willow on the MBNF is in a riparian area near the Happy Jack Road (State Highway 210) on Pole Mountain. Long-term changes to the hydrology of the riparian area near the road continue to influence this population. In general, any activity that alters water levels may adversely affect this species. Snowplowing on the Happy Jack Road potentially alters snow accumulations and snowmelt within the riparian area and may introduce salt and road chemicals (hydrocarbons, auto fluids, etc.). Road maintenance activities on Happy Jack road are conducted by state or county agencies and not by the Forest Service. Since this population occurs near the head of the watershed, other activities that alter water levels are rare.

The presence of light, wind-dispersed seeds and the ability to sprout from suckers should allow silver willow to respond well to moderate disturbances by fire. However, extensive severe wildfire or backfiring (with severe effects) associated with fire suppression actions could cause soil heating that would eliminate live root systems.

As for other populations on the MBNF, there are no predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and

endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the silver willow. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to minimize impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning. In addition, riparian/wetlands habitat is easily recognized and is protected by standards and guidelines. This reduces the need to identify silver willow to provide protection.

Alternative F contributes to high viability for silver willow. All other alternatives contribute to moderately high viability for silver willow.

## Autumn Willow *(Salix serissima)*

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

Status: USFWS: None; Agency Status: USFS Region 2 Sensitive; Heritage Rank: Global: G4; WY State: S1; WYNDD Plant List: Disjunct (Medium Conservation Priority) (Fertig 2000). It is ranked S1 in Colorado; S2 in Montana and S1 in South Dakota.

***Distribution and Status***

Autumn Willow is widely scattered but uncommon in the northern states except Washington and Idaho and becomes more common in Canada (Fertig 2000) (Burke 2000). Despite its widespread occurrence in North America, it is listed as vulnerable, imperiled or critically imperiled in most states. Autumn willow is currently reported from the Pole Mountain (Sherman Mountain) area in one location on the MBNF. It is also known from one location in South Dakota and four locations in Colorado. Weber and Whitman (Weber and R.C. Wittman 2001) document this species in Boulder, Larimer and Routt counties of Colorado.

### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. However habitat for this and other fen obligate plant species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002). This species is reported from Rocky Mountain National Park (Dallin 1999), (UC Davis).

### Status and Distribution on the MBNF

Autumn willow is currently reported from the Pole Mountain (Sherman Mountain) area in one location on the MBNF adjacent to the Happy Jack Road (State Highway 210). This and other rare peatland (obligate) plant species were searched for in an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of Pole Mountain, the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park) (Heidel and S. Laursen 2003). Potential habitat occurs in other nearby riparian areas (Burke 2000), (Fertig 2000).

### Habitat and Natural History

### *Species Description*

Autumn Willow is a shrub 1-4 m tall with grayish-brown branches and red glossy twigs (Fertig 2000). This species flowers from May-July and fruits are produced from June-September. Autumn Willow is unique among Wyoming willows in that it has a late fruiting period. Staminate and pistillate catkins are borne on separate plants. Willows produce light, wind-born seeds that have the potential to travel long distances, but generally establish only in appropriate habitats. The species has the ability to sprout from the roots.

### *Habitat*

Autumn willow occurs in montane swamps and bogs (Fertig 2000), (Heidel and S. Laursen 2003). The Pole Mountain population is reported at 7,900 feet in elevation and is associated with *Salix brachycarpa, S. planifolia, S. bebbiana*, and *Carex simulata*. It also known to occur with two other rare species: silver willow (*Salix candida*) and *Lomatagonium rotatum* (Fertig 2000), (Heidel and S. Laursen 2003).

### Threats from Human Activity

Autumn willow could be threatened by highway maintenance on the Happy Jack Road. Since this species occupies very wet fen/bog type riparian habitats, it would generally not be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. It could be subject to browsing and/or trampling impacts from domestic livestock. Recreational use with riparian areas can remove and/or injure plants, alter soil properties and reduce the overall vigor of

willows. In general, any activity that alters water levels may adversely affect any willow species.

**Environmental Baseline**

Autumn willow is currently reported from the Pole Mountain (Sherman Mountain) area in one location on the MBNF adjacent to the Happy Jack Road (State Highway 210) (Burke 2000), (Fertig 2000), (Heidel and S. Laursen 2003). The status of this population was confirmed in peatland surveys in 2002 (Heidel and S. Laursen 2003). This population had 80 – 100 individuals in 1995 in area of less than 4 acres (Crook 2001).

This and other rare peatland (obligate) plant species were searched for in an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora for select portions of the MBNF including parts of Pole Mountain, the Snowy Range (North Fork Allotment, Libby Flats and Elk Creek drainage), Sheep Mountain and the Sierra Madre Range (Huston Park) (Heidel and S. Laursen 2003). Potential habitat occurs in other nearby riparian areas (Burke 2000), (Fertig 2000).

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of autumn willow. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or endangered species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Management Plan that specifies fire suppression strategies will include conservation measures for autumn willow.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for autumn willow and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if autumn willow is determined to occur within a project or contract area.

**Direct Effects on Populations on NFS Lands**

The single documented occurrence of autumn willow on the MBNF (and within Wyoming) is in the riparian area near the Happy Jack Road (State Highway 210) on

Pole Mountain (Sherman Mountain). This road provides recreational access to this riparian area. The Pole Mountain area is a popular area for recreation. Recreation use within riparian areas can remove and/or injure the plants, can alter soil properties and reduce the overall vigor of willows. Dispersed recreation activities are difficult to control, however area closures can be used to regulate access, if needed. Levels, amounts and types of recreation uses in this area are similar among all the alternatives. All alternatives allocate this area to rangeland and recreation emphases. Theses alternatives would continue the existing pattern of uses and disturbance to this species.

This population of autumn willow is included within an active grazing allotment. Autumn willow is potentially threatened by grazing. Occasional trampling or consumption could occur. All alternatives maintain most of the MBNF in grazing allotments. Alternative F has the lowest levels of stocking and poses the lowest risk to autumn willow.

In general, any activity that alters water levels may adversely affect any willow species. The documented population occurs near the head of the watershed, so other forest management activities that alter water levels are rare.

Watershed Conservation Practices (also known as best management practices) control management practices that influence hydrology, riparian areas and streams. Watershed conservation practices are required to be implemented during project planning and implementation.

The Pole Mountain area is not included in the suitable land base for timber production, so timber harvest activities in this area would be limited to salvage or actions to benefit other resources. The current known location is surrounded by grasslands, not by forestlands further reducing the risk from timber harvest activities.

***Indirect Effects***

Neither management actions, nor management area allocations are likely to create any effects on any other populations. The interaction mechanisms of disjunct populations is unknown.

Competition from non-native invasive plants constitutes a potential threat to this or any native plant species. Invasive species are introduced and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting autumn willow or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the

greatest potential threat to wetland habitat due to its preference for marshy, saturated sites (Lym 1997).

**Cumulative Effects**

The single documented occurrence of autumn willow on the MBNF is in the riparian area near the Happy Jack Road (State Highway 210) on Pole Mountain (Sherman Mountain). Road paving and maintenance on this road is suspected of reducing the size of this population. Long-term changes to the hydrology of the riparian area near the road continue to influence this population. Snowplowing on the Happy Jack Road, potentially alters snow accumulations and snowmelt within this riparian area and may introduce salt and road chemicals (hydrocarbons, auto fluids etc.).

The documented population occurs near the head of the watershed, so other forest management activities that alter water levels are rare.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform with the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

The presence of light, wind-dispersed seeds and the ability to sprout from suckers should allow autumn willow to respond well to moderate disturbances by fire. However, extensive severe wildfire or backfiring (with severe effects) associated with fire suppression actions could cause soil heating that would eliminate live root systems.

As for other populations, there are no predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the autumn willow. Based on standards and guidelines and

administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning. In addition, riparian/wetlands habitat is easily recognized and is protected by standards and guidelines. This reduces the need to identify autumn willow to provide protection.

Alternative F contributes to high viability for autumn willow. All other alternatives contribute to moderately high viability for autumn willow.

## Low spike-moss (*Selaginella selaginoides)*

### Status and Distribution of Species

#### *ESA Status and Other Organization Rankings*

USFWS: None; Agency Status: USFS Region 2: Sensitive; Heritage Rank: Global: G5 (NatureServe 2003); State WY: S1; WYNDD Plant List: Peripheral (Low conservation priority) (Heidel and W. Fertig 2001) (Fertig and B Heidel 2002). It is ranked SH in Colorado and SR in Idaho (NatureServe 2003).

#### *Distribution and Status*

The species ranges across the Northern Hemisphere. In North America, it extends south as far as Nevada, Colorado, Michigan and Maine (Heidel and W. Fertig 2001). Wyoming populations are known from the upper Green River Basin and foothills of the Wind River and Teton Ranges in Sublette and Teton counties. In Colorado, it is documented on the Routt National Forest. There are no known occurrences on the MBNF (Fertig and B. Heidel 2001) however potential habitat may exist.

#### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species.

### Status and Distribution on the MBNF

There are no known occurrences on the MBNF (Fertig and B. Heidel 2001) however potential habitat may exist.

### Habitat and Natural History

#### *Species Description*

Low spike-moss is a moss-like glabrous perennial herb with slender branched, prostrate sterile stems and ascending fertile stems arising 3-10 centimeters above the ground. The thin, narrow leaves are spirally arranged on the stem and have bristles

on the margins (Dorn and J. Dorn 1992), (Hitchcock, A. Cronquist et al. 1969).

***Habitat***

In Wyoming, this species is found on mossy banks and saturated moss-covered zones in wet meadows at 7,700 to 8.000 feet. Its habitat is patchy and highly discontinuous on the landscape since it consists of specialized microsites. In eastern Colorado, it is in marshy places by beaver ponds and wet spruce forests (Weber and R.C. Wittman 2001).

**Threats from Human Activity**

Due to the fact that low spike-moss occurs in riparian areas and riparian/upland ecotones, it may be threatened by livestock trampling. Its palatability to livestock is unknown. Since this species occupies riparian and riparian ecotone habitats, it would generally not be directly affected by timber harvest activity, except in instances where a road or skid trail associated with timber harvest might cross a riparian area.

**Environmental Baseline**

There are no known occurrences on the MBNF (Fertig and B. Heidel 2001) however potential habitat may exist.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of low spike-moss and its habitat. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for low spike-moss and/or its habitat.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

The Forest Service maintains discretion to modify projects or contracts if low spike moss is determined to occur within a project or contract area.

### Direct and Indirect Effects on Populations on NFS Lands

#### *Direct Effects on Populations on NFS Lands*

Wet, mossy riparian habitats occur within active livestock grazing allotments across the Forest. Such sites could be subject to trampling damage.

Since this species occupies very wet riparian habitats, it would also generally not be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils.

Recreational use with riparian areas can remove and/or injure plants, alter soil properties and reduce the overall vigor of this species. Area closures can be used to regulate recreational use riparian sites where damage is occurring.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

#### Indirect Effects

Competition from non-native invasive plants constitutes a potential threat to this or any native plant species. Invasive species are introduced and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting low spike-moss or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*) probably presents the greatest potential threat to low spike moss habitat due to its preference for marshy, saturated sites (Lym 1997).

#### Cumulative Effects

Due to the discontinuous nature of the habitat for this species, effects to one potential habitat site would not influence other habitat sites.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the low spike-moss. Based on standards and guidelines and administrative feasibility, nearly all of the activities can be planned at the project level to have no effect on the low spike-moss. Management actions ***may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability rangewide.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning. In addition, riparian/wetlands habitat is easily recognized and is protected by standards and guidelines. This reduces the need to identify low spike-moss to provide protection.

Alternative F contributes to high viability for low spike-moss. All other alternatives contribute to moderately high viability for this species.

## Lesser Bladderwort (*Utricularia minor*)

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2 Sensitive; Heritage Rank: Global: G5 (NatureServe 2003); State WY: S2; WYNDD Plant List: none (Fertig and B Heidel 2002). It is ranked SR in Colorado, SR in South Dakota, SR in Idaho, S2 in Nebraska and S1 in Utah (NatureServe 2003).

***Distribution and Status***

Lesser Bladderwort is circumboreal, extending south in North America to California, Colorado, Indiana and New Jersey (Handley, Heidel et al. 2002), (Ode 2001). In Wyoming, it is known from lands outside the Region 2 boundary in the Yellowstone Plateau, and Jackson Hole in Teton County.

Within Region 2, lesser bladderwort occurs in the Laramie, Snowy, Absaroka, and Big Horn ranges in Albany, Carbon, Park, and Washakie counties, Wyoming, on the Medicine Bow, Shoshone, and Bighorn National Forests, as well as in the Laramie Valley (Handley, Heidel et al. 2002), (Proctor 2003). In Nebraska, it occurs on the Samuel R. McKelvie National Forest. It also occurs in Colorado and South Dakota.

This species may be more widespread and abundant than currently known, especially in Yellowstone National Park (Handley, Heidel et al. 2002), (Ode 2001).

### *Recovery and Conservation Planning*

There is no documentation of recovery or conservation planning for this species. However, habitat for this and other fen obligate plant species would be conserved through regional direction in the USFS memo 2070/2520-7/2620 which emphasizes the protection, preservation and enhancement of fens to all Region 2 forest supervisors (USDA Forest Service 2002). Lesser bladderwort is protected in the Swamp Lake Special Botanical Area in the Shoshone National Forest and in Grand Teton and Yellowstone National Parks (Handley, Heidel et al. 2002), (Ode 2001). There is also documentation of this species occurring in the Boston Peak Fen RNA on the Arapahoe-Roosevelt National Forest near the headwaters of the Laramie River (Coles and K. Carsey 1998).

## Status and Distribution on the MBNF

Lesser bladderwort is currently known from three sites on the MBNF including two sites on the Snowy Range and one site on the Laramie Range. Two of these are new records in 2003 (Proctor 2003).

## Habitat and Natural History

### *Species Description*

Lesser bladderwort is a perennial aquatic herb with submersed, weak stems and leaves. It is a carnivorous free-floating plant which can reproduce both vegetatively and sexually (Larson 1993). Flowering and fruiting occur from July through September. The most common method of reproduction is vegetatively by turions (winter buds) (USDA 2003). Turions are dense, starch-rich leaf masses which form at tips of branches in late fall, drop to the bottom and remain dormant through the long winter. Turions begin growing as spring water temperatures rise, absorbing air in their leaves to become buoyant. The small, pear-shaped bladders which trap and digest small aquatic invertebrates, are scattered along the main leaf blade, among the leaflets. The plant can be extremely difficult to locate and identify when it is not in flower. Additional information on the species, including life history stages, population structure, longevity, mortality, pollination biology and seed biology, are not available.

### *Habitat*

Lesser bladderwort is found submerged in shallow ponds, lakes, and slow-moving streams at 6,600 to 9,600 feet, often in open water microhabitat of alkaline fens (Handley, Heidel et al. 2002), (Proctor 2003). Its habitat is patchy and discontinuous on the landscape. In eastern Colorado, it is said to occupy subalpine ponds (Weber and R.C. Wittman 2001). The habitat is rare and discontinuous across the landscape. Known populations are all very small and restricted to specialized microsites. It does not seem to be common anywhere in its range, likely due to the specialized microsites it occupies.

**Threats from Human Activity**

Lesser bladderwort may be threatened by loss or deterioration of wetland habitat and/or water quality (Handley, Heidel et al. 2002). Across its known range populations have been impacted by drainage, diversion, livestock use, road construction, increased sedimentation, nutrient enrichment, mining and fish introductions.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest.

**Environmental Baseline**

Within Wyoming, lesser bladderwort is known from 8 records including 2 new records on the MBNF (Proctor 2003) and at least 6 other records in Wyoming (one of which is historical, dating from 1900). Two records have been relocated since 1996.

Three sites are known to occur on the MBNF including two sites in the Snowy Range and one site on the Laramie Range. One of the new records resulted from an intensive remote sensing/GIS effort which sought to locate, map, field verify and record high quality peatlands and their flora on select portions of the MBNF. The other record was found as a result of a rare plant survey conducted for the North Fork Allotment Management Plan Revision. Both sites were found in open water ponds within greater basin peatland settings (Heidel and S. Laursen 2003).

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of lesser bladderwort. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for lesser bladderwort.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds

from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if low spike moss is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Any activity that causes loss or deterioration of wetland habitat could adversely affect this species due to its aquatic nature. Watershed conservation practices (also known as best management practices) control management practices that influence hydrology and streams. Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Three populations of lesser bladderwort are known to occur on the Wyoming portion of the MBNF (Fertig and Heidel 2002), (Proctor 2003). Two of those populations occur within active grazing allotment pastures. The other MBNF population occurs within the Three Mile wildlife refuge where it would only be subject to grazing by wildlife. Because lesser bladderwort occupies open water ponds in basin peatland habitats it may only be subject to light or occasional use by cattle. This is because cattle often avoid peatland settings when other foraging areas are available. Because it is a submersed plant, the species is not readily available to livestock. It could be subject to trampling by cattle as they access watering sites. The species is generally not considered preferred forage for wild birds or mammals (USDA 2003). Allotment management plans can be modified to contain considerations for this species and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Since lesser bladderwort occupies wet fen/bog habitats, it would also generally not be directly affected by timber harvest activity or associated activities such as construction of roads or skid trails. These activities do not occur on saturated soils or open water.

Concentrated recreational use in and along aquatic habitats could damage plants or alter the habitat through introduction of pollutants. Area closures can be used to regulate recreational use at riparian sites, if needed to protect habitat quality.

There would be little to no difference in management activities in riparian areas under the various Forest Plan alternatives since under all alternatives riparian area management practices must conform to the same set of Watershed Conservation Practices. These practices are required to be implemented during project planning and implementation.

***Indirect Effects***

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this

habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. Purple loosestrife (*Lythrum salicaria*) probably presents the greatest potential threat to lesser bladderwort habitat due to its preference for marshy, saturated sites (Lym 1997). Non-native aquatic plants could also present a threat if introduced.

**Cumulative Effects**

Cumulative effects to aquatic habitats would include climatic cycles such as prolonged drought or changes in pH from acid rain.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

A determination that a given range is suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the lesser bladderwort. Based on standards and guidelines and administrative feasibility, nearly all of the activities can be planned at the project level to have no effect on the lesser bladderwort. Management actions or recreational use by the public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

This plant (lesser bladderwort) can be extremely difficult to locate and identify and distinguish from other *Utricularia*, however riparian/wetlands habitat are easily recognized and protected, thus all alternatives pose a low level risk for management actions that involve project planning.

## Great-spurred Violet (*Viola selkirkii*)

**Status and Distribution of Species**

***ESA Status and Other Organization Rankings***

USFWS: None; Agency Status: USFS Region 2: Sensitive; Heritage Rank: Global: G5 (NatureServe 2003); State WY: None; WYNDD Plant List: None. It is ranked S1 in Colorado, Connecticut, Montana, Pennsylvania, and South Dakota; S2 in Manitoba, Canada; S2S3 in Saskatchewan; and S3 in Alaska and Alberta (Hornbeck,

C.H. Sieg et al. 2003).

### *Distribution and Status*

Great-spurred violet is a circumboreal species that is found in North America south to Pennsylvania, Minnesota, and British Columbia, with disjunct occurrences in the Black Hills of South Dakota and the Rocky Mountains of Colorado and New Mexico (Hornbeck, C.H. Sieg et al. 2003). Throughout the species range it is locally abundant in specialized microsites in coniferous and deciduous forests.

There are 17 known populations of great-spurred violet in the Black Hills in South Dakota, one confirmed occurrence on the Kootenai NF in Montana and several confirmed locations within Rocky Mountain National Park (UC Davis 2003). There may be additional populations in the Rocky Mountains of northern Colorado that have not been verified (Hornbeck, C.H. Sieg et al. 2003). There are no documented occurrences in Wyoming. Census data are lacking for most populations. In Colorado, the great-spurred violet is known from two areas: Rocky Mountain National Park, where it was last seen in 1965, and at the east base of Devil's Head in Douglas County, where it was last seen in 1923.

### *Recovery and Conservation Planning*

The Nature Conservancy has identified the High Granite Region of the Black Hills Central Core and all verified occurrences of the great-spurred violet as targets for conservation in its ecoregional conservation plan for the Black Hills. The plant seems most vulnerable to climatic changes that would affect the cold-moist conditions it requires, so a conservation strategy recommended by Hornbeck *et al.* (Hornbeck, C.H. Sieg et al. 2003) is to store the plant's seed in a certified seed safe. UC Davis (UC Davis 2003) reports a reproducing population in Rocky Mountain National Park.

### Status and Distribution on the MBNF

Great spurred violet is not currently found on the MBNF. However, historic documented populations in Colorado within Rocky Mountain National Park are from the southern end of a continuous mountain range that stretches northward through the Routt National Forest to the MBNF. Any potential habitat that may occur on the MBNF would likely be in ravines or on north-facing slopes in the spruce/fir zone. White spruce habitat found in localized areas on the Snowy Range (Heidel and Laursen 2003, MBNF RIS database) and Laramie Peak Range (Hartman and Nelson 1998.) would be similar to habitat for great spurred violet found in the Black Hills.

### Habitat and Natural History

### *Species Description*

Great-spurred violet is a small perennial herb with long slender rhizomes without stolons. Flowering and fruiting occur in spring (Hornbeck, C.H. Sieg et al. 2003). Gene flow between plants is likely low due to its seed dispersal methods which

include being transported by ants or being explosively ejected from the capsule (Beattie and N. Lyons 1975). Additional information on the species is available in the Conservation Assessment for great-spurred Violet in the Black Hills National Forest, South Dakota and Wyoming (Hornbeck, C.H. Sieg et al. 2003).

***Habitat***

Great-spurred violet occupies moist, shaded ravines and cold boreal and hardwood forest habitats. In the Black Hills, it is restricted to high elevation cold, shaded, spruce-dominated forest habitats in moist, mossy or grassy, sheltered microsites and similar microhabitats on streamside benches, ledges in rock walls, and places where grass or litter has accumulated next to cliffs or canyon walls. It occurs on soils derived from granitic parent material in the Black Hills, but in other parts of its range it occurs on limestone-derived soils. Moist, cool microsite conditions may be more important than the substrate. Known associates vary by location, that is the plants are associated with western red-cedar/wild sasparilla forest in Montana, beech forest in Wisconsin, and spruce forest in South Dakota (Hornbeck, C.H. Sieg et al. 2003). The habitat is discontinuous across the landscape. Any potential habitat that may occur on the MBNF would likely be in ravines or on north-facing slopes in the spruce/fir zone. White spruce habitat found in localized areas on the Snowy Range (Heidel and S. Laursen 2003), (MBNF RIS database) and Laramie Peak Range (Hartman and Nelson 1998.) would be similar to habitat for great spurred violet found in the Black Hills.

**Threats from Human Activity**

Threats may include activities that change the canopy cover, soil temperature, or soil moisture of great spurred violet habitat (Hornbeck, C.H. Sieg et al. 2003). The effects of management activities such as prescribed fire on the great spurred violet are not well understood. There is some potential for impact to likely habitat from trampling by wildlife or recreational hikers, invasion by noxious or other aggressive non-native weeds, wildfire, or flood, but the risks are considered low, except where a population might occur next to a popular rock-climbing site.

**Environmental Baseline**

Great spurred violet is not currently found on the MBNF. However, historic documented populations in Colorado within Rocky Mountain National Park are from the southern end of a continuous mountain range that stretches northward through the Routt National Forest to the MBNF.

**Protection in the Plan**

Standards and guidelines for the protection of sensitive plants apply to the conservation of the great spurred violet. Special Forest/Rangelands Products Standard One on Plant Collecting allows Botanical collection permits to be issued to authorize collection of plants or plant parts for other than threatened or sensitive species. Such collections must not jeopardize the continued vigor or existence of a

plant population.

The Fire Plan that specifies fire suppression strategies will include conservation measures for great spurred violet if it is located on the MBNF.

Watershed conservation practices are required to be implemented during project level planning and implementation. Project implementation will assess site-specific risks and strategies.

Allotment management plans can be modified to contain considerations for great spurred violet and exclosures constructed if needed to maintain viable populations. Area closures can be used to exclude recreation and other uses, if needed.

Region 2 has a weed free hay policy in place that will limit the introduction of weeds from pack stock feed.

The Forest Service maintains discretion to modify projects or contracts if greater spurred violet is determined to occur within a project or contract area.

**Direct and Indirect Effects on Populations on NFS Lands**

***Direct Effects on Populations on NFS Lands***

Because the potential habitat for this species on the MBNF would likely consist of sheltered microhabitats within the spruce/fir zone, or on localized areas of white spruce habitat, threats from land management activities would generally be low. Most of the spruce/fir forest on the MBNF is within active grazing allotments; but livestock seldom forage within spruce/fir forest, preferring open meadows and slopes where forage is more abundant and palatable. Timber harvest and associated road building generally do not occur in the specialized wet microsites described as typical habitat of this species in the Rocky Mountains. Microsites that could be potential habitat for this species would be surveyed as part of any project planning in the spruce/fir zone. New occurrences of this species would be evaluated for the need for protection and/or employment of mitigation measures during project analysis. Hardwood forests such as alder habitat described by Spackman *et al*. (Spackman, B. Jennings et al. 1997) are most often associated with riparian or wet areas and would be subject to riparian and aquatic standards and guidelines.

***Indirect Effects***

Climatic warming and drought may post the greatest potential risk to this species by altering the temperature and moisture regimes of its specialized microhabitats in the Rocky Mountains.

Competition from non-native invasive plants constitutes a potential threat to this species based on habitat characteristics. Invasive species could be introduced to this habitat and spread by a variety of activities including livestock grazing, recreational use, road maintenance or construction, and timber harvest. For this reason, those alternatives that include the most timber harvest, road construction and road

maintenance have the greater chance of increasing populations of invasive plants and thereby adversely affecting great spurred violet or its potential habitat. Thus, Alternative F (which includes the least amount of ground disturbing management activities) has the least potential for increasing invasive plant populations, while Alternatives B and A (in descending order) have the most potential for increasing invasive plant populations. Purple loosestrife (*Lythrum salicaria*), though not known from on the MBNF, probably presents the greatest potential threat to great spurred violet habitat due to its preference for marshy, saturated sites (Lym 1997).

Habitat and populations in Colorado occur within forested landscapes contiguous with forested areas of the MBNF. A large wildfire (extreme event) ignited on the MBNF could threaten populations and habitat for this species in Colorado. Alternative F has the highest predicted levels of stand replacement wildfire. The impacts of wildfires are controllable through suppression actions which are generally successful but at times, incidents can exceed suppression capabilities.

**Cumulative Effects**

There are no predicted effects from management actions or management area allocations on the MBNF for populations or habitat on lands outside the National Forest. Any effects to a single population are unlikely to influence the status of other populations.

There are no predicted cumulative effects other than those produced by fluctuations in climate, such as prolonged drought, or other natural events such as insect and disease outbreaks.

Decisions to make NFS lands available for oil and gas leasing can result in an application permit to drill (APD) and eventual on-site development. Although the decision to make areas available for oil and gas leasing does not result in on-the-ground activities, oil and gas stipulations to protect and conserve threatened and endangered species and their habitats are needed at the time leasing availability decisions are made. Site-specific biological assessments and evaluations are also conducted at the time applications for permits to drill are considered by the Forest Service. Standard stipulations provide for relocation of facilities up to 250 feet.

Determining range to be suitable for livestock grazing most often results in issuance of a livestock grazing permit for that area or inclusion of the area into a livestock grazing agreement.

**Biological Determinations, Risk Assessments, and Rationale**

None of the activities proposed in the MBNF Forest Plan Revision would programmatically affect the great spurred violet or its habitat. Nearly all of the activities can be planned at the project level to have no effect on the great spurred violet or its habitat. Based on standards and guidelines and administrative feasibility discussed earlier, management actions on the MBNF can be controlled to reduce impacts to this species. However, management actions or recreational use by the

public ***may adversely affect individuals but are not likely to result in a loss of viability on the planning area, nor cause a trend towards Federal Listing or a loss of Species Viability.***

Because the presence of this plant can be determined in project planning surveys, all alternatives pose a low level risk for management actions that involve project planning.

By identifying the possibility of potential habitat at the Forest Planning level even though the species has not been known to occur in Wyoming, project level surveys and biological evaluations can help to determine the presence or absence of potential habitat and occupancy by great spurred violet.

## Sensitive Plant Species Summary of Effects

The effects to each species by alternative are summarized in the following table.

Table I-54. Impact Determinations for R2 Sensitive Plant Species on the MBNF.

| | Alternatives | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sensitive Species** | **A** | **B** | **C** | **D DEIS** | **D FEIS** | **E** | **F** |
| **Plants** | | | | | | | |
| Laramie columbine | NE | NE | NE | NE | NE | NE | NE |
| Park milkvetch | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Slender Moonwort | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Leathery grape-fern | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Lesser panicled sedge | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Bristly-stalked sedge | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Livid sedge | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Yellow ladies" slipper | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Round leaf sundew | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Boreal spikerush | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Slender-leaved buckwheat | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Slender cotton-grass | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Hall's fescue | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Rabbit ears gilia | MAII | MAII | MAII | MAII | MAII | MAII | MAII |

| | Alternatives | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sensitive Species** | **A** | **B** | **C** | **D DEIS** | **D FEIS** | **E** | **F** |
| **Plants** | | | | | | | |
| Simple kobresia | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Colorado tansy-aster | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Kotzebue grass of parnassus | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| White larchleaf beardtongue | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Rocky Mountain cinquefoil | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Nagoon berry | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Silver willow | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Autumn willow | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Low spike-moss | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Lesser bladderwort | MAII | MAII | MAII | MAII | MAII | MAII | MAII |
| Great spurred violet | MAII | MAII | MAII | MAII | MAII | MAII | MAII |

NI – no impact; BE – beneficial impact; MAII – may adversely impact individuals but not lead to a trend toward federal listing; LFL- Likely to result in a loss of viability on the planning area, in a trend to federal listing, or in a loss of species viability rangewide.

## Species of Local Concern

Species of local concern has been moved to FEIS Appendix D- Biological Diversity Report.