Appendix

H

MEDICINE BOW NATIONAL FOREST

Revised Land and Resource Management Plan

Final Environmental Impact Statement

Appendix H Management Indicator Species

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Introduction

The Forest Service Manual defines Management Indicator Species (MIS) as "…plant and animal species, communities, or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (United States Department of Agriculture [USDA]-Forest Service 1991). The National Forest Management Act (NFMA) requires that MIS be selected as part of the forest plan to estimate the effects of planning alternatives on fish and wildlife populations (Hayward et al. 2001).

The 1982 NFMA regulations require that "populations trends of the MIS will be monitored and relationships to habitat determined" [36 CFR 219.19 (a) (6)]. NFMA planning regulations requires MIS to be selected "because their population trends are believed to indicate the effects of management activities." Categories appropriate for selection of MIS may include Threatened and Endangered species, as well as commonly hunted and fished species.

The 1982 NFMA regulations however, do not make a direct link between MIS and viability. Attempts to do so in individual plans have been problematic. Simply stated, population trends of MIS species are not expected to mirror trends of other species (Region 1 Consistency Paper on Viability, 2003).

As part of the Medicine Bow National Forest (MBNF) 2003 Final Revised Land and Resource Management Plan (Plan), this document identifies MIS and includes rationale for selection. The process used for MIS selection follows the method described in Hayward et al. (Hayward et al. 2001) (as presented in the Regional Desk Guide, Appendix G: Revision Analysis Requirements for Planning Documents) and includes principles guiding selection process and a seven-step process to select MIS. The MIS concept and scientific criticism of MIS are discussed in Hayward et al. (Hayward et al 2001).

Guiding Principles

Hayward et al (Hayward et al 2001) outline five principles to guide selection of MIS. Each principle is discussed below in terms of its relevance to the selection of MIS for the MBNF.

Principle 1 - Choose MIS to reflect major management issues and challenges.

Principle 2 - MIS function to facilitate evaluation.

Principle 3 - Consider MIS chosen on neighboring planning units.

Principle 4 - Consider whether employing MIS is the best approach to evaluate the management problem.

Principle 5 - Choose an adequate but limited number of species.

This approach represents a shift away from the past emphasis on habitat representation toward an emphasis on management issues. The two approaches often overlap. MIS have always been defined as being useful in assessing management effects, but the array of species actually selected often was driven by a desire to have a representative of each habitat that occurred on the National Forest. With the focus on management issues, not every habitat will be represented by a species on the MIS list.

The two criteria that dominate the MBNF process for selecting MIS are (1) the degree of concern about the issue- is our management possibly having adverse effects on the animal community? and (2) can monitoring a species provide usable information on the effects of management? Many other criteria have been proposed for selection of MIS. The selection of activities to monitor might depend on the "footprint" of an activity (how much land was affected) or the magnitude of the alteration of the environment at the site. Species characteristic include status as a listed species, size of home range, width of habitat selection, migratory habits, population stability, abundance, generation time (or speed of response to habitat change), ease of detection, and freedom from effects other than the management effects of concern, among others. These factors are weighed into the MBNF's selection, but are subordinate to a focus (1) on the management issues that have been identified as "major" and (2) on whether data on species can help resolve uncertainty about management effects.

MIS Selection Steps

Hayward et al. (Hayward et al 2001) outlined the following seven steps for selecting MIS:

Step 1: Assemble Information About the Planning Area and Species-Habitat Relationships.

Information reviewed for the MIS evaluation process includes a report describing the historic range of variability (HRV) on the MBNF Dillon and Knight (Dillon and Knight 2000), the 1985 Plan, von Ahlefeldt and Speas (Von Ahlefeldt and Speas 1996), the Wyoming of Game and Fish Department *Wildlife Atlas*, and other literature on wildlife and ecological processes conducted on the MBNF or in similar habitat.

Step 2: Establish MIS Monitoring Priorities

Monitoring priorities were established to reflect major management issues. Three sources of information were considered in selecting issues that were of high concern, which might be suitable for monitoring using MIS.

First, the Analysis of the Management Situation identified "need for change" topics for the forest plan revision. One of the major "revision topics" was "biodiversity," which included concerns about fragmentation, connectivity, old growth, TES species, and health of riparian and aquatic systems.

Second, the Historic Range of Variability identified ways in which the Forest had changed from a system shaped by natural processes to one in which many natural processes were altered by humans and in which new human activities affected the landscape. Among these are changes in the size and distribution of openings in the forest, reduction in area with large trees at high elevation (lodgepole and spruce-fir forest), increase in understory in low-elevation ponderosa pine, and reduction in dead downed wood and snags in areas that have been logged. (Many other changes were also noted, Dillon et al. 2003) In addition to these changes in vegetation, effects of human disturbance have greatly increased, a road system has been built, and the structure of snow has changed at sites of winter recreation.

Finally, Forest biologists identified areas of uncertainty in the effects and assumptions made in the Forest's management. Areas of concern included (not in order of priority):

- Dead downed wood/snags.
- Fragmentation/spatial pattern of forest.
- Water quality.
- Old growth.
- TES and their prey.
- Effects of change in structure of spruce-fir as logging (shelterwood, group selection, individual tree selection, and overstory removal) replaces fire (and other natural processes) as a regenerating disturbance.
- "Health" of riparian zones. Homogenization of riparian zones/Decline in vertebrate diversity in riparian zones/Ungulate herbivory in willow community.
- Aspen regeneration and forb production in aspen stands.
- Alteration in ponderosa pine structure/ health.

Other topics were proposed but were determined to require research rather than just monitoring. MIS monitoring would not answer the associated questions. These included:

- Snow compaction: What are effects, especially on subnivian species?
- Game population objectives: Are levels compatible with other species needs?
- Road density/ intensity of motorized recreation/ lack of security areas.
- Assumptions about burning or other management of sage-steppe.
- Assumptions in Lynx Conservation Strategy and Assessment (especially effects of thinning on snowshoe hare populations).
- Effect of non-native plants and animals.
- How do shortened harvest rotations affect certain species?
- Alteration of wet places to dry/wet sites.

These three sources of information are not exactly comparable. The HRV assessment focused on vegetation in forested landscape, for example, and did not address changes in grass/shrub communities, snow, or human disturbance. The "need for change" items did not include grazing, but the biologists felt the need to monitor effects on riparian habitat, especially in the wake of the recent drought and with the introduction of the non-native moose to the Forest. Finally, the biologists' concerns sometimes emphasized local and project-level concerns, rather than broader issues that MIS are intended to address. Nonetheless, there was concurrence on several major issues.

Criteria for selecting "major issues" included the magnitude and duration of adverse effects (if they are occurring), the area affected by associated management activities, and information (or unresolved debate) in the scientific literature suggesting potential adverse consequences of certain types of management. Some critical issues (like road density and snow compaction) were considered "major" in importance, but had been categorized by the Forest biologists as ones that would not be resolved through monitoring of a species.

The biologists debated the need for an MIS for aspen. The amount of aspen on the Medicine Bow NF has not declined as it has in much of the West. The use of aspen itself as an MIS was considered. This was later dropped in favor of including an item on aspen in the annual monitoring report.

The Lewis' woodpecker was considered as an indicator of ponderosa pine structure, but the issue was dropped because (a) much of the ponderosa pine on the Forest is at high elevation and typically had multistoried stands, (b) much of the ponderosa pine of the Laramie Peak Unit has died or burned, and (c) relatively little area is involved.

Eight issues were selected to carry forward as the highest priority issues for which an attempt was made to find a meaningful MIS. These are old growth, dead downed wood/snags, spatial pattern of forest (fragmentation/connectivity), riparian heath, water quality, TES and their prey, aspen, and uneven-aged management in spruce-fir,

Old growth, dead downed wood/snags, and spatial pattern of forest (fragmentation/ connectivity) are all issues raised by all of these sources and in public comment. Effects of management on these characteristics persist for centuries, so it is very important to detect adverse effects quickly. Activities that affect these issues affect many acres of land each year. These issues are all high priority.

Riparian areas are important to wildlife far more than their limited area might suggest. In relatively dry areas, a large part of the primary productivity of an area is produced near water. In addition to true habitat obligates, the riparian zones provide necessary elements for many animals that use larger areas. The distribution and seasonal pattern of livestock grazing does not imitate presettlement grazing, and the non-native moose has been introduced. Given these changes, it is important to monitor this disproportionately valuable part of the ecosystem.

Water quality/aquatic function is essential for wildlife on the forest and for the quality of water that leaves the Forest for downstream species and human uses. Water quality is among the highest values placed by the public on National Forest lands.

Species of concern, whether federally listed or designated as "sensitive" or "species of local concern" by the Forest Service, may be valuable as indicators of some limiting factor. In addition, each species makes its own contribution to biodiversity and tracking of species of concern as MIS also tracks its presence as part of the communities.

Step 3: Identify Potential MIS Based on Categories Identified in the Regulations and the Forest Service Manual.

The 1982 NFMA identifies five appropriate MIS categories. MIS are not limited to species in these categories, and the MBNF process selected candidates primarily for their association with the major issues. The following categories from NFMA were all considered.

- Federally and state listed endangered and threatened plant and animal species that occur on the forest.
- Species commonly hunted, fished, or trapped.

- Species that have special habitat needs and may be impacted by planning activities.
- Non-game species of special interest.
- Species whose population changes may be indicative of the effects of management activities on other species within a selected biological community.

For the first two of the categories, each species was assessed individually (see below). For the other three categories, these traits were considered with others in selecting from candidates that arose as potential MIS for the major issues.

Screening of TES species: The list of threatened, endangered, and sensitive species on the Forest was reviewed and assessed for the advantages and disadvantages each had as an MIS (Attachment 1). All Federally listed species were eliminated from consideration. Eight sensitive species were retained for further evaluation. (Species eliminated and rationale are given in Attachment 1.) The TES species retained for consideration in the next step as possible MIS are:

- American marten (fragmentation, old growth, dead downed wood).
- Northern goshawk (fragmentation, patches of mature/old trees, dead downed wood).
- Boreal owl (snags, fragmentation, old growth, dead downed wood).
- Lewis' woodpecker (ponderosa pine and post-fire habitat).
- Three-toed woodpecker (old spruce/fir, snags).
- Pygmy nuthatch (ponderosa pine structure).
- Northern leopard frog (water quality).
- Colorado River cutthroat trout (water quality).

Screening of species commonly hunted, fished, or trapped: Common trout are a possible MIS. No terrestrial game species were selected as MIS (Attachment 2). Game species will still be assessed in NEPA analysis for projects, using data available from Wyoming Game and Fish Department.

Step 4: Generate a List of Species that may Respond to Priority Management Issues.

No species reacts with population change only in response to single management activity. Population increases or decreases suggest some changing condition, and trigger closer examination of case and effect relationships.

Table H-1. Potential MIS for the priority management issues.

Issue/Uncertainty	Question	Potential MIS
Old growth	Is the amount and distribution of old growth being left adequate for maintaining viable populations of species requiring old growth or old growth components?	Brown creeper, marten, boreal owl, northern goshawk (for old elements in mosaic)
Dead down wood	Are we leaving enough and in the right manner to meet the needs of wildlife dependent on downed wood? How does this conflict with traditional fuels management/forestry?	Red-backed voles, marten
Snags	Are the number and type of retained snags meeting species needs?	Boreal owl, three-toed woodpeckers, northern flicker
Spatial pattern – fragmentation/ perforation/ connectivity	Is the pattern of openings on the land meeting the needs of wide-ranging or interior forest associates (Clearcuts, roads)?	Marten, boreal owl, brown creeper, northern goshawk, three-toed woodpecker
Riparian zones/ Ungulate herbivory in willow community	Are we leaving enough shrubs in riparian zones? Are riparian-dependent species changing in abundance with on-going grazing and the introduction of moose?	Lincoln's sparrow, Wilson's warbler, fox sparrow
Water quality	Are effects of sedimentation or other pollutants altering populations of aquatic animals?	Trout, aquatic insects
TES	What species are declining, or have the greatest uncertainty and controversy and/or respond to major management activities?	American marten, goshawk amphibians
Uneven aged management in spruce-fir/ within stand fragmentation	Are treatments that create density or pattern of gaps within a stand unlike that created by natural processes used by animals (thinning, group selection in continuous old spruce/fir)?	Brown creeper, hermit thrush, golden-crowned kinglet

These are old growth, dead downed wood/snags, spatial pattern of forest (fragmentation/connectivity), riparian heath, water quality, TES and their prey, aspen, and uneven-aged management in spruce-fir,

Step 5 - Review Preliminary List of MIS

The species were selected to address the management concern for which it was to serve as an indicator. If a good indicator was listed in the categories represented by the Tables above, it was favored over other species. Additional selection criteria were:

1 Scientific literature should support the habitat relationships and limiting factors assumed for each species.

2 Preference is given to species whose population trends can be monitored effectively and efficiently.

3 Selection should favor persistent year-round residents.

4 Selection should favor indigenous species.

5 MIS should reflect habitat change at appropriate spatial and temporal scales. Species considered for MIS for each of the management questions and the selection made are shown in the following table. The rational for selection or non-selection is shown in (the following table).

Step 5 requires that recommended species and habitat components be reviewed to determine how well they fulfill Principle 3 (Consider MIS chosen on neighboring planning units), Principle 4 (Consider whether employing MIS is the best approach to evaluate the management problem), and Principle 5 (Choose an adequate but limited number of species).

Table H-2. Selected MIS for the priority management issues.

Issue/Uncertainty	Potential MIS	Selection	Rationale
Old growth	Brown creeper marten, boreal owl, northern goshawk (for old elements in mosaic)	Marten (spruce-fir, lodgepole), Northern goshawk (for components in lodgepole, aspen)	Brown creepers are the most tied to old growth. However, the species' low density will result in few observations and difficulty in detecting trends. Marten and goshawks cover different but overlapping elevations. Both are sensitive. Goshawks use other age classes, need mature and old components, not tied as closely to old forest.
Dead down wood	Red-backed voles, marten	Marten	Vole population varies greatly making it hard to detect trends. Marten addresses more conditions created/altered by management at larger scale.

Issue/Uncertainty	Potential MIS	Selection	Rationale
Snags	Boreal owl, three-toed woodpeckers, northern flicker	Three-toed woodpecker (spruce-fir, recent burns)	Boreal owl nest boxes confuse the linkage to snag availability. Detection away from boxes would require winter nighttime call surveys. northern flickers are more generalist in habitat. The three-toed woodpecker is a sensitive species. Three-toed woodpeckers are not abundant, leading to difficulty detecting trends. However, it is an MIS on the adjacent Arapaho Roosevelt NF, and relies on old forest and recent burns, the two boreal forest habitats that are most reduced compared to HRV.
Spatial pattern/ fragmentation-perforation at landscape scale (not within stand)	Marten, boreal owl, brown creeper, northern goshawk, three-toed woodpecker	Marten	Martens are the only species well best supported in literature as responding to *pattern* of habitat as opposed to the *amount* left after logging. They respond to fragmentation at the scale produced by logging. The marten is a sensitive species.
Fragmentation-within stand	Brown creeper, hermit thrush, golden-crowned kinglet	Golden-crowned kinglet	Creepers are too rare to detect a large enough sample size to detect trends. Hermit Thrush not common on the Medicine Bow.
Riparian zones/ Ungulate herbivory in willow community	Lincoln's sparrow, Wilson's warbler, fox sparrow, beaver	Lincoln's sparrow, Wilson's warbler	Use both species to cover more elevation. Use same method for both (RMBO).
Water quality	Trout, aquatic insects	Common trout	Have baseline data and monitoring methods established for trout. Non-native desired species. No comparable baseline data and methods are available for insects.
TES	American marten, goshawk, amphibians	Snowshoe hare as prey of TES forest carnivores (lynx, goshawk, marten)	Have baseline data and monitoring methods established for hare on Routt. Amphibian declines not known to be related to FS management, so monitor them as TES, not MIS.

Based on this review, the following MIS were identified:

Common trout	Golden-crowned kinglet
American marten	Three-toed woodpecker
Snowshoe hare	Lincoln's sparrow
Northern goshawk	Wilson's warbler

Population monitoring that indicates a declining trend will not show the cause of the decline. Though these species are known to respond to one or more management effects that led to their selection as MIS, population change can have other causes, either related to Forest Service activities or not. In fact, selection of some was done knowing that more than one habitat component affected by the Forest Service could affect populations. For example, marten decline could be caused by loss of downed wood, loss of old forest, loss of connectivity, or reduced density of resources at the scale of the home range. In some cases a cause could be obvious (for example if stand-replacing fire burned a large number of transects). In most cases, a declining trend would indicate the need research into causation and for caution in continuing activities that are possible causes.

The species selected were reviewed for co-occurrence on neighboring forests (the Routt NF and the Arapaho-Roosevelt NF (ARNF).

Table H-3. Management Indicator Species in the 1985 MBNF Plan and on adjacent forests.

Species	Medicine Bow 1985 Plan	Routt 1998 Plan	ARNF 1997 Plan	Medicine Bow 2003 Revision
Dwarf Shrew	x			
Beaver	x	x		
Western jumping mouse	x			
Red-backed vole	x	x		
Long-tailed vole	x			
Sagebrush vole		x		
Snowshoe hare				x
Elk	x	x	x	
Mule deer	x	x	x	
Bighorn sheep	x		x	
Black bear			x	
Townsend's big-eared bat			x	
American marten		x		x
Wolverine			x	
River otter			x	
Lynx			x	
Sandhill crane	x	x		
C. sharp-tailed grouse		x		
Sage grouse	x			
Blue grouse	x	x		
Turkey	x			
White-tailed ptarmigan	x	x		
Osprey	x	x		
Bald eagle	x	x	x	
Northern goshawk	x	x		x
Peregrine falcon	x		x	
Flammulated owl			x	

Species	Medicine Bow 1985 Plan	Routt 1998 Plan	ARNF 1997 Plan	Medicine Bow 2003 Revision
Common flicker (Northern)		x		
Three-toed woodpecker			x	x
Hairy woodpecker	x	x	x	
Lewis' woodpecker	x			
Yellow-bellied sapsucker	x			
Pygmy nuthatch			x	
Blue-gray gnatcatcher		x		
Ruby-crowned kinglet	x			
Golden-crowned kinglet			x	x
Mountain bluebird			x	
Cedar waxwing	x			
Blue-gray gnatcatcher		x		
Warbling vireo		x	x	
Yellow warbler	x			
Wilson's warbler		x	x	x
Pine grosbeak		x		
Green-tailed towhee		x		
Lincoln's sparrow				x
Vesper sparrow		x		
White-crowned sparrow	x			
Brown-capped rosyfinch		x		
Boreal toad	x		x	
Chorus frog				
Northern leopard frog			x	
Wood frog	x	x	x	
Smooth green snake	x			
Colorado River cutthroat trout	x	x	x	
Common trout species	x		Brook, brown, rainbow	x

The proposed MIS list does not overlap as much as desired with MIS lists for adjacent forests. These differences arise from several sources. First and most important, the MBNF Revised MIS list was selected in response to management issues rather than as representatives of all habitats occurring on the Forest. In addition, many species on the other Forest's lists are federally listed (threatened/endangered) or are terrestrial game species that were eliminated from consideration on the MBNF (Attachments 1 and 2). Finally, the deliberate shortening of the list means that fewer of the species on other lists will be represented on the MBNF list.

The list of selected MIS responds to the issues of greatest concern on the Medicine Bow NF, which may be different from those on adjoining Forests. For example, spatial arrangement of forest patches is a major issue on the MBNF. The species

most likely to respond to pattern at the scale of logging activity is the American marten. On the MBNF, the importance of the issue on the Forest outweighs the costs of monitoring marten. On adjacent forests with more existing large, well-connected forest patches, the issue of spatial pattern is less critical and those forests could select species that are more cost-effective to monitor.

Step 6 - Prepare MIS Report Documenting Selection

Rationales for the selection of the above MIS are described below. Combined with the above-described selection process, this document fulfills the requirement of Step 6.

Common trout (Brook, Brown, and Rainbow): Selection of common trout as an MIS addresses Monitoring (Water Quality), particularly as it relates to sediment loads, dissolved oxygen, and a macro-invertebrate prey base.

American marten 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).

Martens appear to respond to fragmentation (including perforated patterns) at the scale at which logging typically occurs on Forest Service land. 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.

The snowshoe hare is the primary food base of a top predator and threatened species, the North American lynx, as well as an alternate prey source for two sensitive species, the American marten and the goshawk. Additionally, this hare responds to vegetation manipulations of the forest understory and canopy. This species will serve to indicate the adequacy of habitat for the prey base of top predators. Selection of the snowshoe hare as an MIS addresses the management question of adequacy of habitat to support the prey species of top predators.

The northern goshawk will serve to indicate the condition and biodiversity of late-seral lodgepole and aspen forests. For a top predator, this species is relatively common on the MBNF, and therefore may be more easily monitored for population trends than other top predators of interest. The variety of prey species used by the goshawk should allow some extrapolation of biodiversity from the population trends of this bird. Indirectly, goshawk populations indicate the adequacy of habitat for their prey and our management of dead downed wood and snags. The goshawk has the most diverse prey base of the top predators on the MBNF, and thus, if goshawk population trends are stable or increasing, then the habitat must be supporting adequate densities of some prey species.

Three-toed woodpecker: On the Medicine Bow, potential limits to persistence of three-toed woodpeckers include fire suppression, salvage logging, and loss of late-successional coniferous forest. Selection of three-toed woodpecker as an MIS addresses management questions on the availability of late-successional coniferous forest, snags, and burned forest.

Golden-crowned kinglet: This bird likely is adversely affected by events that reduce canopy-cover, such as logging and fire, because it feeds and nests in the mid- and upper crown of spruce trees, respectively. The nest is hidden by branches from above that may serve as both thermal shelter and forage habitat. In breeding season, the golden-crowned kinglet is highly associated with late-successional, multi-aged, multi-sized coniferous stands. This species is considered relatively common on the MBNF. The confounding factors of deducing management affects on a migratory species are less pronounced than for other migratory birds because the golden-crowned kinglet can use a variety of habitats in the non-breeding season. This species will serve to indicate the condition and adequacy of canopy-cover in spruce/fir stands, including effects of partial treatments.

Wilson's warbler: This common songbird inhabits riparian willow thickets and will serve as an indicator for the condition of riparian shrub communities. Such riparian communities may be affected by grazing and browsing of domestic and wild ungulates, road construction and maintenance, and recreation. Selection of the Wilson's warbler addresses the concerns on management of riparian-shrub communities.

Lincoln's sparrow: This common songbird inhabits riparian willow thickets and will serve as an indicator for the condition of riparian shrub communities. Such riparian communities may be affected by grazing and browsing of domestic and wild ungulates, road construction and maintenance, and recreation. Unlike the Wilson's warbler, the Lincoln's sparrow nests on the ground. Selection of the Lincoln's sparrow (along with the Wilson's warbler) addresses the concerns on management of riparian-shrub communities.

Step 7 - Conduct a Review of the MIS Selection Process and Report

The selection of Management Indicator Species was done in consultation with biologists at the Regional Office following Regional direction on the process (Hayward et al 2001).

Attachment 1

Assessment of the MIS Potential of Threatened, Endangered, and Sensitive Species

Species whose persistent presence on the forest is not documented or remains unconfirmed were removed from the MIS selection process.

Table H-4. Status, occurrence, and MIS suitability of endangered, threatened, and proposed species on the Medicine Bow National Forest.

Listed, Proposed, and Candidate Species	Status	Expected Occurrence	Suitable as MIS?
Canada lynx (*lynx Canadensis)*	Threatened	Resident of forested areas	No- very rare. Unlikely to obtain sample large enough to detect trends.
Preble's meadow jumping mouse (*Zapus hudsonius prebl*ei)	Threatened	Riparian habitats east of Laramie Mts. And south of the N. Platte River	No- Too difficult to identify and distribution too localized
Bald eagle (*Haliaeetus leucocephalus*)	Threatened	Nesting, Winter resident. Migrant	No- Too rare to get adequate sample
Ute ladies' –tresses (*Spiranthes dilulvialis*)	Threatened	Seasonally moist soils and wet meadows of drainages below 7000 feet elevation.	Not on forest (downstream effects)
Mountain plover (*Charadrius montanus*)	Proposed	Grasslands Statewide.	Not on forest
Black-tailed prairie dog (*Cynomys ludovicianus*)	Candidate	Grasslands	Not on forest
Western boreal toad (*Bufo boreas boreas*)	Candidate	Coniferous forest. Breeds in warm shallow ponds in mountains. Assessed in the BE as a sensitive species.	No- Too rare to get adequate sample

Table H-5. Ranking, habitat, distribution, and MIS suitability on the Forest of R2 terrestrial **sensitive** species occurring on the Medicine Bow National Forest.

Species	Habitat	Distribution on MBNF	Suitable as MIS?
Mammals			
Pygmy shrew *Sorex hoyi*	High elevation, especially borders of wetlands in spruce/fir forest.	Medicine Bow Range is only known location in Wyoming	No- Status of population uncertain. May respond to snow compaction and dead downed wood levels, but populations are likely to fluctuate and obscure trends
Fringed myotis *Myotis thysanodes*	Caves, abandoned mines; often in dry shrub and forest, but broad range of ecological settings.	Probably on Laramie Peak Unit	No. Need to survey for locations. Not tied to identified management questions.
Townsend's big-eared bat *Corynorhinus townsendii*	Caves, abandoned mines; broad range of ecological settings.	Probably on Laramie Peak Unit	No. Need to survey for locations. Not tied to identified management questions.
American marten *Martes americana*	Mature spruce/fir and (to lesser extent) lodgepole forest with complex structure.	Medicine Bow and Sierra Madre. Low population on Laramie Peak Unit since 1960's.	Possible- Responds to old growth, fragmentation of high elevation forest. Probably also to dead down wood. Labor intensive to get population estimate or index (enough to detect trend).
Wolverine *Gulo gulo*	Generalist. Uses large areas, sensitive to disturbance.	Uncertain. Scattered sightings on forest.	No- Has not been detected, so cannot get adequate sample.
Northern river otter *Lontra (Lutra) canadensis*	Rivers.	A few sightings on or near Forest in recent years.	No- too rare.
Birds			
Northern goshawk *Accipter gentiles*	Older forest with mixture of structures.	Throughout forest.	Possible- Common on parts of the Forest, requires specific structures and pattern on the landscape. Affected by fragmentation, dead downed wood, snags, old growth (for prey).
Ferruginous hawk *Buteo regalis*	Open habitat, nests on high ground (rock outcrop, cliff) or tree.	Occurs on all units.	No- Too rare on forest to get adequate sample. Not tied to the identified management questions.
Peregrine falcon *Falco peregrinus anatum*	Nest in cliffs, forage in open country, wetlands	A few reports on MBNF	No- Too rare to get adequate sample. Not tied to the identified management questions.
Northern harrier *Circus cyaneus*	Nest in tall grass, forage in open country, wetlands.	A few reports at edges of MBNF	No- uncommon. Not tied to the identified management questions.
Columbian sharp-tailed grouse *Tympanuchus phasianellus columbianus*	Grass/shrub.	Western slope of Sierra Madre	No- only a few isolated populations.

Table H-5, cont.

Species	Habitat	Distribution on MBNF	Suitable as MIS?
Greater sage grouse *Centrocercus urophasianus*	Sagebrush shrub with grass/forb understory.	Possible use for nesting and foraging on periphery of forest. No leks.	No-Too rare on MBNF for adequate sample size. No known leks on Forest. Not tied to the identified management questions.
White tailed ptarmigan *Lagopus leucourus*	Alpine, willow.	Extirpated	No- None believed remaining on Forest
Boreal owl *Aegolius funereus*	Spruce fir forest with snags (cavities for nest sites) and downed wood (for prey).	Laramie and BCH Districts.	Possible- responds to snag density, dead downed wood, dense old spruce-fir forest.
Short-eared owl *Asio flammeus*	Grassland with clumps of trees.	Probable on Laramie Peak Unit	No- Too rare on forest to get adequate sample. Not tied to the identified management questions.
Flammulated owl *Otus flammeolus*	Ponderosa pine, mosaic of structure. Adjacent open areas.	Probably on Laramie Peak Unit	No- Status unknown. Would respond to ponderosa pine structure. Few records, uncertain whether current population adequate for MIS.
Lewis' woodpecker *Melanerpes lewis*	Open ponderosa pine habitat, burned pine, cottonwood.	Laramie Peak Unit	Possible- Responds to ponderosa pine structure and post-fire habitat.
Three-toed woodpecker *Picoides tridactylus*	Old spruce-fir forest with snags and downed wood, burned forest.	Throughout forest.	Possible- Responds to old spruce-fir and post-fire habitat.
Black-backed woodpecker, *Picoides arcticus*	Burned forest, patches of dead trees.	Only 2 sightings. May not be a breeding population on MBNF.	No- Too rare for adequate sample size.
Olive-sided flycatcher *Contopus borealis*	Burned areas, high elevation forest with snags and openings.	Throughout forest.	No- Does not respond to the identified management questions.
Pygmy nuthatch *Sitta pygmaea*	Ponderosa pine with large snags, soft snags.	Laramie Peak Unit	Possible- Responds to structure of ponderosa pine.
Brown creeper *Certhia americana*	Old growth forest in large patches.	Present	No- Too dispersed for adequate sample size.
Loggerhead shrike *Lanius ludovicianus*	Grassland with shrubs	Believed present	No- Too rare for adequate sample size. Not tied to the identified management questions
Brewer's sparrow *Spizella breweri*	Sagebrush with openings	Present	No- Not tied to the identified management questions
Sage sparrow *Amphispiza bellii*	Large patches of mature sagebrush.	One verified sighting in or near forest boundary.	No-Too rare for adequate sample size. Not tied to the identified management questions

Table H-5, cont.

Species	Habitat	Distribution on MBNF	Suitable as MIS?
Amphibians			
Northern leopard frog *Rana pipiens*	Wetlands, beaver ponds, lakes.	Throughout forest at lower elevation.	Possible- responds to water quality concern.
Wood frog *Rana sylvatica*	Ponds, wetlands, wet meadows, slow streams.	Medicine Bow and Sierra Madre.	No- too localized.
Fish			
Colorado River cutthroat trout	Streams	Sierra Madre west slope.	No- Too localized to indicate forestwide practices

Table H-6. Habitat, distribution, and MIS suitability of species of local concern on the Medicine Bow National Forest.

Species	Habitat	Distribution on the MBNF	Suitable as MIS?
Pika (Medicine Bow population) *Ochotona princeps saxitilis*	Alpine rock and talus	Snowy Range	No- easy to monitor, but not enough information to interpret results. Need research.
Bighorn sheep *Ovis canadensis*	Open areas and rock outcrops, cliffs	Three herds on the MBNF: Laramie Peak herd, Encampment River herd, and Douglas Creek herd	No- Does not respond to any of the identified management questions.
Brown-capped rosyfinch *Leucosticte australis*	Alpine meadows, edges of snowbanks, rocky hillsides	Snowy Range	No- Does not respond to any of the identified management questions.

Attachment 2

Table H-7. Habitat, distribution, and MIS potential of game species on the Medicine Bow National Forest.

	Habitat	Distribution on Medicine Bow NF	Suitable as MIS?
Elk	Generalist: forested areas in summer, low elevation in winter	Across Forest	No- Habitat generalist. Population not driven by MBNF management. Does not respond to any of the identified management questions. Data available from WDGF
Mule deer	Generalist: forested areas in summer, low elevation in winter	Across Forest	No- Habitat generalist.
Bighorn sheep	Open country, rock outcrops, cliffs	Three herds, Laramie Peak herd, Encampment River herd, Douglas Creek herd.	No- Does not respond to any of the identified management questions. Data available from WDGF
Black bear	Generalist: coniferous forest. Riparian areas, aspen, wet meadows.	Across Forest	No- Habitat generalist, does not respond to any of the identified management questions.
Mountain lion	Generalist: coniferous forest, shrub, aspen,	Across Forest	No- Habitat generalist, does not respond to any of the identified management questions.
Wild turkey	Open forest, openings, aspen	Laramie Peak Unit	No- Does not respond to any of the identified management questions.
Blue grouse	Open forest, edges	Across forest	No- Does not respond to any of the identified management questions. Population varies greatly.
Columbian sharp-tailed grouse	Grass/forb/shrub	Only in Sierra Madre	No- Too localized in a few populations.