



CENTER FOR LARGE LANDSCAPE CONSERVATION

Federal Agency Planning for Wildlife Corridors and Habitat Connectivity

Language Used in Completed or Draft Documents

A COMPENDIUM

Compiled by:

Robert Ament and Katie Meiklejohn

June 4, 2009

TABLE OF CONTENTS

Department of Agriculture - Forest Service

Forest Plans.....	3
▪ Beaverhead-Deerlodge NF Draft Plan Revision.....	3
▪ Gallatin National Forest Travel Plan FEIS.....	4
▪ Gallatin National Forest Travel Plan – Alternatives Document.....	6
▪ Kootenai-Idaho Panhandle National Forest Plan Revision.....	6
▪ Shoshone National Forest Forest Plan Draft Revision.....	7
▪ Bridger-Teton Forest Plan Amendment.....	9
▪ Targhee National Forest Forest Plan Revision.....	10
▪ White River National Forest Plan Revision 2002.....	10
Regional Plans.....	12
▪ Interior Columbia Basin Ecosystem Management Plan.....	12
▪ Southern Rockies Lynx Management Direction.....	13
Other Documents.....	16
▪ Forest Service Strategic Framework for Responding to Climate Change.....	16
▪ Kootenai National Forest Wildlife Approach Areas.....	24
▪ Zoological Special Interest Areas.....	26
• Tongass National Forest Pack Creek.....	26

Department of Interior

BLM	28
▪ Dillon Resource Management Plan.....	28
▪ Pinedale Resource Management Plan.....	28
DOI Climate Change Land and Water Policy Paper.....	29
USFWS Climate Change Policy Paper.....	33

Federal Interdepartmental

Interagency Grizzly Bear Memo.....	35
------------------------------------	----

DEPARTMENT OF AGRICULTURE-FOREST SERVICE

FOREST PLANS

Beaverhead-Deerlodge National Forest Draft Revised Land and Resource Management Plan Draft EIS

Linkages: Maintain options for Forest Service's contributions to linkages between landscapes, unless such landscape isolation is determined to be beneficial. Linkage areas are those areas that have been identified for a federally listed species through a conservation strategy. Options may include, but are not limited to:

- Maintaining forest ownership at highway and road crossings
- Acquiring lands to consolidate ownership at highway and road crossings
- Providing adequate cover within linkage areas
- Minimizing open motorized roads and trails within linkage areas

Wildlife Secure Areas and Connectivity: Provide secure areas for ungulates, large carnivores and connectivity while recognizing the variety of recreational opportunities. Manage open motorized roads/trails density by landscape to [minimize impacts from motorized vehicles]

Urban expansion, both locally and regionally, also increases public concerns that National Forests also function as biological reserves and provide wildlife habitat connectivity at broad scales.

Connectivity or Linkage Areas

Connections to other public and private lands at this point have mostly been challenged by development of adjacent land. The forest is characterized by mountainous island landscapes separated by broad valleys in mixed private, State and BLM ownerships. State management and the Dillon Resource Area draft management plan are generally compatible with maintaining habitat linkage to the island landscapes and neighboring public lands. Development of private lands will present the greatest challenges to maintaining habitat linkages to public lands.

...habitat connectivity has not been fundamentally compromised by management actions.

Two interstate highways (I-15 and I-90) traverse the area with approximately only 13 miles of right of way on national forest land. State Highways 1, 12, 43, and 278 encompass an approximate total of 30 miles of right of way. Other than these paved highways and small utility corridors, the Forest remains largely intact compared to its original composition. All of the Alternatives maintain options to address wildlife crossing concerns as they develop.

...linkage can also develop challenges related to disease introductions and the spread of noxious weeds. The latter negative connotation for 'linkage' is addressed amongst the alternatives through restriction of motorized access.

Gallatin National Forest Travel Plan FEIS

Issue 3: Biological Diversity and Ecological Sustainability

Transportation systems of any kind across the landscape with linear trails and/or roads may affect vegetation, wildlife movement and habitat use; facilitate species invasion (native and nonnative plants and animals) and disrupt corridors.

The Travel Management Plan or any other Forest Service document or action must maintain viable populations of wildlife species. ...The most likely threat to viability that the Forest Service transportation system could cause is damage to wildlife movement corridors in areas not currently covered by recovery plans and specific direction for threatened and endangered and other species.

Affected Environment –

Corridors:

Corridors are defined as "...avenues along which wide-ranging animals can travel, plants can propagate, genetic interchange can occur, populations can move in response to environmental changes and natural disasters, and threatened species can be replenished from other areas". The term corridor is often used synonymously with connectivity and linkage or linkage zone. Corridors help determine how and if an animal can move through the landscape. Confusion arises with whether or not the species in question just uses a corridor for travel or if it must be able to meet all of its needs for survival and reproduction there. The intention in this document is to define a corridor as a passageway, and not as meeting the full habitat requirements for the species of interest. A corridor need not provide all the life requirements for a species within the corridor (passage species), but some species will live entirely within a corridor (corridor dwellers).

Wildlife corridors may have several functions:

- Wide-ranging animals can move through these corridors
- Plants can propagate
- Genetic interchange can occur
- Populations can move in response to changes in the environment
- Areas can be recolonized where populations have been extirpated

Roads affect the connectivity of the landscape. "Landscape connectivity is the degree to which the landscape facilitates animal movement and other ecological flows." Good connectivity exists if there are no barriers in the landscape and the habitat types that exist are usable by the species of interest. Many species must move through the landscape to meet their habitat needs throughout their life, and some species must move large distances (e.g. large carnivores, migratory species). Barriers to movement can result in mortality, reduced reproduction, and a smaller, less viable population. Connectivity also allows areas to be repopulated if there have been local declines of some species. Roads can be barriers to animal movements. Forest interior species may be the most affected by roads. This is because roads provide openings in a forested area and the openings change both the abiotic and biotic factors in the habitat (light, snow depth, precipitation, facilitation of movement for some predators, etc.).

Roads may pose a threat to carnivore populations due to road mortality and the indirect effects of barriers. Populations of both small and large mammals may become effectively isolated by barriers. Barriers to wildlife movement are most often caused by wide roads that have high

speeds and may have center barriers and/or medians. Roads that have adjacent power lines, frontage roads, and/or railroad tracks can be formidable barriers for many wildlife species. Secondary and unpaved roads seem to have little effect on most animal movement and can be fairly permeable to wildlife. However, for small animals, the width of the road can be an important variable. The relative permeability (ease of crossing) of a road and its adjacent edge habitat influences how animals may cross it. The hardness or abruptness of an edge seems to be important to some animals, especially forest dwelling species. Some animals may actually move parallel along the road.

Where habitat truly occurs between islands, connectivity between islands becomes important. Physically continuous corridors may be preferred by many species. Riparian corridors may be especially important due to the presence of water, nutrients and energy from the riparian system. Riparian systems are often dominated by hardwoods and host higher bird populations. Riparian strips are excellent means of connecting islands of habitat across elevations.

...Mid and large-size carnivores typically have large home ranges and they range widely in the environment. They may be more vulnerable than most species to habitat fragmentation on a landscape scale. Even for common species like elk, it is critical to maintain security areas and migration corridors.

...Key linkage areas are areas where habitat connectivity has been decreased...

...Highways and private lands are the elements that lead to the most risk to key linkage areas. Those areas with high priority for maintaining wildlife connectivity are:

- Four-lane highways
- Two-lane highways that may be upgraded
- Two-lane highways with high traffic volume
- Roads with a high potential for improvement
- Highways that parallel railroads

...The large amount of private land surrounds the islands of mountainous National Forests. Once the private lands are developed it will be much more difficult for wildlife to move between protected islands of public land.

For linkages, Interstate highways that are typically four-lane and often have some type of center barrier and large clearings on either side as well as occasionally in the median, are the roads of most concern. On and around the Gallatin NF, the road of most concern is I-90...Most of the actual linkages identified are either not located on the Forest or are not roads the FS has jurisdiction over. Therefore, for the most part, the corridor issue is one of cumulative effects, but the parts of the NF that facilitate animals to get to the corridors of concern are part of direct or indirect effects analysis and several of these areas will be analyzed.

Gallatin Travel Plan – Alternatives Document

Goal E:

Wildlife Corridors. Provide for wildlife movement and genetic interaction (particularly grizzly bear and lynx) between mountain ranges at Bozeman Pass (linking the Gallatin Range to the Bridger/Bangtails); across highway 191 from Big Sky to its junction with highway 287 (linking the Gallatin and Madison Mountain Ranges); the Lionhead area (linking the Henry's Lake Mountains to the Gravelly Mountains and areas west); Yankee Jim Canyon (linking the Absoroka Mountains to the Gallatin Range); and at Cooke Pass (linking the Absoroka/Beartooth Range to areas south).

Kootenai-Idaho Panhandle National Forests Plan Revision Corridors/Linkage Areas/Approach Areas Desired Condition – Forest wide

Compared to historical conditions portions of the forests have become more isolated as cover needed for travel between patches is disturbed by highways, cities, rural housing, reservoirs, or other barriers to migration. Species now often have to travel greater distances to find food and den sites. These changes are affecting large, mobile species such as grizzly bear, wolf, wolverine and fisher which have lost much of their historical range.

Corridors/linkage areas (including approach areas) are established (with completion of a forest wide management plan) that provide for wildlife movement (migration/dispersal corridors) and genetic interaction. Established corridors/linkage areas and approach areas provide secure habitat conditions for wildlife movement, especially across valley bottoms (termed approach areas). These corridors provided connectivity for wildlife such as lynx, grizzly bear, and wolverine. Suitable habitat and conditions within established corridors/linkage areas allow wildlife species movement between large blocks of habitat, and seasonal and special habitats on a localized and landscape scale.

Corridors/linkage areas are most often in areas with established wildlife use, and in areas relatively free of development such as roads and developed campgrounds. These areas provide cover and often connect key habitat components for those species that use the area. Forest Service lands contribute to linkages between landscapes, unless such landscape isolation is determined to be beneficial. Mortality in these associated approach areas is reduced as safer crossings are provided in areas with high levels of human development through coordination and or cooperation with State Highway Departments, private landowners, and other entities.

Approach areas are defined and 24 have been identified on the Kootenai National Forest. See: Brundin, L. and W. Johnson. 2008. Kootenai National Forest Wildlife Approach Areas.

Desired Condition – Canada lynx

A forest wide linkage area management plan is complete, providing areas for connectivity of habitat and movement of animals within and between LAUs. The lynx and wolverine steering committee established coarse scale maps used to complete this plan. Established corridors/linkage areas provide suitable habitat conditions for cover and security.

Desired Condition – grizzly bear

Corridor/linkage areas are established providing for movement of bears within and between Bear Management Units and between recovery zones. The establishment of wildlife corridors/linkage

areas is directed by the Interagency Grizzly Bear Committee. Established corridors/linkage zones provide suitable habitat conditions for cover and security, based on the species needs that use the area, as determined during management planning.

Geographic Area Desired Condition

The Forest provides for movement and genetic exchange of wide ranging carnivores, through the Scotchman Peaks and the McArthur Lake wildlife management area.

Management activities within established corridors/linkage areas should:

- Minimize new permanent roads
- Maintain hiding cover based on the needs of those species that use the area
- Minimize new site developments such as campgrounds

Draft Proposed Land Management Plan Shoshone National Forest August 2008

http://www.fs.fed.us/r2/shoshone/projects/planning/revision/revision_documents/february_2009/2008_0820_plan.pdf

NOTE: Chapter 1 of the Draft Proposed Land Management Plan lists the various desired conditions for the Forest. On pages 40-41 is the section on habitat connectivity

HABITAT CONNECTIVITY

Background

Many species in this ecosystem move long distances between summer and winter ranges, specifically, bighorn sheep, elk, moose, mule deer, greater sage grouse, grizzly bear, Canada lynx, wolverine, and gray wolves. Many other species make shorter seasonal movements. Connectivity between important areas is critical for species making these movements. Due to the abundance of wilderness and inventoried roadless areas on the Forest, most connectivity corridors for wildlife have not been impacted by management activities. Plan components focus on providing vegetation in appropriate patterns and connectivity to facilitate wildlife movement across the landscape. Other components provide direction for managing infrastructure, forest roads⁴⁷ in particular, in ways that do not impede wildlife movement.

Habitat connectivity desired conditions

Vegetation patterns vary spatially and temporally across landscapes. Patterns of vegetation provide an inherent degree of connectivity, facilitating animal movement between habitats.

Forest roads do not impede big game and riparian and aquatic species movement during seasonal use. Infrastructure is designed and located to facilitate movement of big game, riparian, and aquatic species. Some secure habitat occurs in big game migration corridors to facilitate big game movement.

NOTE: Chapter 2 lists the objectives for each of the desired conditions, including habitat connectivity, which describes how the Forest Service intends to move toward the desired conditions described in chapter 1. The text for habitat connectivity is on page 88.

Management approach

Program emphasis for improving elk migration corridors should focus on watersheds with low elk security habitat (less than 30 percent). Highway projects bisecting big game crossing routes are coordinated with the Wyoming Department of Transportation to reduce or mitigate animal/vehicle collisions and facilitate connectivity between seasonal habitats. Vegetation activities are generally designed to maintain habitat mosaics within the natural range of variability. Program planning utilizes Wyoming Game and Fish Department mapping of elk and bighorn sheep migration corridors. Maintaining connectivity corridors in riparian habitat focuses on fish, frogs, and toads, as well as other riparian species. Highway projects in riparian areas are coordinated with the Wyoming Department of Transportation to mitigate connectivity issues.

Though the desired condition for habitat connectivity in streams calls for limited barriers, barriers may be created or maintained to block the spread of invasive or non-native species. Additionally, natural barriers may be removed to provide additional habitat for native species.

1986 Forest Plan direction that is retained

Connectivity objectives for lynx habitat are outlined in appendix D Northern Rockies lynx management objectives ALL 01, HU 06.

Note: Chapter 5 is the Plan's standards and guidelines, which includes standards, guidelines, and references to other applicable guidance. There are no standards or guidelines developed by the Forest to protect terrestrial connectivity and only one guideline for providing for aquatic connectivity.

Habitat connectivity

<p>Guideline 19: New, replacement, and reconstructed stream crossing sites (culverts, bridges, and other stream crossings) should be designed to provide and maintain passage for fish, other aquatic species, and/or riparian associated terrestrial species. Constructed barriers may be maintained in instances where native species benefit from species isolation.</p>

¹¹¹ Guideline supplements Forest Service Handbook 2509.25 Region 2 Watershed Conservation Practices Handbook Management Measure (3)
Part three—Design criteria 5.4 Species diversity Chapter 5 Standards and guidelines Shoshone National Forest Proposed Land Management Plan
Page 125

1986 Forest Plan direction that is retained

Connectivity standards and guidelines for lynx habitat are outlined in appendix D Northern Rockies lynx management standards ALL S1, LINK S1 and guideline ALL G1.

Other guidance

Environmental Assessment

Bridger-Teton National Forest

Land and Resource Management Plan Amendment: Pronghorn Migration Corridor

SUMMARY

The Bridger-Teton National Forest proposes to amend its 1990 Land and Resource Management Plan (Forest Plan) to allow continued successful migration of the pronghorn (*Antilocarpa americana*) that summer in Jackson Hole and winter in the Green River basin in Wyoming. The Forest Plan Amendment would designate a Pronghorn Migration Corridor and create a standard requiring that projects, activities and infrastructure authorized by the Forest Service in the corridor be designed, timed and/or located to allow continued successful migration. The migration corridor to which this amendment would apply extends from the Forest boundary near the Green River Lakes Road north of Pinedale in Sublette County, Wyoming to the Forest boundary with Grand Teton National Park northeast of Kelly in Teton County, Wyoming. It is within the Pinedale and Jackson Ranger Districts of the Bridger-Teton National Forest.

Because the proposal would not result in significant changes to multiple-use goals and objectives for long-term land and resource management, the proposed amendment is considered to be “non-significant” according to the planning regulations at 36 CFR 217. Therefore, the amendment can be authorized in a Decision Notice after completion of this Environmental Assessment (EA). In this EA, the Forest Service evaluates the Proposed Action and the “No Action” alternative of not amending the Forest Plan.

Based on this EA, the responsible official will decide whether or not to amend the Forest Plan as described. The Responsible Official is the Forest Supervisor of the Bridger-Teton National Forest Kniffy Hamilton.

Decision Notice & Finding of No Significant Impact

Pronghorn Migration Corridor Forest Plan Amendment

USDA Forest Service
Bridger-Teton National Forest
Wyoming

Decision and Reasons for the Decision

Background

The pronghorn (*Antilocarpa americana*) that summer in Jackson Hole migrate annually between there and wintering areas in the Green River basin. Documented round trip migration distances from 175 to 330 miles make this the longest known terrestrial animal migration in the 48

contiguous states. Typically, the pronghorn migrate through the corridor in April or May and again in October or November. These pronghorn are a part of the impressive panorama of free-ranging native Rocky Mountain mammals in northwest Wyoming. This landscape and its wildlife draw tourists from around the world and support a robust regional economy.

A significant portion of the full migration route of these pronghorn is within the Bridger-Teton National Forest. The Forest portion extends from the Forest boundary near the Green River Lakes Road north of Pinedale in Sublette County, Wyoming to the Forest boundary with Grand Teton National Park northeast of Kelly in Teton County, Wyoming. It includes approximately 47,000 acres within the Pinedale and Jackson Ranger Districts of the Bridger-Teton National Forest.

Managing this migration corridor to facilitate continued successful movement of pronghorn will help ensure protection of this herd and its migration. The purpose of this amendment to the Bridger-Teton National Forest Land and Resource Management Plan (Forest Plan) is to ensure that projects, activities, and facilities authorized by the Forest Service on National Forest System lands within the corridor allow for continued successful pronghorn migration.

It should be noted that the Forest Service by itself cannot guarantee continued successful migration of this herd over the entire migration route. There are numerous factors beyond Forest Service control such as activities on lands under other jurisdictions within the migration route.

Decision

Based upon my review of the Environmental Assessment (EA), I hereby amend the Bridger-Teton National Forest Land and Resource Management Plan by 1) designating a Pronghorn Migration Corridor as shown on the attached map; and 2) adding the following standard, "All projects, activities, and infrastructure authorized in the designated Pronghorn Migration Corridor will be designed, timed and/or located to allow continued successful migration of the pronghorn that summer in Jackson Hole and winter in the Green River basin." This amendment does not remove any current Forest Plan direction for the area encompassed by the corridor; it simply designates the corridor and adds the above standard. This amendment makes no decisions about the compatibility of specific uses with the pronghorn migration, but requires that all uses be found to allow continued migration before they are authorized.

Activities currently authorized by the Forest Service within this migration corridor, including livestock grazing operations, coexist with the currently successful pronghorn migrations, so changes to current activities and infrastructure are not required by this amendment. Before future activities can be authorized, a determination must be made that the activity will allow continued successful migration.

It is important to note that, while the full length of the pronghorn migration route includes lands under various jurisdictions, this Forest Plan amendment applies only to National Forest System lands within that larger corridor. Furthermore, the amendment does not constrain activities on private land within the Forest boundary.

Reasons for the Decision

I have decided to create the Forest Plan amendment because it meets the purpose and need of ensuring that Forest Service authorized activities and infrastructure allow continued successful pronghorn migration in the corridor. Furthermore, I find that there are no unacceptable impacts from the amendment. As noted above, activities currently authorized by the Forest Service within

the corridor coexist with successful migration, so changes to current activities will not be required by this amendment.

Targhee Forest Plan – 1997

Goals – Grizzly Bear Habitat

(2) Allow for unhindered movement of bears (continuity with Yellowstone National Park and adjacent bear management units)

White River National Forest Plan Revision 2002 Record of Decision

COMPONENT 3: ESTABLISHMENT OF MANAGEMENT AREA DIRECTION

Management Area 5.5 – Forested Landscape Linkages: I am placing an emphasis on the importance of landscape linkages. Alternative K places the highest acreage in corridor designation of any alternative. The creation of habitat gaps heightens the risk that suitable habitats will become isolated from each other. Barriers to the movement of species from one suitable habitat patch to another reduce the connectivity of these habitats. When suitable vegetation types and cover conditions are present between patches, species can move between them. Corridors will provide areas for landscape-scale movement, migration, and dispersal of forest carnivores and other wide-ranging wildlife species; safe travel connections between large blocks of forested landscapes across the Forest; and security from intensive recreational and other human disturbances. This is an important step in providing for the maintenance of biodiversity across the forest. This prescription includes many of the aspects of two different management areas included in the Proposed Revised Forest Plan, Corridors Connecting Core Areas (3.55) and Forest Carnivores (5.45).

REGIONAL PLANS

Interior Columbia Basin Ecosystem Management Plan ICBEMP: Interim Management Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales Regional Forester's Eastside Forest Plan Amendment #2

Alternative 2, as adopted

The interim wildlife standard only altered portions of current Forest Plans. All additional Forest Plan wildlife standards and guidelines not altered in this direction still apply.

d. Scenario A

If either one or both of the late and old structural (LOS) stages falls BELOW HRV in a particular biophysical environment within a watershed, then there should be NO NET LOSS OF LOS from that biophysical environment. DO NOT allow timber sale harvest activities to occur within LOS stages that are BELOW HRV.

(3) Maintain connectivity and reduce fragmentation of LOS stands by adhering to the following standards:

INTENT STATEMENT: While data is still being collected, it is the best understanding of wildlife science, today, that wildlife species associated with late and old structural conditions, especially those sensitive to 'edge', rely on the connectivity of these habitats to allow free movement and interaction of adults and dispersal of young. Connectivity corridors do not necessarily meet the same description of 'suitable' habitat for breeding, but allow free movement between suitable breeding habitats. Until a full conservation assessment is completed that describes in more detail the movement patterns and needs of various species and communities of species in eastside ecosystems, it is important to insure that blocks of habitat maintain a high degree of connectivity between them, and that blocks of habitat do not become fragmented in the short term.

- a) Maintain or enhance the current level of connectivity between LOS stands and between all Forest Plan designated 'old growth/MR' habitats by maintaining stands between them that serve the purpose of connection as described below:
 - 1) Network pattern – LOS stands and MR/Old Growth habitats need to be connected with each other inside the watershed as well as to like stands in adjacent watersheds in a contiguous network pattern by at least 2 different directions.
 - 2) Connectivity Corridor Stand Description – stands in which medium diameter or larger trees are common and canopy closures are within the top one third of site potential. Stand widths should be at least 400 ft. wide at their narrowest point. The only exception to stand width is when it is impossible to meet 400 ft with current vegetative structure AND these 'narrower stands' are the only connections available; (use them as last resorts). In the case of lodgepole pine, consider medium to large trees as appropriate diameters to this stand type.

If stands meeting this description are not available in order to provide at least 2 different connections for a particular LOS stand or MR/Old Growth habitat, leave the next best stands for connections. Again, each LOS and MR/Old Growth habitat must be connected at least 2 different ways.

- 3) Length of Connection Corridors – The length of corridors between LOS stands and MR habitats depends on the distance between such stands. Length of corridors should be as short as possible.
 - 4) Harvesting within connectivity corridors is permitted if all the criteria in (2) above can be met, and if some amount of understory (if any occurs) is left in patches or scattered to assist in supporting stand density and cover. Some understory removal, stocking control, or salvage may be possible activities, depending on the site.
- b) To reduce fragmentation of LOS stands, or at least not increase it from current levels, stands that do not currently meet LOS that are located within, or surrounded by, blocks of LOS stands should not be considered for even-aged regeneration, or group selection at this time. Non-regeneration or single tree selection (UEAM) activities in these areas should only proceed if the prescription moves the stand towards LOS conditions as soon as possible.

e. Scenario B

Within a particular biophysical environment within a watershed, if the single, existing late and old structural (LOS) stage is WITHIN OR ABOVE HRV, OR if both types of LOS stages occur and BOTH are WITHIN OR ABOVE HRV, then timber harvest can occur within these stages as long as LOS conditions do not fall below HRV. Enhance LOS structural conditions and attributes as possible, consistent with other multiple use objectives.

The intent of the following direction is to maintain options by impacting large and/or continuous stands of LOS as little as possible, while meeting other multiple use objectives.

(2) Maintain connectivity as directed in Scenario A, (3)

Southern Rockies Lynx Management Direction Record of Decision

INTRODUCTION

Risks to Lynx and Lynx Habitat

The LCAS identified risk factors affecting movement (pp. 2-17 to 2-19) as highways and associated development and private land development.

Within lynx home ranges, highways and associated high-intensity uses and developments may constrain habitat use and impede daily movements. At a broader scale, lynx are known to disperse and make exploratory movements across long distances and varied habitat and terrain. Maintaining connectivity within and between lynx subpopulations is an important consideration to maintain long-term persistence. However, the Forest Service has limited authority over highways and no authority to manage activities on private land. This decision provides guidelines applicable to maintaining connectivity within the limits of the Forest Service's jurisdiction.

RECREATION MANAGEMENT

Developed Recreation

There are 25 existing alpine ski areas in the Southern Rockies Lynx Amendment area, encompassing 82,704 permitted acres. Most ski areas were constructed well before the lynx was listed...

Under Alternative F-modified, the management direction would only apply to the development of new ski areas and to expansions of existing ski areas and would not affect existing ski area facilities or operations, with minor exceptions. Since the U.S. Fish and Wildlife Service concluded in their 2003 Remand Notice that there is no evidence showing that recreational activities exert a population-level impact on lynx, Alternative F-modified applies guidelines, rather than standards. To assure that lynx habitat connectivity is maintained, Alternative F-modified includes standards ALL S1 and LINK S1.

The management direction in Alternative F-modified will minimize the potential impacts of ski areas and other developed recreation sites on lynx habitat. Existing facilities and operations would not be affected. New developments and expansions would need to be designed in accordance with the management direction, which in most cases would have only minor effects.

LINKAGE AREAS

Highways

Highways impact lynx by fragmenting habitat and impeding their movement. With human population growth, highways tend to increase in size and traffic density. As traffic lanes, volumes, speeds and rights-of-way increase, the effects on lynx are increased.

The LCAS recommended one objective, two standards, and a guideline directly or indirectly related to highways and connectivity. These are reflected in Alternative B, Objective ALL O1, Standards ALL S1 and LINK S1 and Guidelines ALL G1 and LINK G1. Objective ALL O1 and Standard ALL S1 are intended to maintain connectivity. Standard LINK S1 provides a process for identifying wildlife crossings across highways. Guideline LINK G1 encourages retaining in public ownership National Forest System lands located within linkage areas.

In comments on the Draft EIS, some people said more should be done than just identifying highway crossings. Others questioned whether wildlife will even use highway crossing structures.

The U.S. Fish and Wildlife Service identified connectivity as an important consideration in the Southern Rockies (USDA Fish and Wildlife Service 2000b and 2003). The selected alternative will provide management direction for those aspects within the authority of the Forest Service that will contribute to the conservation of lynx. Only minor effects to the existing road system, resource management programs and the traveling public would be anticipated as a result of the management direction under Alternative F-modified.

The Colorado Department of Transportation (DOT) and Wyoming DOT coordinate with the Forest Service to identify areas where efforts could be made to reduce lynx mortality and to improve highway permeability to lynx movement. There will be some additional time and costs associated with evaluating and implementing methods to avoid or reduce effects of highways on lynx.

Habitat Connectivity

Maintaining habitat connectivity is particularly important in the Southern Rockies Amendment area, which is separated from lynx habitat to the north in Wyoming and distant from populations of lynx in the Northern Rockies and Canada. Objective ALL O1 and standard ALL S1 assure that all management projects in lynx habitat will consider the need to maintain habitat connectivity within and between LAUs and in linkage areas.

ENDANGERED SPECIES ACT

Preliminary recovery objective 2: Ensure that sufficient habitat is available to accommodate the long-term persistence of immigration and emigration between each core area and adjacent populations in Canada or secondary areas in the United States.

The U.S. Fish and Wildlife Service concluded the selected alternative contributes to this recovery objective in part, although some concerns remain regarding connectivity within the Southern Rockies and between the Northern Rockies and Southern Rockies.

ALL MANAGEMENT PRACTICES AND ACTIVITIES (ALL). The following objectives, standards and guidelines apply to all management projects in lynx habitat in lynx analysis units (LAUs) in occupied habitat and in linkage areas, subject to valid existing rights. They do not apply to wildfire suppression or to wildland fire use.

Objective ALL O1

Maintain or restore lynx habitat connectivity in and between LAUs and in linkage areas.

Standard ALL S1

New or expanded permanent developments and vegetation management projects must maintain habitat connectivity in an LAU and/or linkage area.

Guideline ALL G1

Methods to avoid or reduce effects on lynx should be used when constructing or reconstructing highways or forest highways across federal land. Methods could include fencing, underpasses or over passes.

Standard LAU S1

Changes in LAU boundaries shall be based on site-specific habitat information and after review by the Forest Service Regional Office.

VEGETATION MANAGEMENT ACTIVITIES AND PRACTICES (VEG). The following objectives, standards, and guidelines apply to vegetation management projects in lynx habitat within lynx analysis units (LAUs) in occupied habitat...

Standard VEG S5

The Standard: Pre-commercial thinning practices and similar activities intended to reduce seedling/sapling density are subject to the following limitations from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat.

5. In addition to the above exceptions...pre-commercial thinning may occur provided that:

- c) Projects are designed to maintain lynx habitat connectivity and provide snowshoe hare habitat over the long term

Note: This standard is intended to provide snowshoe hare habitat while permitting some thinning, to explore methods to sustain snowshoe hare habitat over time, reduce hazardous fuels, improve

forest health and increase timber production. Project design must ensure any pre-commercial thinning provides an appropriate amount and distribution of snowshoe hare habitat with each LAU over time and maintains lynx habitat connectivity within and between LAUs. Project design should focus on creating irregular shapes for the thinning units, creating mosaics of thinned and un-thinned areas and using variable density thinning, etc.

HUMAN RESOURCE PROJECTS (HU): The following objectives and guidelines apply to human use projects such as special uses (other than grazing), recreation management, roads, highways and mineral and energy development in lynx habitat and lynx analysis units (LAUs) in occupied habitat, subject to valid existing rights. They do not apply to vegetation management projects or grazing projects directly. They do not apply to linkage areas.

Objective HU O2

Manage recreational activities to maintain lynx habitat and connectivity.

Objective HU O4

Provide for lynx habitat needs and connectivity when developing new or expanding existing developed recreation sites or ski areas.

Objective HU O6

Reduce adverse highway effects on lynx by working cooperatively with other agencies to provide for lynx movement and habitat connectivity and to reduce the potential for lynx mortality.

Guideline HU G6

Methods to avoid or reduce effects to lynx habitat connectivity should be used when upgrading unpaved roads to maintenance levels 4 or 5 where the result would be increased traffic speeds and volumes or contribute to development or increases in human activity.

Guideline HU G7

New permanent roads should not be built on ridge-tops and saddles or in areas identified as important for lynx habitat connectivity. New permanent roads and trails should be situated away from forested stringers.

GLOSSARY

Linkage Area – A linkage area provides landscape connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas, where blocks of lynx habitat are separated by intervening areas of non-lynx habitat such as basins, valleys or agricultural lands, or where lynx habitat naturally narrows between blocks.

OTHER DOCUMENTS

Forest Service Strategic Framework for Responding To Climate Change

The Forest Service Mission is to: Sustain the health, diversity and productivity of the Nation's forests and grasslands to meet the needs of present and future generations.

The Nation's forests and grasslands provide clean water, scenic beauty, biodiversity, outdoor recreation, natural resource-based jobs, forest products, renewable energy and carbon

sequestration. Climate change is one of the greatest challenges to sustainable management of forests and grasslands and to human well-being that we have ever faced, because rates of change will likely exceed many ecosystems' capabilities to naturally adapt. Without fully integrating consideration of climate change impacts into planning and actions, the Forest Service can no longer fulfill its mission.

The Forest Service has a unique opportunity and responsibility to sustain forests and grasslands in the United States and internationally. This responsibility includes: 1) stewardship of 193 million acres of national forests and grasslands, 2) partnerships with States, Tribes and private landowners for assisting communities and owners of 430 million acres of private and Tribal forests, and with other federal agencies, 3) international cooperation, 4) research and development to provide science and management tools. These responsibilities make it imperative that we understand and be able to respond to the effects of climate change on the Nation's forest and grassland resources.

While some ecosystems may be able to adapt rapidly enough to maintain viability and productivity in the face of changing climate, the impacts of climate change on most terrestrial ecosystems are expected to occur at a rate that will exceed the capacity of many plant and animal species and communities to migrate or adapt. Ecosystem processes, water availability, species assemblages and the structure of plant and animal communities and their interactions will change. Some of these changes will enhance ecosystem productivity and carbon storage...Under a changing climate, however, many ecosystems will experience widespread mortality, increased fire and insect activity and other disturbances, changes in water regimes and species losses, with associated loss of productivity and resilience and accelerated carbon loss. Disturbance events can also provide opportunities for recovery actions that will facilitate adaptation and enhance resiliency and ecosystem health in a changing climate. Management to maintain vegetation within the historic range of variability will increasingly not be an option in many areas. Strategies based on historical or current conditions will need to be replaced with approaches that support adaptation to the changing conditions of the future.

Strategies to address climate change must encompass two components:

- Facilitated adaptation, which refers to actions to adjust to and reduce the negative impacts of climate change on ecological, economic and social systems; and
- Mitigation, which refers to actions to reduce emissions and enhance sinks of greenhouse gases, so as to decrease inputs to climate warming in the short term and reduce the effects of climate change in the long run.

In the face of current changes and future projections, critical work is needed to help ecosystems adapt to the changes that will occur in our lifetimes and pursue mitigation opportunities that can help ensure sustainable ecosystems for future generations.

Facilitated Adaptation: Approaches to facilitating adaptation will need to be regional and site-specific, and they will fall into two major categories. Anticipatory actions intended to prevent serious disruptions due to changing climate may include thinning of forests to increase tolerance to drought and resistance to wildfire or insects, genetic conservation of species, assisted migration of species to suitable habitat, development of wildlife corridors to facilitate migration, or construction of new water storage facilities. Opportunistic actions that take advantage of man-made or natural disturbance events to facilitate adaptation to future climate may include planting of different species or genotypes from those that occurred on a site before disturbance or active conversion of vegetation structure to make it more resilient to changing climate.

Actions that minimize disruptions in the ability of ecosystems to provide ecosystem services and that facilitate adaptation to changing climate must be central priorities for the Forest Service because many of these services may be lost or significantly altered if the ecosystems are left to adapt on their own. Ecosystem health and resilience, productivity, biological diversity, and carbon storage are likely to decrease over large areas without direct intervention and management. Mitigation activities can only provide significant benefits if ecosystems are adapted to their new environments.

Key Terms:

Adaptation –

- *Natural Adaptation* – reactive responses by natural systems to the effects of a changing climate. In some cases, individuals, species, communities or ecosystems may adapt (migrate, shift, modify behavior, etc.); in other cases these entities may perish or cease to exist.
- *Facilitated Adaptation* – initiatives and measure to reduce the vulnerability of natural and human systems against actual or expected climate change effects includes both anticipatory and opportunistic actions.

Ecosystem Services – are commonly defined as the benefits people obtain from ecosystems. They include basic services like the provision of food, fresh water, wood and fiber, and medicine; environmental services like carbon sequestration, erosion control, biodiversity, wildlife habitat, and pollination; cultural services like recreation, ecotourism, and educational and spiritual values; and supporting services like nutrient cycling, soil formation and primary productivity.

Mitigation – actions to reduce emissions and enhance sinks of greenhouse gases, so as to reduce the impacts and effects of climate change.

- 1) Adaptation to the effects of climate change is essential if we are to sustain forests and grasslands to provide ecosystem services and continue to mitigate greenhouse gases.
- 2) Management for adaptation will not be possible or needed everywhere; priorities will need to be set to determine the most beneficial outcomes.
- 3) Improved risk analysis and decision support tools will be critical to facilitate new policies and management approaches in the face of uncertainty.
- 4) Continual monitoring and incorporation of new science into planning, policies, and decision processes are essential to adaptation and mitigation in a changing climate.

Principles Related to People

- 1) Alliances and collaboration will be essential to achieving science-based, integrated approaches for adaptation and mitigation.
- 2) Institutional and public support and encouragement for implementing innovative approaches is essential.
- 3) Strategies, policies, and actions for addressing climate change will be integrated across all Deputy areas at all levels of the Forest Service.

Goals Focused on Managing the Land

- 1) **SCIENCE – advance our understanding** of the environmental, economic and social implications of **climate change** and related adaptation and mitigation activities on forests and grasslands.

To successfully manage forests and grasslands in a changing environment, the Forest Service needs to translate relevant science into land management applications using improved, coordinated and enhanced monitoring systems, predictive models, decision support tools, and databases. These tools will aid resource managers by monitoring trends and predicting future changes. These tools are also critical to understanding the role of the United States forests and grasslands in international agreements created to mobilize global action to address climate change. Managers and policy makers will be better able to evaluate the effects of management actions, consider alternatives and make decisions in an uncertain, changing environment. Research is also needed to develop improved, cost-effective methods for biomass utilization, bioenergy, fossil fuel substitutes, soil carbon enhancement, storage in wood products and greenhouse gas accounting.

Also needed are unified, multi-scale monitoring systems sufficient for:

- Evaluating national and regional trends;
- Assessing the effectiveness of management activities designed to mitigate climate change and adapt to its effects;
- Assessing progress in working across landscapes and ownerships; and
- Understanding the interactions with environmental, social and economic conditions.

The integration of science, monitoring, and management will aid land managers – federal, State, Tribal and private – and citizens in making decisions and taking actions affecting the Nation’s forests and grasslands.

- 2) **ADAPTATION – Enhance the capacity of forests and grasslands to adapt** to the environmental stresses of climate change and maintain ecosystem services.

The primary focus of efforts on National Forest System lands will be to facilitate the adaptation of ecosystems to the effects of climate change. Many activities currently underway to restore forests and grassland health and reduce the risk of severe wildfires or pest outbreaks (such as thinning overstocked stands, thinning to alter species composition, fuels reduction, and prescribed fire) also serve to restore ecological health and resilience in the face of future stressors. More extensive application of such measures is vital for adaptation of forests and grasslands, and will need to be part of future planning and management actions to address climate change and its impacts. Lack of markets for the by-products of treatment activities and institutional barriers are significant constraints on implementing adaptation-related projects on National Forest System lands. The Woody Biomass Utilization Strategy identifies goals to address the lack of markets and institutional barriers for marketing the by-products of treatment activities.

The Forest Service has authorities and the ability to assist private landowners and communities to voluntarily implement adaptation techniques on their lands, and to work collaboratively with other federal agencies and international partners. Science-based and easily accessible information and tools are essential.

- 4) **POLICY – Integrate climate change, as appropriate, into Forest Service policies, program guidance and communications** and put in place effective mechanisms to coordinate across and within Deputy Areas.

The Chief has made climate change a top issue for the Forest Service because of its significant impacts to forests and grasslands, and to society. The agency has begun considering climate change in policies, program guidance and communications. In particular, several actions constitute important first steps in grappling with the issues of addressing climate change in forest plans, NEPA analysis, and budget guidance. As required by the 2008 National Forest System Land Management Planning Rule, the National Environmental Management System will include a land management component, which could be defined to address adaptation and mitigation on National Forest System lands.

The uncertainties of outcomes in a changing climate will require the Forest Service to be flexible and adaptable. Addressing climate change will depend on reducing institutional barriers and increasing adaptive learning through experimentation. Monitoring and evaluation will assist managers in dealing with uncertainties and the risks of options, decisions and actions. The Forest Service will need to build consideration of climate change into virtually all aspects of agency operations including consideration of life cycle analysis of activities.

There are a variety of national strategies in place or under development that could complement and reinforce a truly cohesive approach to climate change. These include strategies on integrated vegetation management, biomass, open space, ecological restoration, water, research and development and others.

Collaboration and integration structures are essential to effectively coordinate across Deputy Areas. Some Regions and Research Stations have begun to identify governance actions to improve integration. These types of activities should be encouraged and reinforced. Coordination that integrates across regions and stations will assure that efforts are complementary and not redundant. Unless more effective integration and coordination mechanisms are put into place, this strategic framework has little chance of meaningful implementation.

- 7) **ALLIANCES – Establish, enhance and retain strong alliances and partnerships** with federal agencies, State and local governments, Tribes, private landowners, non-governmental organizations, and international partners to provide sustainable forests and grasslands for present and future generations.

APPENDIX 1 - CLIMATE CHANGE STRATEGY GOALS & RECOMMENDATIONS		
Number	Goal	Recommendation
1	<p>Science - Advance our understanding of the environmental, economic and social implications of climate change and related adaptation and mitigation activities on forests and grasslands.</p>	<p>1.1 Develop and implement internal mechanisms to assure a systematic, interactive dialogue between researchers, public and private land and resource managers, and other users to promoted effective alignment of climate change science delivery efforts. (Links to Recommendation 4.1)</p>
		<p>1.2 Review and adjust priorities for the most critical focus areas for Forest Service research, development and application activities, including: (1) key knowledge gaps in the economic, social and environmental effects of climate change; (2) implications of land use and land cover change feedbacks to climate change; and (3) effects of potential adaptation and mitigation actions related to forest and grassland ecosystems and products.</p>
		<p>1.3 Effectively move science into application, including synthesis of current research and monitoring information, incorporating science into decision support tools, disseminating new knowledge to managers, and integrating tools into common data and analysis structures. Among other things, decision support tools should focus on: (1) predicting the ecological effects of climate change at national, regional and local scales; (2) predicting the effects of management activities on the ability of forest and grassland communities and their component species to adapt to climate change and provide ecosystem services; (3) assisting public and private land managers in prioritizing activities to maximize effectiveness of adaptation strategies in the face of limited resources; and (3) evaluating the feasibility and impacts of mitigation actions that involve forests and grasslands and their products.</p>

		1.5 In collaboration with partners and stakeholders, carry out integrated regional and sub-regional landscape-scale assessments of the multiple implications of climate change to improve adaptation, mitigation, and conservation activities on forest and grassland ecosystems and the values, outputs and ecosystem services they provide.
		1.6 Develop improved life cycle analysis of bio-products from forests and grasslands. Promote development of methods , operational processes and decision support tools to enhance the capacity of these bio-products to offset fossil fuel emissions and to sequester carbon.
2	ADAPTATION - Enhance the capacity of forests and grasslands to adapt to the environmental stresses of climate change and maintain ecosystem services.	2.1 Set priorities for where, when and how to employ adaptation activities and implement actions that will: (1) facilitate adaptation to the long-term effects of climate change by fostering resilient, productive and functional ecosystems and (2) prioritize types and distribution of management activities for the greatest benefits to ecosystems and society.
		2.2 Work with partners , including other federal agencies, international partners, State and local governments, Tribes, private landowners, managers, consultants, non-governmental organizations, and other stakeholders to be most effective in supporting their efforts to adapt lands, ecosystems and species to climate change.
		2.3 Assess how land management activities (e.g. fire suppression, fuels treatment, post-fire rehabilitation, timber harvest, forest health and invasive species management, ecological restoration and watershed management) contribute toward adaptation objectives and how they can be modified to better facilitate adaptation to climate change at various spatial scales.
		2.4 Ensure that effects of climate change adaptation activities are monitored (using the monitoring system established under Recommendation 1.4) and that new knowledge is documented , reported and used effectively to modify future management actions.

3	<p>MITIGATION - Promote the management of forests and grasslands to reduce the buildup of greenhouse gases, while sustaining the multiple benefits and services of these ecosystems.</p>	<p>3.1 Participate in the development of protocols for carbon accounting at the international, national, regional and state levels that fully incorporate the potential for forests, forest products and grassland ecosystems and products to mitigate the build-up of greenhouse gases. Develop a consistent approach to guide that participation. Develop a national-level central 'clearinghouse' for information and Forest Service positions on carbon protocols to provide consistency across efforts.</p>
		<p>3.3 Identify opportunities across all ownerships for afforestation, reforestation, and forest management to reduce greenhouse gas emissions and increase sequestration domestically and globally.</p>
		<p>3.4 Work internationally and with States and other partners to identify opportunities to reduce the rate of conversion of forests and grassland ecosystems to other uses, and in cooperation with partners, facilitate participation by landowners in programs, including market incentives to retain forest cover.</p>
4	<p>POLICY - Integrate climate change into all Forest Service policies, program guidance, and communications and put in place effective mechanisms to coordinate across and within Deputy Areas.</p>	<p>4.1 Create a rapid national analysis of the implications of climate change for the Nation's forests and grasslands and our capacity to respond to them, including economic and social costs and benefits to the agency and society.</p>
		<p>4.2 Implement the appropriate mechanisms and institutional structures to promote effective collaboration between Deputy Areas of Research, National Forest System and State & Private Forestry to assure that relevant and helpful research and science is being conducted and distributed.</p>
		<p>4.3 Address climate change as a part of agency plans and direction to the field, including: (1) program budgeting, (2) forest planning and NEPA, and (3) strategic plans at various levels (Forest Service Strategic Plan, Ecological Restoration Plan, Cohesive Fuels Management Strategy, Water Strategy, Open Space Conservation Strategy and others).</p>

		4.4 Evaluate and remove the institutional barriers , policies and constraints that exist to implementing effective management activities to address climate change.
		4.5 Implement approaches and incentives to encourage managers to make responsible decisions in the face of uncertainty.
		4.7 Promote innovation by incorporating the results of Environmental Management System's scientifically-designed monitoring into decision-making.
6	EDUCATION - Advance awareness and understanding regarding principles and methods for sustaining forests and grasslands, and sustainable resource consumption in a changing climate.	6.1 Work with scientists, land and community managers, educators and communicators to translate climate change science into accurate, audience-appropriate and easily accessible tools and information.

Kootenai National Forest Wildlife Approach Areas

Introduction

Maintaining wildlife population connectivity through identification of corridors/linkage zones has been examined by a variety of experts and managers...

In general terms, corridors/linkage zones are areas where animals can find food, shelter, and security in order to move across the landscape. They are areas where there are lower densities of human site developments and lower risk to wildlife. Direction associated with NF lands related to corridors and linkage zones are found in a number of areas including: the grizzly bear recovery plan and the Northern Rockies lynx management direction. Corridors/linkage zones were considered at the broader forest-wide scale and included in the draft final plan desired conditions and guidelines. As some point these corridors/linkage zones cross what are termed “fracture lines” (e.g. valley bottoms with highways, railways) where animal movement may be hindered and mortality risk may be elevated. These areas are termed “approach areas”. Providing a safe way for wildlife to approach, cross, and then leave a fracture line is the focus of this paper.

Providing safe and secure areas of wildlife movement across the Kootenai national Forest is one management component needed to assure continued species diversity. The focus area for management is the National Forest System (NFS) lands adjacent to major motorized vehicle routes (highways and railways). These routes have been called “fracture lines” b/c of the increased mortality risk to wildlife as they attempt to move across these features and the potential for fragment habitat and separate or isolate portions of a species population. NSF lands that lie adjacent to these linear features may provide a way for wildlife to approach and leave safely before and after crossing one of these fracture lines. The identification and delineation of these

areas, termed “approach areas” and the subsequent management of NFS lands within those areas were based on direction developed by the IGBC Public Lands Wildlife Linkage Taskforce (2004) headed by the regional office. Delineations of approach areas also identifies private lands where land exchange, conservation easement or direct acquisition may be appropriate to improve management options for one or more wildlife species.

Management Considerations

In order to connect large land areas and populations of highly mobile species, planning an effective linkage zone includes public lands, private lands, and issues relating to transportation corridors.

Corridors/Linkage areas/Approach Areas Desired Condition

Corridors/linkage areas and associated approach areas provide for wildlife movement (e.g. migration/dispersal) and genetic interactions. Corridors/linkage areas and associated approach areas provide secure habitat conditions for wildlife movement (for species such as Canada lynx, grizzly bear and wolverine) between large blocks of habitat and/or seasonal habitats on a localized and landscape scale, especially across valley bottoms and other ‘fracture zones’. These areas provide cover and often connect key habitat components for those species that use that particular area. NFS lands contribute to linkages between landscapes, unless such landscape isolation is determined to be beneficial.

The Forest cooperates with MT and ID State departments of transportation and private landowners to allow movement of wildlife across valley bottoms between large blocks of habitats on NF lands while considering public safety (reduce automobile/wildlife associated accidents).

Current Forest Plan Guidelines

1. The construction of new permanent roads, opening currently restricted roads to long term motorized use (more than 2 years), motorized trails, and site developments that reduce security and tend to make wildlife avoid use of these areas should not occur in established approach areas. When necessary to construct a new permanent road through established approach areas, motorized use of that road should be restricted.
2. Vegetation management activities in established approach areas should maintain or improve habitat conditions, such as visual cover, for continued and future use of the area.

Proposed Forest Plan Guidelines

1. Avoid activities that reduce security or tend to make wildlife avoid use of corridors/linkage zones and approach areas such as construction of new permanent roads, motorized trails, or site developments; and opening currently restricted roads and trails to motorized use within those areas.
2. Maintain appropriate amounts and distribution of natural foods and hiding cover in corridors/linkage zones and approach areas to meet the subsistence and movement needs of target wildlife species.
3. Manage dispersed recreation use to maintain suitability of approach areas for identified target species
4. Manage human, pet and livestock foods, garbage and other potential wildlife attractants to minimize the risk of conflicts between people and wildlife in approach areas
5. Pursue mitigating, moving and/or reclaiming developments and disturbed sites that conflict with the objective of providing wildlife linkage.

Attachment B: Recommended management direction to maintain wildlife linkage on public lands along highways (from IGBC Public Lands Linkage Taskforce Report 2004)

Recommended Management Direction	Objective
1. Maintain appropriate amounts and distribution of natural foods and hiding cover in linkage zones to meet the subsistence and movement needs of target wildlife species.	Maintain food/cover/movement
2. Avoid constructing new recreation facilities or expanding existing facilities (e.g. campgrounds, visitor centers, lodges, etc.) within linkage zones.	Maintain security/avoid mortality risk/avoid habitat loss
3. Avoid other (non-recreational) new site developments or expansions that are not compatible with subsistence and movement needs of target species in linkage zones (e.g. special use developments, gravel pits, etc.).	Maintain security/avoid mortality risk/avoid habitat loss
4. Pursue mitigating, moving and/or reclaiming developments and disturbed sites that conflict with the objective of providing wildlife linkage.	Maintain security/avoid mortality risk/restore lost habitat
5. Manage dispersed recreation use to maintain suitability of approach areas for identified target species. Avoid issuing new permits or additional use days for commercial recreation activities (e.g. outfitter and guide permits) that may conflict with wildlife linkage objectives.	Maintain security/avoid mortality risk and displacement
6. Manage roads and trails in linkage zones to facilitate target species movement and limit mortality risk, displacement and disturbance.	Avoid mortality risk, displacement and disturbance
7. Manage livestock grazing to maintain wildlife forage and hiding cover and to minimize disturbance, displacement and mortality of target wildlife species.	Maintain food/cover/avoid mortality risk
8. Work with adjacent landowners, planners, and other interested parties to improve linkage opportunities across multiple jurisdictions (e.g. cooperative agreements, land consolidations, exchanges, acquisitions, easements, etc.).	Enhance linkage opportunities
9. Manage human, pet and livestock foods, garbage and other potential wildlife attractants to minimize the risk of conflicts between people and wildlife.	Provide for human safety/avoid wildlife mortality risk

**Zoological Special Interest Areas:
Tongass National Forest – Pack Creek**

Terrestrial Mammal Management Indicator Species (MIS)

Bears at Middle Creek:

...The majority of bear bedding currently occurs on the north side of the creek and on the gravel bars at the apex of the alluvial fan. Bear trails are concentrated near the stream, but there are also important corridors linking this drainage with others to the north and south...

...Human use of the shelter and the estuary meadows has likely influenced long-term patterns of use by bears (e.g. the conspicuous lack of bedding in the large tree forest at the base of the west-side alluvial fan). Most human use of this southern estuary in Windfall Harbor is on the western side of the creek. Commercial guides agreed in 2000 to confine their visits to the western side to prevent displacing bears from habitats further up the creek. SEAWEAD has offered two suggestions for future management of visitor use in this area:

1. To emphasize protection of bear access to habitat, discourage human use of the Windfall Harbor estuary and focus a limited amount of use at the existing shelter. This location would provide a long-distance viewing opportunity that would not significantly affect bears in the estuary and along the anadromous stream. The beach on the west side of Windfall Harbor is likely an important travel corridor for bears that travel to and from drainages to the north. Strict emphasis on protection of bear resources argues for limited use of this shoreline, including the shelter, such that the area would be free of human occupation as much as possible.
2. A compromise between bear and human use of the Windfall Harbor estuary may be achieved if guided and non-guided use is restricted to the beach area at the base of the west-side alluvial fan. This area offers a broad view of the meadow and creek without placing observers in the immediate vicinity of the concentrated trail and bedding areas near shore. The viewing site should be approached from the shelter. All food should be left in bear-proof containers in the shelter to reduce the possibility of food conditioning. Travel time to and from the viewing site should be minimized to reduce disturbance to the west-side bear travel corridor. Because the close proximity to important grazing resources, human behavior at the viewing site should be controlled to reduce offensive scents, loud noises, and abrupt movements. Duration of site occupancy might also be restricted. Disturbance of some bears will likely occur under this scenario because of overlapping use on the west-side travel corridor and the occurrence of high-value grazing habitats in close proximity to the viewing site.

As noted above, the western shore of Windfall Harbor between Pack Creek and Windfall Creek is used by bears as a travel corridor between high value habitats at the estuaries, while the eastern shore has no anadromous estuarine habitat and far less evidence of use by bears...

POTENTIAL FISH AND WILDLIFE PROJECTS

Introduction

...Sensitive wildlife habitats that could be impacted by visitor use would include avian nest sites, amphibian breeding ponds, seal and sea lion haul outs and important bear fishing sites and travel corridors. Human caused impacts to these sites can best be mitigated by restricting or discouraging visitor use of such sites. The specific locations of some of the more sensitive sites at risk from visitor presence (i.e. amphibian breeding ponds) should not be made common public knowledge in order to protect the site.

Avoid Impacting Sensitive Wildlife Habitats

These would include avian nest sites, amphibian breeding ponds, seal and sea lion haul outs, and important bear fishing sites and travel corridors...Devise a permanent strategy whereby impacts to the resource and recreational opportunities may be mitigated.

DEPARTMENT OF INTERIOR

BUREAU OF LAND MANAGEMENT

Dillon Resource Management Plan and EIS

Desired Future Condition

- (bullet 3) provide suitable habitat and condition to allow wildlife, species movement between large blocks of habitat, and seasonal and special habitats on a localized and landscape scale.

Alternative A

Under current management, specific wildlife travel corridors or linkage corridors between major habitat areas would not be delineated, and potential impacts would be considered on a case by case basis during project and activity planning.

Alternative B

...wildlife migration/dispersal corridors that provide connectivity for special status species such as lynx, grizzly bear, and wolf (as well as wildlife in general) would be managed to reduce conflicts between listed species and land use authorizations and activities.

Management actions would include:

- Evaluate projects and authorizations proposed on public lands in this area that may increase habitat fragmentation, create physical barriers to movement or potentially increase mortality.
- Food storage strategies...
- Amend grazing permits..

These actions would apply to all public lands that contain relatively intact habitat and migration corridors between units of the BDNF.

Alternative C

...wildlife migration/dispersal corridors would be delineated as described under Alternative B, but additional management actions would apply. Management actions to reduce potential risks to grizzly bear, wolf and lynx would include:

- Coordinate with others to identify critical barriers and potential passage locations...
- Evaluate projects and authorizations proposed on public lands in this area that may limit the effectiveness of the corridor by increasing habitat fragmentation, creating physical barriers, or potentially increasing mortality

Pinedale Resource Management Plan Record of Decision

2.3.16 Wildlife and Fish Habitat Management

Management Goals

Maintain or enhance aquatic and wildlife habitat.

Maintain functioning big game habitats and migration corridors that allow free movement and use of habitats.

2.3.17 Special Designations and Management Areas

Management Goals

Trapper's Point ACEC Management Goal. Preserve the viability of the big game migration bottleneck, cultural and historic resources, and important livestock trailing use.

DEPARTMENT OF INTERIOR

Department of the Interior Task Force on Climate Change Report of the Subcommittee on Land and Water Management

ADAPTATION ISSUES AND OPTIONS

COMMON THEMES AND DOI-WIDE OPTIONS

Theme 2: Land, Resource and Species Management Plans Need to be Revised to Reflect Climate Change Effects.

Nearly all of the working groups of the Subcommittee on Land and Water Management identified a need to revise management plans to reflect effects of predicted climate conditions...

Theme 3: Definitions for Key DOI Agency Terms, such as "Natural" and "Unimpaired."...

Option 3: Define Key DOI Agency Terms in the Context of a Changing Climate...

Theme 6: Encouraging and Supporting Partnerships for Adapting to Climate Change...

Option 6: Develop an Interior Climate Adaptation Partners Program. Develop a DOI Adaptation Partners (ICAP) Program that provides guidance and possible financial incentives for developing cross-jurisdictional, public/private partnerships that contribute to the conservation of species, natural communities and lands and waters placed at risk by changing climate conditions...

...A financial incentives fund could increase the ability of individual management units to work with private partners who need compensation to take lands out of agricultural production, delay timber harvest, or take other actions in order to maintain a corridor or protected area...

SPECIES MIGRATION AND HABITAT CHANGE

Statement of the Issue

Climate change causes species and natural communities to shift in latitude and/or elevation (primarily northward or upward) across the landscape, perhaps away from DOI-managed lands.

Description of Issue

Plants and animals only reproduce, grow and survive within specific ranges of climate and environmental conditions. When conditions change beyond their tolerance, both plant and animal species may respond by shifting range boundaries or changing the density of individuals within their ranges. Predicted climate changes will make the current ranges inhospitable for many resident species on DOI lands. Following suitable habitat conditions, these species will generally attempt to migrate northward or upward.

This 'species migration' is not the short-term seasonal migration that waterfowl perform each year, but long-term shifting of entire species or local communities to new home ranges. These natural communities will not be replaced suddenly. Individual species will migrate to new areas or die off, placing stress on other species in the community that depend on them for food or habitat. Species losses will eventually cascade through many natural communities and

landscapes. Other species will invade empty niches left behind, bringing with them changes to the historical landscape and the ecological services and benefits to which people are accustomed.

A wide variety of natural and man-made barriers can prohibit the natural migration of plants and animals to suitable new locations. Highways, urban areas, rivers, agricultural lands, pipelines, dams, unseasonably low river flows, habitat fragmentation, and lack of connectivity between water sources are just a few obstacles to migration. Even highly mobile species may face serious obstacles to successful migration if their food and habitat requirements cannot cross barriers or do not exist in new areas.

Migratory waterfowl, Neotropical birds, anadromous fish (those that migrate from saltwater to freshwater to spawn) and some insects such as Monarch butterflies offer unique challenges. These species travel great distances during their life cycle, generally from wintering to breeding habitats. Loss of any portion of essential habitat along their migration routes may cause serious populations declines. For example, much of the Prairie Pothole wetlands in the upper Midwest is predicted to dry due to climate change. This drying would eliminate critical breeding grounds for ducks and geese along the central flyway.

Anadromous fish are of particular concern to DOI because they provide significant ecological, economic, and cultural values to native peoples, rural Alaskans, and American society as a whole. Many salmon species are already suffering serious declines due to past and present human-induced habitat modifications and other stresses that are not yet well understood. Climate changes are expected to cause additional stresses, possibly pushing some populations to the brink of collapse. Actions could be taken to increase our understanding of fish responses to changing climate conditions and to reduce other stressors to fish populations.

Statement of Options

Option 1: Assess Vulnerabilities: Species Migration. Conduct a screening level vulnerability assessment of ecosystem shifts in relation to DOI lands.

Option 2: Encourage Regional Inventory and Monitoring Partnerships. Develop regional partnerships to build on existing biodiversity monitoring programs to inform regional-scale decisions for species on DOI lands.

Option 3: Identify and Highlight Species Migration Case Studies. Use selected case studies to educate and inform resource managers on successful species migration and relocation projects.

Option 4: Develop Predictive Models for Species Response. Develop planning models to predict species response.

Option 5: Promote Regional Partnerships for Species Migration and Relocation. Promote regional partnerships to enhance the success of species migration and relocation in response to climate change. This option is more fully described under DOI-Wide Option 6, “Develop an Interior Climate Adaptation Partners (ICAP) Program”.

Analysis of Options

Option 1: Assess Vulnerabilities: Species Migration.

DOI could conduct a vulnerability assessment of ecosystem shifts in relation to DOI lands. The first phase of the assessment could begin by using regional-scale models of climate change predictions and ecosystem responses to create a series of regional maps that overlay expected ecosystem shifts onto DOI lands. These initial maps could then be used to focus national DOI resources on climate change species migration hot-spots. The initial assessment would be regional aimed at completing all regions within a short timeframe.

A second phase of the vulnerability assessment would focus on the species migration hotspots identified in the initial assessment. At this scale, the assessment would focus on identifying individual species and their specific habitats that are expected to either migrate away from protection of DOI lands or be locally extirpated due to climate change. These species will need specific intervention either to protect species health, or to ensure continuance of the services (ecosystem, economic, or cultural) they provide. The cost of a second-level vulnerability assessment would be medium and the timeframe would be medium to long, depending on the availability of resources and the findings of the initial regional assessments. There would be ample opportunity for partnerships with other agencies and with existing partnerships as data are developed and compared.

Option 2: Encourage Regional Inventory and Monitoring Partnerships.

DOI could develop regional partnerships to build on existing biodiversity monitoring programs. For example, these could build upon existing partnerships between DOI and sister Federal agencies, such as the EPA and USDA and other partnerships such as the National Biological Information Infrastructure and NatureServe

As discussed in DOI-Wide Option 1, adaptive management provides a framework for decision making in the face of uncertainty about human and ecological responses to climate change. This framework includes an iterative decision-making process that involves an initial assessment of conditions, a decision, and monitoring for results. As information is received through the monitoring process, understanding and management decisions are updated by what is learned. Therefore, inventory and monitoring information is necessary for both the initial assessment and for the iterative management decisions inherent in adaptive management.

Few DOI land management units have complete biological inventories of species. Additionally, DOI has no cohesive, systematic program for monitoring change over time in the distribution of species and communities. Inventories will be critical to assessing climate change impacts and to developing management responses to those impacts. During the time that DOI conducts the initial regional-scale vulnerability assessments mentioned in Option 1, managers of DOI lands can begin evaluating existing gaps. Our lands do not exist in a vacuum. Rather, they exist in a matrix with other Federal, State, private, non-profit and corporate neighbors. DOI resource managers can begin developing partnerships at various organizational levels for filling ecological data gaps and for monitoring ecological trends that would help guide our adaptive management strategies into the future.

At the national level, DOI could explore strategic partnerships with one or more well-established national programs to identify current biological resources and assess changes in response to climate change. Joining in one or several of these programs would provide a more complete

picture of the biological resources on and adjacent to DOI lands allowing DOI land managers to see their resources and make management decisions in the context of the larger landscape...

Managers at regional and local scales could develop other partnerships to deal with more local issues and to begin developing local and regional strategies for meeting the challenges climate change poses to their resources. These would complement the activities of the national programs previously discussed. By enabling DOI to monitor for changes using the same data and parameters as these other organizations, collaboration on monitoring would promote adaptation partnerships. The direct cost to DOI would likely be in the low-to-medium range and the savings could be substantial as compared to setting up completely new and independent DOI monitoring programs.

Option 3: Identify and Highlight Species Migration Case Studies.

Selected case studies could be used to educate and inform resource managers on successful species migration and relocation projects...

Option 4: Develop Predictive Models for Species Response.

In an uncertain climate future, models will be important tools for predicting how plants and animals are expected to respond to climate changes and for adapting and revising management plans accordingly. These models would allow managers to analyze scenarios that incorporate local and regional temperature, rainfall, and stream flow, as well as selected management actions and to predict responses of plant and animal communities...

Option 5: Promote Regional Partnerships for Species Migration and Relocation.

DOI could promote regional partnerships to enhance the success of species migration and relocation in response to climate change...In particular, DOI's success in both its Healthy Lands Initiative and its Cooperative Conservation Initiative could serve as examples.

TERRESTRIAL CARBON SEQUESTRATION

Statement of Opportunity

...DOI is poised to play a key role in reducing the amount of CO₂ in our atmosphere through terrestrial carbon sequestration. There is an opportunity to reduce DOI's carbon footprint through specific mitigation actions, such as minimizing or offsetting residual carbon emissions through a comprehensive carbon sequestration program...

Analysis of Options

Option 3: Create Habitat Restoration Partnerships

DOI could use its statutory authorities, existing policies and regulations, programs and expertise to work with private landowners and CO₂ emitters to restore significant habitat while helping to offset CO₂ emissions. An important component of the option is to understand where to best establish habitat linkages. A plant and wildlife habitat gap analysis could be used to strategically determine where important plant and wildlife habitat linkages (i.e. wildlife and ecosystem corridors) are needed across the landscape. The results would guide private lands programs and broaden the impact of a comprehensive carbon program to restore native wildlife habitat.

DOI's land base provides anchors of biodiversity that could serve as a foundation for our conservation efforts. Linking these lands together as corridors will require public/private partnerships aimed at cooperatively working with private landowners. Strategic habitat conservation through a well conceived terrestrial carbon sequestration program may accomplish a

number of public policy goals, including offsetting CO₂ emissions and conserving nationally important natural resources...

DOI could establish collaborative efforts with the USDA Forest Service Farm Service, USDA Agency and Natural Resources Conservation Service and with non-governmental organizations to look for ways to provide incentives to private landowners as part of a broad terrestrial carbon sequestration program. Options include using existing wetlands, grasslands and conservation reserve programs.

U.S. FISH AND WILDLIFE SERVICE

U.S. Fish and Wildlife Service Climate Change Strategic Plan for the 21st Century

OUR VISION

As a leading conservation organization, we see ourselves:

- Depending on our 95 million acre National Wildlife Refuge System to play a critical role in ensuring habitat connectivity and conserving key landscapes and populations of fish and wildlife;

STRATEGIC GOALS AND OBJECTIVES

Adaptation

Goal 2: We will plan and deliver landscape conservation that supports climate change adaptations by fish, wildlife and plan populations of ecological and societal significance.

While our long-term response to climate change will be determined over the next 5 years as we work collaboratively in developing the National Fish and Wildlife Adaptation Strategy there will be many near-term actions we can take to begin the process of managing fish and wildlife adaptation to climate change. Near-term conservation delivery will apply vulnerability assessments and focus on...(2) reducing habitat fragmentation and building connectivity by means such as habitat corridors...(7) addressing key ecological processes...

Objective 2.2 – Promote Habitat Connectivity

Climate change will interact with non climate stressors such as land-use change, fire, and habitat fragmentation from urban, suburban and agricultural development. Protecting contiguous and un-fragmented habitat and enhancing connectivity between protected areas using linkages and corridors will facilitate the movement of fish, wildlife and plan species in response to habitat protection and landscape scale habitat linkages and corridors. By joining the habitat protection and management capacities of the Service (e.g. national Wildlife Refuge System, Partners for Fish and Wildlife Program and North American Wetlands Conservation Act) with those of partners, we will help build this connectivity within and between landscapes.

Goal 5 – We will build capacity to understand, apply and share terrestrial carbon sequestration science and work with partners to sequester atmospheric GHGs while conserving fish and wildlife habitat at landscape scales.

Objective 5.5 – Facilitate International Carbon Sequestration

One of our most important roles in carbon sequestration may well be to facilitate carbon sequestration activities internationally... We will work through our Wildlife Without Borders and Multinational Species Programs to provide funding and technical assistance to increase carbon sequestration, restore habitat and increase connectivity.

U.S. Fish and Wildlife Service Draft 5-Year Action Plan for Responding to Climate Change

ADAPTATION

Goal 2 - We will plan and deliver landscape conservation that supports climate change adaptations by fish, wildlife and plant populations of ecological and societal significance.

Objective 2.1 – Take Conservation Action for Climate Vulnerable Species

FY 2011-13

- The Science Advisor will ensure that the results of the vulnerability assessments are spatially integrated with recommendations for landscape-scale habitat connectivity in order to provide a landscape-level overview of opportunities for climate-vulnerable species to migrate and colonize new habitats.

Objective 2.2 – Promote Habitat Connectivity

Climate change will interact with non-climate stressors such as land-use change, fire and habitat fragmentation from urban, suburban and agricultural development. Protecting contiguous and un-fragmented habitat and enhancing connectivity between protected areas using linkages and corridors will facilitate the movement of fish, wildlife and plant species in response to climate change. Through conservation design, we will work with partners to identify needed habitat protection and landscape-scale habitat linkages and corridors. By joining the habitat protection and management capacities of the Service (e.g. national Wildlife Refuge System, Partners for Fish and Wildlife Program and North American Wetlands Conservation Act) with those of partners, we will help build this connectivity within and between landscapes.

FY 2009

- The ANWRS, AMB and AFHC will work with the RDs to demonstrate how Service programs can promote habitat connectivity to achieve population objectives. AFHC will provide a progress summary and final report including proposed funding redirections.

FY 2010-11

- RDs, working through LCCs, will ensure that climate change is addressed in existing on-the-ground projects to promote habitat connectivity among protected areas to achieve objectives through habitat acquisition or restoration. The projects should characterize the carbon sequestration potential of habitat that is conserved or restored.

Goal 5 – We will build capacity to understand, apply and share terrestrial carbon sequestration science and work with partners to sequester atmospheric GHGs while conserving fish and wildlife habitat at landscape scales.

Objective 5.5 – Facilitate International Carbon Sequestration

One of our most important roles in carbon sequestration may well be to facilitate carbon sequestration activities internationally... We will work through our Wildlife Without Borders and Multinational Species Programs to provide funding and technical assistance to increase carbon sequestration, restore habitat and increase connectivity.

FEDERAL INTERDEPARTMENTAL

Interagency Grizzly Bear Committee Memo Re: Support for the concept of linkage zones

...Habitat fragmentation is one of the issues complicating the conservation of grizzly bears and many other species of wildlife. Habitat fragmentation is the process of separating populations of animals and their habitats into smaller and smaller units. Small, fragmented populations of any species are less likely to survive. The main factor causing habitat fragmentation is human development, especially when development occurs in a linear fashion. Development in mountain valleys and transportation systems such as highways and railroads are common problems for wildlife. If we do not maintain the opportunities for linkage of wildlife populations across these areas of human development, we will have difficulty securing the future of wildlife species such as the grizzly.

To address the issue of habitat fragmentation, the IGBC supports the identification of those areas within and between the major grizzly bear ecosystems where wildlife can live or move between existing large blocks of relatively secure habitat. These areas are called linkage zones. Linkage zones occur primarily between large blocks of public lands. Cooperation and coordination between public land managers, fish and game agencies, private landowners, and state and federal transportation agencies is required to maintain linkage zones that work for wildlife. The IGBC supports this cooperation and coordination.

Especially important in this effort is the cooperation and support of state and federal highway departments to work with wildlife agencies to enhance crossing possibilities for wildlife within linkage zones. A critical part of this effort is support of research and monitoring to identify the best sites for crossing enhancement structures, and the design and placement of such structures at such sites when the opportunity arises through highway improvement and redesign. We urge highway departments to cooperate in this effort.

Another key factor in linkage zone implementation is close and careful cooperation with private landowners to allow them to participate in linkage zone implementation if they choose to do so. The IGBC supports a careful approach that involves private landowners, local governments and all stakeholders in linkage zone activities.

In summary, the IGBC believes linkage zone identification and the maintenance of existing linkage opportunities for wildlife between the large blocks of public lands in the range of the grizzly bear are fundamental to healthy wildlife. Wildlife habitat conservation and the eventual recovery of listed species such as grizzly bears will require connections between populations. Maintaining linkage opportunities will benefit all wildlife species and will help assure healthy populations of the wildlife species we all value.
