

Upper Clark Fork River Basin Terrestrial Wildlife Resource Prioritization



Photos by Kristi DuBois & Ray Vinkey

By:

Kristi DuBois, Ray Vinkey, and Scott Story



**Montana Fish,
Wildlife & Parks**

and

Carol Fox and Greg Mullen



Final

December 2011

Table of Contents

Introduction..... 1

Background..... 2

Terrestrial Injured Resource Areas 2

Values of Habitats to Wildlife 3

Terrestrial Wildlife Assessment Methods..... 4

Terrestrial Prioritization Methods..... 5

Overview of Prioritization Methods Relative to Goals.....5

Prioritization Steps.....7

Terrestrial Resource Prioritization Results 10

Strategies for Wildlife Habitat Protection and Enhancement 12

Important Considerations..... 14

Monitoring 15

Public Participation..... 15

Literature Cited 16

APPENDIX A. Upper Clark Fork River Basin Terrestrial Wildlife Assessment Reports. 23

APPENDIX B. Planned remediation and restoration of Injured Terrestrial Resource Areas. 24

APPENDIX C. Land-cover (habitats) in the UCFRB, indicating those included in the habitat patch analysis and area prioritization..... 29

APPENDIX D. Resource maps used to inform decisions during the prioritization process. 30



Mature Cottonwood with a Great Blue Heron rookery near Garrison (Kristi DuBois Photo)

List of Figures

Figure 1. Aerial photo showing the Upper Clark Fork River Basin, western Montana.17
Figure 2. Location of the Terrestrial Injured Areas in the UCFRB.18
Figure 3. Detailed map showing the Terrestrial Injured Areas in the UCFRB.....19
Figure 4. Land-cover types (habitats) in the UCFRB.20
Figure 5. Priority areas for terrestrial wildlife replacement in the UCFRB.....21
Figure 6. Riparian and wetland habitats in the UCFRB.22

List of Appendix Figures

Figure B-1. Public land ownership in the vicinity of the terrestrial injured areas in the UCFRB.....28

Figure D-1. Priority areas in relation to big game (elk, mule deer, antelope, and bighorn sheep) winter range30
Figure D-2. Priority areas in relation to elk winter range in the UCFRB.....31
Figure D-3. Priority areas in relation to modeled species richness in the UCFRB.32
Figure D-4. Priority areas in relation to connectivity with watersheds surrounding the UCFRB.....33
Figure D-5. Priority areas in relation to size of native habitat patches in the UCFRB.....34



Western Meadowlark (Kristi DuBois Photo)

Introduction

The Montana Fish, Wildlife & Parks (FWP), in consultation with the Natural Resource Damage Program (NRDP), developed a prioritization process to focus terrestrial wildlife restoration and replacement efforts in the Upper Clark Fork River Basin (UCFRB) of western Montana (Figure 1). This prioritization process seeks to identify priority areas and habitats where restoration and replacement projects would be desirable and describe the types of projects that could be used to accomplish restoration or replacement of terrestrial wildlife resources. This effort is parallel to and complimentary to the aquatic resource assessment and prioritization effort described in Saffel et al. (2010).

Terrestrial resources injured by mining activities in the UCFRB include riparian and wetland habitats along the Upper Clark Fork River and several tributaries, and native grassland, shrub-steppe, and forested habitats in the vicinity of Anaconda. These habitats and associated terrestrial wildlife resources were impacted by hazardous substance releases associated with tailings ponds, processing facilities, smelter stack emissions, and other mining-related activities.

Injured wildlife in riparian areas include birds, mammals, and other wildlife species that inhabit riparian habitat, especially those that rely on fish or aquatic invertebrates in their diets (Lipton et al. 1995). Injured wildlife in grassland, shrub-steppe, and forested habitats includes species impacted by the loss of vegetation diversity, density, and structural complexity, and species dependent on ground-dwelling or burrowing mammals and the invertebrates in their diet. Injured wildlife species encompass a wide variety of taxonomic groups such as raptors, songbirds, waterfowl, waterbirds, woodpeckers, upland game birds, furbearers, ungulates, small mammals, and bats (Lipton et al. 1995). The services lost or impaired due to injuries to vegetation, wildlife, and wildlife habitat include ecological services (such as insect consumption, pollination, nutrient cycling, and water filtration), and recreational services, such as hunting, fishing, bird watching, hiking, wildlife viewing, and other forms of wildlife-related outdoor recreation.

FWP and NRDP seek to restore or replace these injured wildlife resources in the UCFRB by implementing habitat protection and enhancement measures. Specific to terrestrial wildlife resources, restoration is improving wildlife habitat and populations through long-term habitat protection and enhancement activities. Replacement is acquiring or improving equivalent resources to those that were damaged in the injured areas, with high quality natural resources outside of the injured terrestrial resource areas.

Terrestrial wildlife restoration or replacement goals are to:

- *Restore the injured terrestrial resources and associated ecological and recreational services (lost hunting, wildlife viewing, bird watching and other wildlife-related outdoor recreation) covered under the State's natural resource damage lawsuit (Montana v. ARCO).*
- *Replace injured terrestrial wildlife resources by protecting and enhancing grassland, shrub-steppe, riparian, wetland, and conifer forest habitats in the UCFRB that are similar to those injured. This involves maintaining or improving wildlife species*

diversity, natural ecological functions, and habitat connectivity in grassland, forest, and riparian ecological systems.

- *Replace lost hunting, wildlife viewing, bird watching and other wildlife-related outdoor recreational opportunities by enhancing wildlife habitat, and consequently, wildlife populations, and ensuring public access to these wildlife resources.*

These goals are all considered to be of substantially equal importance, recognizing that both restoration and replacement are appropriate strategies for increasing wildlife populations and recreational opportunities to compensate for what was lost.

Terrestrial resource prioritization is intended to direct collaborative efforts by the state and other entities to priority areas that are most likely to contribute to terrestrial wildlife restoration and replacement. This document identifies priority habitats and areas where habitat protection and enhancement efforts should be focused to best achieve the above goals, describes strategies that could be used to achieve the goals, and provides examples of habitat protection and enhancement actions commonly used to benefit wildlife. This document does not, however, identify, evaluate, or rank specific projects or land parcels where restoration or replacement should be accomplished.

Background

In 2008, the State of Montana concluded its natural resource damage litigation against Atlantic Richfield Company (ARCO) for injuries to natural resources in the UCFRB. In 2009, FWP and NRDP assessed the terrestrial wildlife resources of the UCFRB to gather information needed for the development of this prioritization process (Vinkey and DuBois 2010; see Appendix A for a detailed list of reports). Existing wildlife information for the UCFRB consisted mainly of data on game species obtained by FWP from their annual survey efforts, and on other species from a statewide diversity monitoring effort. Information on aquatic furbearers and nongame species was lacking, especially on private lands in the valleys. Existing statewide land-cover layers misclassified important habitat types, notably native grasslands. The terrestrial wildlife assessment was necessary to develop a more complete picture of terrestrial wildlife resources in the UCFRB.

Terrestrial Injured Resource Areas

The State pursued a natural resource damage claim for terrestrial injured resources under Montana v. ARCO in four injured areas. These areas are the Smelter Hill Area Uplands, hereafter referred to as the Anaconda Uplands, the Opportunity Ponds, Silver Bow Creek, and the Upper Clark Fork River (Figures 2 & 3). The State's 1995 terrestrial claim addressed impacts to soils, vegetation, and wildlife habitat in these injured areas. Although there were other areas in the UCFRB with severe and widespread impacts to soils and vegetation, the State pursued terrestrial injury claims in these four areas where it could best document the associated injury to wildlife resources. The Anaconda Uplands terrestrial resource damage claim primarily involved injury to upland soils and associated wildlife habitat, whereas the claim for the other three areas primarily involved injured riparian soils and associated wildlife habitat.

Remediation and restoration activities in these four injured terrestrial resource areas are ongoing, at various stages, and expected to be substantially completed in the next 10 years. For further information on these areas and planned activities, see Appendix B.

Values of Habitats to Wildlife

The natural resource damage assessment for the UCFRB used a habitat-based approach to determine injury to terrestrial wildlife (Lipton et al. 1995). Injured habitats that were identified included riparian and wetland, aspen, grassland and shrub-steppe habitats, and several types of conifer forests. These desired habitats collectively define what we are trying to protect or enhance to achieve replacement of injured wildlife resources. The value of these habitats to wildlife is complex and site-specific, often dependent on the landscape context of an area; however, there are important wildlife-habitat relationships in the UCFRB that are applicable throughout much of the area. These relationships in the UCFRB provide the foundation for development of priorities and strategies for wildlife conservation.

Riparian and wetland habitats are extremely important, but of limited extent in the arid environments of the UCFRB. These habitats naturally occur as small patches by springs and seeps, or in linear strips along drainages and although small in extent, these habitats support significantly higher diversity and population density of songbirds than any other habitat group. Wetland and riparian habitats usually support more wildlife species than all other habitats combined, and are the primary habitats for moose, aquatic furbearers, amphibians, several reptile species, and many small mammal species. Riparian and wetland habitats support about half the bird species found in the UCFRB. These habitats are critical for maintaining water quality for fish and other aquatic species. Riparian areas are often used as travel corridors by bears and other species to move across the landscape.

Due to the high value of riparian and wetland habitats to wildlife, we consider all of them to be high priority for conservation activities. Primary impacts to these habitats include encroachment of houses (and associated impacts) and agricultural fields, and loss of natural woody regeneration (especially cottonwoods and willows) due to livestock grazing or hydrologic modifications (like dewatering from irrigation diversions, flow control through dams, or bank modifications). Other factors that impact riparian and wetland areas include wood cutting and noxious weed invasion.

Grasslands and shrub-steppe habitats in the foothill areas of the UCFRB provide winter range for elk, mule deer, and bighorn sheep. These areas provide year-long habitat for antelope and small mammals, foraging habitat for many birds of prey, and nesting habitat for migratory grassland bird species such as long-billed curlews, grasshopper sparrows, and Brewer's sparrows. Most grassland/shrub-steppe species, including wintering big game, require large expanses of habitat to survive and habitat effectiveness decreases with smaller patch size and higher levels of landscape fragmentation.

In the UCFRB, grassland types are highly interspersed with shrub-steppe types. Both are bisected by riparian habitat and conifer stands, which enhance their value for big game winter range, by providing cover for thermal protection as well as for calving/fawning. In a few places, excessive conifer tree encroachment into grasslands has reduced overall grassland patch size. The primary limiting factors for species using grassland and shrub-steppe habitats include

conversion to non-native cover (such as agricultural crops and hay), fragmentation by roads and houses, loss of plant species diversity (especially forbs) from noxious weed infestations and weed control actions, and poor condition due to intensive livestock grazing. Connectivity between grassland patches is important for most species, and small, isolated patches surrounded by human development are generally not used by grassland obligates such as pronghorn antelope and long-billed curlews.

Conifer forests similar to those found on injured areas provide summer range and winter thermal cover for big game and comprise the primary habitats used by wildlife such as forest carnivores, forest grouse, woodpeckers, forest songbirds and small mammals, accipiter hawks, mountain lions, and bears. Conifer forests provide winter roost habitat for bald and golden eagles, and important nesting habitat for eagles and many other raptor species. Low elevation forest with large-diameter trees is especially important for a number of bird species of concern, including pileated woodpeckers, flammulated owls, brown creepers and several bat species which require large-diameter trees for maternity roosts. Limiting factors for conifer forests include fragmentation due to excessive timber harvest, incursions by subdivisions and rural developments, high road densities, and more recently, mountain pine beetle infestations.

Terrestrial Wildlife Assessment Methods

Existing information, collection of new data, and predictive modeling were used to complete the Terrestrial Resource Assessment (Appendix A; Vinkey and DuBois 2010). Existing wildlife data consisted primarily of big game data compiled in the FWP Crucial Areas Assessment and Planning System (CAPS) and limited nongame observations from Montana Natural Heritage Program (MNHP). Most existing data on nongame species was from Forest Service lands in higher elevations than the impacted habitats. Another source of existing information reviewed for this work was an earlier prioritization effort conducted by the NRDP for the Silver Bow Creek Watershed (NRDP, 2005). Since that effort identified priorities on a watershed scale, rather than a basin-scale, and was based on limited wildlife information, it was of limited use for this basin-wide prioritization effort which required a more rigorous scientific assessment as further described herein.¹

Better information on nongame terrestrial species was needed for prioritization, so extensive field surveys focusing on nongame species were completed in the UCFRB in 2009. New data was collected on aquatic furbearers, small mammals, bats, reptiles, amphibians, songbirds, raptors, colonial nesting waterbirds, and migrating waterfowl (Vinkey and DuBois 2010). Sampling in the UCFRB focused on grassland, shrub-steppe, and riparian habitats in the valley bottoms and foothills because existing wildlife information was lacking in these habitats. (These habitats are mostly under private land ownership and access to specific sample sites was dependent on landowner permission.) An improved land-cover map was developed using remote sensing with subsequent ground-truthing to improve the accuracy of classifications and refine the identification of habitat types in the UCFRB (Figure 4).

¹ Further explanation on the use of the *2005 Silver Bow Creek Watershed Restoration Plan* is provided in the State's response document (NRDP and FWP, 2011).

Assessing complex wildlife resources in a 2,362,000 acre watershed at the sampling scale of the fisheries assessment would have been cost and time-prohibitive. Since we could not sample nongame wildlife at a detailed level to map species distributions, we used predictive models that combined species point observations, with associated land-cover types, to create maps of the potential distribution of some of wildlife species in the UCFRB. Unfortunately, there were not enough point observations for most species to predict their distribution in the UCFRB. To better prioritize lands for restoration and enhancement we developed a metric to integrate data from over 200 species of birds, mammals, amphibians, and reptiles. This metric was species richness—the number of species in an area. We used habitat associations to estimate species richness by habitat, and developed a species richness map (*Appendix D, Figure D-3*) as a way to integrate information on nongame species into the prioritization.

This assessment is a starting point for mapping habitats and nongame species distribution in the UCFRB, but is not complete. Detailed information on every parcel of land and an understanding of all wildlife-habitat relationships and limiting factors are not available from this one-year assessment. The UCFRB is a dynamic system, with both natural and anthropogenic processes affecting change over time. To better inform restoration and replacement, wildlife and habitat data from on-going survey and inventory efforts, and from current and future research projects, should be incorporated as it becomes available.

Terrestrial Prioritization Methods

We used Geographic Information Systems (GIS) analysis to examine the habitats, land ownerships, and human impacts in the UCFRB, applied principles of landscape ecology to evaluate habitat extent and connectivity, then used wildlife information and best professional judgment to determine how to prioritize different areas. Given the wide diversity of impacted wildlife species and habitats in the UCFRB, we focused on identifying habitats and areas where protection or enhancement efforts would likely be most effective to achieve the goals.

During this analysis, we found that the wildlife information, while extensive, lacked the resolution needed to determine the relative value of different areas. For example, information for nongame wildlife species provided good distribution information, but lacked population information. To evaluate the value of lands relative to each other, information on habitat condition was also required. Unfortunately we were unable to locate and incorporate GIS layers that describe habitat condition, such as levels of weed infestations, so we had to rely on our field knowledge to assess the condition of lands.

Overview of Prioritization Methods Relative to Goals

This section explains the steps conducted to identify priority areas for the protection and enhancement of wildlife resources in the UCFRB consistent with restoration and replacement goals. We first identify and then elaborate on these goals. These goals are all considered to be of substantially equal importance, recognizing that both restoration and replacement are valid strategies for increasing wildlife populations and recreational opportunities to make up for what was lost. We next identify the prioritization steps, followed by a detailed description of the approach and rationale for these steps.

Goal: *Restore the injured terrestrial resources and associated ecological and recreational services (lost hunting, wildlife viewing, bird watching and other wildlife-related outdoor recreation) covered under the State’s natural resource damage lawsuit (Montana v. ARCO).*

This goal is specific to the four terrestrial resource injured areas shown in Figure 3. Remediation and restoration of these areas are being planned and implemented under provisions of the approved and yet-to-be approved settlements/consent decrees. These areas are already considered a high priority, so further analysis for them is not needed. Remediation and restoration efforts funded through other processes will cost-effectively address these sites. Appendix B has detailed information about on-going or planned activities in these injured areas that are expected to enhance wildlife habitat.

Goal: *Replace injured terrestrial wildlife resources by protecting and enhancing grassland, shrub-steppe, riparian, wetland, and conifer forest habitats in the UCFRB that are similar to those injured. This involves maintaining or improving wildlife species diversity, natural ecological functions, and habitat connectivity in grassland, forest, and riparian ecological systems.*

To meet this goal, we used GIS analysis to identify the largest, most intact habitat landscapes that provide core wildlife habitat in the UCFRB. Protecting these core habitat areas is critical for maintaining wildlife populations. We also evaluated the size and distribution of desired habitats in relation to one another to address landscape connectivity. We focused our prioritization efforts on private lands and interspersed public lands that are not managed by the U.S. Forest Service because most grassland, shrub-steppe, and riparian habitats in the UCFRB are on private lands that are at high risk of future development and degradation. Private lands often provide critical habitat connectivity that cannot be protected by maintaining existing public land. Private lands are expected to provide some of the best opportunities for enhancement.

Goal: *Replace lost hunting, wildlife viewing, bird watching and other wildlife-related outdoor recreational opportunities by enhancing wildlife habitat, and consequently, wildlife populations, and ensuring public access to these wildlife resources.*

We expect to meet this goal in part by focusing on private and interspersed public land, and in part by providing additional recreational opportunities by enhancing wildlife habitat, and consequently wildlife populations. Enhancement of wildlife habitat and provision for increased public access are both important for accomplishing this goal. Creating additional access without enhancing wildlife habitat in the area can result in poorer quality recreation experiences. Also, the public expects to have access to wildlife in project areas where public agencies are involved in wildlife habitat enhancement, whether on private or public land. Large tracts of National Forest land already provide high levels of recreational access, so opportunities for creating additional recreation on them are limited. The best opportunities for replacing lost recreational opportunities will come from increasing public access for hunting and wildlife viewing on private land and interspersed public land such as Department of Natural Resources & Conservation parcels (DNRC) that currently do not have public access. Wildlife habitat enhancement activities on these lands, combined with a reasonable amount of public access to

enhanced areas on private lands for hunting or wildlife viewing, will help to accomplish this goal.

Prioritization Steps

As previously indicated, the terrestrial injured areas are already considered to be high priority areas, so they did not need to be further prioritized during this effort. They will be addressed using dedicated remediation and/or restoration funding to enhance wildlife habitat in injured areas (see Terrestrial Injured Area Resources section p. 2 and Appendix B). For the remaining lands in the Basin, we conducted the following steps to prioritize areas for wildlife enhancement and protection efforts:

- 1. Narrow focus to low-elevation private lands and interspersed public lands in the valley bottoms and foothills by eliminating National Forest lands from prioritization.*
- 2. Narrow the focus to the most intact native habitats by eliminating non-native habitats such as agricultural fields and areas heavily impacted by human developments.*
- 3. Identify the habitats most similar to those injured, including grassland, shrub-steppe, conifer forest, riparian, and wetland habitats, and eliminate non-impacted habitats such as high-elevation forests.*
- 4. Using GIS, perform a landscape patch analysis on the remaining native habitats, to classify the habitat patches by size and identify the largest, least fragmented patches of native habitats.*
- 5. Evaluate habitat patches and assign a priority level based on size, connectivity and proximity to larger habitat patches, estimated wildlife values, and other factors (including best professional judgment based on on-the-ground knowledge of land condition or wildlife use).*
- 6. Delineate priority areas by drawing simplified boundaries around groups of habitat patches with the same priority rank.*
- 7. Classify all riparian, wetland, and aspen habitats as Priority 1, regardless of the priority level of the surrounding area.*

We first focused on lower-elevation private lands and interspersed public lands (such as BLM, DNRC) by removing National Forest lands from the prioritization process. National Forest lands in the UCFRB have a higher degree of habitat integrity and connectivity relative to other public and private parcels that are smaller in size and highly interspersed with one another. National Forest lands are at low risk of future development and the Forest Service considers wildlife along with other management activities. While National Forest lands are not totally eliminated from consideration for projects, we did not attempt to prioritize them.

We next focused on landscape areas of high integrity by eliminating areas highly impacted by human development. We did this because urban areas and other sites highly impacted by human

development do not support the diversity of native species that are found in less developed areas for a variety of reasons. The high level of fragmentation of habitats in urban areas makes native species more vulnerable to predation by domestic cats and dogs as well as native predatory species like crows and magpies. As a result, urban areas can function as population ‘sinks’ where more animals are lost than are produced. Also most species require larger territories and more diverse habitats than are present in developed areas and many wildlife species are intolerant of human disturbance. Large habitat patches support animals that are more likely to have been impacted by contamination (otter, beaver, shorebirds, fish-eating birds, raptors, etc.).

An upland integrity model developed during the terrestrial wildlife assessment enabled us to identify areas with the least human impact (Vance and Tobalske 2010). Highly impacted areas included areas with high levels of residential development, travel corridors with large highways and railroads, and non-native agricultural fields (irrigated and dry-land farm land). We considered to what extent roads fragmented habitats, for example a heavily traveled county road was deemed to fragment a patch of continuous habitat while a lightly traveled jeep trail does not.

We next focused prioritization on desirable habitats, which are defined as those most similar to habitats in injured areas or habitats that support wildlife species groups identified as impacted by the natural resource damage assessment. Desirable habitats include riparian and wetland habitats, aspen habitats, deciduous shrubs in upland areas, native grassland and shrub-steppe habitats, conifer forest and forest/grassland habitats typically found at lower elevations, and rocky outcrops (needed for raptor nesting and bighorn sheep security areas). Most habitats found in the UCFRB were included in the prioritization, but we eliminated some high-elevation habitats such as alpine tundra and subalpine forest types, because they were not impacted, or did not support impacted species. See Appendix C for a complete list of UCFRB habitats, indicating those which were included or eliminated during this process.

A little over one-third of the UCFRB remained after these initial steps. On these remaining lands, we completed a habitat patch analysis which classified patches of desirable habitats according to their size and level of fragmentation by human activities. A habitat patch, for the purposes of this analysis, was an area or extent of desirable habitat within an area classified as having high integrity, surrounded by areas of low habitat integrity. We analyzed contiguous patches of desirable habitats lumped together rather than analyzing each habitat separately, because these habitats can be heavily interspersed within foothill areas.

The patch analysis step generated over 9,000 habitat patches, ranging in size from less than one-tenth of an acre to over 60,000 acres. We classified all habitat patches by size in order to identify the largest, most intact patches of contiguous habitat within the UCFRB. The classification of habitat patches by size was done by using ArcGIS to automatically classify patches into 4 size categories, then rounding the category size to the nearest 10,000 acres. The four size categories resulting from the patch analysis were under 10,000 acres, 10,000 to 20,000 acres, 20,000 to 30,000 acres, and over 30,000 acres of relatively unfragmented habitat per patch.

By itself, this landscape analysis of habitat patches identified the largest areas of contiguous habitat, but did not distinguish differences in habitat condition or wildlife values between similar-sized habitat patches. Wildlife information generated from the terrestrial wildlife

assessment indicated that all the habitat patches provided important wildlife habitat, regardless of size, but did not infer which patches, for example, supported the most wintering elk or the highest-quality riparian habitat. We needed to do more analysis to determine the best habitats in the UCFRB.

Since we lacked specific information on wildlife populations or habitat condition within each patch, we looked at other supporting GIS information, such as high concentrations of wetlands, landscape connectivity, and proximity to the largest, most intact landscape patches to inform our evaluation. We also used our best professional knowledge of wildlife values and habitat condition to determine how to prioritize habitat patches. These values included number of wintering big game from survey counts, knowledge of areas known to support certain nongame species of interest, areas with high nongame species diversity, and observations of areas with especially good habitat condition. Also, a few patches were reclassified because of specific inaccuracies in the GIS layers used to develop the patches. For example, several large patches were known to have been fragmented by new subdivisions and roads which were not in the GIS layers used during the landscape integrity analysis.

Habitat patches in the UCFRB were classified as Priority 1 (highest), 2, 3, or 4. Although most habitat patches were prioritized according to their size from the patch landscape analysis, some were reclassified after we evaluated them using the factors described above. For example, small habitat patches adjacent to larger habitat patches and separated from them only by a two-lane highway were considered higher priority than similarly small habitat patches that were isolated from larger habitat patches by extensive human development. Habitat patches known to support significant numbers of wintering elk were considered higher priority than similar habitat patches that supported only small numbers of wintering elk. Habitat patches that were well-watered and heavily interspersed with riparian, wetland, or aspen habitats were considered higher priority than similar habitat patches that were dry with little riparian, wetland, or aspen. To simplify the priority map, groups of same-priority habitat patches were put into priority areas by combining them.

We classified all wetland and riparian habitats as Priority 1, regardless of where they were located because riparian and wetland habitats are naturally found in small, isolated patches, they have a high value to wildlife, and there was disproportionate injury to these habitats. Aspen habitats are usually associated with springs and seeps and are functionally similar to riparian habitats, so they were also included in the riparian and wetland layer and classified as Priority 1. Some riparian habitat in the UCFRB is found in areas delineated as low integrity during the landscape integrity analysis, (due to the fact that roads, railroads, and power lines tend to follow river corridors), so by designating all riparian areas as Priority 1, irrespective of the size of the patch that they are in, we assure that all riparian habitats are targeted for conservation.

National Wetland Inventory (NWI) mapping has been completed in the eastern portion of the basin, adding better resolution to the riparian and wetland habitat layer in that portion of the UCFRB. Although NWI wetland mapping has not been completed in the western portion of the watershed, riparian and wetland habitats were mapped in the revised land-cover layer developed from 30-meter pixel satellite mapping data. NWI mapping in the western portion of the UCFRB will be incorporated when completed, and used to update this prioritization effort.

Terrestrial Resource Prioritization Results

The prioritization map, Figure 5, depicts the terrestrial wildlife priority areas that were identified and ranked. Figure 6 shows the mapped riparian and wetland habitats. Four areas in the UCFRB were identified as Priority 1, including three areas in the eastern part of the watershed and one area in the western part of the watershed. Priority 1 areas totaled 156,800 acres or almost 7 % of the watershed (Table 1). Priority 2 areas totaled 299,520 acres in nine areas scattered throughout the UCFRB. Most Priority 1 and 2 areas are dominated by large, contiguous patches of high quality native grassland and shrub-steppe habitats. Priority 3 areas cover 119,680 acres and are generally places where landscape fragmentation is greater, but habitats are in good condition. Priority 4 areas are comprised of numerous highly fragmented and small patches of native habitats, interspersed with high levels of development.

Priority 1 areas depict the most intact assemblages of terrestrial resources in the Upper Clark Fork River Basin. They are habitats that contribute to wildlife occurrence and persistence across a much larger percentage of the UCFRB than their own footprints. They are the best remaining examples of what was there before the mining injuries occurred, and they are the cornerstones of restoration and recovery. The loss of resources in Priority 1 areas would diminish the terrestrial benefits of restoration and replacement efforts elsewhere in the Basin. These areas connect the Continental Divide with the Clark Fork bottom, the John Longs with the Flint Creek and Rock Creek Valleys, and they connect Upper Blackfoot grasslands with those of the Deer Lodge Valley. These connections are found where the largest unfragmented blocks of private lands occur in the UCFRB. Their exceptional values for wildlife and agriculture are the very attributes that attract development and irreversible habitat loss. Priority 1 areas are at once the most precious and most threatened of the Basin's wildlife and recreation legacy.

The Garrison and Avon areas stand out due to their large intact landscapes, light human footprint, high value for wintering elk, and connectivity along the Continental Divide and through the Garnets to the Blackfoot watershed. Lands west of Philipsburg identified as Priority 1 and Priority 2 are composed of high quality native grasslands providing habitat for elk, bighorn sheep, mule deer, and numerous nongame species linked to these habitats. Philipsburg area lands also support outstanding recreational and fisheries resources in the Rock Creek drainage. The Priority 1 area south of Deer Lodge contains an assemblage of native grasslands, aspen, riparian and forest habitats with high interspersed and proximity to the Continental Divide.

All riparian, wetland, and aspen communities are considered high priority for conservation and enhancement efforts in the UCFRB and thus classified as Priority 1 areas. Conserving the entire mainstem of Silver Bow Creek and the mainstem of the Upper Clark Fork River from Milltown to Warm Springs Ponds, the Little Blackfoot, Flint Creek and Warm Springs Creek is critical. Maintaining connectivity of riparian habitat along the smaller tributaries with that of the larger rivers is as important for terrestrial wildlife species diversity and connectivity as maintaining stream connectivity for fish. Riparian and wetland communities are highly impacted by activities in the surrounding uplands, so protection of wide upland buffers around riparian and wetland habitats is essential for protecting their full functionality.

Priority 2 areas represent significant intact assemblages of important terrestrial resources that are smaller or more fragmented than Priority 1 areas. Important habitats and wildlife resources occur in these areas, but they generally involve smaller land parcels and more landowners. Thus in Priority 2 areas more individual projects at a higher per-acre cost are required to generate the same benefit as from a single large project within a Priority 1 area. In many cases, these areas are a buffer between Priority 1 areas, or intact National Forest lands, and encroaching development in Priority 3 and Priority 4 areas. Projects in these areas that adjoin protected lands that contain significant riparian or wetland values or that adjoin Priority 1 areas may be of equal value as projects in Priority 1 areas.

Priority 3 areas are blocks of terrestrial habitats that are yet smaller, more fragmented, or more isolated by development or contain non-priority habitats. Generally, the wildlife benefit found in Priority 3 areas is contained to these areas and they contribute less toward a cumulative wildlife benefit in the Basin. The best projects in the Priority 3 areas will connect to other conserved lands or contain exceptional habitat relics worthy of preservation.

Priority 4 areas contain important wildlife habitat, including ungulate winter range, timber lands, and other contributors of species richness, but they occur within a landscape fragmented by roads, subdivisions and other human development. They are important contributors of wildlife to the local area. It would be cost prohibitive to conserve an ecologically significant block of lands in the Priority 4 areas due to the high number of parcels and landowners. Stand alone projects in Priority 4 areas would provide opportunities of local value. Projects that conserve and enhance patches along the Clark Fork River bottom to provide buffers around Priority 1 riparian habitats would be an example.

Table 1. Relative extent of priority areas for terrestrial wildlife replacement in the UCFRB.

Priority	Square Miles	Acres	% of Whole Basin	% of Prioritized Patches
1	245	156,800	6.64	18.45
2	468	299,520	12.68	35.24
3	187	119,680	5.07	14.08
4	428	273,920	11.60	32.23
Not Assigned	2,362	1,511,680	64.01	NA
Total	3,690	2,361,600	100.00	100.00
High priority Terrestrial Injured Areas	24.71	15,816	0.67	NA
*Riparian, Wetland, and Aspen	167	107,145	4.54	Overlaps with prioritized areas

**These habitats overlap with other priority areas and are all assigned a Priority 1.*

Strategies for Wildlife Habitat Protection and Enhancement

Habitat protection provides for the replacement of terrestrial wildlife resources when it prevents future developments that would negatively impact wildlife populations. Habitat enhancement provides restoration when it improves habitat conditions in a manner that reduces limiting factors to wildlife populations and allows populations and/or species diversity to increase. Protection and enhancement activities often go hand-in-hand when it comes to improving terrestrial wildlife resources. Depending on the habitat, enhancement activities may require years to allow vegetation conditions to recover sufficiently to provide maximum benefits for wildlife. Protection in perpetuity is desirable to ensure that investments to improve habitat conditions are not lost due to future changes in land use or management. Short-term protective measures, such as term leases, provide benefits for the term of the lease or agreement; however, future renewals are not guaranteed. Combined investments in permanent protection and habitat enhancement will provide the highest levels of replacement for wildlife and recreation over the long term.

The primary strategies or tools used to provide long-term habitat protection include fee-title acquisition, perpetual conservation easements, acquisition of desired lands through land trades, and long or short-term lease agreements. Since projects that allow public access to private lands will replace lost recreational opportunities better than those that do not, access for wildlife related recreation on private lands is encouraged. Both consumptive (hunting, fishing) and non consumptive (bird watching, hiking) recreation could provide this opportunity.

While fee-title acquisition of private lands to be held in public trust by FWP (or other public agencies) is typically the most expensive strategy in terms of up-front costs, it provides lasting replacement values over the long term. Acquisition allows the most flexibility for managing native habitats to maximize wildlife populations. Ownership by FWP provides high levels of access for both hunting and wildlife viewing, while offering the flexibility of access closures during sensitive periods for wildlife. Ownership by other public land management agencies can provide similar habitat protection and access values. Management activities can be implemented to benefit many different wildlife species, both game and nongame. Benefits can extend to adjacent private and public lands, through mutual grazing agreements, increased access to adjoining public lands, and enhancement of migratory big game populations. In many circumstances this strategy will result in high levels of success for achieving replacement goals for both wildlife and recreation. Fee-title acquisition is, however, not always the best approach. Other tools may be fit better in some cases and provide similar benefits.

Conservation easements have less expensive up-front costs than fee-title acquisitions. To be successful, current and future landowners must be willing to be a partner with the entity holding the conservation easement to ensure that management practices implemented to enhance wildlife habitat and wildlife are successful and maintained over the long term. Access for consumptive and non consumptive recreation in the terms of the easement agreement will contribute towards replacement of recreational services. Opportunities to manage lands for the maximum benefit to wildlife on conservation easements depend on the willingness of the land-owner and terms of the agreement. Perpetual conservation easements, combined with up-front investments to enhance wildlife habitat (such as fencing riparian areas or making improvements to manage grazing for enhanced upland conditions), can provide cost-effective wildlife enhancement, while at the same time providing benefits to the private landowners. The control of public access offered by

private land ownership can be a good tool for protecting sensitive wildlife sites, such as heron rookeries and bald eagle nesting areas.

Land trades are a useful tool for consolidating land holdings to enable better management. In some cases, land trades can be used to facilitate more effective management by reducing the intermingling of private and public land, or of public land by agencies with differing management mandates. Land trades may also involve the purchase of agricultural or commercial property elsewhere, to be traded for high quality wildlife habitat. Land trades can be used to improve public access to lands of high recreational value.

Wildlife habitat or recreational access can be obtained through long or short-term lease agreements. This is the least protective strategy for ensuring protection over the long-term when applied on private land with no other protective strategies. Lease agreements may be appropriate in some circumstances, such as offering temporary protection or access until a more permanent measure can be implemented, or providing recreational access to public lands via a leased access corridor across private lands. Lease agreements are less costly for the short-term, but they can be very expensive to maintain over the long-term.

Habitat enhancement actions can improve wildlife populations and species diversity on private and public land. Habitat enhancement is most effective when applied to areas that have perpetual protection under public ownership or conservation easements. Landscape level habitat enhancement projects that span ownership boundaries, provide opportunities for partnerships, and can be more cost-effective than multiple unconnected projects. Habitat projects on private land can help build lasting, productive relationships with land-owners. Habitat enhancement opportunities are available in collaboration with other government programs, like the Natural Resource Conservation Service.

The effectiveness and costs of management actions to enhance habitat and wildlife populations are site-specific. The most effective enhancement efforts depend on habitat types and conditions at each site, the local limiting factors, primary use of the area, and surrounding land uses. Below we list some possible habitat management practices and provide examples of commonly used management actions that may benefit wildlife.

Grasslands and shrub-steppe: Protection of large, intact tracts of native habitat is most effective, because restoration of native, fully functional grasslands from non-native vegetative cover is costly, difficult, and it may take decades or centuries to recover the plant species diversity (and functionality) of native habitats. Protection through acquisition or conservation easements is critical to prevent future fragmentation by roads or subdivisions. Enhancement practices include modification of livestock grazing systems, weed management, removal or prevention of off-road vehicle use, and removal of unused barbed wire fences and other obstructions to wildlife movement. In some circumstances, reducing encroachment by conifer trees is necessary to maintain grasslands and shrub-steppe habitats in mountain foothill landscapes.

Targeted species include elk, mule deer, antelope, long-billed curlew, Brewer's sparrow, grasshopper sparrow, certain raptor species, and a variety of grassland songbirds and small mammals.

Riparian and Wetland Habitats: Implementation of practices that protect existing cottonwood forests, especially old-growth large trees, and encourage natural regeneration of cottonwood trees, aspen, and willows will benefit riparian habitat. Enhancement practices include eliminating livestock grazing within wetland and riparian zones, managing weeds, removing anthropogenic bank modifications that constrain the natural lateral movement of rivers and streams, restoring connectivity between riverine oxbow wetlands and the associated river or stream, prohibiting development in the meander corridors of rivers and streams, restoring and maintaining sufficient water flows to maintain riparian and wetland vegetation, and removing power lines from river corridors.

Targeted species include bald eagle, great blue heron, osprey, common merganser, songbirds, Lewis's woodpecker, red-knaped sapsucker, otter, and white-tailed deer.

Conifer Forest: Implement practices appropriate to the forest types on the site, and manage specifically for wildlife. Management practices include closing and re-vegetating roads, eliminating livestock grazing, protecting existing large diameter trees and snags, leaving burned timber in place, restoring natural fire cycles, and thinning out thick undergrowths of small diameter trees, when appropriate, to maintain ponderosa pine forests.

Targeted species include northern goshawk, marten, flammulated owl, pileated woodpecker, black-backed woodpecker, golden and bald eagles, Clark's nutcracker, elk, black bear, snowshoe hare, ermine, mountain bluebird, Townsend's solitaire, evening grosbeak, olive-sided flycatcher, dusky grouse, and spruce grouse.

Important Considerations

While this document identifies priority areas to focus conservation efforts in the Basin, based on the stated goals, it does not constitute any predetermination of the merits of funding a particular wildlife habitat protection or enhancement project. A project in a priority area may or may not be a worthwhile funding prospect, depending on whether it appropriately and cost-effectively addresses the factors that limit the wildlife resources in that particular area. Geographic location, habitat types and landscape connections alone cannot determine whether a project is likely to be successful at restoring wildlife resources and their associated services.

A few large projects are generally preferred to many smaller projects because of the lower cost per area and larger footprint on the landscape. Clustering of projects will improve their effectiveness. Projects adjacent to public lands or conservation easements are preferred to projects surrounded by unprotected private land or isolated from good wildlife habitat by large expanses of compromised habitats.

Projects that provide protection and enhancement of several targeted habitats are generally preferred over projects that only contain a single habitat. Projects that meet some or all of the fisheries restoration goals are preferred to projects that lack benefits to fisheries. Access for wildlife-related recreation needs to be managed to ensure that increased recreational use does not negatively impact wildlife resources or compromise restoration and enhancement efforts.

We emphasize that prioritization will, by necessity, be an adaptive process as additional information becomes available and as restoration in the UCFRB proceeds. Also it is important to note, that while we have prioritized large areas of the Basin to guide project development and basin-wide planning, all individual projects will be evaluated on their own merits under the appropriate guidelines. All proposed projects will be subject to public review, as required by NRDP and FWP.

Monitoring

We consider monitoring to be critical for successful terrestrial resource restoration and replacement. Monitoring should include compliance monitoring, to ensure that management actions are implemented as proposed, vegetation monitoring to evaluate effectiveness of habitat improvement actions, and wildlife monitoring to ensure that wildlife benefits from the restoration and enhancement efforts. Monitoring enables an adaptive management approach, so that changes in management can be implemented when needed, to better achieve restoration and enhancement goals. Monitoring plans should be developed on a project specific basis for highest effectiveness. Information gathered during the terrestrial wildlife assessment can provide a baseline for long-term monitoring on some sites.

Given that our knowledge of terrestrial resources in the watershed is still developing, we suggest that this terrestrial prioritization be revisited at least every five years, to revise priorities, if needed, based on additional data, public and agency input, and to evaluate the effectiveness of ongoing projects in the UCFRB.

Public Participation

The State produced a draft of this document in August 2010, which was subsequently the subject of a 60-day public comment period in fall 2010. In April 2011, the State produced a proposed final version of this document, along with a draft response to comment document that summarized the public comments received on the draft and the changes that State made to the draft document based on those comments. Those changes are reflected in this final document, which was approved by the Governor in December 2011, along with approval of the related final response to comment document.² As noted in the previous section, this document is likely to be updated as new information becomes available. Significant changes to this document would also be the subject of public comment.

² *Final State of Montana's Response to Public Comment on the August 2010 Draft Final Upper Clark Fork River Basin Terrestrial Wildlife Resource Prioritization Plan*, dated December 2011. This document is available from the NRDP's website at: <http://doj.mt.gov/lands/prioritizing-aquatic-and-terrestrial-resources> or from the NRDP upon request (nrdp@mt.gov or 406-444-0205).

Literature Cited

- FWP and NRDP, 2011. State of Montana Response to Public Comments on the Draft UCFRB Terrestrial Wildlife Resource Prioritization, prepared jointly by Montana Fish, Wildlife & Parks and Montana Department of Justice, Natural Resource Damage Program, April 2011. 15 pp.
- Lipton, J., H. Galbraith, K. LeJeune, H. Bergman, L. Kapustka, L. McDonald, and D. Cacela. 1995. Terrestrial Resources Injury Assessment Report – Upper Clark Fork River Basin. Montana Department of Justice, Natural Resource Damage Program. Helena, MT.
- NRDP, 2005. Silver Bow Creek Watershed Restoration Plan. Final. Montana Department of Justice, Natural Resource Damage Program. Helena, MT. 304 pp.
- Saffel, P., B. Liermann, J. Lindstrom, L. Knotek, T. Mostad, and C. Fox. 2010. Prioritization of Tributaries in the Upper Clark Fork River Basin for Fishery Enhancement. Draft Final. Montana Fish, Wildlife & Parks and Montana Department of Justice, Natural Resource Damage Program. Helena, MT. 14 pp.
- Vance, L., and C. Tobalske. 2010. Upper Clark Fork Sage Steppe and Grassland Classification and Mapping. Montana Natural Heritage Program, Helena, MT. 16 pp.
- Vinkey, R., K. DuBois, C. Fox, and G. Mullen. 2010. Upper Clark Fork River Basin Terrestrial Resource Assessment Final Report. Montana Fish, Wildlife & Parks and Montana Department of Justice Natural Resource Damage Program. Helena, MT. 36 pp.

Figure 1. Aerial photo map showing the Upper Clark Fork River Basin, western Montana.



Figure 2. Location of the Terrestrial Injured Areas in the UCFRB.

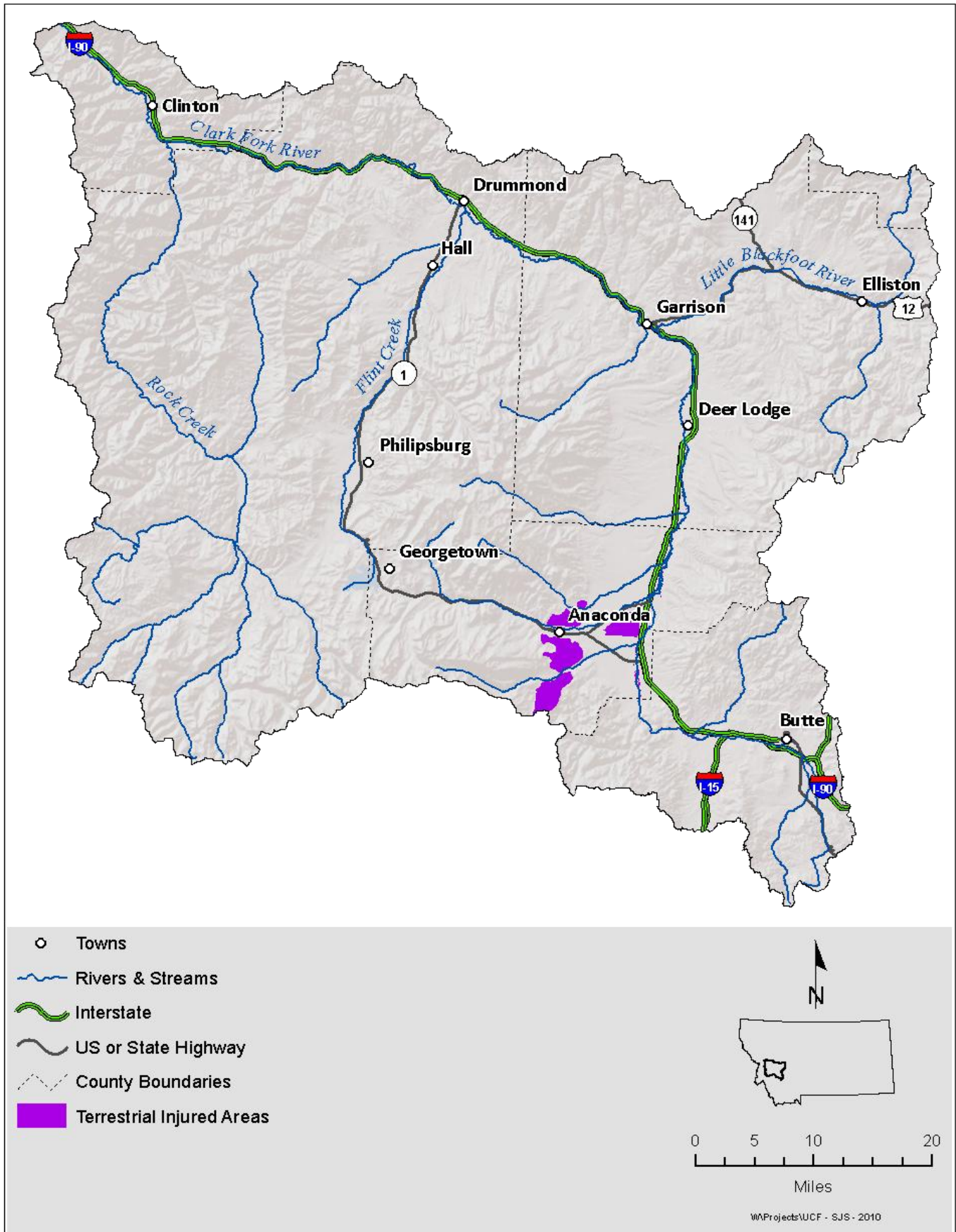


Figure 3. Detailed map showing the Terrestrial Injured Areas in the UCFRB.

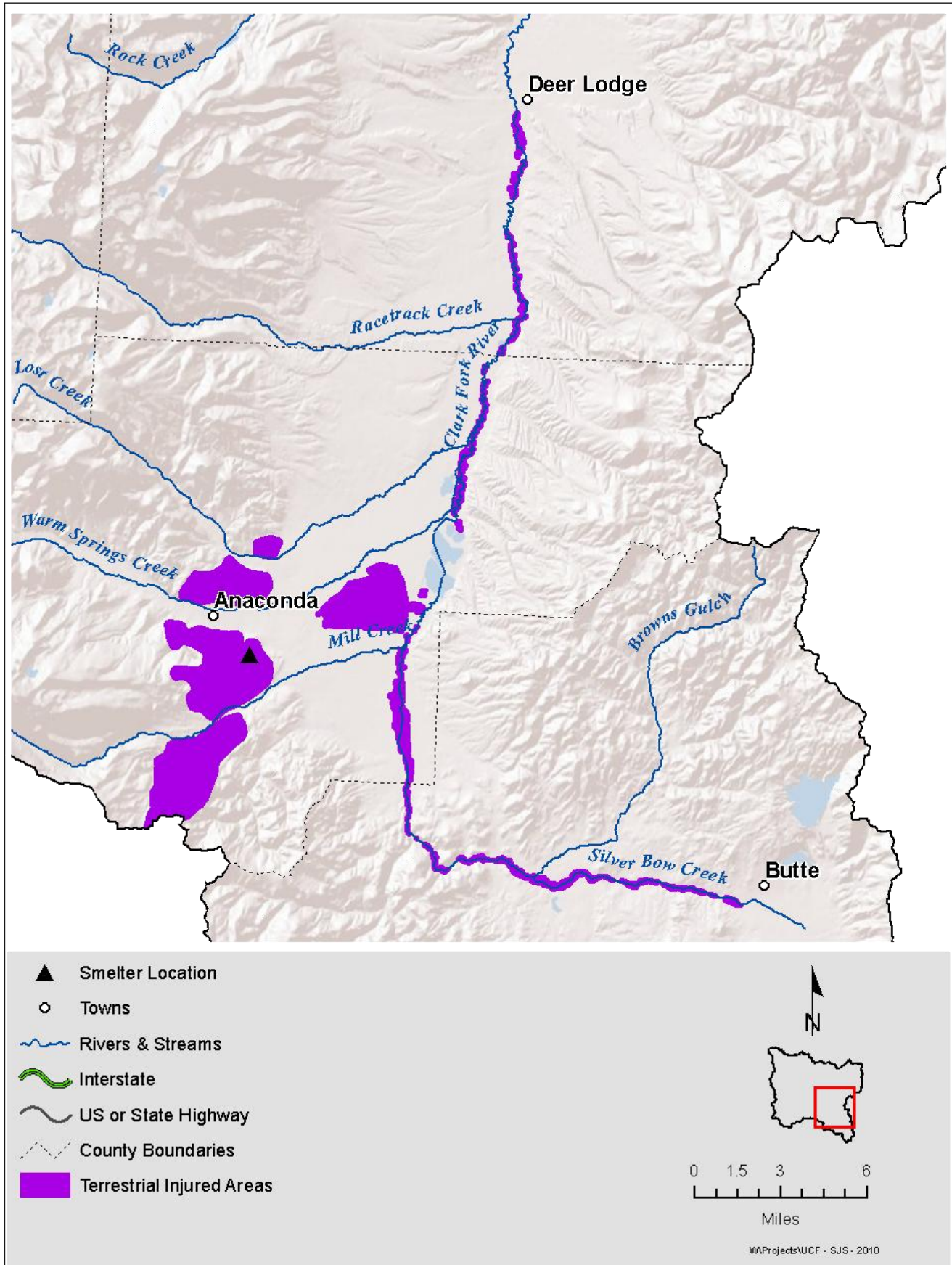


Figure 4. Land-cover types (habitats) in the UCFRB.

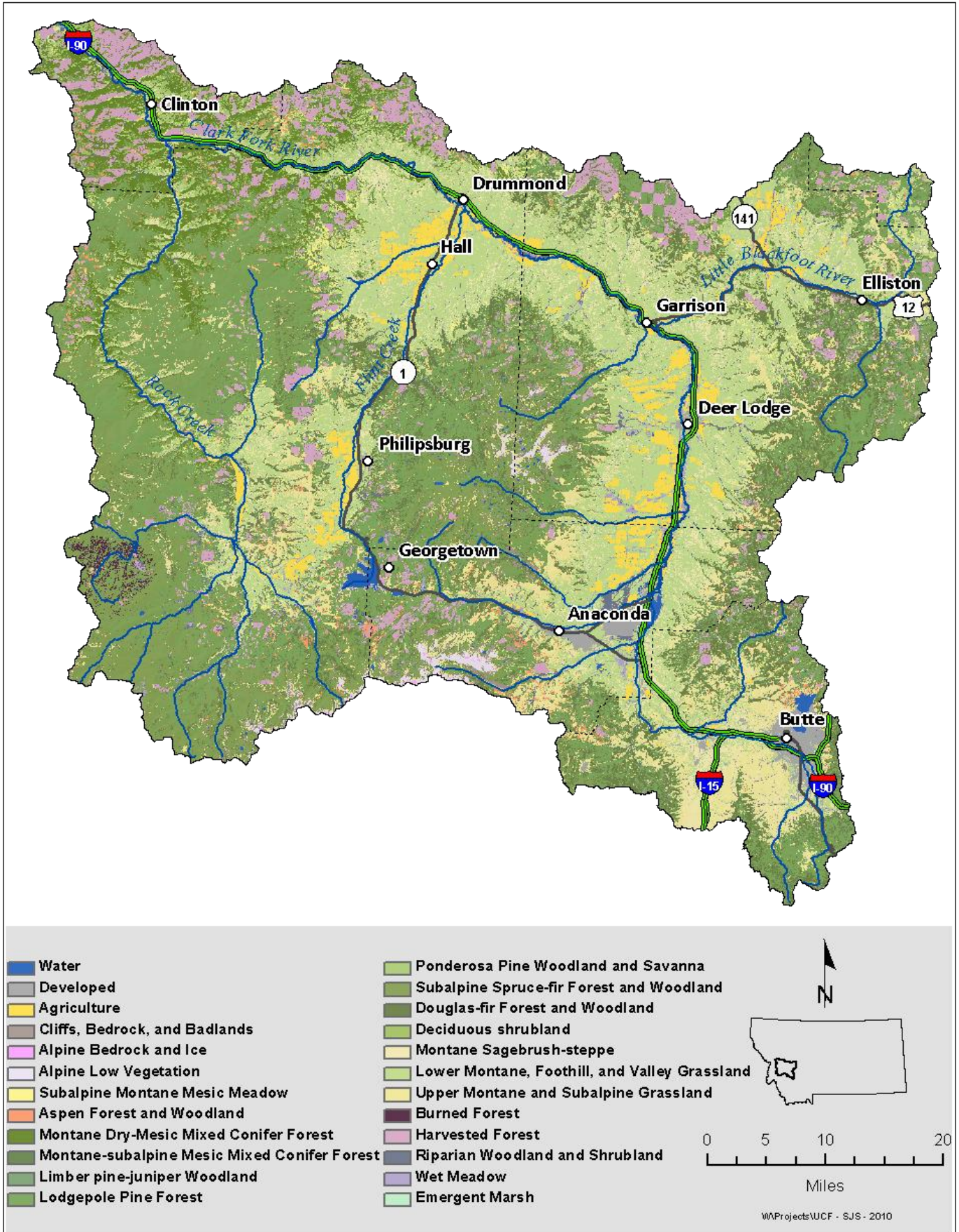


Figure 5. Priority areas for terrestrial wildlife replacement and restoration in the UCFRB.

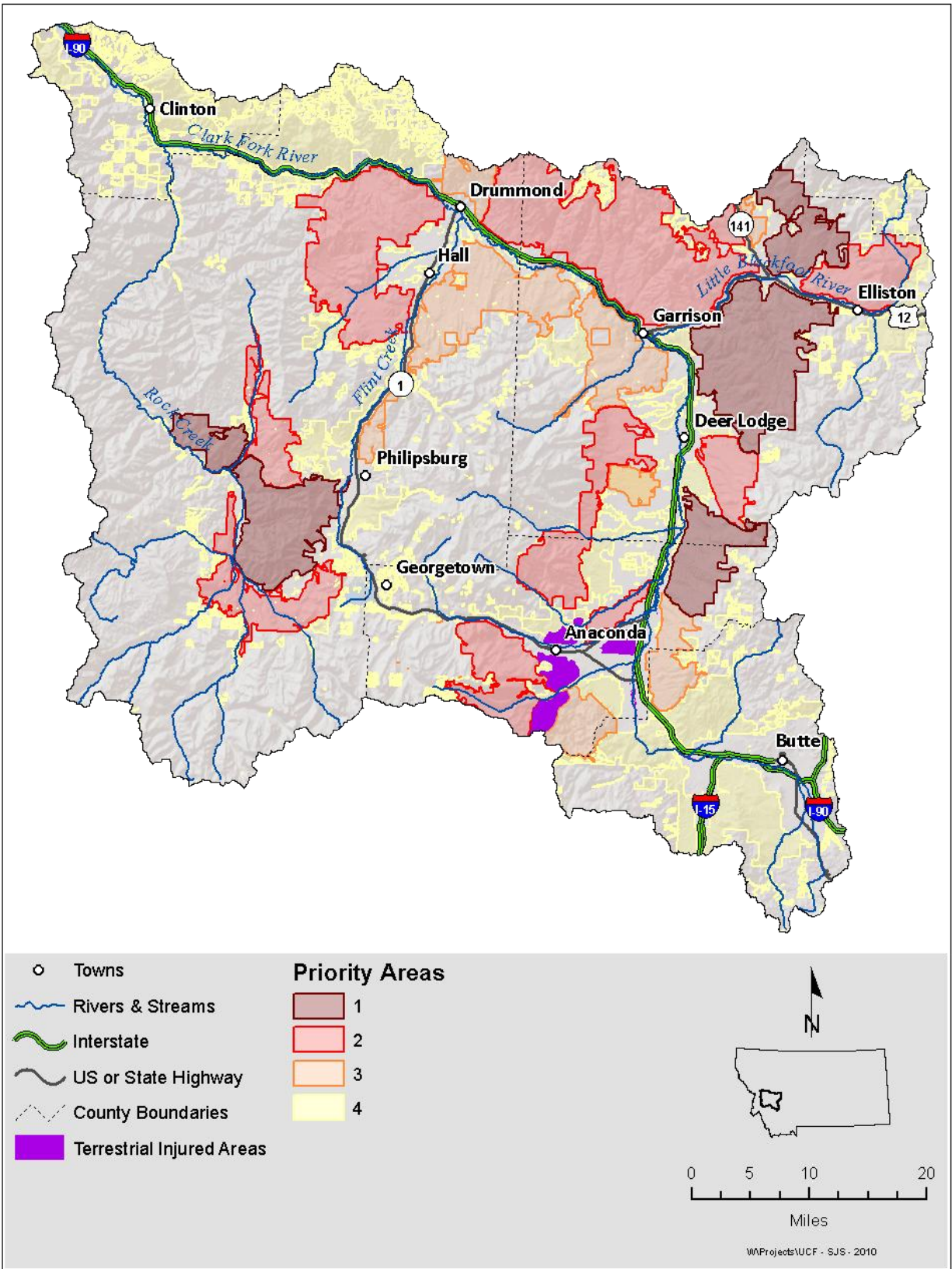
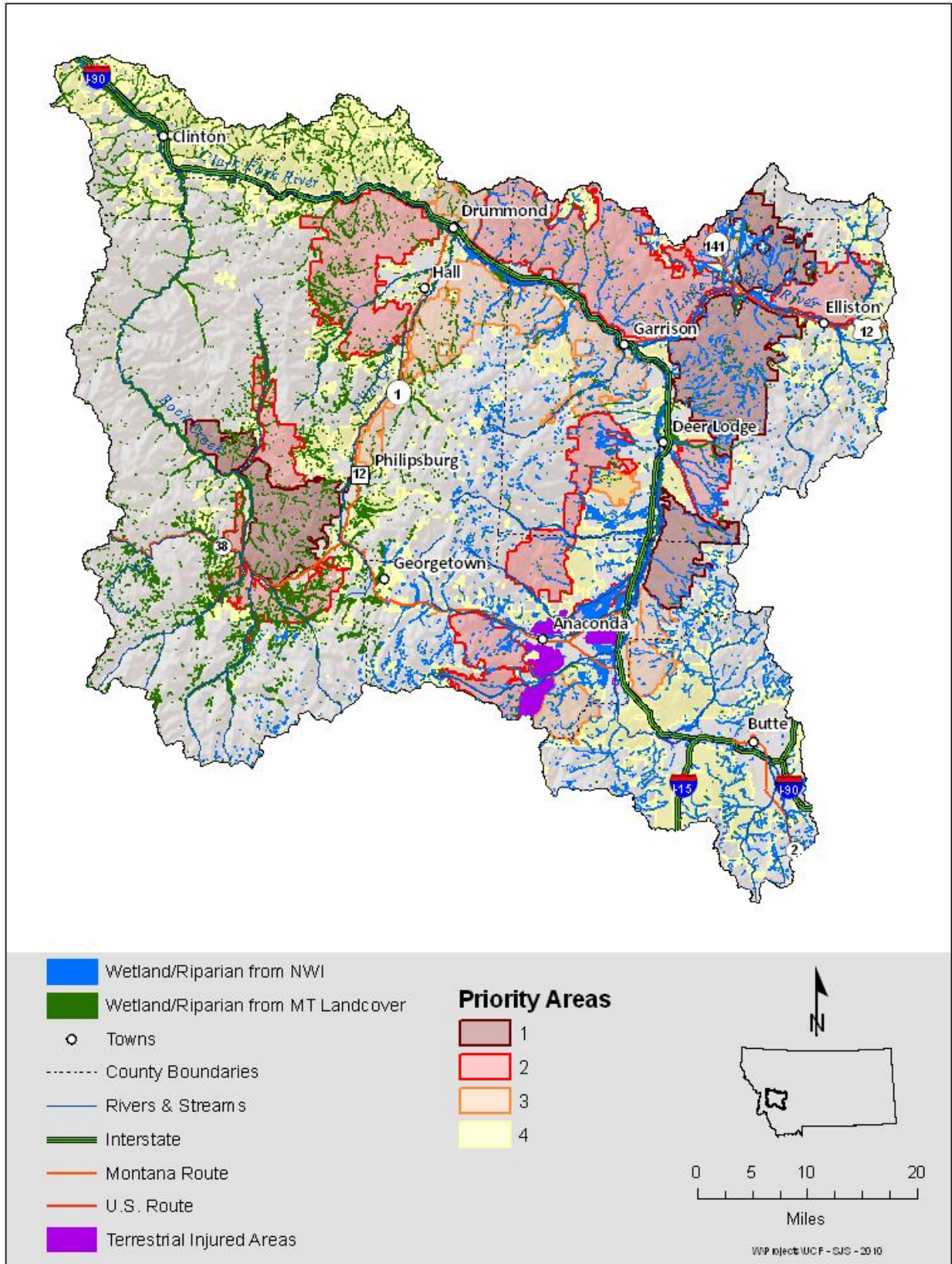


Figure 6. Riparian and wetland habitats in the UCFRB.



APPENDIX A. Upper Clark Fork River Basin Terrestrial Wildlife Assessment Reports.

The Upper Clark Fork River Basin Terrestrial Wildlife Assessment Final Report can be found on the Department of Justice, Restoration Road Map Web Page:

<http://doj.mt.gov/lands/naturalresource/restorationroadmap.asp>

The citation and web link directly to the Final Report is:

Vinkey, R., K. DuBois, C. Fox, and G. Mullen. 2010. Upper Clark Fork River Basin Terrestrial Resource Assessment Final Report. Montana Fish, Wildlife & Parks and Montana Department of Justice Natural Resource Damage Program. 36 pp.

<http://doj.mt.gov/lands/naturalresource/resources/projects/2010ucfrbterrestrialresourceassessment.pdf>

Individual reports produced as part of this effort include:

DuBois, K.L. 2010. Upper Clark Fork Wildlife Assessment, Raptor, Colonial Waterbird, and Targeted Species Survey and Monitoring. Montana Fish, Wildlife & Parks, Region 2, Missoula. 18 pp. <http://fwpiis.mt.gov/content/getitem.aspx?id=44772>

Foresman, K.R. 2009. Upper Clark Fork Wildlife Resource Monitoring Assessment—Aquatic Furbearers. University of Montana, Missoula. 25 pp.

<http://fwpiis.mt.gov/content/getitem.aspx?id=44770>

Leary, A. 2010. Upper Clark Fork River Basin Small Mammal, Amphibian, and Reptile Surveys. Montana Tech, and Montana Fish, Wildlife & Parks. 29 pp.

<http://fwpiis.mt.gov/content/getitem.aspx?id=44773>

Lenard, S. 2009. Summary: Bat Species in Select Vegetation Communities in the Upper Clark Fork Watershed. Montana Natural Heritage Program, Helena, MT. 18 pp.

<http://fwpiis.mt.gov/content/getitem.aspx?id=44767>

Ritter, J. 2010. Predicted Distribution Model Analysis Using 2009 UCFRB Field Data. Montana Fish, Wildlife & Parks, Helena, MT. 12 pp.

<http://fwpiis.mt.gov/content/getitem.aspx?id=44763>

Smucker, K. and M. Fylling. 2010. Upper Clark Fork River Basin Report on 2009 Bird Surveys. Avian Science Center, University of Montana. 20 pp.

<http://fwpiis.mt.gov/content/getitem.aspx?id=44768>

Swant, G. 2009. Fall Shorebird, Waterbird, and Waterfowl Migration Counts at Warm Springs Wildlife Management Area, 2009. GoBird Montana, LLC. For Montana Fish, Wildlife & Parks. 32 pp.

<http://fwpiis.mt.gov/content/getitem.aspx?id=44774>

Vance, L., and C. Tobalske. 2010. Upper Clark Fork Sage Steppe and Grassland Classification and Mapping. Montana Natural Heritage Program, Helena, MT. 16 pp.

<http://fwpiis.mt.gov/content/getitem.aspx?id=44758>

APPENDIX B. Planned remediation and restoration of Injured Terrestrial Resource Areas.

Following is a summary of the planned remediation and restoration in the four high priority injured terrestrial resource areas. It should be understood that actions taken to remediate and restore areas impacted by hazardous substance releases must be cost-effective pursuant to both the remedial and restoration provisions in federal Superfund law and associated regulations. The planned actions, which have or will occur over decades, include major removal, re-vegetation, stabilization, and/or treatment actions to jump start the recovery to baseline vegetation conditions, with further natural recovery to occur over time. The State acknowledges that recovery of the four injured areas will be lengthy due to the severity of the injury, and, in the case of Opportunity Ponds, the injury is so severe that the injured riparian and wetland resources cannot be cost-effectively returned to a baseline condition, as documented in the *State's 1995 Restoration Determination Plan*.³ Also provided is an attachment that describes activities and a map that depicts the lands in public ownership that are adjacent to these injured areas.

Anaconda Uplands: Approximately 18 square miles of upland soils, vegetation, and wildlife habitat have been injured around the Anaconda area, primarily due to historic releases of hazardous substances by the Anaconda Smelter. The injured area encompasses the eastern portion of Stucky Ridge (2,409 acres), areas to the west and south of Smelter Hill (4,653 acres), and portions of the Mount Haggin Wildlife Management Area (4,304 acres). These areas lack major indigenous plant associations, resulting in the significant reduction of the quantity and quality of wildlife habitat and an associated reduction in wildlife populations.

Pursuant to a 1998 Record of Decision, ARCO is responsible for conducting remediation activities in and around the Anaconda Uplands that primarily involve re-vegetation techniques. The goal of these remediation activities is reduce surface soil arsenic concentrations and to establish a self-sustaining assemblage of plant species capable of stabilizing soils against erosion and minimizing transport of contaminants to surface and ground water. These goals are aimed at meeting water quality standards, reestablishing wildlife habitat, and establishing a permanent, diverse, and effective vegetation covers. In the past decade, ARCO has conducted pilot remediation re-vegetation actions in the Uplands areas and they are expected to begin more re-vegetation efforts in 2011 or 2012.

Under provisions of the 2008 settlement/consent decree, the State received \$13.3 million to conduct both remedy and restoration actions in the most severely injured portions of the Mount Haggin injured area and on the state-owned lands on Stucky Ridge and to conduct restoration actions on the county-owned lands within the Uplands injured areas. The State initiated its integrated remediation and restoration actions in 2010. The remedial and restoration work to be performed are outlined in the *2007 Draft Conceptual Smelter Hill Area Uplands Restoration Plan* (NRDP, 2007). This report outlines the remedial consent decree requirements, including remedial requirements to be accomplished with restoration actions on State-owned property within the Upland injured areas. These state actions, combined with ARCO's remediation actions of the Uplands area, are expected to take up to 10 years to complete.

³ *Restoration Determination Pan for the UCFRB*, prepared by the NRDP, October 1995.

Opportunity Ponds: Riparian resources (soils, vegetation, wildlife, and wildlife habitat) have been lost on the 3,400 acre Opportunity Ponds tailings area, which contains an estimated 150 million cubic yards (cy³) of metal-laden tailings accumulated from the Anaconda smelter's operation over 60 years. The Ponds site serves as a waste repository for waste from area Superfund sites and will be referred to as the Atlantic Richfield Land Management Area upon completion of area remediation activities. ARCO's remediation of the Ponds includes capping the entire area with 18" of clean soils and a grass vegetative cover, controlling dust and surface water run-off, and conducting long-term operation and maintenance activities. To date, most of the Ponds site has been capped. Near completion of tailings capping and re-vegetation of the Ponds is expected in several years. The major purpose of the vegetative cap on the Ponds is to control dust and institutional controls and this will require that the cap not be disturbed.

Silver Bow Creek Area: The State's natural resource damage assessment completed in 1995 indicated that about 800 acres of the 22-mile floodplain corridor of Silver Bow Creek between Butte and Warm Springs Ponds contained toxic metal-laden tailings that eliminated riparian wildlife habitat. It also indicated that populations of otter, mink, and raccoons have been eliminated from Silver Bow Creek.

Pursuant to the 1999 settlement/consent decree that provided \$80 million, plus interest, in funding for remediation of Silver Bow Creek, the State Department of Environmental Quality (DEQ) is conducting remedial actions along the creek corridor. DEQ's remediation work primarily involves excavation of tailings and related impacted soils from the floodplain of Silver Bow Creek and reconstruction of the stream channel and floodplain. Since remediation activities began 1999, about 4 million of an estimated 4.7 million cy³ of tailings (about 80%) have been removed from the Silver Bow Creek floodplain corridor and 14 of 24 stream miles have been reconstructed. Restoration activities that enhance the fish and wildlife habitat along the creek are being conducted in coordination with the remediation work via Natural Resource Damage Program grants totaling \$15.5 million to the Greenway Service District for the Silver Bow Creek Greenway project. These restoration activities enhance wildlife habitat by augmenting organic matter, seeding, and restoration plantings of the remedial re-vegetation work. The Greenway project also involves the development of a passive-use recreational corridor along Silver Bow Creek that will enhance the public's viewing and enjoyment of wildlife resources. The State expects to complete remediation and restoration of injured floodplain areas in about 3 years.

Upper Clark Fork River: The State's natural resource damage assessment completed in 1995 (Lipton et al. 1995) and the 2004 Record of Decision for the Upper Clark Fork River indicated that approximately 215 to 250 acres of floodplain along the 17 miles of the Upper Clark Fork River between Warm Springs Ponds and Deer Lodge contained phytotoxic concentrations of hazardous substances so that they were entirely or largely devoid of vegetation, having no or little capacity to support viable wildlife populations. It also indicated populations of otter, mink, and raccoon have been significantly reduced relative to baseline conditions.

The 2008 settlement/consent decree provided the State with \$95 million, plus interest, for the remediation of the Upper Clark Fork River and \$26.7 million, plus interest, for the restoration of the Upper Clark Fork River. The DEQ will conduct the remediation activities that involve

removal of contaminated tailings from areas mostly devoid of vegetation, treatment of other contaminated soils, with lime and deep tilling, and stream bank reconstruction. The NRDP will conduct restoration activities that will be integrated with remediation activities, and enhance riparian wildlife habitat by removing additional tailings and completing more vegetation activities (addition of organic matter, grasses, trees, and shrubs) to augment remediation work. The State's Restoration Plan also provides for acquisitions/easements in the upper Clark Fork River riparian zone, when feasible, based on landowner agreements. The State anticipates remediation and restoration work of the Upper Clark Fork River to be completed in the next 10 to 12 years.

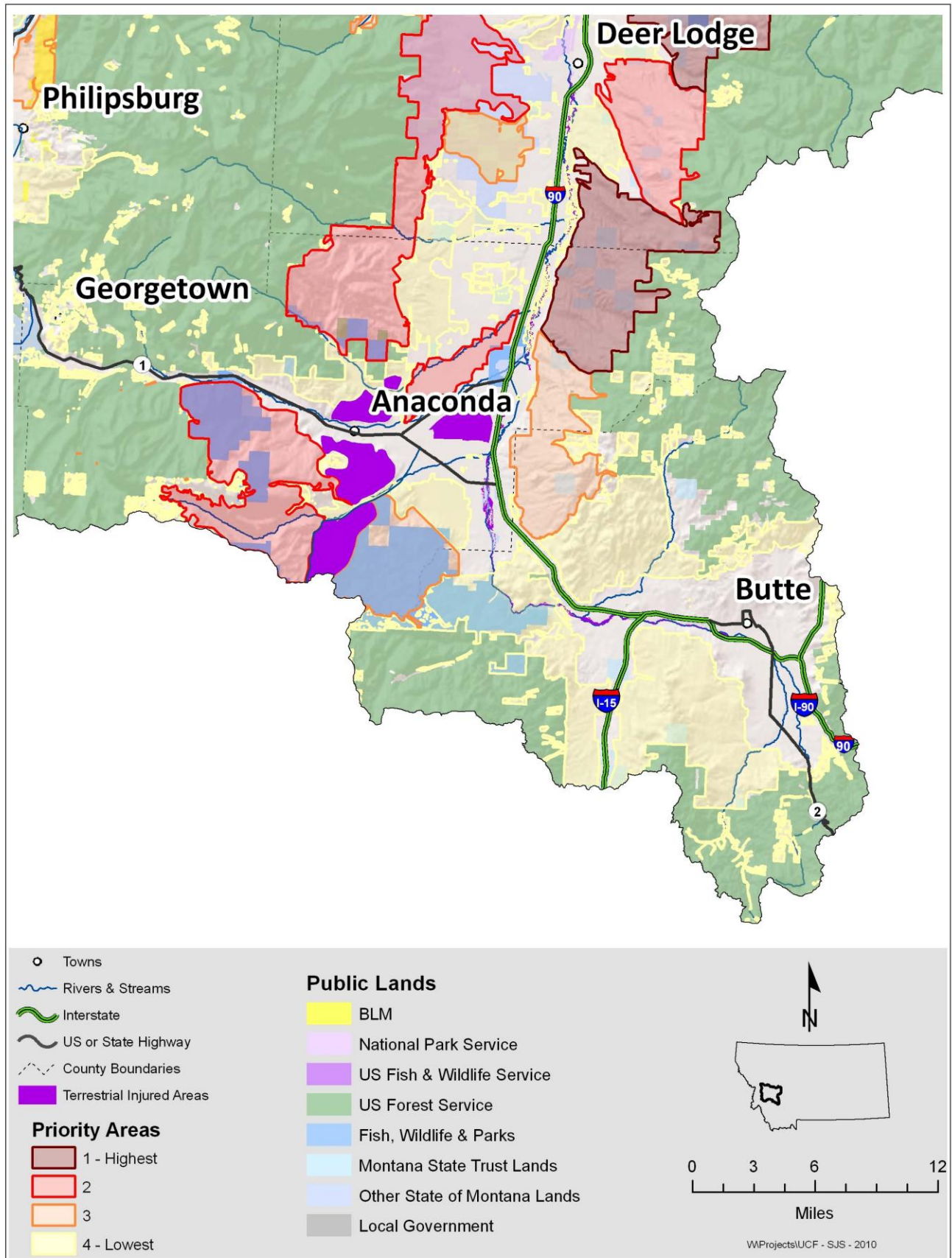
Attachment A. Summary of Public Lands on or near the Four Terrestrial Resource Injured Areas. Note: The areas of public ownership outlined below are depicted Figure B-1.

- Opportunity Ponds (3,400 acres of injured lands): The State is negotiating with ARCO to acquire the 3,750 acre Dutchman wetlands near the Opportunity Ponds.
- Silver Bow Creek (750 acres of injured lands): Through the 1998 settlement and grants funded by it, the majority of the 1,400 acre floodplain of Silver Bow Creek is owned by the State or Greenway Service District. FWP acquired ownership of another 1,746 acres of lands along four miles of Silver Bow Creek in Durant Canyon (Duhamé property) through a NRD grant. In addition, some of the lands south of Silver Bow Creek in Durant Canyon are USFS lands.
- Smelter Hill Area Uplands (11,366 acres of injured lands), have extensive public lands already in public ownership within or surrounding the upland injured areas. The Upland injured areas consist of Mount Haggin, Smelter Hill, and Stucky Ridge.
 - FWP owns Mount Haggin injured area (4,304 acres) and adjoining lands that, combined, are part of the 55,000 acre Mount Haggin Wildlife Management Area.
 - Anaconda Deer Lodge County owns about 600 acres of Smelter Hill (which in total is a 4,653 acre injured area) and some of the lands surrounding the area. Also, via NRD grants, the state acquired the nearby 6,800 acre Garrity Mountain Wildlife Management Area west of Anaconda and the US Forest Service owns most land between west of Garrity to Georgetown Lake.
 - Almost half of 2,409 acre Stucky Ridge area is owned by the DNRC (480 acres) or Anaconda Deer Lodge County. Surrounding areas to the west of Stucky Ridge are part of the Blue Eyed Nellie and Stucky Ridge Wildlife Management Areas—460 acres.
- A total of 7.7 miles (17%) of the 45 river miles in Reach A is currently or will be in public ownership.⁴ Also, the States' 2007 Clark Fork River restoration plan⁵ provides for funding of easements along the river floodplain corridor in Reach A.

⁴ The State currently owns about 3.75 miles along the Clark Fork River in Reach A that includes sections of FWP's Warm Springs Ponds Wildlife Management Area and the Paracini Ponds site located near Racetrack, acquired in 2010. ARCO owns 1.6 river miles that may be transferred to the State under provisions of the 1998 State/ARCO Consent Decree. Plus there are about 2.35 river miles in Reach A under federal ownership.

⁵ *State of Montana Revised Restoration Plan for the Clark Fork River Aquatic and Terrestrial Resources*, NRDP, Nov. 2007.

Appendix Figure B-1. Public land ownership in the vicinity of the terrestrial injured areas in the Upper Clark Fork River Basin.



APPENDIX C. Land-cover (habitats) in the UCFRB, indicating those included in the habitat patch analysis and area prioritization.

UCFRB Habitat Name (Bold = removed from analysis)	Land-cover Codes	Land-cover Classes	Included in Analysis
Water	11	Open Water	
Developed	21, 22, 23, 31	Developed - Open Space, Developed - Low Intensity, Developed - Medium Intensity	
Agriculture	81, 82	Pasture - Hay, Cultivated Cropland	
Cliffs, bedrock, and badlands	3114, 3129	Western Great Plains Badland, Rocky Mountain Cliff, Canyon, and Massive Bedrock	X
Alpine Bedrock and Ice	3130, 3135	North American Alpine Ice Field, Rocky Mountain Alpine Bedrock and Scree	
Alpine Low Vegetation	5207, 716, 7117	Rocky Mountain Alpine Dwarf-Shrubland, Rocky Mountain Alpine Fell-Field, Rocky Mountain Alpine Turf	
Subalpine-montane mesic meadow	7118	Rocky Mountain Subalpine-Montane Mesic Meadow	X
Aspen Forest and Woodland	4104, 4302	Rocky Mountain Aspen Forest and Woodland, Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland	X
Montane dry-mesic mixed conifer forest	4232	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest	X
Montane-subalpine mesic mixed conifer forest	4233, 4234	Northern Rocky Mountain Subalpine Woodland and Parkland, Northern Rocky Mountain Mesic Montane Mixed Conifer Forest	X
Limber pine-juniper woodland	4236, 4303	Rocky Mountain Foothill Limber Pine-Juniper Woodland, Inter- Mountain Basins Mountain Mahogany Woodland and Shrubland	X
Lodgepole pine forest	4237	Rocky Mountain Lodgepole Pine Forest	X
Ponderosa pine woodland and savanna	4240	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	X
Subalpine spruce-fir forest and woodland	4242, 4243	Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland, Rocky Mountain Subalpine Mesic-Wet Spruce- Fir Forest and Woodland	
Douglas-fir forest and woodland	4266	Middle Rocky Mountain Montane Douglas-fir Forest and Woodland	X
Deciduous shrubland	5312, 5326	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland, Northern Rocky Mountain Subalpine Deciduous Shrubland	X
Montane sagebrush steppe	5209, 5455	Wyoming Basins Dwarf Sagebrush Shrubland and Steppe, Inter- Mountain Basins Montane Sagebrush Steppe	X
Big sagebrush steppe	5454	Inter-Mountain Basins Big Sagebrush Steppe	X
Lower montane, foothill and valley grassland	7112	Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland	X
Upper montane and subalpine grassland	7113	Northern Rocky Mountain Subalpine-Upper Montane Grassland	X
Burned forest	8501	Recently burned forest	X
Harvested forest	8601, 8602, 8603	Harvested forest-tree regeneration, Harvested forest-shrub regeneration, Harvested forest-grass regeneration	X
Riparian woodland and shrubland	9155	Northern Rocky Mountain Lower Montane Riparian Woodland and Shrub	X
Wet meadow	9217, 9234	Rocky Mountain Alpine-Montane Wet Meadow, Rocky Mountain Subalpine-Montane Fen	X
Emergent marsh	9222	North American Arid West Emergent Marsh	X

APPENDIX D. Resource maps used to inform decisions during the prioritization process.

Figure D-1. Priority areas in relation to big game (elk, mule deer, antelope, and bighorn sheep) winter range.

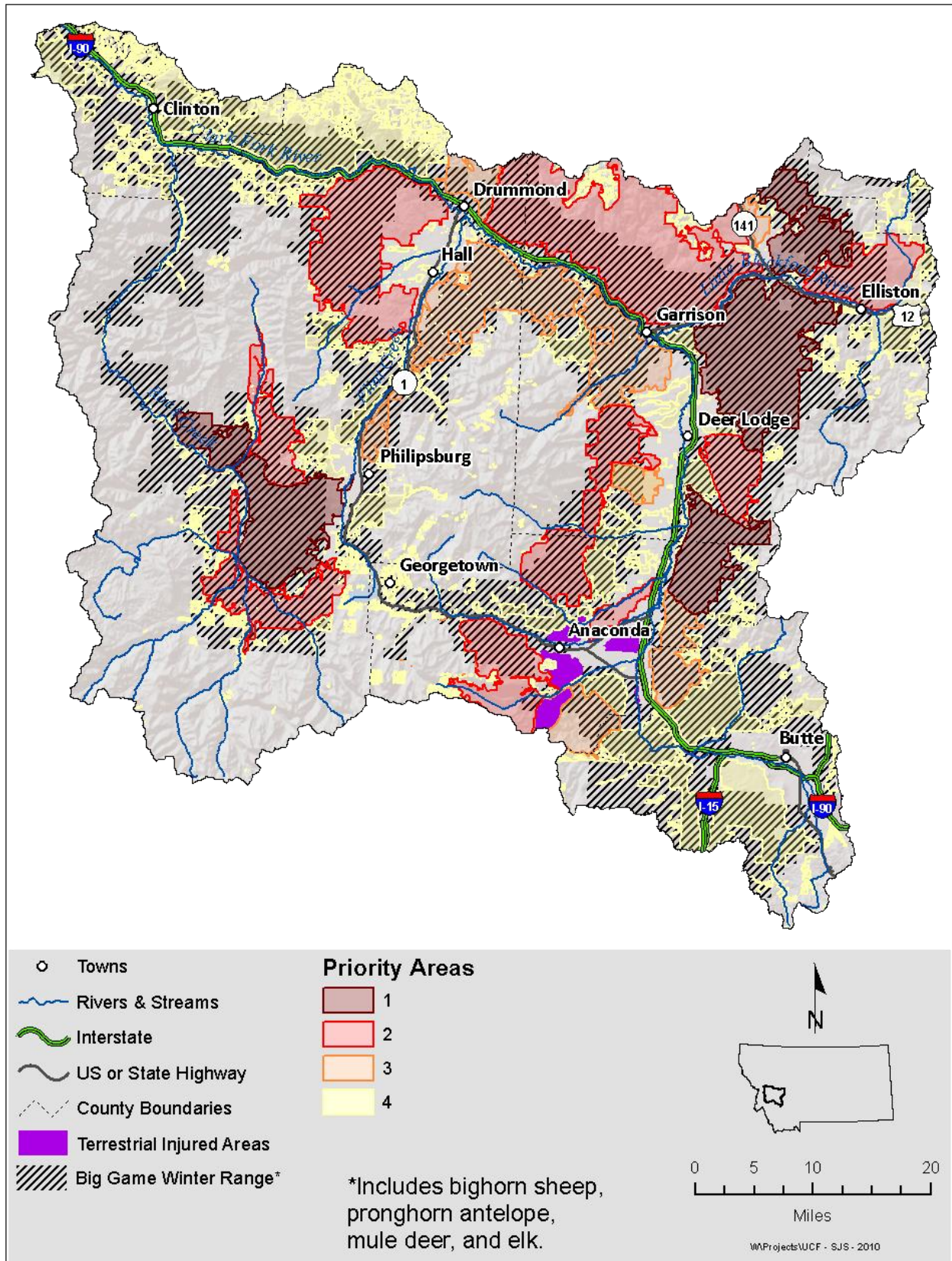


Figure D-2. Priority areas in relation to elk winter range in the UCFRB.

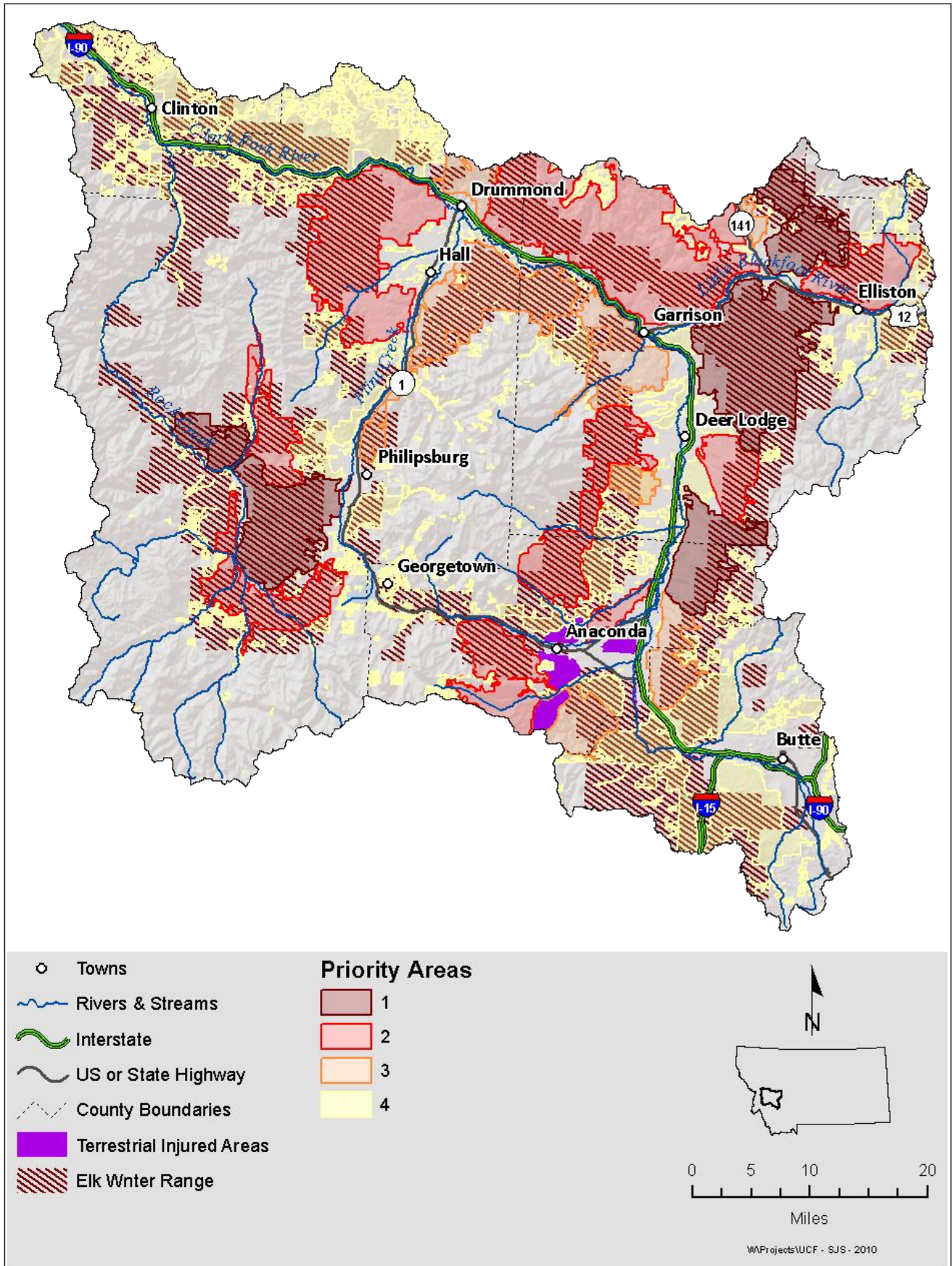


Figure D-3. Priority areas in relation to modeled species richness in the UCFRB.

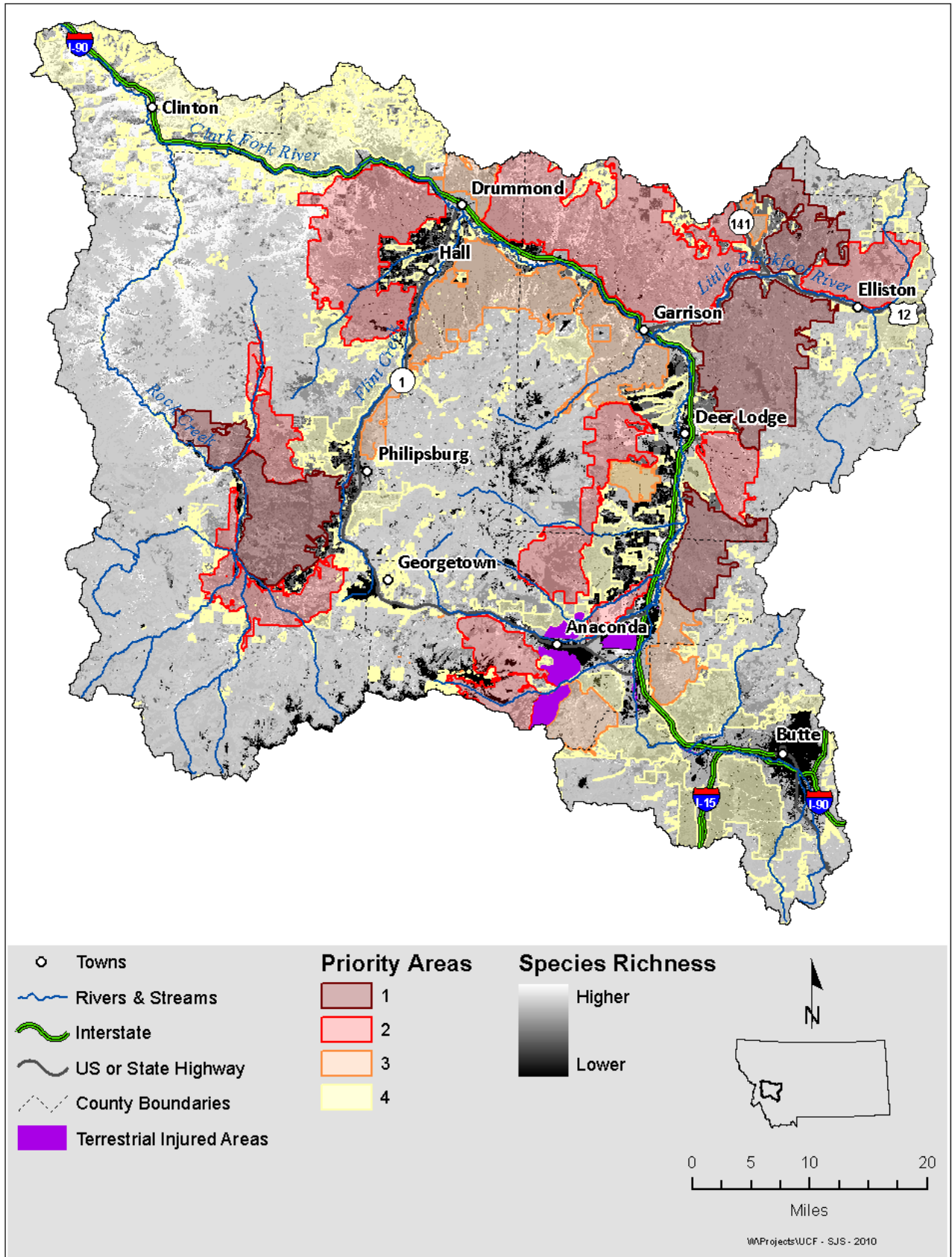


Figure D-4. Priority areas in relation to connectivity with watersheds surrounding the UCFRB.

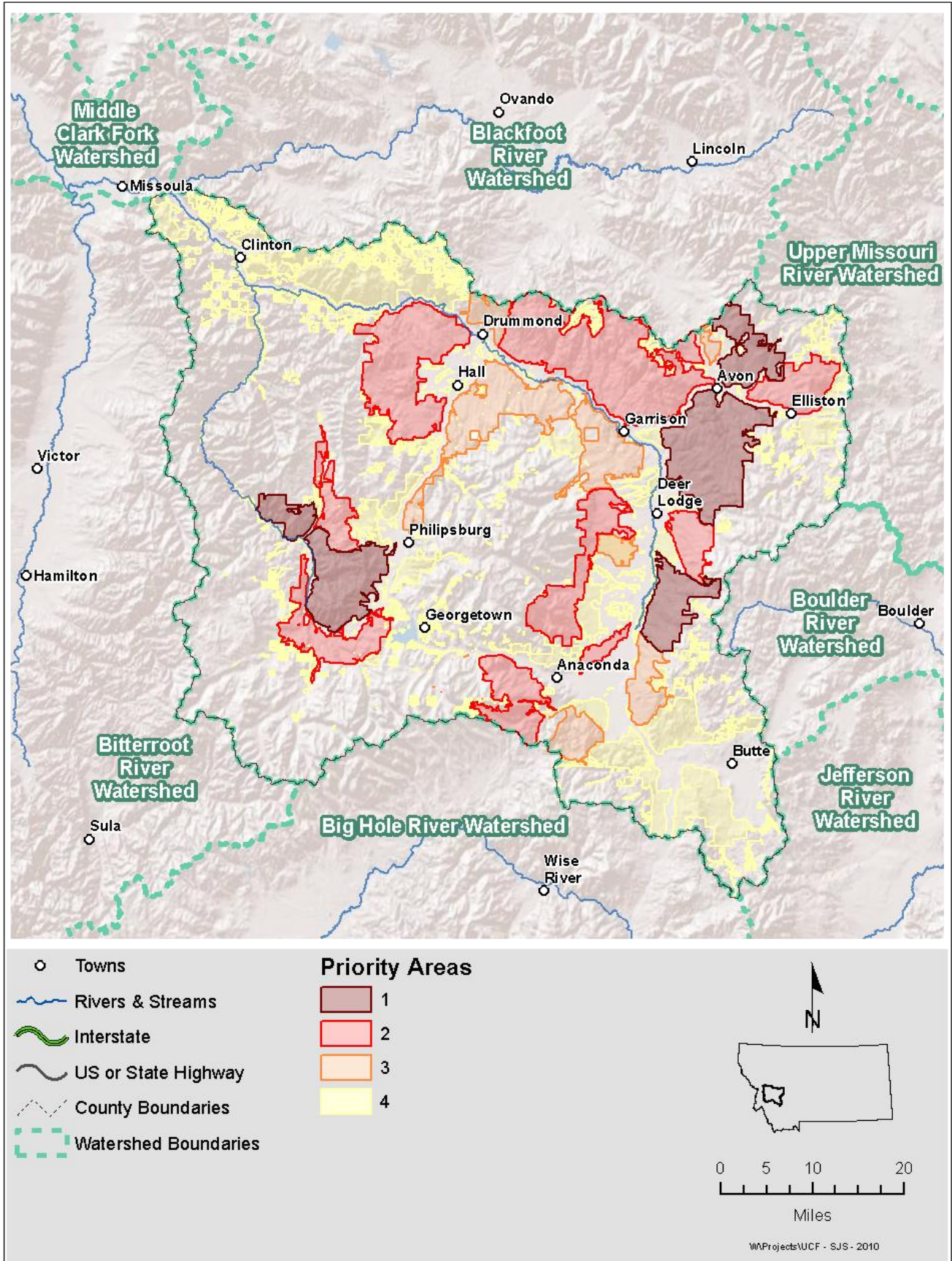
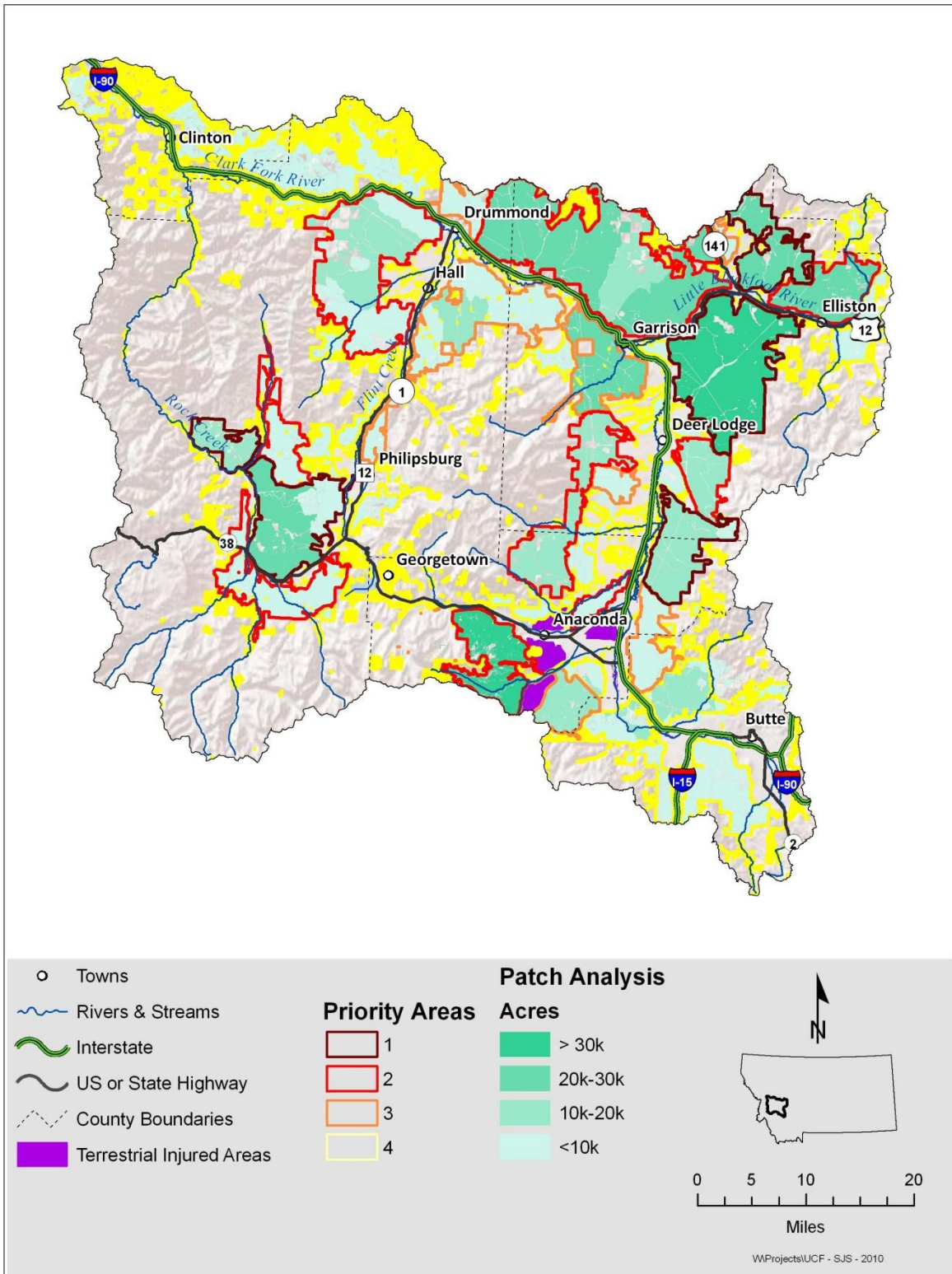


Figure D-5. Priority areas in relation to size of native habitat patches in the UCFRB.





Sagebrush & skyline. Deer Lodge Valley. (Ray Vinkey, photo)