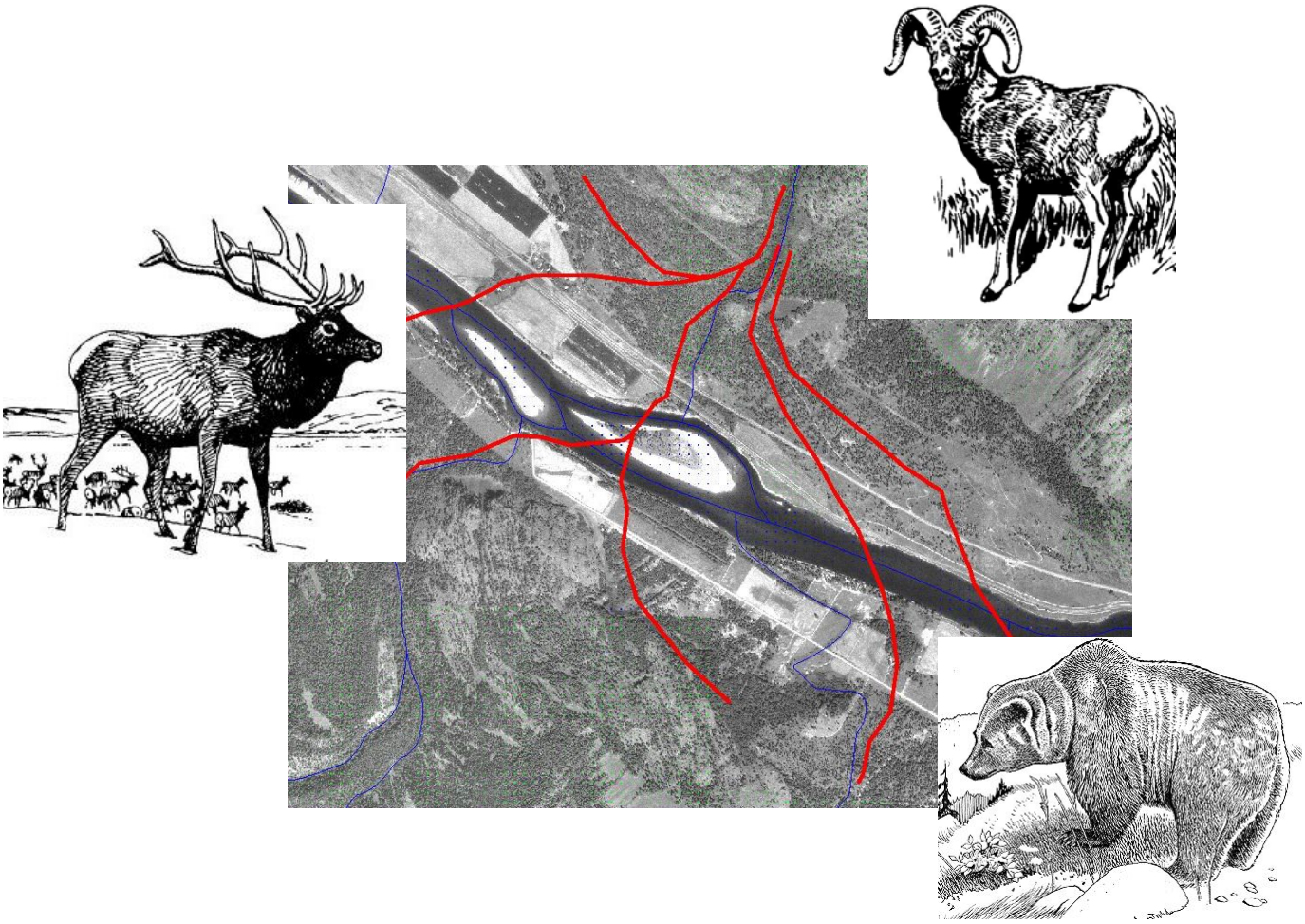
Identifying and Managing Wildlife Linkage Approach Areas on Public Lands

A Report to the

Interagency Grizzly Bear Committee



Prepared by the

IGBC Public Lands Wildlife Linkage Taskforce

June 17, 2004

Habitat fragmentation is one of the issues complicating the conservation of grizzly bears and many other species of wildlife….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….Maintaining linkage opportunities will benefit all wildlife species and will help assure healthy populations of the wildlife species we all value.

Interagency Grizzly Bear Committee, 2001

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INTRODUCTION

Background

The Grizzly Bear Recovery Plan (U.S. Fish and Wildlife Service 1993) outlines numerous tasks required to achieve recovery of the grizzly bear (*Ursus arctos*), a species listed as threatened in the conterminous United States under the federal Endangered Species Act of 1973 as amended (PL 93-205). Task #37 of the Plan calls for evaluation of linkage potential between grizzly bear recovery zones. U.S. Fish and Wildlife Service completed the report *Identification and Management of Linkage Zones for Grizzly Bears Between the Large Blocks of Public Land in the Northern Rocky Mountains* (Servheen *et al*. 2001, hereafter referred to as "Linkage Report") in fulfillment of that task.

The Interagency Grizzly Bear Committee (IGBC) sanctioned the Linkage Report (IGBC 2001) and recognized that linkage is an issue affecting not only grizzly bears, but many other wildlife species as well. Subsequently, the Linkage Report was revised to be applicable to wildlife in general rather than just grizzly bears (Servheen *et al.* 2003). The importance of maintaining wildlife linkage in the northern Rocky Mountains is an issue that is recognized by federal, state and county governments, conservation organizations, and many others, in addition to IGBC. It is an issue that encompasses not only wildlife conservation, but also human safety and economics, since vehicle-wildlife collisions on highways result in many human fatalities and injuries each year and cost millions of dollars in property damage.

In 2002, IGBC chartered three groups to further develop the concepts in the Linkage Report (Servheen *et al.* 2001) with respect to priority highway segments. The three groups are: the Public Lands Taskforce (Appendix 1), the Private Lands Taskforce, and the Highways Taskforce. Refer to the Linkage Report (Servheen *et al.* 2001) for background information on the need for and mission of each group. The Public Lands Taskforce "Charter" is contained in Appendix 3.

Fracture Zones

- In the context of this report, linkage refers to successfully moving animals across "fracture zones". Fracture zones are highways, railroads and similar potential barriers to wildlife movement and the adjacent developed private lands, typically in mountain valleys between large tracts of public lands.
- Linkage across fracture zones is only one aspect of the broader issue of habitat fragmentation. Habitat fragmentation through forest management activities (eg. vegetation patch size, forest road management, etc.), while important, is not addressed in this report. Rather, it is being addressed through other agency avenues such as the land management planning process.

This report is the final report of the Public Lands Taskforce in fulfillment of our charter. For purposes of this report, public lands are defined as lands administered by federal or state government agencies primarily for natural resource management.

Problem Statement

The following problem statement is excerpted from the Linkage Report (Servheen et al. 2003).

> Habitat fragmentation occurs when contiguous blocks of habitat are broken into pieces, with the pieces being separated from one another by unsuitable habitats. Habitat fragmentation is usually accompanied by habitat loss. [Wildlife] populations that are dramatically reduced in size and isolated from one another on small habitat "islands" are at increased risk of extinction. Extinction risk increases because small populations are less able to absorb losses caused by random environmental, genetic, and demographic changes. The primary causes of wildlife habitat fragmentation are human activities such as road building, and residential, recreational, and commercial developments. When developments reach a certain concentration, they become impermeable and are termed "habitat fracture zones".

In addition to the ecological problems caused by habitat fragmentation, wildlife attempting to cross fracture zones present a significant human safety hazard and a major economic impact due to wildlife-vehicle collisions.

The **goal** of this report is to provide the knowledge and processes to address these problems on the public lands portions of linkage zones. This goal is met by achieving the four functions described below.

Utility of this Report

This report potentially serves four functions. First, it provides a useful tool to public land managers for their use in developing and revising land and resource management plans. By using this tool, land managers can ensure that their plans will maintain wildlife linkage so far as public lands are concerned.

Second, the report presents the results of wildlife linkage assessments in three specific high priority areas in northern Idaho and western Montana (U.S. Highway 95, Montana Highway 200 and U.S. Interstate 90). Managers in these areas may choose to incorporate the results of these case study assessments into their land management and project-level planning to meet the objective of providing for wildlife linkage.

Third, the protocols developed in this report can be used as a template by agencies in other locations throughout the northern Rockies, the United States, and even other countries to assist in maintaining healthy wildlife populations where habitat fragmentation due to human development in fracture zones is a threat.

Fourth, this report is complimentary to and will provide supportive information for the IGBC private lands and highways linkage taskforces as they continue to pursue their work with private landowners and highway structures.

Coordination with Other Efforts

Wildlife linkage across the valleys of the northern Rockies can only be maintained through appropriate consideration in three areas: 1) the public lands which serve as approach areas on the side-slopes of these valleys, 2) the private lands in the valley bottoms, and 3) the highways, railroads and other human developments that bisect the valley bottoms, creating habitat fracture zones that potentially cut off animal movements. The public lands linkage taskforce focused on only one of these areas, the public lands. However, our work has been coordinated with the private lands and highways taskforces and is complimentary to the work of those groups. Only by all three of these groups working closely together, whether in the three specific locations we considered in northern Idaho and western Montana, or wherever linkage is a consideration, will wildlife linkage be effectively maintained.

So universally important is the concern for wildlife linkage that other groups and entities have also been active in the pursuit of linkage objectives. Our public lands linkage taskforce coordinated closely with some of these other efforts, including the Interstate 90 initiative spearheaded by American Wildlands, wildlife crossings research on Interstate 90 being conducted by U.S. Fish and Wildlife Service and the University of Montana, the U.S. Forest Service Highways Ecology Program, and highways linkage work ongoing by Montana Department of Transportation and Idaho Transportation Department. Other ongoing efforts, such as the U.S. Forest Service culvert inventory program, are complimentary to the efforts of the Public Lands Linkage Taskforce.

During the preparation of this report, the Public Lands Taskforce consulted with many other individuals, groups, and agencies who have an interest in wildlife linkage. A list of these contacts is contained in Appendix 2.

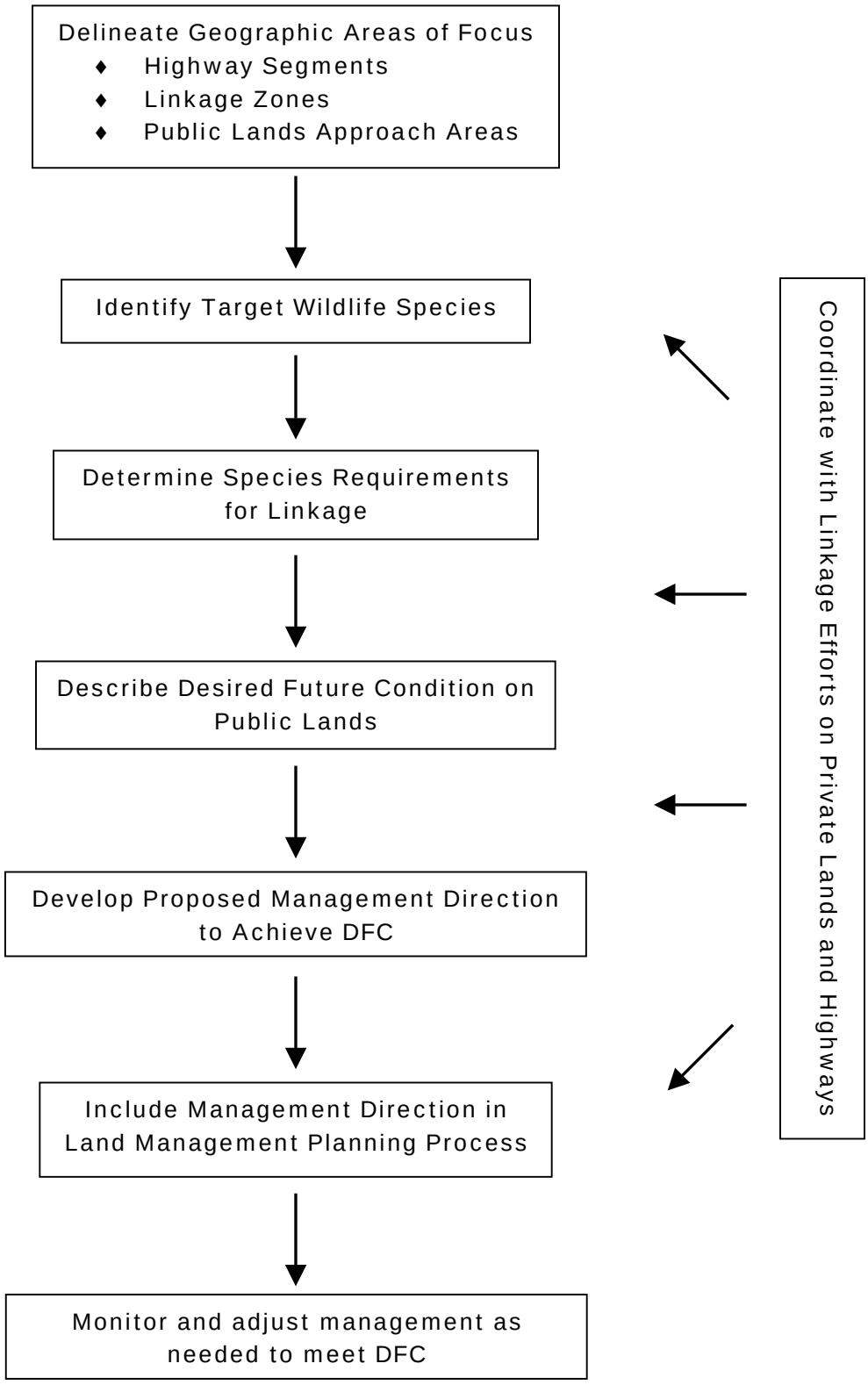
As stated earlier, maintaining linkage across fracture zones is only one part of addressing the habitat fragmentation issue. This report should provide the tools to address fragmentation due to highways and similar human developments during the public land management planning process. The issue of forest fragmentation (e.g. vegetation patterns, forest roads, etc.) is also important and is being addressed on National Forest System lands in the Northern Rockies through the land management planning process.

Any discussion of linkage must address the issue of scale. The Public Lands Taskforce identified three scales at which, as a minimum, wildlife connectivity should be addressed (Appendix 4). Linkage across fracture zones, as addressed in this report, is a local scale issue that is appropriately addressed by a fine-filter analysis. Other linkage scales are equally important and should be addressed in land management planning.

PROCESS USED FOR PUBLIC LANDS LINKAGE ASSESSMENT

The Public Lands Linkage Taskforce used the process shown in Fig. 1 to assess wildlife linkage along the three previously identified highways in western Montana and northern Idaho and to develop linkage management recommendations for

Figure 1. Process used by Public Lands Linkage Taskforce.



public lands in these areas. In addition, the process was developed in such a way that it can be used as a template to establish management direction for public lands along any highway segment, regardless of location. Each step within the process is described below.

Step 1 – Delineate Geographic Areas of Focus

Delineating the geographic area of focus involves several sub-steps.

Transportation Corridors – Using whatever prioritization process may be appropriate, the transportation corridor where linkage is to be provided must be selected. In the case of the Public Lands Taskforce, the Linkage Report (Servheen et al. 2003) identified three high priority transportation corridors, and direction to focus on these corridors was included in our charter. Three highways of concern within these transportation corridors are Montana Highway 200 in the lower Clark Fork valley, U.S. Highway 95 in the Idaho panhandle, and U.S. Interstate 90 in the Clark Fork and St. Regis River valleys. Results of our work on these highways are presented in the Case Examples section of this report.

Linkage zones – Once a highway has been selected, specific linkage zones crossing the highway must be identified. The Linkage Report (Servheen et al. 2003) identifies potential linkage zones across numerous highways in the northern Rockies, based on a computer model that considers various landscape characteristics. The results of this model for our three selected highway segments were validated or adjusted by additional data on animal movements and road-killed wildlife and the knowledge of local resource managers. Linkage zones across Interstate 90 (Fig. 2) were validated or adjusted by knowledgeable resource managers in a meeting at Missoula, MT on October 24, 2003. Linkage zones across Highway 200 (Fig. 3) were delineated in a similar meeting at Paradise, MT on March 11, 2004. In each of these meetings the services of a Geographic Information Systems (GIS) specialist were contracted to display various data overlays, including the linkage zones identified in the Linkage Report (Servheen et al. 2003), topography, land ownership, road-killed animals, and any available data on local animal movements. Resource managers then collectively applied their knowledge to refine the boundaries of linkage zones.

Along Highway 95 in northern Idaho, work on linkage zones has been ongoing for several years. For this area, no further delineation of linkage zones has been completed by our taskforce. However, an interagency meeting is planned for June 21, 2004 to undertake this task.

Public Lands Approach Areas – Once the linkage zones are delineated, it is necessary to identify the adjacent areas on public lands that will be managed to facilitate animal movements. The Taskforce discussed at length various methods for delineating these approach areas, including development of “rule sets” that would mechanically guide the mapping of these areas. So much local variation exists in topography, land ownership, animal movement patterns, human developments, and other environmental factors, however, that it is impossible to develop a rule set that works in every situation. As an alterative, the taskforce

Figure 2. Linkage zones across Interstate 90 in northwestern Montana.

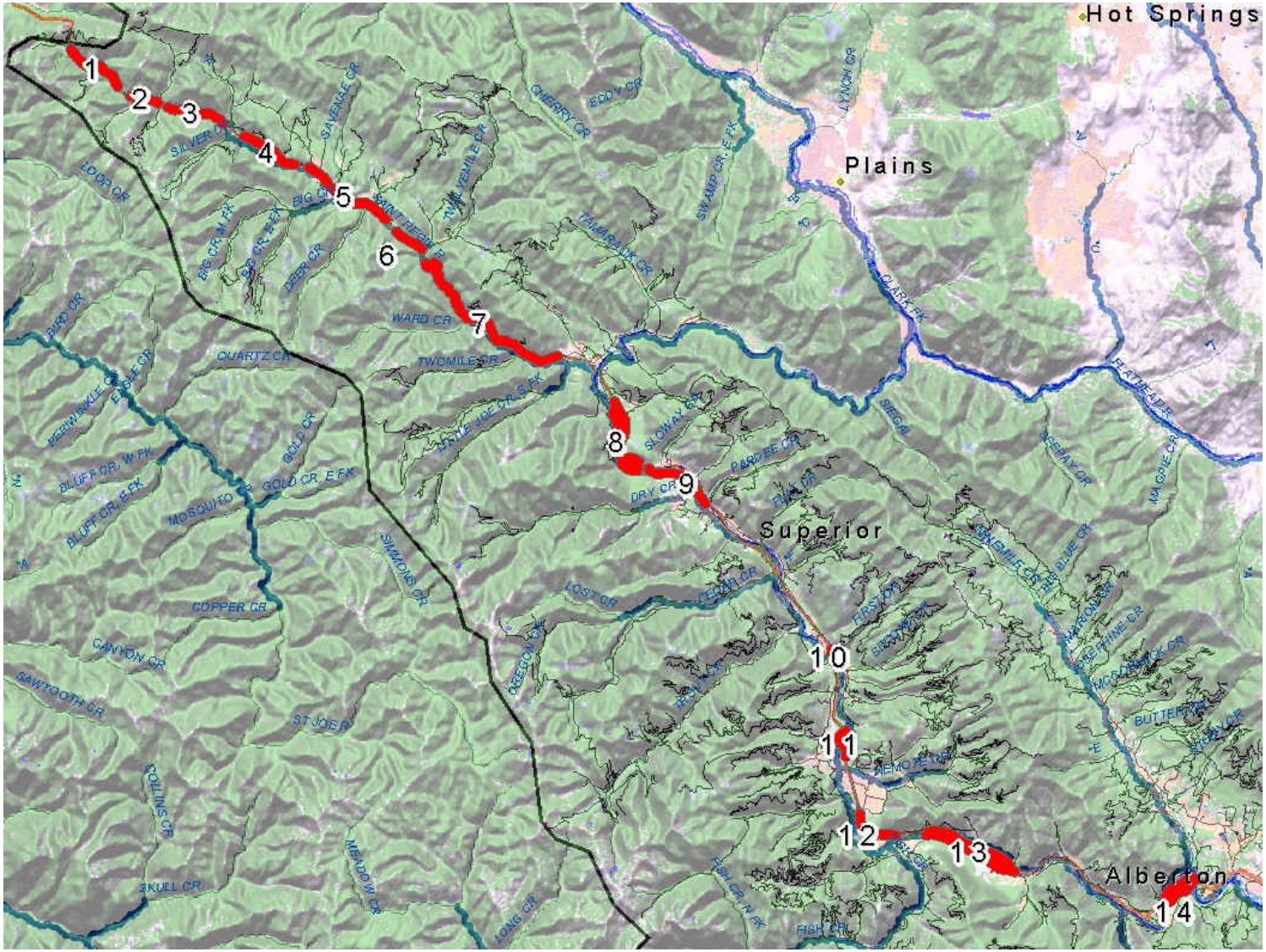
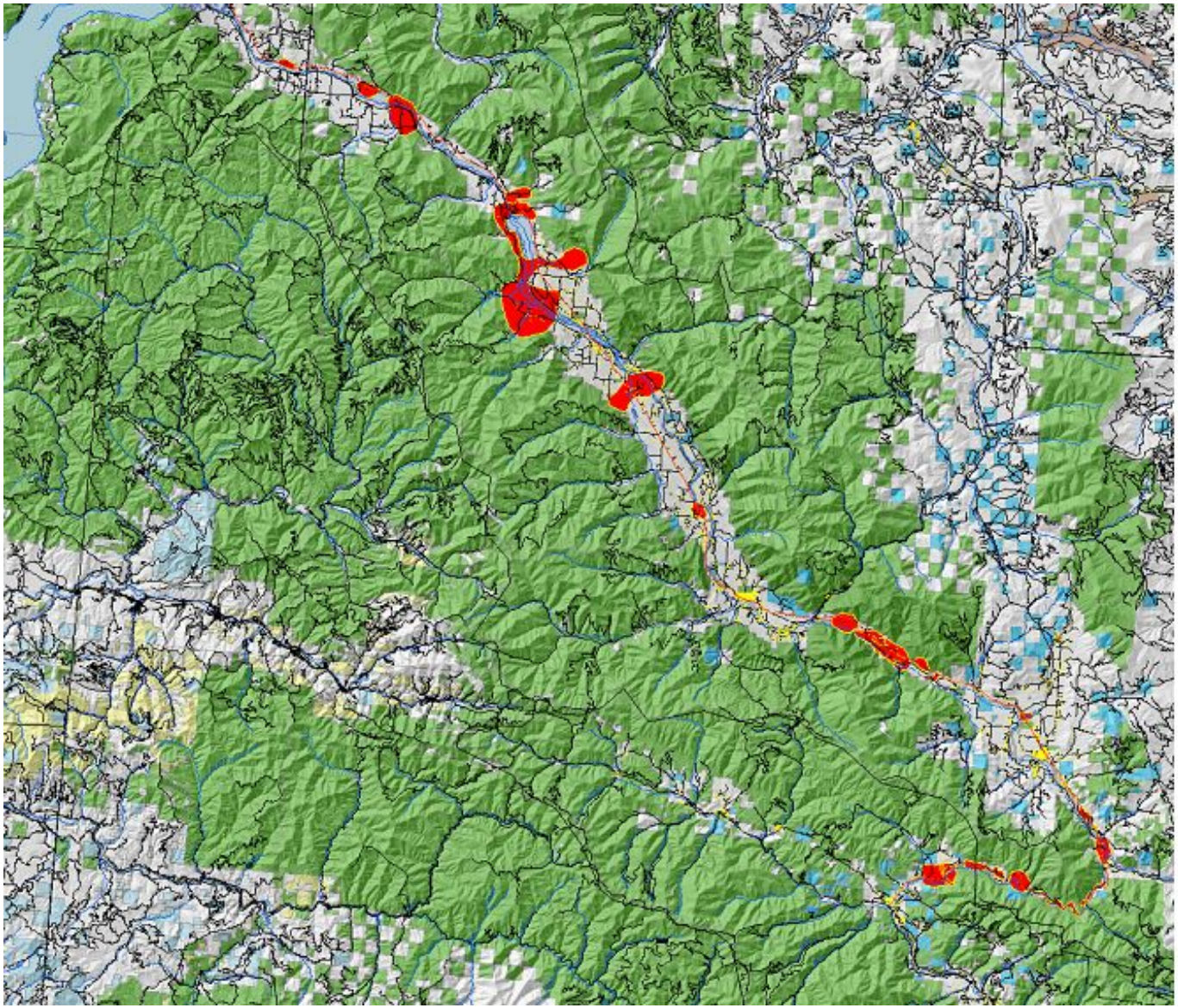


Figure 3. Linkage zones across Montana Highway 200 in northwestern Montana and northern Idaho



developed a list of factors (Fig. 4) that should be considered when delineating public lands linkage approach areas. Resource managers can then use these considerations along with their local knowledge to site-specifically delineate public land approach areas that make sense for each individual linkage zone. See the case examples section of this report for examples of how this was done.

Figure 4. Considerations for delineating linkage approach areas on public lands

- Topography
- Habitat quality
- Road density
- Riparian presence
- Human developments and activities
- Vegetative cover
- Land ownership patterns
- A measure of the relative mobility of the target species (daily movement radius, home range size, etc.)

Public lands approach areas are most appropriately delineated during landscape-level analyses, based on programmatic guidance in Forest Plans. Project-level planning within linkage zones should also consider local wildlife needs for cover, forage, and movement.

Step 2 – Identify Target Wildlife Species

The delineation and management of linkage zones and public lands approach areas could vary widely, depending on the specific habitat needs of the species being managed. Therefore, it is necessary to carefully consider what species should be targeted within each linkage zone. For purposes of this report, ungulates, carnivores, and one bird species were targeted. These are the appropriate species for the three priority highway segments being addressed. Many other species exist in these areas, but either are primarily a private lands and highways issue (e.g. reptiles, amphibians, fish), are highly mobile (most bird species), or human safety and wildlife population status are not currently an issue (e.g. small mammals).

The case examples in the next section describe the target species selected for each of the three priority highway segments. When this process is applied to other highways, local wildlife managers should be consulted to determine the appropriate target species in those areas. The process of identifying target species should consider, at a minimum, the factors shown in Fig. 5.

Figure 5. Factors to consider in identifying target species

- Suite of species locally present
- Presence of species of special concern
- Mobility of species
- Wildlife road-kill data
- Suitable habitat on each side of fracture zone

Step 3 – Determine Species Requirements for Linkage

Habitat that may provide excellent linkage for a salamander may not work at all for an elk. Thus, it is necessary to consider the specific habitat requirements for each target species. Information on habitat requirements will be used later in Steps 4 and 5 to describe the desired future condition and develop management recommendations.

When determining habitat requirements, it is critical that the best available scientific information be used, and that the sources of the information be well documented. An example of documenting species habitat requirements based on the scientific literature is shown in Table 1. Species listed in this table are the target species selected for the case examples in the next section.

Step 4 – Describe Desired Future Condition on Public Lands

The desired future condition (DFC) of linkage approach areas on public lands should closely reflect the habitat requirements of the target species. Perhaps one species requires the security afforded by low road densities. Perhaps another species requires movement up and down riparian zones. Still another species may require certain types, amounts and arrangements of vegetative cover. The collective habitat requirements of all target species must be met within a linkage zone in order to provide successful use by all the species. The DFC must provide for all these needs.

The following generic DFC statement is provided as a starting point for describing desired conditions within public lands linkage approach areas. It may be modified as needed to reflect the needs of identified target species or other conditions at the site-specific level.

Desired Future Condition of Wildlife Linkage Zone Approach Areas on Public Lands

On the public lands portion of wildlife linkage zones (i.e. “the approach areas”), life requisites necessary for the subsistence of target species are met. The opportunity for natural movements within the approach areas, and to find security before and after moving across private lands, highways and other fracture zone features, is provided. Meeting the species’ life requisites includes providing natural foods, cover, and security in a manner that facilitates movement, limits mortality risk, and limits disturbance and displacement by humans.

Step 5 -- Develop Proposed Management Direction to Achieve DFC

Ecosystems are dynamic, and in most instances management actions are needed to achieve or maintain the DFC. These management actions are guided by management direction. In effect, this is the set of “instructions” land managers will implement to achieve or maintain a DFC on the ground that meets the habitat

Table 1: Habitat considerations for selected species in linkage zone approach areas.

	Female Approximate Annual Home Range Size	Average Daily Movement Distance	Relative Road Density Concern Level	Relative Riparian Use Level	Vegetation Cover/Non-Cover Ratio	Relative Human Development Tolerance	Topography Important Use Areas	Elevation and/or Aspect	Relative Winter Human Use Concern
Grizzly Bear	574 km^2 (206 mi^2) *(18)*	2-3 km (1-2 mi) *(33, 34)*	High for both open and total road densities *(8, 28, 30)*	High *(14, 15, 18, 27)*	Small openings ≤200 m (≤650 ft)	Low *(8, 14, 15, 16, 27, 28, 30, 61)*	Riparian, Snowchutes, Grass sidehills Berryfields *(14, 15, 18, 27)*		Moderate *(61)*
Wolf	480 km^2 (172 mi^2) *(9, 23)*	14 km (9 mi) *(9, 23)*	Moderate (prey based) *(8, 23)*	Moderate *(9, 23)*	40:60 (prey based) *(9, 23)*	Moderate *(8, 9, 23, 64)*	Rendezvous sites *(23)*		Moderate *(8)*
Lynx	65-129 km^2 (23-46 mi^2) *(24, 25, 61)*	3 km (2 mi) *(24, 25, 26)*	Moderate. No research available, suspect low open road density due to risk of trapping mortality *(24, 25)*	Moderate *(24, 25, 26)*	70:30 *(24, 25)*	Moderate *(24, 25, 26)*	Ridges Riparian Gentle slopes *(24, 25, 26)*	> 4500 ft *(24, 25, 26)*	High *(24, 61)*
Wolverine	350 km^2 (135 mi^2) *(3, 61)*	5 km (3 mi) *(3)*	High. Low open road density due to risk of trapping mortality *(26, 61)*	Low	Prefers cover *(26)*	Low *(3, 26)*	Rock outcrops Snow Chutes *(26)*		High *(8, 26)*
Fisher	5-30 km^2 (2-11 mi^2) *(1, 10, 11, 26, 35, 61)*	5 km (3 mi) *(1, 10,26, 35)*	High. Low open road density due to risk of trapping mortality *(11, 26, 29, 61)*	High *(1, 10, 11, 26, 61)*	Closed canopy. Avoid openings *(1, 10, 11, 26, 29, 35, 36)*	Moderate *(10, 61)*	Riparian Concave, Lower slopes *(1, 10, 11, 35, 61)*	< 4500 ft *(11, 35)*	Moderate *(10)*
Black Bear	26 km^2 (10 mi^2) *(15)*	0.5-1 km (0.3-0.6 mi) *(63)*	Moderate *(8)*	High *(15)*	Prefer dense understory and tree size for escape *(15, 17)*	Moderate *(8, 16)*	Riparian Snow chutes Berry fields *(15, 17)*		Moderate *(61)*

	Female Approximate Annual Home Range Size	Average Daily Movement Distance	Relative Road Density Concern Level	Relative Riparian Use Level	Vegetation Cover/Non-Cover Ratio	Relative Human Development Tolerance	Topography Important Use Areas	Elevation and/or Aspect	Relative Winter Human Use Concern
Elk	31 km^2. (11 mi^2) *(5, 52)*	0.5-1 mi *(5, 62)*	High for open roads *(8, 12, 19, 20, 32, 51, 52, 54)*	Moderate *(52)*	40:60 *(52, 55)*	Moderate *(8, 12, 20, 51, 53)*	Riparian, ridges/saddles *(12, 20, 52)*	South to West aspect in winter *(12)*	High *(8, 20, 32, 61)*
Deer (Wt, Md)	5 km^2- Wt (2 mi^2) 27 km^2- Md (10 mi^2) *(21, 58)*	0.25 mi *(62)*	Low *(21, 32, 60)*	Moderate *(21)*	70:30 - Wt 40:60 - Md	High *(21, 60, 61)*	Dense deciduous woodland – Wt Steep, rocky, open terrain– Md *(21, 58)*	South to West aspect in winter	Moderate *(59, 61)*
Moose	40 km^2 (14 mi^2) *(6, 22, 56, 57)*	1-3 km (0.6-1.9 mi.) *(6, 22)*	Low *(6)*	High *(6, 7, 22, 57)*	50:50	Moderate	Riparian, deciduous shrubs *(6, 7, 22)*		Moderate *(61)*
Bighorn Sheep	78 km^2 (30 mi^2) *(2, 40)*	1-3 km (0.5-2 mi) *(2, 38, 39, 62)*	Moderate. Low open road density due to risk of stress-induced disease and accidents *(50)*	Low	Prefer open habitat *(2)*	Moderate *(2, 41, 50)*	Steep, rocky, open terrain *(2, 31, 37)*		Moderate *(61)*
Harlequin Duck	8 km (3 mi) of linear stream *(42)*	1-2 km (0.6-1.2 mi) *(42)*	High in riparian area. Avoid disturbance of breeding birds, limit access to breeding streams, maintain cover, minimize sediment *(4, 43, 46, 47, 48, 49)*	High *(4, 13, 43, 44, 45, 46)*	Prefer dense riparian habitat *(4, 43, 44, 45, 46)*	Low *(4, 43, 47, 48, 49)*	Riparian, low gradient, swift streams *(4, 13, 43, 44, 45, 46)*		None

Italicized numbers in parentheses at bottom of cells key to references in Literature Cited.

requirements of target species. Management direction may be in the form of goals, objectives, guidelines or standards.

In developing potential management direction, often the requirements of one species are more stringent than those of another. For example, perhaps habitat security is important to both grizzly bears and mule deer, but bears may require a greater level of security than do deer. In such cases, the target species with the most stringent requirements must be used to establish management direction, or the needs of all target species will not be met.

Table 2 contains a list of recommended management direction for maintaining wildlife linkage across the three highways considered in this report. Depending on target species in each area, all recommendations may not apply for each highway. See the case examples in the next section for identification of which recommendations apply to which linkage zones.

Step 6 – Include Management Direction in Land Management Planning Process

Management direction such as goals, objectives, guidelines and standards cannot be applied to future agency actions until it has been adopted using an appropriate process. For federal lands, this is the land and resource management planning process. Public involvement is an integral part of this process. Alternatives to the proposed management direction may be developed and evaluated, culminating in a final decision about future management direction within public lands linkage approach areas.

During the planning process, proposed management direction will be compared to current management direction, and the need for change, if any, will be determined. If change is necessary in an area that has been identified as a linkage area, then an amendment or revision of the land and resource management plan is required.

Special Note

This report contains recommendations for maintaining wildlife linkage on specific areas of public land. These recommendations were developed as a part of fulfilling the charter of the Public Lands Linkage Taskforce. While it is hoped that these recommendations will be useful tools for land and resource management planners and decision-makers, this report is not a part of the planning process, as not been reviewed by the public, and is not management direction for these areas. Rather, it describes a process and provides examples of how wildlife linkage may be secured or maintained through the planning process. The concepts contained in this report are based on the best scientific information currently available for addressing wildlife linkage across fracture zones.

Table 2. Recommended management direction to maintain wildlife linkage on public lands along Montana Highway 200, U.S. Highway 95, and Interstate 90.

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

Step 7 – Monitor and Adjust Management as Needed to Meet DFC

Monitoring is an important step in any management action. The effectiveness of linkage zones should be monitored to determine if management actions were successful in meeting or maintaining the desired condition. If not, then adaptive management principles should be applied. Changes in management direction would require Forest Plan amendment or revision.

CASE EXAMPLES

Montana Highway 200 (Lower Clark Fork Valley)

Linkage Zone Location: The Trout-Whitepine linkage zone is located across Montana Highway 200 in the lower Clark Fork valley between Thompson Falls and Trout Creek, MT. The linkage zone lies between mileposts 31 and 34 on the highway. The legal description is Township 24 North, Range 31 West.

Linkage Zone Description: Public lands cover the upper and mid-slope positions of several small face drainages and the lower slopes of the Vermilion River drainage.

The Trout-Whitepine linkage zone connects the mouth of Vermilion River on the north side with the Beaver and Whitepine drainages on the south. The Vermilion drainage is within the Cabinet-Yaak Grizzly Bear Recovery Zone. Much of the drainage in the vicinity of the linkage zone is roadless. The Beaver/Whitepine Creek side is within the Clark Fork Occupancy Area for grizzly bears. Both Whitepine and Beaver Creek drainages are roaded. The Trout Creek Roadless Area is located immediately north of Whitepine Creek, approximately 3 miles west of the linkage zone.

The Clark Fork valley in the vicinity of the linkage zone is approximately 3 miles wide. Noxon Reservoir lies in the valley bottom and at this point is approximately 400 yards wide. The valley bottom is entirely in private holdings, except for a two-lane highway and railroad. Relatively large parcels of private property ($\geq$40 acres) are fairly common in the area. Scattered family residences occur on the private lands. There is one small subdivision east of Vermilion Bay and north of Noxon Reservoir. Private land extends one to two miles out from Highway 200.

The forest in this area is mixed conifer, primarily Douglas fir, grand fir, western hemlock, ponderosa pine, and larch. The vast majority of stands are 80 to 90 years old, having regenerated from the 1910 wildfires. The cover to non-cover ratio in the area is 83:17.

Target Species: The target species for this area are: grizzly bear, wolf, lynx, elk, deer, moose, fisher, and black bear. The target species were selected based on: 1) National Forest and State wildlife records, 2) Montana Department of Transportation road kill data, and 3) availability of suitable habitat for the species on both sides of the fracture zone.

Desired Future Condition: The Trout-Whitepine approach areas (public lands at each end of the linkage zone) provide the life requisites necessary for the subsistence of all target species. Forest stands provide cover and security habitat on 40-50 percent of the approach area lands. The opportunity for natural movements in the approach area before and after crossing private lands and the fracture zone (Highway 200 and railroad tracks) exists. Open and total linear road densities remain at or below present levels. Current Forest Plan direction (as amended March, 2004) is capable of providing the desired future condition.

Linkage Approach Areas: The approach areas (Fig. 2) were drawn using identifiable features (ridges, roads, streams, property boundary) and were based on 1) daily movement distances for the target species (average of 3 miles used for this example), and 2) reduced effects from human activity along the fracture zone (due to distance, topographic features and/or vegetative cover). The approach area boundaries on either side of the linkage zone start and end at logical points within the daily movement distances for the target wildlife species.

The portion of the approach area on the southwest side of Highway 200 was drawn from the private land boundary west along the divide ridge between Whitepine Creek and Little Trout Creek for a distance of about 6 miles. The line then turns north and runs down a ridge that divides Little Trout Creek from Trout Creek to the private land boundary. These ridge locations were selected because 1) they provide the best visual and sound break from Highway 200, 2) the distance is adequate to meet the daily movements of the target species, and 3) the amount of public lands included in the approach area is sufficient to meet habitat needs of the target species for a short time period.

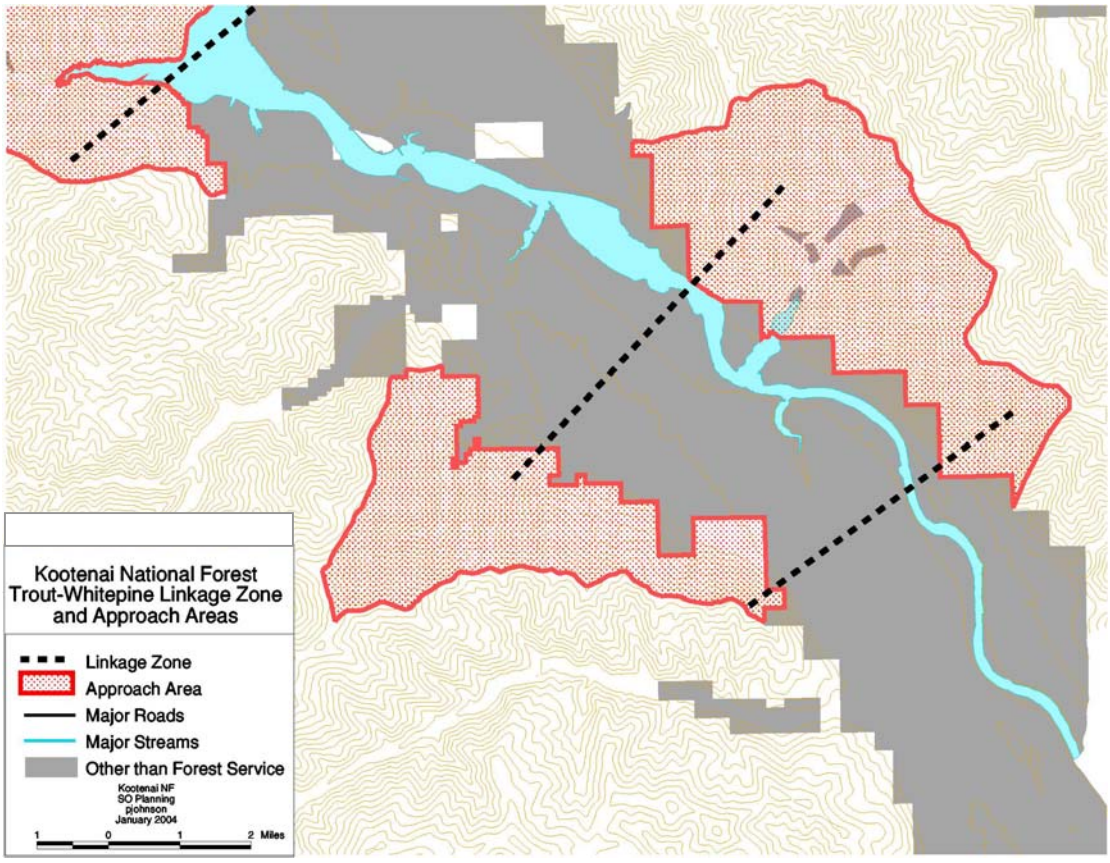
The portion of the Trout-Whitepine approach area northeast of Highway 200 was drawn from the private land boundary east up a small ridge to Copper Ridge then over Copper ridge and down the divide ridge between Roe Creek and the West Fork Canyon Creek. It then extends southeast up another small ridge and finally turns southwest down the watershed boundary for Water Gulch to the private land boundary. These ridge locations were selected because 1) the distance is adequate to meet the daily movements of the target species, 2) the amount of public lands included in the approach area is sufficient to meet habitat needs of the target species for a short time period, and 3) they provide an area of public land to allow animals to move around private land in-holdings along the Vermilion River and across Forest road 154.

This process results in the public lands portion of the Trout-Whitepine approach areas being about 25 square miles in size (15 north and 10 south of highway 200), with all but 183 acres on National Forest Land. The private land acres are in five small in-holdings (homesteads or patented mining claims) along the Vermilion River.

Management Recommendations: Management recommendations 1, 2, 3, 5, 6, and 8 (Table 2.) apply to the Trout-Whitepine approach areas.

Recommendation number one would be met by designation of the

Figure 6. Trout-Whitepine linkage zone and public lands approach areas.



approach areas on each side of the fracture zone. There are no public recreation developments present and no apparent opportunities to construct new sites; therefore, recommendation two can be met. There are no apparent opportunities or needs to construct any other type of development on public lands, so recommendation three can be met. The area is used during hunting season and some roads are closed to use during that season. This meets recommendation five. The approach areas are either in a grizzly bear management unit with low road densities or in a grizzly bear reoccurring use area that has a no net increase standard for both open and total linear road miles. This meets recommendation six. There is one large single-owner block of private land south of the reservoir and north of highway 200 that should be given high priority for private land conservation efforts.

U.S. Highway 95 (Idaho Panhandle)

Linkage Zone Location: The McArthur Lake linkage zone is situated between Bonners Ferry and Sandpoint, Idaho, in the geographically narrowest (less than 5 miles across) forested strip of the valley between the Selkirk and the Cabinet Mountains (Purcell Trench). The fracture zone is defined as U.S. Highway 95

between mileposts 489 and 499, from approximately two miles North of Walsh Lake to the Twentymile Creek crossing, with McArthur Lake at the center (Fig. 7).

Linkage Zone Description: This area is important for wintering big game, including deer and moose, and is a critical linkage zone for wildlife, including lynx, grizzly bears and numerous other species. The area also has an important wetland, McArthur Lake. In general, the area consists of mixed ownership across the valley, with private lands containing farms, forest lands, and a relatively high degree of recent development in the form of home building. In addition, the valley funnels several major travelways: U.S. Highway 95; two major rail lines (Burlington Northern Santa Fe and Union Pacific); a power transmission line; and a natural gas pipeline. These attributes invite conflict with wildlife by vehicles and homeowners.

U.S. Highway 95 is a recognized threat to the connectivity across the valley. With an average daily traffic (ADT) of approximately 4,600 vehicles/day and growing, Highway 95 is a major barrier to animals such as grizzly bears, and a major source of mortality for other animals, particularly ungulates. High rates of animal/vehicle collisions have occurred. Initial data collection indicates animal/vehicle mortality rates of more than two dozen big game animals each winter and spring, and many more individuals of smaller species such as otters and coyotes. These mortality rates are significantly higher than the rest of Highway 95 from Bonners Ferry to Coeur d'Alene, where sample roadkill data collection indicates 6-7 times the number killed on the entire rest of the 65 mile stretch (S. Jacobson, pers. comm.).

The McArthur Lake linkage zone has been identified in both the Grizzly Bear Recovery Plan and the Lynx Conservation Assessment and Strategy, and is a critical resource for ecological connectivity of the Selkirk Mountains with the Cabinet and Purcell Mountains. These mountain ranges are important wildlife conservation areas, supporting populations of many species of interest and concern.

The linkage zone (Fig. 8) encompasses approximately 96,560 acres, nearly 41percent of which are in private ownership (39,120 acres). While more than 17,000 acres are in large parcels belonging to industrial forest owners (Forest Capital Partners and Stimson Lumber Company), nearly 22,000 acres belong to various private parties and are in much smaller parcels. The major public landowners are the Idaho Panhandle National Forests (35,967 acres; 37 percent) and the State of Idaho (20,302 acres; 21 percent), with the Bureau of Land Management contributing another 1,171 acres. It is important to note that there is relatively little Federal property within three miles of Highway 95.

There are no buildings or permanent residential structures on Federal lands in the linkage zone. The only known buildings/residences on State lands are the residence and maintenance buildings at the McArthur Lake Wildlife Management Area (WMA), immediately adjacent to Highway 95 and the rail lines.

Private holdings, by contrast, have shown significant development in recent years (excluding industrial forest lands). Development activity has been

Figure 7. General location of McArthur Lake wildlife linkage zone.

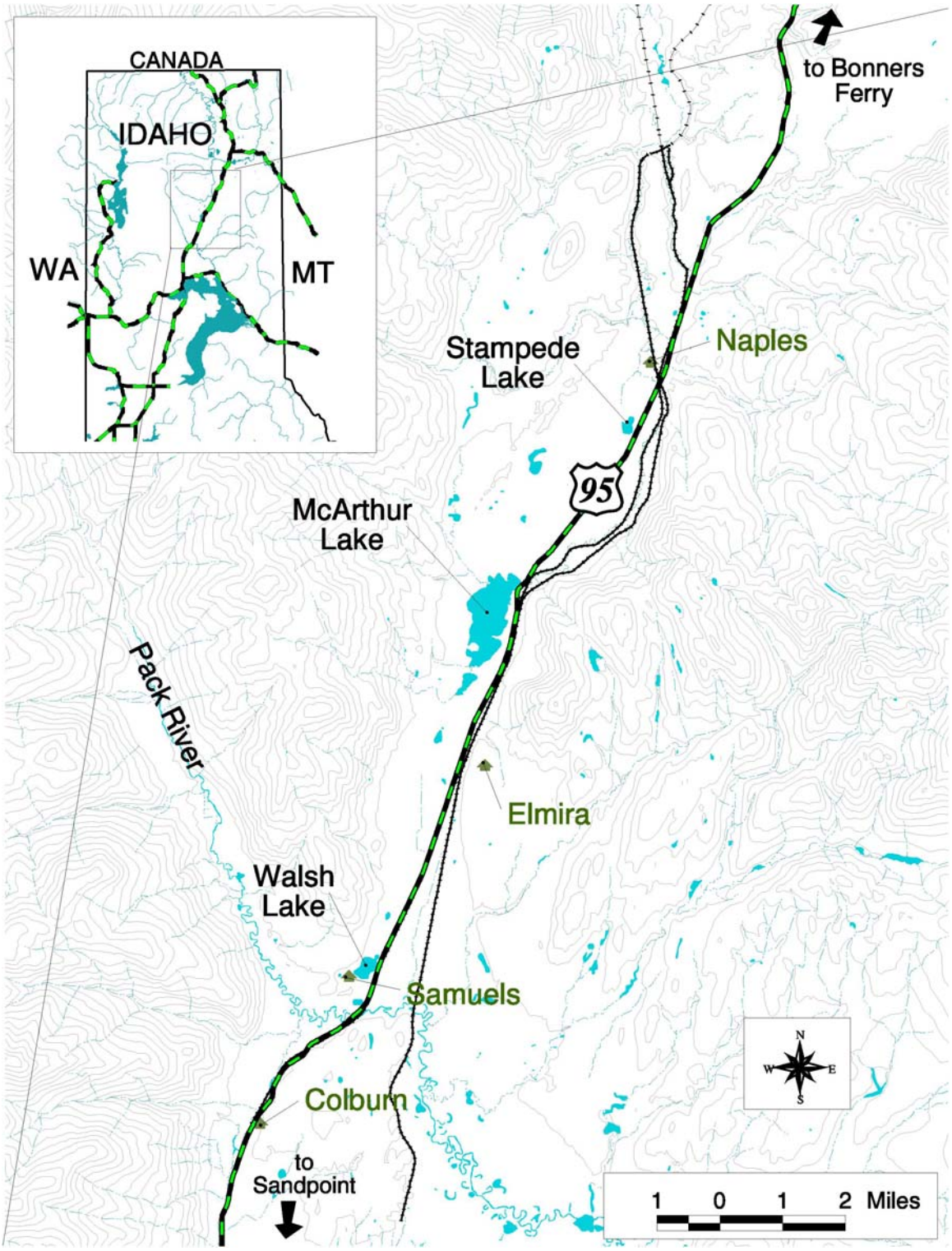
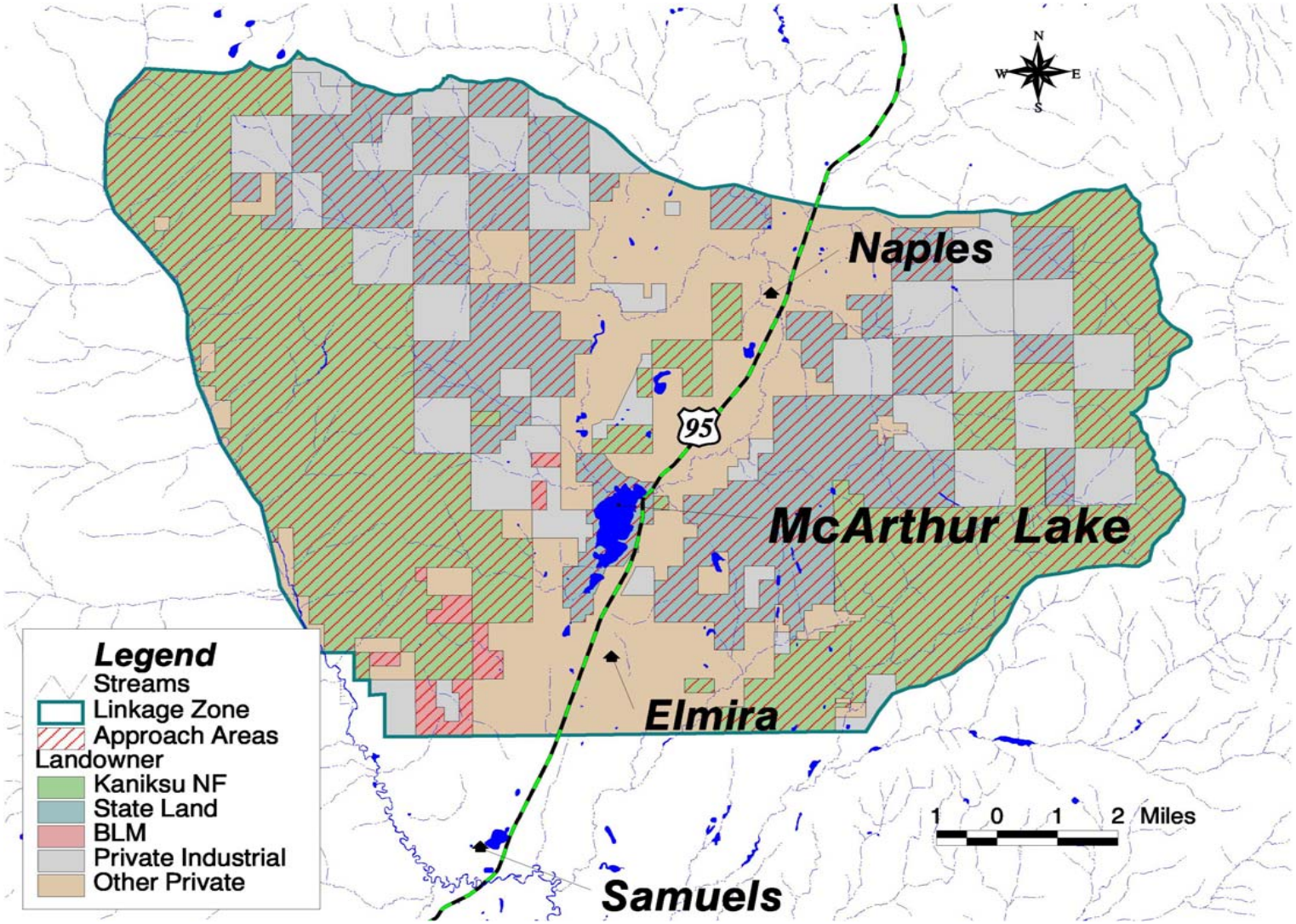


Figure 8. McArthur Lake wildlife linkage zone and public lands approach areas.



particularly high in the Naples/Highland Flats and west Elmira areas on the west side; and the Paradise Valley, Elmira, and Deep Creek areas on the east side.

Target Species: Target wildlife species chosen for the McArthur Lake linkage zone are grizzly bear, Canada lynx, wolverine, fisher, elk, whitetail deer, and moose. While transient wolves may utilize this linkage zone, or wolf packs may emerge in the area in the future, we do not feel that it is necessary to include gray wolves as a target species at this time.

Desired future condition: On the public lands portion of wildlife linkage zones, life requisites of target species are met in such a fashion as to allow individual animals to subsist within the zones, and to allow these animals to move securely from the public lands, across private lands, highways and other fracture zone features and back onto public lands. Meeting these life requisites includes providing natural foods, cover, and security in a manner that facilitates movement, limits mortality risk, and limits disturbance and displacement by humans.

National Forest lands at lower elevations within approach areas were classified in the 1987 Forest Plan as Management Areas (MA) 1-4: lands designated solely for timber production, or lands designated for timber production within grizzly bear habitat and/or big game winter range. Higher elevations contain these as well as areas of MA 9 (unsuited for timber production) and, in the western approach area, MA 7 (designated for caribou management) and MA 10 (semi-primitive recreation) in the Apache Ridge/Roman Nose area. Most of the eastern approach area is within the Grouse Grizzly Bear Management Unit (BMU), where the management emphasis is on low drivable road densities. With the exception of the McArthur Lake WMA (managed by Idaho Department of Fish and Game), all State land in the approach areas is managed by the Idaho Department of Lands (IDL). IDL- and BLM-administered properties in the area are generally managed for timber production, although the BLM has recently made attempts to exchange scattered parcels like these for more consolidated holdings. The McArthur Lake WMA is an artificial lake/wetland complex that is managed for wildlife values.

Linkage Approach Areas: Mapping of the approach areas was conducted using GIS. Approach areas were generally defined by natural features (watershed boundaries or stream courses), with consideration given to average daily movement distances for target species. The boundary of the eastern approach area is represented by the watershed boundary between the North Fork Grouse Creek and main Grouse Creek, and the boundary between Boulder Creek and tributaries of Deep Creek to the west. The western approach area is bounded by Pack River and Ruby Ridge.

Public lands comprising the western approach area total approximately 33,426 acres; 65 percent of which is managed by the IPNF, 31 percent State Land, and 4 percent BLM. The eastern approach area totals 24,014 acres; and is 59 percent IPNF-administered and 41 percent State-owned.

Management Recommendations: All of the management recommendations shown in Table 1 are applicable for this case example. Number 8, in particular, should be emphasized.

U.S. Interstate 90 (Clark Fork/St. Regis River)

Linkage Zone Location: The Ninemile linkage zone is located between Milepoint 79 and Milepoint 82 on I-90. The linkage zone is mapped as #14 among the linkage zones identified on I-90 (Fig. 2). This mapped linkage zone is based on the modeled linkage zone (Servheen et al. 2003) as modified by on-the-ground information. The Ninemile linkage zone lies between the Ninemile exit off of I-90 (north end of linkage zone) and the confluence of the Clark Fork River and Eddy Creek (south end). Private lands are immediately adjacent to the interstate highway, on both sides. The confluence of the Clark Fork River and Ninemile Creek is the most identifiable topographic feature in the area.

Linkage Zone Description: On a local scale, this linkage zone provides access across I-90 between the Ninemile Valley (to the north) and the Fish Creek/Petty Creek/Lolo Creek area (to the south). On a landscape scale this area provides one possible link from mountainous regions in NW Montana (such as the Swan Range) to the Bitterroot Mountains.

The linkage zone lies within T15N, R22W, Sections 28, 32 and 33 and T15N, R23W, Section 5. The length of the linkage zone (along I-90) is approximately 3 miles. I-90 does not run through much of a valley in this area – flat terrain extends approximately ¼ - ½ mile on both sides of the interstate highway (except for the area where the highway bridge spans the Clark Fork River and floodplain. The floodplain extends approximately 1-1 ½ miles across.

Cottonwood bottomlands dominate along the Clark Fork River; otherwise vegetation is generally characterized as dry ponderosa pine/open grassy slopes or ponderosa pine/Douglas Fir. No past timber sale areas exist within the linkage zone.

The bulk of private land in this linkage zone is ranchland, although some small private parcels exist. Lack of subdivisions and low road densities continue to make this area desirable as a linkage zone. Other existing developments within the linkage zone include a large Bonneville Power Administration power line that crosses the linkage zone in a NW-SE direction approximately ¼ mile north of Eddy Creek and along Tank Creek. There is also a small communications site on Ellis Mountain (T15N, R23W, Section 25) that includes a repeater for the Ninemile Rural Fire Department.

Target Species: Deer (common), elk (common – rancher feeds on private land), moose (fairly common in riparian area), bighorn sheep (occasional), wolf (fairly common), grizzly bear (unlikely but possible; grizzly fatality near Alberton in 2001), lynx (possible), wolverine (unlikely), fisher (unlikely).

Desired Future Condition: On the public lands portion of the Ninemile wildlife linkage zone (the approach areas), life requisites necessary for the subsistence of target species are met. The opportunity for natural movements within the

approach areas and to find security before and after moving across private lands, I-90, the frontage roads and the railroad is provided. Meeting the species' life requisites includes providing natural foods, cover, and security in a manner that facilitates movement, limits mortality risk, and limits disturbance and displacement by humans.

Current Management Areas (MAs) within the approach areas include MA23 (lands primarily below 5,000' on north-facing slopes with moderate visual sensitivity; unsuitable for timber harvest except to maintain or improve big game winter range) and MA27 (scattered parcels of commercial forest land that are generally steep and rocky where timber management is not economically or environmentally feasible). Revision of the Lolo Forest Plan is not expected to significantly change this direction with the exception of possibly including language addressing the presence of the wildlife linkage zone.

Linkage Approach Areas: Approach areas (Fig. 9) were delineated using the most logical topographic features on public lands, land ownership boundaries, and the average daily movement distances for the target species.

The boundary of the approach area on the northwest side of I-90 extends north along the private and state land boundary east of Kirchey Creek (Sec. 1/Sec 6), then west along the private/Forest Service boundary (Sec. 1/Sec. 36). The boundary continues north along the boundary of Plum Creek/Forest Service lands (Sec. 35/Sec. 36). From the corner of Sections 36, 35, 26, 25, the boundary continues northwest along the ridgeline to Cromwell Creek and then northeast along Cromwell Creek until the Forest Service/private land boundary (Sec. 13/Sec.12). The approach area boundary follows the National Forest boundary back to state land in Section 6 (at the intersection with Sec. 1). This area is approximately 8 square miles in size.

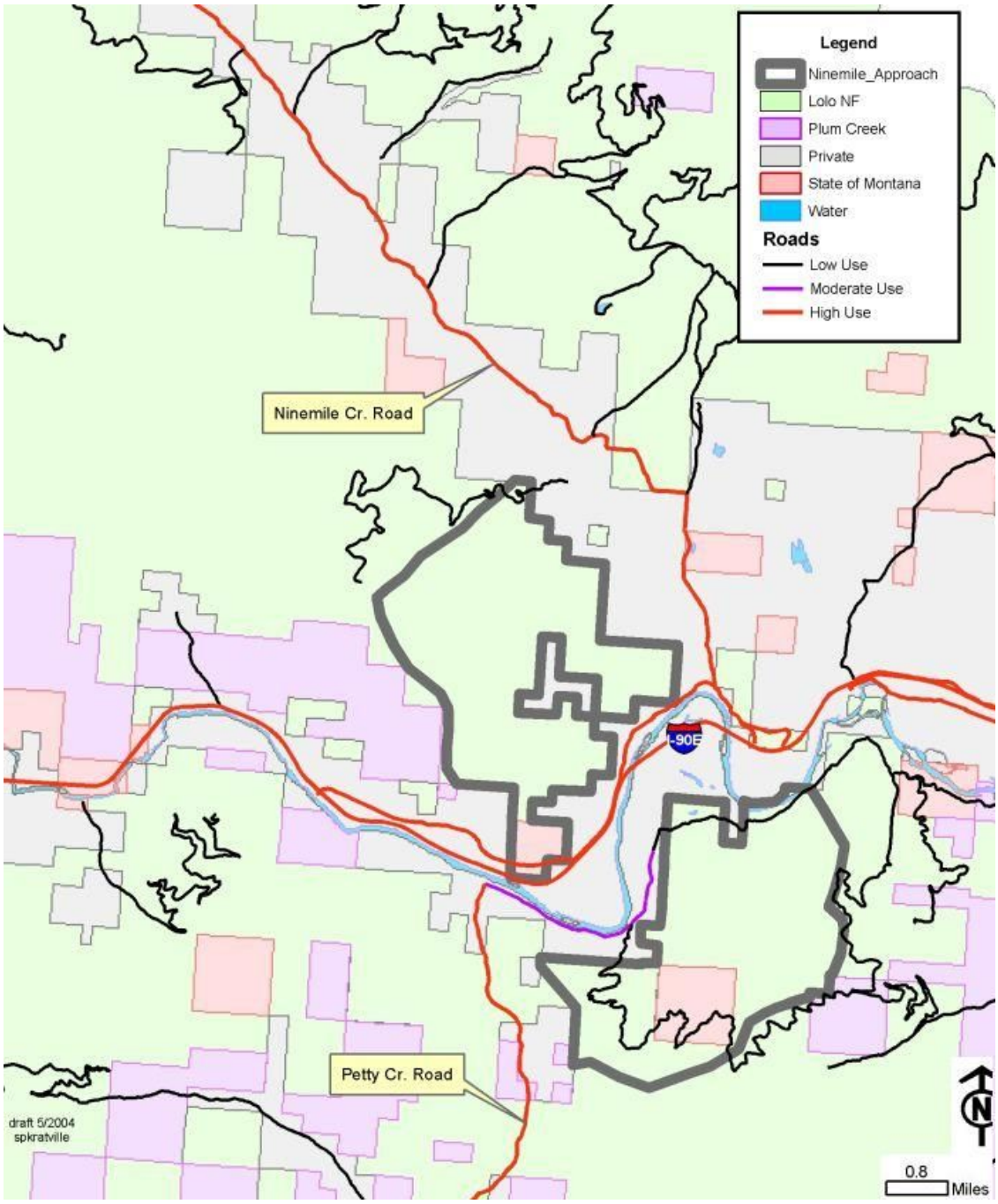
The approach area on the southeast side of I-90 begins on the south side of the Clark Fork River, just east of French Gulch (Sec. 34). The boundary moves southeast – south along the ridgetop above French Gulch in Sections 2 and 11. The boundary follows he Plum Creek/Forest Service boundary in the northwest corner of Section 14 and then follows the ridgeline to the southwest through Section 15 until the head of Madison Gulch, then moves down Madison Gulch until the Forest Service/private land property line (Sec. 19/Sec. 20). The boundary then follows the Sec. 19/Sec. 20property line to the north until the ridgeline in the southeast corner of Section 18, then follows the ridgeline to the northwest (approximately 2/3 of a mile) until reaching the private land in the northwest corner of Section 18. The approach area boundary follows the private/Forest Service property lines (south of the Clark Fork River) from Sec. 18 towards the north – northeast until just east of French Gulch. This area is approximately 9 square miles in size.

Management Recommendations: All of the management recommendations in Table 2 are applicable. In addition:

1) ATV use in Section 29 (T15N, R22W; NFS land) is already occurring. The area is easily accessible from I-90. Specific direction/enforcement of ATV use in this area is recommended.

2) Ranchland in this area should be considered a high priority for private land conservation efforts (especially in T15N, R22W, Sections 32, 33 and T15N, R23W, Section 5).
3) Acquiring private land in Section 30 would reduce potential fragmentation of the north approach area.

Figure 9. Ninemile linkage zone and public lands approach areas.



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APPENDICES

1. Public Lands Linkage Taskforce Participants

Taskforce Chairman:
Bob Summerfield
National Grizzly Bear Habitat Coordinator
USDA Forest Service
PO Box 7669
Missoula, MT 59807

Brian Avery
District Ranger
Cabinet Ranger District
Kootenai National Forest
2693 Hwy 200
Trout Creek, MT 59874

Ross Baty
Wildlife Biologist
Montana Dept. Natural Resources & Conservation
2705 Spurgin Rd.
Missoula, MT 59804

Ron Erickson
Lands Specialist
USDA Forest Service
Northern Region
PO Box 7669
Missoula, MT 59807

Jon Haber
Planning Specialist
USDA Forest Service
Northern Region
POB 7669
Missoula, MT 59807

Rob Harper
District Ranger
Superior Ranger District
Lolo National Forest
209 W. Riverside
PO Box 460
Superior, MT 59872

Mike Herrin
District Ranger
Bonners Ferry Ranger District
Idaho Panhandle National Forest
Route 4, Box 4860
Bonners Ferry, ID 83805

Steve Johnsen
Wildlife Biologist
Cabinet Ranger District
Kootenai National Forest
2693 Hwy 200
Trout Creek, MT 59874

Wayne Johnson
Wildlife Biologist
Kootenai National Forest
1101 Hwy 2 W.
Libby, MT 59923

Wayne Kasworm
Wildlife Biologist
US Fish & Wildlife Service
475 Fish Hatchery Rd.
Libby, MT 59923

Terry Knupp
Recreation Program Manager
USDA Forest Service
Northern Region
POB 7669
Missoula, MT 59807

Sandy Kratville
Wildlife Biologist
Lolo National Forest
Bldg 34, Ft. Missoula
Missoula, MT 59804

Lisa Krueger
District Ranger
Plains/Thompson Falls Ranger District
Lolo National Forest
POB 428
Plains, MT 59859

Bob Ralphs
Wildlife Biologist
Idaho Panhandle National Forest
3815 Schrieber Way
Coeur d'Alene, ID 83815

Laird Robinson
IGBC Executive Assistant
PO Box 7669
Missoula, MT 59807

Bill Ruediger
National Highways Ecology Program Leader
USDA Forest Service
PO Box 7669
Missoula, MT 59807

Chris Servheen
Grizzly Bear Recovery Coordinator
US Fish & Wildlife Service
Univ Hall 309, U of M
Missoula, MT 59812

Gregg Servheen
Wildlife Program Coordinator
Idaho Dept. of Fish & Game
PO Box 25
Boise, ID 83707

Tim Their
Wildlife Biologist
Montana Fish, Wildlife & Parks
PO Box 507
Trego, MT 59934

Wayne Wakkinen
Wildlife Biologist
Idaho Dept. of Fish & Game
Bonners Ferry, ID 83805

2. Others Consulted During Preparation of this Report

Katie Deuel, Yellowstone to Yukon Conservation Initiative

Dave Galliard, Predator Conservation Alliance

Deb Kmon-Davidson, American Wildlands

Brian Peck, Great Bear Foundation

Gary Wolfe, Private Lands Linkage Taskforce, Boone and Crockett Club

Melanie Parker, Northwest Connections, Private Lands Linkage Taskforce

Pat Basting, Montana Department of Transportation, Highways Linkage Taskforce

Don Davis, Idaho Transportation Department

John Konzen, Rita Windom, Lincoln County Commissioners

Hank Laws, Carol Brooker, Sanders County Commissioners

Dan Denning, Boundary County Commissioners

Darrell Kerby, Bonners Ferry Mayor

Members, Kootenai Valley Resource Initiative

Paul Clark, Montana State Representative

Alan Dettwiler, Rancher, Sanders County

Presentations were given to:

USFS Regional Leadership Team

Lolo NF Leadership Team

Beaverhead-Deerlodge NF Leadership Team

Dillon Field Office BLM

USFS Forest Planners

USFS Planning Biologists

USFS/USFWS Montana Level 2 ESA Consultation Team

3. Public Lands Taskforce Charter

Purpose: This taskforce will develop public land management recommendations within linkage zones.

Membership: Lead by USFS and including membership from USFWS, various national forests, and BLM lands where necessary.

Specific products:

1. Outline of processes, timetables, and responsibilities necessary to review and implement needed changes on public lands including relationships to existing forest plans, travel plans, and AMPs.

2. Review the forests where linkage zone management is necessary and identify specific issues within each forest. This section will be dependent upon completion of the linkage zone report with the linkage zones identified.

3. Expected time frame to complete review of these needs for linkage zone management and to implement these needs based on the priority list of linkage zones in the linkage report.

4. List of expected actions within each linkage zone identified by management unit that should be reviewed to successfully implement linkage zone management.

5. Consider land adjustment funds in these areas when possible.

4. Linkage scales identified by the Public Lands Taskforce

Scale Name	Relative Size	Description	Purpose	Where & How Addressed
Broad scale (Inter-ecosystem)	mountain ranges, river basins	Linkage between "populations" or larger segments of meta-populations. Ecosystem to ecosystem linkage	Genetic maintenance. Species health on an evolutionary time scale.	Regional Assessments and Forest Plan to Forest Plan coordination
Mid-scale (Home Ranges)	large drainage(s), home range size of larger mammals	Linkage between areas where animals live for long periods of time. Home range to home range linkage.	Population maintenance. Interconnectedness for breeding and meeting life requisites to maintain viability.	Coarse filter analysis in individual Forest Plans
Local scale (Daily Movements)	local topographic features, daily movements of large mammals	Linkage that facilitates movement across local fracture zones and within adjacent approach areas.	Individual maintenance. Getting animals safely across fracture zones to maintain habitat availability within home ranges.	Fine filter analysis resulting in programmatic standards and/or in project plan analyses.