Appendix

F

BIGHORN NATIONAL FOREST

Land and Resource Management Plan - DEIS

Appendix F – Draft Biological Assessment

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Appendix F

Draft Biological Assessment

Introduction/Abstract

This Biological Assessment is prepared in compliance with Section 7 (Interagency Cooperation) of the Endangered Species Act and 50 CFR 402.12 Biological Assessments. It addresses the potential effects from implementing any of the alternatives proposed in the Bighorn National Forest's Draft Environmental Impact Statement for the Revised Land and Resource Management Plan. This document addresses the programmatic implementation of the plan, rather than specific habitat altering projects. It will be updated for the U.S. Fish and Wildlife Service (USFWS) with information from the selected alternative that would accompany the Final EIS as described in the Record of Decision, and declared a Final Biological Assessment at that time.

In summary, regardless of the preferred alternative selected, implementation of the Revised Plan would have the following effects determinations for the species considered in this document:

Table F-1. Summary of Effects Determinations for T&E species Evaluated on the Bighorn National Forest.

Species	Determination
Canada Lynx	May affect, likely to adversely affect.
Bald Eagle	May affect, not likely to adversely affect.
Gray Wolf	No effect.
Grizzly Bear	No effect.
Pallid Sturgeon	No effect.
Ute's Ladies'-tresses	No effect.

Legal and Administrative Framework

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) under authority of the Endangered Species Act of 1973, as amended. Four categories of species need evaluated with regard to Land and Resource Management Plan revisions, including endangered, threatened, proposed, and candidate species. An endangered species is defined as one that 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. A proposed species is defined as one in which information now in possession of the USFWS indicates that proposing to list the species as endangered or threatened is possibly appropriate, but conclusive data on biological vulnerability and threats are not currently available to support proposed rules. A candidate species is defined as a species for which sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list but issuance of the proposed rule is precluded due to higher priorities.

The USFWS, in a letter dated October 3, 2003 to the Forest, considers two federally listed species that need to be analyzed during the revision process. These are the bald eagle (threatened), and the Canada lynx (threatened). Previously, additional species were also considered as potentially occurring on the Forest. The Bighorn NF recently searched for potential habitat and occurrences of both the mountain plover (previously proposed) and the Ute's ladies'-tresses (threatened), finding neither, and the potential species list was modified accordingly. Currently, there are no endangered, candidate or proposed species occurring or potentially occurring on the Bighorn NF. The sage grouse, which has been petitioned for listing, is addressed in the Biological Evaluation for Forest Service sensitive species (See Project Record). Forest plan direction (standards and guidelines) for sage grouse is contained in the wildlife, range vegetation, and range improvement portions of the Biological section of Chapter 1 in the Revised Plan, and is also addressed under the overall biodiversity/viability goals, objectives and strategies in Chapter 1 of the Plan.

Databases including the Wyoming Natural Diversity Database (WYNDD) and the Wyoming Game and Fish Department's (WGFD) Wildlife Observation System were searched prior to refining species' lists in conjunction with the USFWS.

Table F-2. Threatened Species identified by U.S. Fish and Wildlife Service on the Bighorn National Forest.

Listed Species	Status	Expected Occurrence
Canada lynx (*Lynx Canadensis*)	Threatened	Forested areas as migrant or resident.
Bald eagle (*Haliaeetus leucocephalus*)	Threatened	Cottonwood riparian areas, mountain lakes and streams as a migrant.

There is also a need to consider an additional species occurring downstream in the

Yellowstone River system. In addition, two other species, the gray wolf and the grizzly bear, are briefly considered in this document.

Prior Consultations

At the programmatic level, prior consultations have occurred with the USFWS regarding the 1985 Forest Plan involving the bald eagle and peregrine falcon, both of which were found to not be affected by plan implementation. Since then, the peregrine falcon has been delisted, and is described in the Biological Evaluation as a sensitive species. In 2000, the Canada lynx was listed as a threatened species. At that time, the Forest mapped potential habitat and began hair-snare surveys for the species. The Forest also prepared a Biological Assessment to address ongoing and recently approved projects in a programmatic fashion. None of the ongoing or recently approved activities were found to adversely affect the lynx. Since then, several projects including the Swamp Timber Sale, Devils Canyon AMP, Tongue AMP, Woodrock Project, and the Hunt Mt. prescribed burn have been consulted on regarding lynx, and a forest-wide Biological Assessment was also recently prepared for the continued use of powerlines with regards to the bald eagle and lynx. Conservation measures for both of these species that have been referenced in these projects are now a part of the forest-wide standards and guidelines (e.g. lynx standards and guidelines, raptor electrocution, and raptor nest buffers). Monitoring with the USFWS has recently begun to track the cumulative effects to lynx habitat within lynx analysis units. There are no outstanding conservation measures or monitoring prescribed by consultations that have not been followed to date.

Proposed Action and Alternatives

The purpose of the Plan Revision is to update the 1985 plan with needed changes in terms of laws and regulations, as well as updating the desired application of management area prescriptions and forest-wide standards and guidelines. The actions proposed cover the entire 1.1 million acre Bighorn National Forest in north central Wyoming. The Bighorn NF has some of the least inclusions of private land within its boundary of any National Forest, though private, state, tribal, and federal lands surround the Forest. The lack of private inclusions reduces opportunities for conflicting management emphasis within the boundaries of the Forest. In terms of commodity uses, the Forest is mainly used for recreation purposes, livestock grazing, and timber harvest. In terms of development, the Forest is primarily accessed via Highways 14, 14A, and 16, with approximately 10 lodges providing overnight accomodations and recreation opportunities, approximately 70 campgrounds/ trailheads, 265 summer recreation cabins (private), and two small downill ski areas. Numerous lakes and rivers attract fishermen, big game hunting is a high use in the fall period, and winter activities are primarily snowmobiling and skiing. Wildlife and

scenery viewing are also high recreation uses, as well as the use of the Cloud Peak Wilderness area with approximately 80,000 visitor days in a year. All of these uses were quantified in a social survey conducted on the four counties surrounding the Bighorn NF{Jensen and Blevins 2002}, and discussions of social and economic values associated with the Forest occur in Chapter 3 of the DEIS.

Timber harvest levels originally began near the 15 mmbf level per year following implementation of the 1985 plan, but have averaged approximately 2 mmbf for the past five years. An amendment to adjust the Allowable Sale Quantity (ASQ) of timber harvest was nearly completed in 1994 with an ASQ of approximately 6 mmbf as the preferred alternative, but it was delayed in preference for plan revision and for political reasons. The Regional Forester placed an administrative cap on the Bighorn NF for a harvest level of approximately 5 mmbf per year beginning in 1996.

The Draft EIS prepared for the plan revision lists six alternatives that were considered. The following are the general themes and descriptions of the five alternatives. Refer to Chapter 2 of the DEIS for further descriptions of the alternatives. Alternatives vary in the application of management area prescriptions, both in terms of location and amount. Forest-wide goals and objectives, standards and guidelines, and management area standards and guidelines, and the monitoring and evaluation plan were not varied by alternative. There was no variation in levels of livestock grazing addressed by any of the alternatives considered in detail as described below. Of uncertainty at this point is the application of management areas to comply with the roadless initiative, as this direction has both been litigated by the public and revised by agency administration over the past several years, and remains unsolved.

The activities of timber harvest and its associated road construction were the two main activities varied by alternative with regards to resource uses. The table following the short alternative descriptions show the level of these outputs by alternative. Management prescriptions in category 5, including 5.11, 5.12, 5.13, 5.4 and 5.5 as described in the Revised Plan, would delineate where timber harvest would occur (i.e. suitable base). Roads that are constructed in support of timber harvest activities would primarily be temporary roads (i.e. closed and decomissioned after use), with the exception of roads built into the Piney/Rock Creek area in Alternatives A and E, which would likely leave approximately 25 miles of road open to motorized uses. The miles of road listed in the table below would be those of a higher use level where closure would not be anticipated. Roads are typically of greatest concern with regard to overall wildlife habitat integrity (e.g. disturbance from people, influence of non-native plant and animal species, etc.)

Combined, these potential impacts were the main focus of resource risks to habitat as identified in the species viability planning process, which included consideration of large-scale planning documents prepared by The Nature Conservancy, Forest Service, and others. Refer to the project record for species viability planning process, and the biodiversity section of Chapter 3 in the DEIS.

Alternative A – This is 1985 plan updated with new standards and guidelines, but with the same management area allocations. The true no-action alternative, as described in Chapter 2 of the DEIS, would use the old standards and guidelines. Several areas such as the Piney/Rock Creek area would remain in the Forest's suitable timber base, which have not been harvested in implementation of the 1985 plan due to concerns over economics and road construction.

Alternative B – This is a wildlife and biodiversity emphasis alternative. This alternative contains the most acres of management area 3.5, which is designed to achieve habitat diversity, and yet minimize any new road construction. In addition, 4 wild and scenic rivers would be proposed, and four Research Natural Areas (RNAs – mgmt. prescription 2.2) would be added to the existing two, but no additional wilderness.

Alternative C – This is a roadless and wilderness emphasis alternative. Five new proposed wilderness areas would be designated (managmenet prescription 1.2), along with 4 wild and scenic rivers (management prescriptions 2.4, 3.4 and 4.4). There would be minimal management for habitat diversity other than what would naturally occur. Four new RNAs would be added.

Alternative D – This alternative would seek to implement current management trends on the Forest. Areas that have not been historically roaded would mostly remain unroaded, and current recreation and other emphasis would largely continue similar to those trends currently being managed for in a defacto sense. Four new RNAs would be added, but no new wilderness or wild and scenic rivers would be designated.

Alternative E – This alternative would seek to maximize production of the timber resource commodity. It has the most application of the Category 5 management area prescriptions. Minimal roadless areas would occur. No RNAs would be added, nor any wilderness or wild and scenic rivers.

Other alternatives were considered but not analyzed in detail as described in Chapter 2 of the DEIS.

Table F-3. Summary of timber harvest emphasis and effects by alternative.

	Alt A	Alt B	Alt C	Alt D	Alt E
Suited acres	271,895	124,521	62,093	184,606	305,535
Total Sale Program (MMBF/yr.)	12.5	7.4	3.6	8.6	14.7
Anticipated Road Construction (miles) in next decade	29	20	9	27	32

When viewing this table, it should be noted that there are approximately 720,000 acres of forested lands within the Bighorn National Forest, so Alternative E would allow harvest on a maximum of approximately 41% of the total forested acres.

Anticipated road construction miles are estimated from timber harvest modeling. For most areas, it is assumed that approximately 90% of these road miles would be closed upon project completion. The exception would be any roads constructed into the Piney/Rock Creek areas under Alternatives E and A for harvest purposes, as these roads are presumed to be left open due to the level of durability with which the roads would be constructed. These roads would likely be within the two LAUs for lynx habitat in this area.

There would be no likely increase in urban type development on the Forest (e.g. campgrounds, cabins, lodges, facilities) in the next planning period, as there is a deferred maintenance backlog for caring for existing sites and uses. The possible exception to this would be the development of a small rest area along Highway 16 in the State's right-of way. There would likely be very few miles of additional trails constructed, also due to the maintenance backlog. Of additional risk to species would be the potential in expansion for noxious weeds, which is largely addressed in the standards and guidelines listed below.

In terms of natural disturbance processes (e.g. fire, insects and disease), those alternatives with the least amount of management category 5 prescriptions would have the greatest opportunity for more widespread occurrences of these types of disturbances affecting the vegetative condition.

The Draft Revised Forest Plan that accompanies this document details the forest-wide goals and objectives, standards and guidelines, management area descriptions and standards and guidelines, and the monitoring and evaluation plan that would be implemented for the preferred alternative as selected from those described above. Desired Future Conditions (DFCs) of the Forest are defined by large watersheds (9 total), and are comprised of the dominant management categories applied to that watershed, combined with existing unique features.

It is very likely that the preferred alternative will be modified in response to public comment prior to publication of the Final Revised Plan and FEIS that accompanies it. The Forest would provide the USFWS with this information and seek concurrence on determinations prior to signing the Decision Record. For purposes of the Draft EIS and Plan, the Forest has identified Alternative D as the preferred alternative.

Resource Protection Measures

Laws, policy, forest-wide direction, and standards and guidelines that maintain or enhance habitats for threatened and endangered species apply to the Preferred Alternative. Chapters 1 and 2 of the Revised Plan contain the updated resource protection measures, which can also be termed conservation measures for these species and their habitat. A summary of the measures pertinent to threatened and endangered species, other wildlife, and their potential habitat follows:

Forestwide Goals and Objectives

The following goals, objectives, and strategies would provide guidance and help determine allocation of funding on an annual basis. Strategies listed would be the focus items to accomplish over the next planning period (10-15 years). These items also provide measures with which to evaluate the effectiveness of the plan, as described in Chapter 4 of the revised plan, which is the monitoring and evaluation chapter.

Goal 1 – Ensure Sustainable Ecosystems

Promote ecosystem health and conservation using a collaborative approach to sustain the Bighorn NF's forests, grasslands, and watersheds.

Objective 1.a: Improve and protect watershed conditions to provide the water quality and quantity and soil productivity necessary to support ecological functions and intended beneficial water uses.

Strategies 1 – 8 provide implementation emphasis to improve watershed health.

Objective 1.b: Provide ecological condition to sustain viable populations of native and desired non-native species.

Strategies 1 – 9 provide implementation emphasis for species management.

Objective 1.c: Increase the amount of vegetative communities restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species.

Strategies 1 – 10 provide implementation emphasis for vegetation management.

Forestwide Standards and Guidelines

The following standards and guidelines provide "sideboards" with which to plan and implement projects under the Forest Plan. Standards are more authoritative than guidelines, and would require a Forest Plan amendment to deviate from them in a project. Guidelines provide guidance, but may be deviated from in rare circumstances if properly disclosed with sound rationale in the appropriate project NEPA document (e.g. EA or EIS).

Section	Emphasis	Standards and Guidelines
Physical	Soil, Water, Riparian	Standards 1 - 2; Guidelines 1 – 7
Biological	Biodiversity	Standard 1; Guidelines 1 – 10
	Fisheries	Guidelines 1 – 7
	Rangeland Vegetation	Standards 1 – 5; Guidelines 1 – 12
	Rangeland Improvement and Maintenance	Standard 3; Guidelines 2, 4, 7, 8

Section	Emphasis	Standards and Guidelines
	Silviculture	Guidelines 2, 3
	Threatened, Endangered, and Sensitive Species	Standards 1 – 3 Lynx standards and guidelines;
	Wildlife	Guidelines 1 – 14
	Fire	Guidelines 1 – 4
	Insects and Disease	Guidelines 1 – 3
	Non-native Invasive Species	Standards 1 – 5; Guidelines 1 – 4
Social	Recreation – Dispersed	Standards 1 – 2; Guideline 4
Administrative	Infrastructure – Travelways	Standards 1 – 2; Guidelines 2, 5, 8
	Real Estate – Land Adjustments	Standard 1; Guideline 2
	Transportation and Utility Corridors	Standards 1, 3; Guideline 4

In addition to the above listed measures, one of the positive differences for habitat purposes with the Revised Plan will be the cancellation of the "C" travel management areas, where off-road vehicles were allowed in several places on the Forest to ride off of roads. This measure (restricting vehicles to roads) would now be common to all of the alternatives.

The goals, objectives, standards, guidelines, and monitoring portions of the Revised Plan are largely new focal elements that did not occur with specificity or with the details of species conservation in the 1985 plan. These measures, combined with more realistic planning in terms of timber harvest and road construction levels, and the continued focus on improving livestock management on the Forest will provide improved habitat conditions for the ensuing planning period.

Elk security habitat was the focus of analysis, as it was used as a surrogate for maintaining sufficient canopy cover and lower road density conditions. Refer to the wildlife chapter in the DEIS (Chapter 3) for an explanation of this.

Threatened/Endangered Species with Habitat on the Bighorn National Forest

This section focuses on the status, distribution, habitat, and vulnerability of bald eagles and Canada lynx and on the predicted effects the alternatives will have on habitat for these species.

Bald Eagle (*Haliaeetus leucocephalus)*

Status and distribution of the species

Outside 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, and disturbance at nest sites. By the 1970s, 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. Breeding populations now exist in all Canadian provinces, all but two states in the United States, and in Mexico.

Status and distribution on the Bighorn National Forest

Bald eagles are not currently nor historically known to winter roost or nest on the Forest. Winter roosting occurs adjacent to the Forest in cottonwood dominated riparian areas, such as the Tongue River and Tensleep Canyon. However, day-time foraging use of perches on the fringes of the Forest have been observed in the fall and winter, and other casual observations of migrating eagles are known, particularly during the spring and fall migration periods at unfrozen high elevation lakes. There is no identified "critical habitat" on the Forest. Assuming numbers continue to increase in the future, there may be a potential for some roosting or nesting occurrences on the Forest, though this could also coincide with a delisting of the species.

Habitat

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.

Threats from human activity

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.

Vulnerability to Forest Service management activities

Potential disturbance factors include recreation activities, timber harvest, prescribed fire, and powerline risks. There have not been any known disruptions to eagles from these activities on the Forest. Both raptor nest and raptor electrocution conservation measures have been included in the Revised Plan to provide managers means of protecting eagles and their habitat, should they nest or roost on the Forest in the future.

Environmental Consequences

There are no significant differences among alternatives that would affect habitat or prey base for eagles, as forest-wide standards and guidelines would offer protection needed. Additional logging and roading in Alternatives A and E would not likely have an effect on the eagle, as this has not been shown to be of detriment, and riparian buffers of 100' around streams and lakes from this type of activity would preclude primary habitat disturbance. Extra riparian management would occur out to 300' from perennial streams to help provide habitat for eagles, should they occur in riparian areas. Continued use of powerlines would likely be the most significant mortality risk for the species, though there have been no known occurrences of mortality associated with powerlines for bald eagles. There have been no known disturbances from recreational activities to bald eagles, primarily due to the eagle's limited use of the Forest as foraging habitat.

In terms of cumulative effects, the Forest and the adjoining mile or two surrounding it were generally considered as an analysis area for most effects. With regard to future state and private activities, there are few on the Forest. As mentioned previously, a rest area may be constructed along Highway 16, which should have no effect on the bald eagle. There would likely be widening of Highway 14 on the portion of state land (right of way) from Cutler Hill to Steamboat rock above Dayton over the next several years. Widening of Highway 16 is nearly complete outside of Buffalo. These are not anticipated to be of an effect to the eagle. Future private developments may include the subdivision of private ranches adjoining the Forest, with typical urban development accompanying the subdividing. These developments would provide increased opportunities for noxious weeds, and could also displace wildlife. Most of the eagle's roosting habitat is already managed in ranching private holdings and have not been shown to be of detriment to habitat use in these areas. There are no likely past modifications or development of the Forest that have rendered habitat unsuitable for eagles. Rather, the creation of additional reservoirs for municipal water sources on the Forest may have created additional habitat for eagles, should they begin nesting on the Forest. There are no likely developments on the Forest or immediately adjacent to it in terms of oil and gas developments. In summary, the value of the Forest as habitat would likely increase in the future, assuming

development escalates in adjoining lands.

Determination

Possible disturbance of foraging birds during migratory use could occur under all alternatives, most likely due to recreation uses. Continued operation of powerlines on the Forest could also pose a mortality risk for eagles. These plan alternatives **may affect, but are <u>not likely to adversely affect</u>** the bald eagle.

Lynx (*Lynx Canadensis)*

Status and distribution of species

In the lower 48 states, lynx are still thought to occur in higher numbers only in Washington, Montana, and Maine, with lower numbers in Wyoming and a few of the Great Lake States. The status in the other western states including Idaho, Colorado, and Utah is unknown but considered very low, and they are considered extirpated from Oregon. Extensive reintroduction efforts have occurred in Colorado.

Status and distribution on the Bighorn National Forest

Lynx historically occurred on the Forest {Ruggiero et al 1994}, though whether or not these past observations indicated a resident, self-sustaining population is unknown. Theories have been generated that expansion into more fringe habitats, such as the Bighorn, may have occurred following population highs in other areas. Two recent sightings of lynx have occurred in 2002/2003, though these were unconfirmed with track measurements. Hair-snare surveys that were conducted for three years from 2000 – 2002 failed to detect any lynx {Malloy 2000 – 2003} on the north end of the Forest in what was estimated to be the most likely potential habitat due to the amount of spruce-fir and snowshoe hare populations. The Forest would continue to manage habitat for this species assuming that lynx could potentially occur. Another decision that may affect this is the "critical habitat" ruling that the USFWS is expected to make in 2005, which would delineate this type of habitat in the Lower 48, and may or may not include the Bighorn.

Habitat

Lynx are temperate forest dwelling carnivores. They are mostly dependent upon snowshoe hare for prey, but also prey regularly on red squirrels when hares are not abundant. Mid-successional stages of forested communities may serve to promote travel between early and late-successional habitats. Early successional forest stands, following fire or management activities, may promote higher hare densities than late-successional forest stands, but the effect is considered transient. Lynx denning habitat is typically under a forested canopy where an abundance of coarse woody debris occurs {Ruediger et al 2000; Ruggiero et al 1999}, which may favor late-successional stands on the Bighorn.

The Forest is not known for high prey levels of snowshoe hare as compared to more northern latitudes such as in Idaho, Montana, or Canada {Beauvais pers. comm. 2001; Beauvais 1997}. Foraging habitat includes willow carrs and both young and older forests

that provide understory conditions for snowshoe hares. Red squirrel habitat is typically optimal in mature conifer forests where coarse woody debris is maximized.

Lynx are adapted to deep snow conditions for a competitive advantage on prey sources. The Bighorns do not maintain a deep snow base below 10,000' (treeline), where an average snowpack is 2-3' during the months of January – March, and less outside of those months, indicating marginal habitat for lynx on the Forest.

Habitat was mapped on the Forest in 2000 in conjunction with the Wyoming Game and Fish Department (WGFD) and the USFWS. Six Lynx Analysis Units (LAUs) were identified. Potential habitat was considered to be coniferous forests above 7,000' to allow for snowpack. The analysis units were combinations of watersheds to approximate the size of lynx home ranges, and were focused on the northern 2/3 of the Forest where the majority of spruce-fir occurs, which was deemed to be the most suitable habitat for hares and lynx. In 2000 during consultation with the USFWS for the forest-wide BA, the Rocky Mountain Resource Information System (RIS) database was used in conjunction with GIS data to estimate foraging, denning, and unsuitable habitat amounts. There were no units found to be below the suitable thresholds for denning or combined lynx habitat as identified in the Lynx Conservation Assessment and Strategy (LCAS) {Ruediger et al 2000}. There have been no field verifications of lynx denning habitat to date.

With an aerial-photo based, updated vegetation database (Common Vegetation Unit) and GIS capabilities during plan revision, potential habitat and denning habitat were remapped within the same LAUs and found to be similar to the amounts derived from the RIS based estimates. The recent project consultations mentioned previously have not been adjusted within the LAUs as the projects have not been implemented yet. However past wildfires and other modifications in vegetation since the original aerial photo interpretation in 1992 have been updated in the database to provide a realistic and more accurate picture of the vegetation on the Forest. Refer to the attached table and map in Appendix A for a description of the mapping criteria, current habitat amounts, and thresholds as applicable to the LCAS. There are no LAUs that are below habitat thresholds as defined in the LCAS, nor anticipated to be as a result of recent disturbances.

It is anticipated that over the next 10 years, old growth habitat will be field inventoried on the Forest, which will provide a suitable surrogate for denning habitat. It is acknowledged that denning habitat (coarse woody debris under a forested canopy) can occur in areas other than old growth, and thus it is not likely a current limiting factor of habitat. Updates to the CVU vegetation database would continue in response to fires, timber harvest, and other vegetation manipulations to provide accurate cumulative estimates of lynx habitat potential on the Forest.

What may be a limiting factor for habitat is the lack of younger structural stages that can contribute to higher densities of hares, particularly in spruce-fir cover types. Currently, there is less than 5% of this type of habitat in any of the LAUs.

There is not currently thought to be any lack of connective corridors or linkage habitat on the Forest, due to the small highways (traffic volume and width on Highways 14 and 16)

and naturally forested conditions that persist throughout most of the Forest connecting the LAUs. Key linkage routes to potential habitat in the Greater Yellowstone Ecosystem have been identified, and include the Pryor Mountains to the northwest of the Forest, and the Owl Creek mountains to the southwest of the Forest. There are no highways or man-induced barriers that are likely a significant barrier along these routes, but rather the drier, shrub type of habitat itself may be more of a barrier, though this was obviously crossed in the past. Lynx have also been sighted out in the sagebrush habitats surrounding the Forest within the past several decades, presumably in a dispersal mode.

In terms of snow compaction, the Bighorn NF has approximately 110 miles of groomed or designated snowmobile trails within lynx habitat, and 342 miles forest-wide, all on existing roads and trails. There are 14 miles of groomed cross-country ski trails in lynx habitat, with 35 miles total forest-wide. The Antelope Butte ski area also occurs within lynx habitat on the Forest, though it is very small compared to larger developments in CO and elsewhere. There are several outfitter-guide operations that provide snowmobiling, dogsledding, x-c skiing, or snowshoeing that also compact snow, though at reduced levels as compared to other areas in the Northern Rockies. There are no designated snow play areas on the Bighorn, though large meadows at high elevations outside of the wilderness are often well used by snowmobiles. Should this potential resource risk show increased importance through current research efforts in Montana and other sites, the Forest may need to examine this more closely. The Forest has noted some increase in snowmobiling activity since the further restrictions in Yellowstone National Park have taken effect.

Threats, limiting factors, and vulnerabilities

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. Prey appears to be a limiting factor in reproductive success {Ruggiero et al 1994}.

Grazing of livestock and increases in elk populations can create competition for forage with lynx prey, especially hares. 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 the Forest, another compounding effect. As indicated below, wolves are anticipated to increase on the Forest, though it is a remote chance of a pack becoming established due to predation concerns on livestock.

Lynx may be killed by vehicular traffic, other predators (like mountain lions or wolves), shooting, and as non-target species in predator control and commercial fur trapping. Wyoming does not permit the harvest of lynx from fur trapping, nor have there been any takings from predator trapping associated with livestock management in the Bighorns. Effects of loss of connectivity include restricted gene flow and increased mortality risks to animals moving between patches in some areas of its range. Trapping may have been a factor in the initial decline of lynx in the Northern Rockies.

Vulnerability to Forest Service management activities

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}.

- Loss of habitat, including denning, dispersal (connectivity), and foraging (mainly winter habitat for the snowshoe hare).
- Loss of competitive advantage over other predators (like bobcats and coyotes) in deep snow resulting from snow compaction by snowmobiles, other vehicles, skiers, and plowing of roads (for example to provide access to private land or for winter logging).
- Disturbance at certain times of the year so that lynx use of habitat may be limited, especially at and near denning habitat. In other settings, lynx seem to be little disturbed by human activity.

Thinning of young stands of lodgepole and spruce–fir to enhance growth for timber production temporarily reduces one of the winter foraging habitats of the lynx's primary prey, the snowshoe hare. However, considerable debate has accompanied this issue as the resulting dog-hair stands of lodgepole that result without thinning provide little habitat for hares or squirrels, and thinning may promote canopies near the snow and resulting larger mature trees more readily than un-thinned stands {Shaw 2001}. Research is continuing on this subject.

The Northern Rockies Lynx Amendment provided the framework for the goals, objectives, standards and guidelines with this plan revision (DEIS released January of 2004). The Bighorn considered modifying this direction further to pursue allowing pre-commercial thinning within dry lodgepole pine stands to promote red squirrel habitat, but dropped this from further consideration. Other Forests have removed dry lodgepole from suitable lynx habitat, however the Bighorn NF had no compelling need at this time to revisit the mapping criteria previously developed. As lodgepole in general still contributes to potential lynx habitat as it is intermingled with moister habitat types, the Forest chose not to remap its habitat classification.

Changes from HRV in factors that may affect the species

Some clear-cut harvested sites have lost large downed wood used for denning and for resting. 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. However, harvesting activities on the Bighorn have taken place on less than 20% of the forested acres, and less than 4% of the forested acres have been harvested by clear-cut methods, indicating a small level of significance from these effects {Regan et al 2003}.

Winter habitat has been altered by the compaction of snow by recreation uses, providing travelways for other predators that could compete with the lynx for prey. The Bighorn recently took part in a proactive study through Utah State University that showed high

densities of coyotes along snow-packed routes in lynx habitat {Bunnell 2003}. The levels of coyote track densities on the Bighorn are similar to those recorded in Utah and Idaho in other study areas, with similar levels of recreation use.

Another issue is the potential for lynx and bobcats to hybridize. As acknowledged by the USFWS (2003), this effect may occur, and the Bighorn has known populations of bobcats that may persist more readily due to a lack of deep snows more typical for lynx habitat. This may also have effects on the overall genetic and species assumptions made for the lynx.

Environmental Consequences

For the following effects analysis, it will be beneficial to refer to the comparison of alternatives section presented in Chapter 2 of the DEIS.

Regardless of alternative, there would likely continue to be an increased level of *recreation use* on the Forest. This type of use can displace wildlife, depending on the amount and location. There remain large tracts of land on the Forest that have low road densities, as per the 2003 roadless inventory. These areas, combined with the Cloud Peak Wilderness Area, comprise approximately 54% of the Bighorn NF. Future implementation and uncertainty surrounding the Roadless Rule may dominate or over-rule any management set forth by the preferred alternative. Refer to the summary of alternatives, as described in Chapter 2 of the DEIS for more information on this subject, and how the preferred alternative allows for motorized vs. non-motorized recreation and roadless management. Alternatives differed in how they addressed both non-motorized and motorized recreation potential, as well as how wilderness or roadless areas were designated.

Livestock management would continue to be improved with possible reductions in some allotments where standards and guidelines for forage utilization cannot be met under existing stocking rates. Riparian areas, shrublands, and meadows most affected by this resource use would be anticipated to slowly improve, regardless of alternative. There was no difference among alternatives with regards to management of this resource. A cumulative effect that has potential with this use is the predator control activities undertaken by the USDA Wildlife Services. No mortality of lynx has even been recorded on the Bighorn associated with this type of activity, and recent improvements in trapping methods should serve to prevent mortality, should lynx occur on the Forest. The USDA Wildlife Services was responsible for consulting with the USFWS on these activities. In general, with the overall reduction of sheep grazing on the Forest, predator control activities have also been reduced, and this trend may continue largely in response to economic conditions in the industry.

Prescribed fires and wildfire would continue to alter habitat on the Forest, though considered natural events. Wildfire and *insects and disease* would continue to be the primary influences on patterns or structural stages of forested vegetation on the Forest, regardless of alternative. Where more active management is pursued through insect and disease treatment and active logging, such as in Alternatives A and E, there may be less potential for these types of natural disturbances, though drought and other factors would

continue to dominate the pattern and occurrence of this. It is anticipated that a combined total of 10,000 acres may burn in the next planning period, with insects and disease a contributing factor to that acreage.

Timber harvests would also continue, mimicking natural disturbances in many aspects in lodgepole pine through clearcuts. Group and individual tree selection would be the primary silvicultural treatments in spruce-fir stands. Alternatives A and E would have higher levels of commercial harvest and its associated road building as compared to the current output. Alternative B would be similar to the level currently occurring and the level prescribed by the ASQ amendment that was delayed in 1994, and Alternative D would be slightly higher. Alternative C would have levels lower than what is currently occurring. LCAS standards and guidelines (e.g. amount suitable versus potential habitat in LAUs, denning habitat requirements) were included in the constraints applied to the timber harvest modeling process. Therefore, any of the plan alternatives still provide compliance with the habitat standards in the LCAS. The risk associated with the increased timber production in Alternatives E and A as compared to current levels would be the increased road network that could lead to exacerbating the challenge of minimizing competition for prey in winter. This would be most evident in the Piney and Rock Creek drainages in these two alternatives, which have currently the most undeveloped lynx habitat on the Forest. This is due to the fact that new roads typically become snowmobile travel zones when adequate snow cover occurs. However, this factor is also under research as the relationship between roads and prey competition is not fully understood. There are not currently any known limitations in either red squirrel or snowshoe hare populations or habitat conditions on the Forest that would render potential habitat for lynx unsuitable.

Thinning was estimated to have previously occurred on approximately 1,000 acres per year in lynx habitat. This action would now be delayed to meet the LCAS standards, although mean snow-depths are approximately 2-3' on the Bighorn, which may not delay this thinning as much as other National Forests as thinning is delayed until crowns are above this point (typically 20-30 years). Finally, the Healthy Forests Initiative is not anticipated to increase current levels or demands for harvesting or thinning on the Bighorn, as the Forest has very few areas with potential urban interface conditions, and other Forests within the Region are anticipated to get the bulk of additional funding and emphasis to meet this initiative.

Overall, forested vegetation would continue to be dominated by mature stand constructions. Young seral conditions may continue to be under-represented at a forest-wide scale. The current dominance of pole sized trees in some areas of the Forest would continue, as these conditions were achieved as a result of wildfires in the late 1800's.

There would be no proposed expansion in *ski areas or highways* within lynx habitat beyond those already approved. Similarly, there would be no expansion in other urban type developments on the Forest (e.g. campgrounds, cabins, lodges). There would be no proposed expansions in outfitter-guide activities also.

Noxious weeds would likely continue to expand, providing some opportunity for lost

habitat. However, the expansion rate on the Forest to date has been minimal in comparison to surrounding landscapes, likely due to the higher moisture regime and shorter growing season on the Forest. Where increased road networks occur, there may be greater risk for expansion of noxious weeds.

In terms of ***cumulative effects***, the Forest and the adjoining mile or two surrounding it were generally considered as an analysis area for effects. With regard to future state and private activities, there are few on the Forest. As mentioned previously, a rest area may be constructed along Highway 16, which should minimal effect on potential habitat for lynx, as it is outside the identified LAUs. There would likely be widening of Highway 14 on the portion of state land (right of way) from Cutler Hill to Steamboat rock above Dayton over the next several years. Widening of Highway 16 is nearly complete outside of Buffalo. These are anticipated to be of minimal effect to the lynx, as these widenings still maintain a two-lane highway, and as such should not alter any kind of "linkage route" habitat for lynx. Increases in traffic volume would likely continue in response to trends in tourism and population demographics, particularly outside of the immediate communities surrounding the Bighorns.

Future private developments may include the subdivision of private ranches adjoining the Forest, with typical urban development accompanying the subdividing. These developments would provide increased opportunities for noxious weeds, and could also displace wildlife. There are no likely developments on the Forest or immediately adjacent to it in terms of oil and gas developments. While some winter recreation activities may increase, there would be no expansion in groomed or designated snowmobile trail networks as the State has indicated that there is sufficient density of this use.

Past effects from timber harvest and livestock grazing were summarized above, and other cumulative effects are listed in the introduction to Chapter 3 within the DEIS.

In *summary*, the value of the Forest as habitat would likely increase in the future, assuming development escalates in adjoining lands. The most significant past activities that have altered the Forest cumulatively have been the development of road networks for timber harvesting purposes that have created a loss of habitat through surface modification and have possibly allowed increased competition for prey during the winter. The impacts from past timber harvesting is considered to be minimal in terms of vegetative change, as clearcuts may mimic fire disturbances, and other harvest regimes are slow to change forest canopy structures. Past and future timber harvests may reduce the amount of coarse woody debris on harvested lands in the long term, as indicated by research {Tinker and Knight 2000 and 2001}. However, due to the limited extent of logging practices on the Forest, this effect should not be widespread and leave large areas with sufficient or naturally potential CWD remaining.

Future projects implemented under the Plan would tier to forest-wide direction (lynx standards and guidelines), and would use the CVU vegetation database for tracking of cumulative effects to vegetation/habitat conditions.

Effects Determination

As the intent and direction of the LCAS is being followed in the Forest Plan amendment (Draft Northern Rockies Amendment Process), and this revision incorporates that direction (Alternative E from the Northern Rockies amendment process), there are few activities contemplated that would result in adverse effects to lynx. Similarly, large areas of the Forest exist in roadless and otherwise limited use management, where risks normally attributed to management activities would not occur. However due to the uncertainties of effects from winter recreation, road construction and timber harvest, and slowly changing livestock administration, the determination for this plan with regards to the lynx is that implementation of the preferred alternative **may affect, likely to adversely affect the lynx**. For example, a prescribed burn or timber harvest could accidentally or unintentionally remove an individual or change its use of habitat. Unintentional take is considered to be non-quantifiable and of very low likelihood or possibility.

The Northern Rockies Lynx Amendment also resulted in a *Likely to Adversely Affect* determination due in part to the preferred alternative not following the LCAS conservation measures completely. The Bighorn NF views that determination as a function of the scale of that amendment (many states), the potential impacts of the Healthy Forests Initiative, and the need to take a "worst case scenario" approach for all of the lands involved in that decision. As mentioned above, the Bighorn is not anticipated to receive additional funding and emphasis for projects to meet the Healthy Forests initiative due to its remote location and lack of development in and around the Forest. In addition, the current preferred alternative in the Revised Plan and DEIS (Alternative D) is a similar approximation of the current and recent past management scenario on the Forest, which was consulted on in 2000 with the USFWS, and found to *not likely adversely affect* the lynx. Therefore, though a worst-case scenario approach was made with the above determination, it is highly unlikely that any negative effects to lynx would actually occur. However, there is very limited potential for a harm condition (habitat or individual) to occur from proposed management activities, and as such the Forest decided to make a worst-case scenario determination for unintentional take possibilities.

Future implementation of the preferred alternative with the Final EIS and Plan would have anticipated changes to lynx habitat from timber harvest and prescribed burn activity, and possible wildfire and insect and disease changes within the next planning period. None of these activities have known site-specific locations, and as such may not even occur in LAUs. Site-specific project analysis and consultation with the USFWS would occur as required. In addition, it is not clear at this point that the Bighorn NF will continue to be considered as habitat for lynx once a "critical habitat" designation is determined by the USFWS, estimated to occur in 2006. The Lynx Biology Team that assembled the LCAS recognized the isolated condition and lack of potential habitat on the Forest as possibly lowering its overall value to lynx in Wyoming.

Finally, with regards to **monitoring**, the Forest plans to perform annual updates of its vegetation GIS database (CVU), which is used to track current status of lynx habitat with regards to suitable/unsuitable habitat thresholds. In addition, the Forest plans to follow

through with verifying or confirming any lynx sightings on the Forest, in conjunction with the WGFD as necessary, and will be conducting some winter track monitoring for carnivores, which may also provide potential information on lynx sightings or occurrences. Projects conducted under the Revised Plan would also be monitored to determine if standards and guidelines were effective in projects and if the goals, objectives, and strategies in the Plan were implemented correctly (e.g. CWD guidelines, lynx suitable habitat guidelines, etc.). Refer to Chapter 4 of the Revised Plan to view planned monitoring efforts.

Downstream Yellowstone River Species

Habitat for populations of threatened and endangered species in the Yellowstone River is of concern from Forest management due to any water depletions or habitat effects. The Tongue River, Powder River, and the Bighorn River which comprise the major watersheds on and surrounding the Forest all flow into the Yellowstone River. The species of concern in the Yellowstone is the Pallid sturgeon, and to some extent, the Ute's ladies-tresses orchid. In conversations with the USFWS (Jordan pers. comm. 2003), the issue for these species is any water depletions that could occur on the Forest that would reduce its habitat potential downstream. There are plans to reintroduce the sturgeon into the Tongue River drainage downstream from the Forest, and the primary habitat concerns lie with the reservoirs and diversions downstream of the Forest that impact habitat. The water quality of streams sampled at the Forest boundary has been shown to be of good water quality prior to impacts occurring on lands adjacent to or downstream of the Forest. As the Forest is not proposing any water depletions with this Revised Plan, there would be **no effect** to these species.

Gray Wolf and Grizzly Bear

Both the gray wolf and the grizzly bear historically inhabited the Bighorn NF. They were both extirpated in the early 1900's following European settlement due to predation concerns. The Bighorn NF is currently outside both of the recovery areas being considered for these species. The WGFD has jurisdiction for management of the populations of the species, and has approved a draft wolf management plan {WGFD 2003} and a final grizzly bear management plan {Moody et al 2002}.

As the gray wolf is being considered as a predator outside of the recovery areas of the Greater Yellowstone Ecosystem, it may never establish packs within the Bighorns, though recent sightings of the wolves have occurred here. If the State's plan is revised to include wolves as trophy game animals outside of the core area, this may reduce some killing of wolves, though predation concerns would likely still dominate for areas around and including the Bighorn. There are no habitat management considerations that the Forest was required to consider for this species, as it is a habitat generalist. Provisions for elk

security habitat may help address some habitat elements by providing forested cover with lower road densities, and big game winter range, another primary habitat, would continue to receive management direction similar to the 1985 plan. People concerned with the management of this species from a predation standpoint, such as on livestock permittees on the Forest, would need to contact the USDA APHIS Wildlife Services agency to seek relief from predation. The Forest would not be directly involved in management of this species, nor are there any plans for transplant of this species to the Forest. Wolves migrating to the Forest would not be removed by the Forest Service or the WGFD, and would be allowed to persist until such time as predation concerns from the public called for their removal. Numbers of wolves are not likely to reach a level where indirect effects to habitat would result from a change in ungulate population levels potentially reduced by wolves.

With regard to the grizzly bear, the State's management plan indicates that grizzly bears are not a desired species to be managed for on the Bighorn. This is due to recreation and human interaction conflicts that would likely occur. Grizzly bears also thrive under less developed conditions than the Bighorns (i.e. road densities), and thus there is likely less suitable habitat here as compared to the Greater Yellowstone Ecosystem. Should any bears migrate to the Bighorn, they would likely be trapped and relocated according to the State plan.

Due to the management authority of the State plans for both of these species, and the lack of habitat management needs on the Forest, and current lack of established populations of these species, there would be **no effect** from plan implementation of any of the alternatives on these species.

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Attachment A

Lynx Analysis Units and Habitat Spreadsheet

The following spreadsheet lists current habitat conditions within the LAUs. The CVU mapping criteria are described below. Differences are noted with regard to previous (2000 RIS database) mapping criteria.

Mapping Definitions:
1) Total acres in an LAU include all cover types (rock, shrub, conifer, etc.). LAU boundaries correspond to the 7,000' elevation contour.
2) Potential habitat acres are all of the conifer acres within the LAU. Previous distinctions of foraging habitat (Willows > 5'; and 3B, 3C, 4B, 4C on less than 40% slopes) were not tracked, as they are not within the LCAS.
3) Unsuitable Acres are totals of 1T, 2T, 3A, and 4A structural stages.
4) Denning habitat defined as acres of structural stage 4C. Note that 2000 mapping was 4C on NW to NE aspects (315-45 deg.) and <40% slope.

Denning habitat would be reclassified to coincide with old growth once geographic area surveys are completed and updated in CVU (~10 yrs.).
Another caveat is that down woody debris occurs in many structural stages due to fire occurrence or harvest methods, and would need ground truthed at the project scale if an old growth inventory is not available.

Structural Stage Class Legend
1T = Previous timber stand in meadow stage
2T = previous timber stand in seedling stage
3A = 1-9" dbh trees, 0-40% canopy
3B = 1-9" dbh trees, 40-70% canopy
3C = 1-9" dbh trees, >70% canopy
4A-C = Same as 3A-C, but >9" dbh

Bighorn NF Lynx Analysis Units (LAU) Habitat Structural Stage Conditions

Category	Porcupine/ Mann	Little Bighorn/ Dry Fork	North Tongue/ Cedar	South Tongue/ Shell	Big Goose/ Piney	Kearney/ Rock
Total Acres in LAU	83,793	65,952	77,828	87,707	88,901	91,706
Potential Lynx Habitat Acres	48,753	41,918	39,826	55,206	68,416	66,427
Unsuitable Acres and % of Potential Lynx Habitat	5,648 (12%)	2,866 (7%)	4,132 (10%)	6,079 (11%)	7,329 (11%)	4,319 (7%)
Denning Acres and % of Potential Lynx Habitat	17,279 (35%)	14,293 (34%)	9,477 (24%)	8,571 (16%)	9,158 (13%)	12,882 (19%)

Last Update 8/11/03, calculated using CVU rather than RIS (2000 edition, as displayed in forest-wide BA consultation)

The following activities are known to have occurred or are planned and have not yet been updated in the CVU database. Not all of the activities may occur within an LAU. Tracking of these activities would include a date, acres, and structural stage conversion made.

2004 Swamp Timber Sale
2005 Woodrock Timber Sale
2004 Hunt Mt. RX burn
2003 Ditch Creek Fire
2003 Little Horn 2 and Riley Point Fires

BIGHORN NATIONAL FOREST
LYNX ANALYSIS UNITS