Chapter 4—Project Implementation

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Riparian habitat along the Thomas Fork of the Bear River, Idaho.

Land Protection Options Not Analyzed in Detail

During development of the alternatives for this project, the Service considered the following land protection options:

- voluntary landowner zoning
- county zoning
- fee-title acquisition
- smaller project area
- short-term easements
- expansion of the project

The Service found that none of the above protection options met the purpose, need, or objectives of the proposed Bear River Watershed Conservation Area, and they were therefore not analyzed in further detail in the EA (appendix A).

No Action

Under the no-action alternative evaluated in the EA (appendix A), habitat enhancement or restoration projects on private lands, such as water developments, grazing systems, and grassland management, could continue through cooperative efforts with private landowners. Public agency and private land trusts would continue conservation efforts by securing easements.

The large numbers of native birds, fish, and other wildlife supported by the diversity of habitat types in the Bear River watershed are a tribute to the conservation efforts of ranchers, landowners, and a variety of agencies and organizations. Although these conservation efforts have been essential to sustaining wildlife populations in the past, they are not expected to be enough to meet future development and climate change challenges.

Under the no-action alternative, many of the privately owned wetlands and riparian corridors vulnerable to development would be lost. The burden to protect wetlands and riparian and upland areas would rest more heavily on private landowners without compensation. Future wetland protection would rely primarily on the Wetland Reserve Program and conservation organizations such as Ducks Unlimited, The Nature Conservancy, and Trout Unlimited. The future of wildlife and the habitat they depend on would be less certain without a collaborative landscape-scale conservation project like the conservation area.

Easement Program

Conservation easements are the most cost-effective and politically acceptable means to ensure landscape-scale level protection of crucial wildlife habitat within the Bear River Watershed Conservation Area. Although fee-title acquisition will be preferable in some locations, it is not required and is not preferable to establishing conservation easements in the Bear River watershed. Fee-title acquisition would triple or quadruple the cost of land acquisition besides adding significant increases in long-term management and operational costs for the Service. The Service views conservation easements as the most viable means of protecting habitat integrity and wildlife resources on the scale necessary to maintain the resiliency of the conservation area and its connectivity to adjacent ecosystems.

Under the easement program, the Service will seek to buy perpetual conservation easements from willing sellers on privately owned lands that are providing valuable wildlife habitat. The easement contract language will reduce confusion about any restrictions, facilitate enforcement, and specify the necessary level of protection and limitations on development for wetland and upland habitat for trust species.

The Service has standard conservation easement agreements that have been used successfully in other easement conservation areas of the United States. With appropriate modifications for the resources of the Bear River watershed, the Service will develop a standard document with similar language and terms for the Bear River Watershed Conservation Area easements.

Development for residential and commercial or industrial purposes, such as energy and aggregate extraction, may not be permitted on properties under a conservation easement. Alteration of the natural topography and conversion of native grassland, shrubland, or wetland to cropland will be prohibited. In addition, the conservation easements will prohibit the draining, filling, or leveling of protected lands.

All land will remain in private ownership, and property tax and land management, including invasive weed control, will remain the responsibility of the landowner. The Service will seek to provide participating landowners with more help for invasive weed control and habitat restoration through the Partners for Fish and Wildlife Program. Control of public access to the land will remain under the control of the landowner.

The easement program will be managed by staff located at the three wildlife refuges located within the Bear River watershed. The Service staff located at Bear Lake National Wildlife Refuge in Montpelier, Idaho; Bear River Migratory Bird Refuge in Brigham City, Utah; and Cokeville Meadows National Wildlife Refuge in Cokeville, Wyoming, will be responsible for monitoring and administering all easements on private land. Monitoring will include periodically reviewing land status through correspondence and meetings with the landowners or land managers to make sure that the stipulations of the conservation easement are being met. Photo documentation will be used at the time the easements are established to document baseline conditions.

Project Objectives and Action

The purposes of establishing the Bear River Watershed Conservation Area are to:

- maintain healthy populations of native wildlife species, including migratory birds and threatened and endangered species;
- protect and maintain water quality and quantity;
- conserve aquatic, riparian, wetland, and upland habitats associated with the full diversity of Bear River ecosystems;
- provide wildlife habitat connectivity and migratory corridors;
- promote partnerships to coordinate implementation of watershed-level wildlife conservation actions;
- increase the resiliency of the watershed to sustain wildlife and important habitat during climate and land use changes.

Through the Bear River Watershed Conservation Area project, the Service proposes to buy or receive through donations up to 920,000 acres of perpetual

conservation easements from willing landowners within the watershed boundary. The Service seeks to connect existing protected lands and to complement ongoing conservation efforts by working with partners. Within the project boundary, the Service will strategically identify the most important areas to acquire wetland and upland conservation easements from interested landowners on a voluntary basis.

After completion of the EA (appendix A), six public scoping meetings, and a public comment period including six additional public meetings on the draft EA, the proposed action of acquiring conservation easements (alternative B) was chosen as the LPP for the Bear River Watershed Conservation Area. The finding of no significant impact documents the Service's selection of alternative B, modified to reflect all applicable comments, as the preferred alternative. Appendix B contains the environmental action statement, the environmental compliance certificate, and the FONSI. Appendix F is the intra-Service section 7 biological evaluation for federally listed species, which documents the Service's concurrence that the project actions will not affect, or may affect but not adversely, the listed, proposed, and candidate species within the project area.

Evaluation of Easement Potential

The relative importance of a potential easement will be determined by the ability of the parcel to help protect the habitat types that trust wildlife resources and species of conservation concern depend on. The prioritization modeling described below, along with evaluation criteria that will be developed, will be used by Service biologists and realty specialists to evaluate individual tracts of land to determine which should be considered as the "best of the best" for habitat conservation.

Contaminants and Hazardous Materials

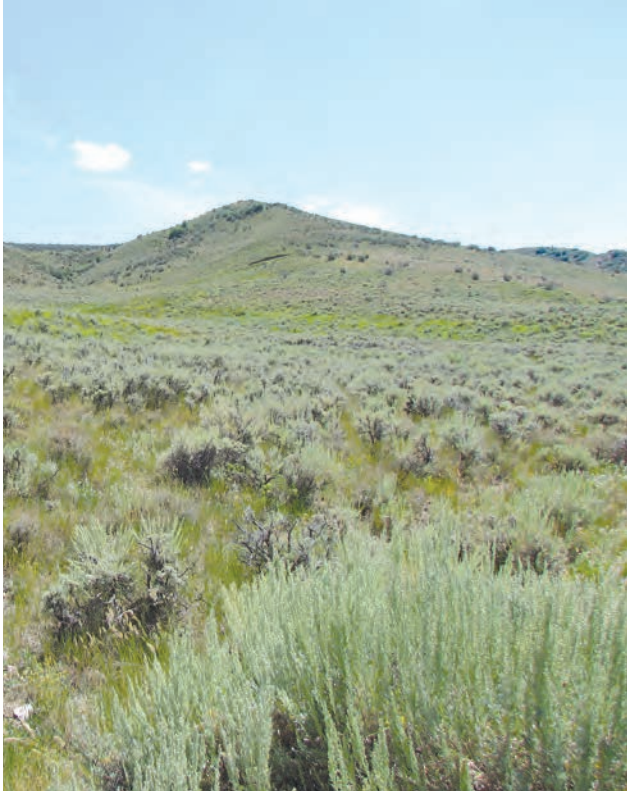
Fieldwork for pre-acquisition contaminant surveys will be conducted, on a tract-by-tract basis, before the purchase of any land interest. Any suspected problems or contaminants requiring more surveys will be referred to contaminants specialists located in the Service's Ecological Services offices in Idaho, Utah, or Wyoming to make sure that policies and guidelines for contaminants assessment are followed before any easements are acquired.

Cost of Project Implementation

The per-acre cost for conservation easements will vary by location in the watershed, habitat type, and the type of restrictions or rights acquired through the easement. Easements will be valued by a qualified outside appraiser using an adjusted land value (Service policy 341 FW6) based on a percentage (usually between 20 percent and 50 percent) of the full fee-title value of the land. Land values within the conservation area vary from $400 per acre to $3,700 per acre, depending on whether the land is upland or wetland and irrigated or nonirrigated and where it is located in the watershed. Based on a watershed-wide average cost of $810 per acre, the one-time initial cost for acquisition of easements is estimated to be about $745 million if all the potentially approved acreage is eventually acquired. Costs for landowner contacts and staff time will be divided among the three refuges and will depend on the level of landowner participation and available funding.

Easement Acquisition Funding

The primary funding source for acquisition of easements in the Bear River Watershed Conservation Area will be Land and Water Conservation Funds.



Dave Kimble / USFWS

Sagebrush habitat in the Bear River watershed.

These funds are not derived from general taxes; rather, they are derived primarily from Outer Continental Shelf oil and gas lease revenues, motorboat fuel taxes, and the sale of surplus Federal property. Land and Water Conservation Funds are intended for land and water conservation projects; funding is subject to annual appropriations by Congress for specific acquisition projects.

Money from other sources may also be considered for use in the project area. If approved by the Migratory Bird Conservation Commission, Migratory Bird Conservation Funds from the sale of Federal Duck Stamps may also be used for wetland conservation. Management activities associated with easements may be funded through sources such as The Nature Conservancy, Partners for Fish and Wildlife, and other private and public partners. Additionally, the Service will consider accepting voluntary donations of easements.

Ecosystem Management and Landscape Conservation Cooperatives

To successfully implement the Bear River Watershed Conservation Area, the Service will work with the three LCCs that encompass the project area. The Great Northern, Great Basin, and Southern Rockies LCCs cover parts of 10 western States and part of Canada (see figure 8). LCCs function across broad landscapes with many partners at the scale necessary to address the needs of wildlife populations.

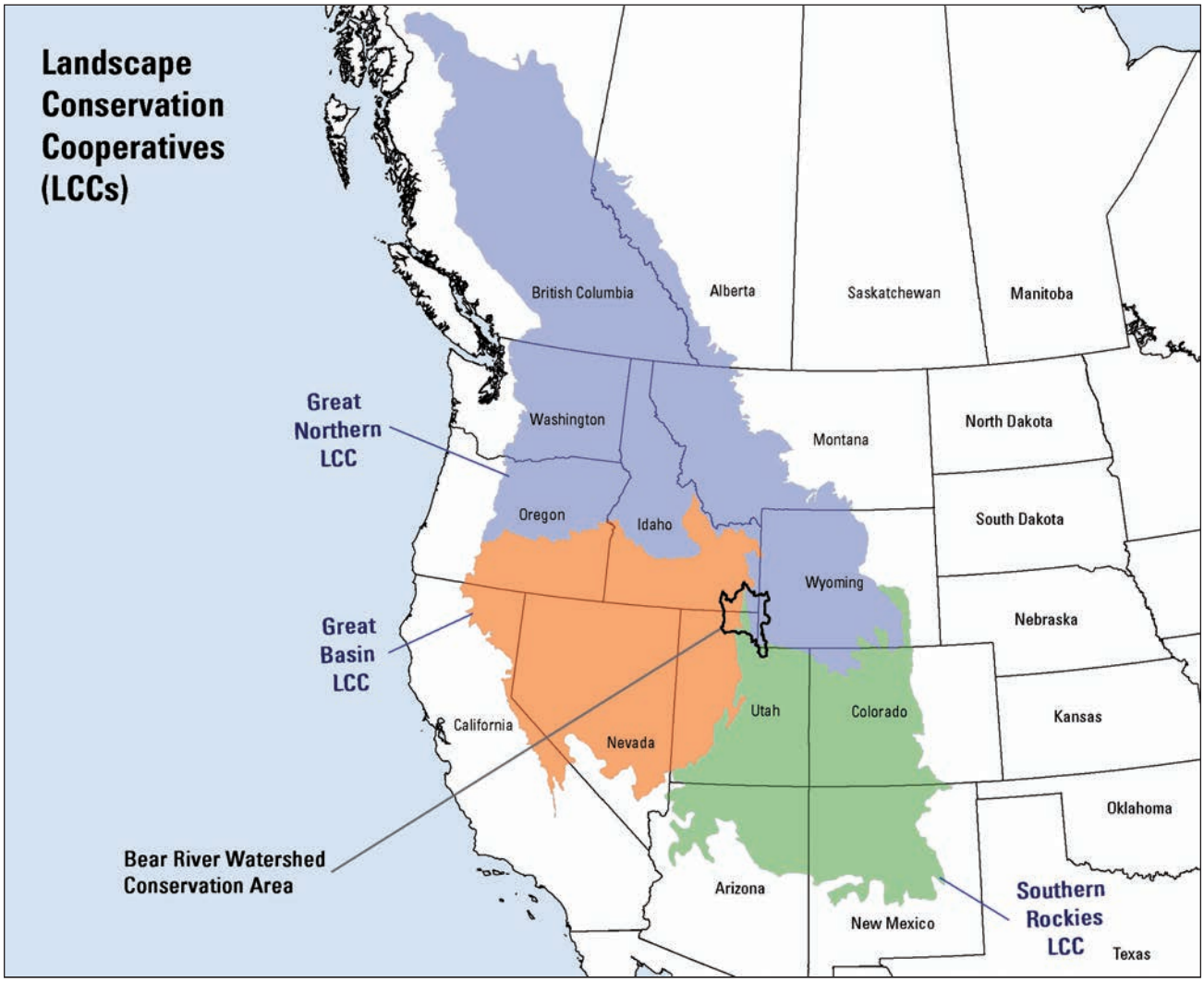


Figure 8. Map of the three landscape conservation cooperative areas that cover the Bear River Watershed Conservation Area in Idaho, Utah, and Wyoming.

Strategic Habitat Conservation and Protection Priorities

Strategic habitat conservation (see figure 9) incorporates five key principles into an ongoing process that changes and evolves:

- biological planning (setting targets)
- conservation design (developing a plan to meet the goals)
- conservation delivery (implementing the plan)
- monitoring and adaptive management (measuring success and improving results)
- research (increasing our understanding)

These steps are essential in dealing with a range of landscape-scale resource threats, such as development, invasive species, and water scarcity—all magnified by accelerating climate change.

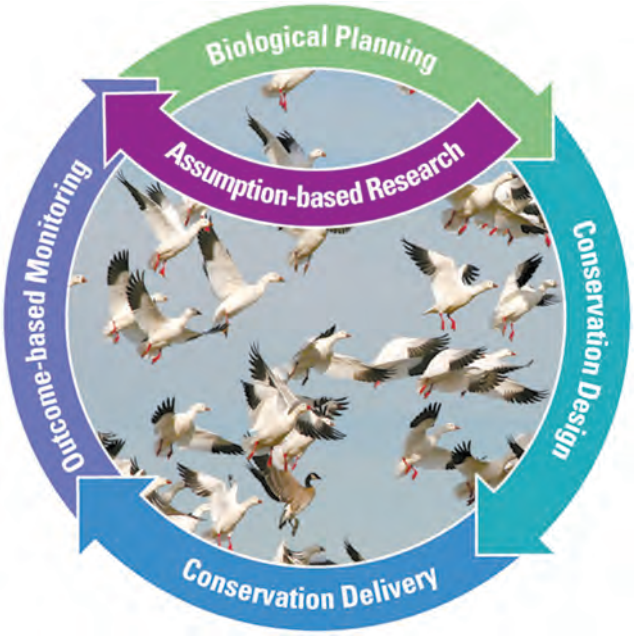


Figure 9. Elements of strategic habitat conservation.

Biological Planning

Biological planning requires the identification of priority species, development of population objectives, and identification of landscape-level limiting factors that keep the populations of priority trust species below desired levels.

The need and opportunity for strategic conservation to benefit fish and wildlife in the Bear River watershed are articulated in the following regional plans reviewed by the planning team:

- "Conservation Action Plan for the Bear River Watershed"
- State Wildlife Action Plans for Idaho, Utah, and Wyoming
- "Intermountain West Regional Shorebird Plan"
- "Intermountain West Waterbird Conservation Plan"
- "Partners In Flight"
- "Audubon Society Globally Important Bird Areas"
- "National Fish Habitat Action Plan 2006"
- "North American Waterfowl Management Plan"
- "U.S. Shorebird Conservation Plan"

Based on these plans and input from local stakeholders and partners, initial biological planning uses four focal or "surrogate species" to model the distribution and habitat needs of a larger group of wildlife species with similar needs. This information will also be used to set priorities for Service conservation efforts within the project area.

Protection Priorities

The Service and its partners recognize the tremendous opportunity within the Bear River watershed to expand existing blocks of conservation lands, including lands under fee-title or easement ownerships by State, Federal and conservation-oriented nongovernmental organizations. There is considerable interest by landowners in an additional landscape-scale conservation effort and funding source within the conservation area.

Determination of which habitat resources are the most important to conserve for the long-term sustainability of wildlife populations requires a prioritization strategy. The Service evaluated the conservation priorities and concerns in many regional plans, including the "North American Waterfowl Management Plan," "Intermountain West Joint Venture Waterbird and Shorebird Plans," Partners in Flight plans, State Wildlife Action Plans (Idaho, Utah and Wyoming),

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Bonneville Cutthroat Trout

and the comprehensive conservation plans under development for the three national wildlife refuges.

In applying conservation ecology, focal or surrogate species have been used as a practical bridge between single- and multiple-species approaches to wildlife conservation and management prioritization. Initial biological planning by the Service used four focal species to model the distribution and habitat of a larger group of wildlife species with similar needs.

Focal Species

Bonneville Cutthroat Trout. All three State comprehensive wildlife strategies identified the Bear River and its tributaries as playing an important role in providing habitat for an assemblage of native cool- and cold-water fish species and for Bonneville cutthroat trout in particular.

Once thought to be extinct because of habitat loss and overharvesting, Bonneville cutthroat trout were rediscovered in recent decades, with relatively pure populations continuing to persist along the periphery of the Bonneville basin in Utah, Idaho, Wyoming, and Nevada. The Bear River watershed supports the largest remaining migratory populations, including both fluvial and adfluvial forms, while other metapopulations and strongholds also occur in the Northern Bonneville basin (Haak et al. 2011).

Declines in populations of native salmonids, including Bonneville cutthroat trout, can result from the combined effects of habitat degradation and fragmentation, blocked migration corridors, degraded water quality or quantity, angler harvest and poaching, entrainment into diversion canals and dams, nonnative species interactions, and other factors (USFWS 2002). The quality of riparian habitat also greatly influences the quality of aquatic habitat. Riffle-dwelling species such as longnose dace and riffle-spawning salmonids require fine sediment levels associated with healthy riparian vegetation. Riparian habitat is also required by many amphibian and reptile species.

Bonneville cutthroat trout is used to represent a variety other native fish species found in the Bear River watershed including northern leatherside chub, mountain whitefish, mottled and Paiute sculpin, longnose and speckled dace, redside shiner, Utah sucker, and mountain sucker.

Sage Thrasher and Greater Sage-Grouse. Sagebrush ecosystems are among the most imperiled in North America because of a variety of human disturbances. Sagebrush habitat has been altered and fragmented, resulting in the decline in both the numbers and the distribution of many of the more than 350 species that depend on sagebrush habitat for all or part of their life cycles (Wisdom et al. 2005.) Shrub–steppe and grassland habitats make up about 60 percent of the Bear River watershed land cover that supports such species as greater sage-grouse, sage thrasher, sage sparrow, Columbian sharp-tailed grouse, burrowing owl, and long-billed curlew, all of which have been listed as "Species of Greatest Conservation Need" in Idaho, Utah, and Wyoming.

Habitat shifts have major implications for sagebrush-dependent vertebrates including sage thrasher, greater sage-grouse, and sage sparrow (Knick et al. 2003). Maintaining large areas of intact sagebrush is considered crucial to the long-term persistence of sage-grouse (Aldridge et al. 2008) as well as other sagebrush-dependent species.

Hanser and Knick (2011) found that the diversity of sagebrush habitats used by greater sage-grouse may provide an effective umbrella for a broader community of passerine bird species associated with sagebrush that are also declining in numbers. Brewer's sparrow, sage sparrow, and sage thrasher were found to have moderate to strong associations with sage-grouse. However, it is important to analyze the habitat needs of grouse and passerines separately due to the large difference in the scale of home range sizes as well as their specific habitat needs within sagebrush communities.

Sage-grouse are considered a landscape-scale species (Connelly et al. 2004, Crawford et al. 2004), and home ranges for individual sage-grouse may vary from hundreds to thousands of acres (Connelly et al. 2004, Rowland et al. 2006). Migratory populations of sage-grouse may use areas of 1,042 square miles (2,700 square kilometers) or more in size (Connelly et al. 2000 and Leonard et al. 2000). By contrast, territories for many passerines, such as sage thrashers and sage sparrows, are about 200 acres for an individual bird (Rowland et al. 2006, Martin and Carlson 1998). To persist, nesting thrasher populations require patches of sagebrush–steppe of at least 247 acres (100 hectares) (Casey 2000, Nicholoff 2003).

Sage-grouse use a variety of patch sizes arranged in a mosaic across the landscape, a reflection of their high mobility and large home ranges (Connelly et

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Sage Thrasher

Mark Hogan / USFWS

Greater Sage-Grouse

al. 2004, Crawford et al. 2004). Sage thrasher populations are found to be positively correlated with specific landscape characteristics, such as structure (for example, presence of "robust" woody plants like big sagebrush), increasing horizontal and vertical heterogeneity, and high horizontal patchiness. Sage thrasher occurrence is greater in shrub steppe located on loamy and shallow soils than on sandy soils (Vander Haegen et al. 2000), Thrasher populations seem to be negatively correlated with grass cover and spiny shrubs (for example, hopsage and budsage) (Rotenberry and Wiens 1980, Wiens and Rotenberry 1981, Dobler et al. 1996). Research suggests that thrashers do best in less disturbed communities that approach climax conditions (Vander Haegen et al. 2000); however, whether they are adversely affected by habitat fragmentation seems to be an unresolved issue (Knick and Rotenberry 1995, Vander Haegen et al. 2000, Nicholoff 2003).

A 2006 assessment by Rowland et al. found that the geographic ranges of sagebrush-dependent species overlap sufficiently with those of sage-grouse that most of their habitat falls within the range of sage-grouse. However, when the spatially explicit overlap in habitats for target species and sage-grouse was accounted for, only 10 of the 39 target species had their habitat both shared with sage-grouse and within the historical range of that species. Thus, conservation benefits to target species from habitat management applied to sage-grouse would be minimal for most species in our analysis. Even within sagebrush communities in the range of sage-grouse, vegetation manipulation tailored to benefit sage-grouse may not improve habitat for other species.

Because of the large difference in the spatial extent of areas used by sage-grouse and other sagebrush-dependent species, declining trends in individual sage-grouse populations may not be apparent until other species associated with sagebrush communities have experienced far more severe population declines that may be difficult to reverse (Rowland et al. 2006).

Because of the large amount and relative importance of sagebrush habitat within the conservation area and the degree of uncertainty about the similarity of habitat needs of greater sage-grouse and sage thrasher, both species were included in the geospatial analysis and modeling for the project.

American Avocet. American avocet represents a larger group of waterbirds including white-faced ibis and long-billed curlew. Breeding Bird Surveys have shown that the population trend for American avocets in the watershed has trended downward through 2000 (Sauer et al. 2005). Habitat destruction and fragmentation of wetlands and marshes limit the population of

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American Avocet

several waterbird and waterfowl species because of the reduction or elimination of nesting, brooding, and foraging habitats. The proximity and quality of these various habitat types particularly affect the survival rates of young birds.

Besides the importance of breeding habitat, the quality and availability of spring migration habitat have direct implications for the survival and breeding productivity of the millions of migratory birds passing through the Bear River watershed each year. Complexes of wetlands, wet meadows, flooded pastures, and hayfields found in the Bear River watershed are used by many species of migrating waterfowl, shorebirds, and waterbirds including American avocet, sandhill crane, white-faced ibis, American bittern, marbled godwit, long-billed dowitcher, and northern pintail.

Conservation Design

Conceptual and quantitative models have been developed to help predict key habitats used by the highest density of the four focal species populations and to aid in initial conservation design and delivery efforts.

Priority species, along with associated population goals, will continually be defined and updated throughout the implementation of this project, and additional landscape models will be developed for priority trust species.

Most wildlife species require more than one type of habitat during their life history. The wetland, riparian, grassland, and shrubland habitat found in the Bear River watershed allow multiple groups of species to meet their needs. The connectivity between the three national wildlife refuges, the waterfowl production area, and other large areas of protected lands maintains migration corridors for migratory and resident wildlife species. The connectivity within the Bear River watershed as well as to other ecosystems such as the Greater Yellowstone increases the resiliency of the region.

Numerous wide-ranging mammals that depend on the large blocks of intact habitat, wintering areas, and key migration linkages found in the Bear River watershed will benefit from the conservation strategy for the four focal species. The Bear River Watershed Conservation Area project will help maintain overall habitat connectivity and keep travel corridors for many species including grizzly bear and Canada lynx (both listed as threatened), wolverine, (a candidate for Federal listing as threatened or endangered), as well as elk, mule deer, moose, and pronghorn.

Focal Species Models

Habitat and Population Evaluation Team (HAPET) biologists assessed land cover data in a Geographic Information System (GIS) to set priorities for the watershed for conservation easement acquisition, resulting in spatially explicit decision-support tools.

Sage Thrasher, Greater Sage-Grouse, and American Avocet Models—Methods were adapted from Niemuth et al. (2008) to design the conservation strategy for the conservation area. North American Breeding Bird Survey data were collected from 1997 to 2010 on 32 roadside survey routes in and around the Bear River watershed. A subset of these data was used in conjunction with land cover information to model the spatial distribution and number of sage thrashers (figure 10). Additionally, Breeding Bird Survey stop-level data were used with the land cover data to model habitat-occupancy relationships of American avocet in the watershed (see figure 11). Predictor variables were sampled using radii of 1,312 feet, 2,625 feet, 3,937 feet, and 5,249 feet (400, 800, 1,200, and 1,600 meters) around Breeding Bird Survey stops; models fit best for sage thrasher at the 3,937-foot (1,200-meter) scale and best for American avocet at the 2,625-foot (800-meter) scale. Besides improving model fit, inclusion of trend surface and time-of-day variables substantially reduced positive spatial autocorrelation in model residuals. Spatial autocorrelation can lead to overestimation of the precision of model parameter estimates (Legendre 1993) and obscure ecological patterns (Carroll and Pearson 2000).

The top model for each species was tested for how well the model fits the data and validated using cross-validation techniques to test the predictive capabilities. The best model was then applied to the land cover data in GIS to set priorities for the watershed for conservation easement acquisition, resulting in spatially explicit decision-support tools. An existing landscape prioritization tool for greater sage-grouse, which identifies rangewide breeding densities (Doherty et al. 2010), was coupled with the decision-support tool for sage thrasher and American avocet. This provides watershed land managers with the best available information on landscape values for the four focal species.

New decision support tools will be developed through refinements of the focal species models described above as more data are collected and new modeling techniques implemented in an iterative, adaptive conservation framework. Further refinements in the conservation framework will be achieved by setting population objectives for focal species and evaluating conservation delivery through the elements of biological planning, conservation design, and monitoring and research. These new tools may result in challenges to currently held paradigms about the best conservation approach for target species (Reynolds et al. 2001).

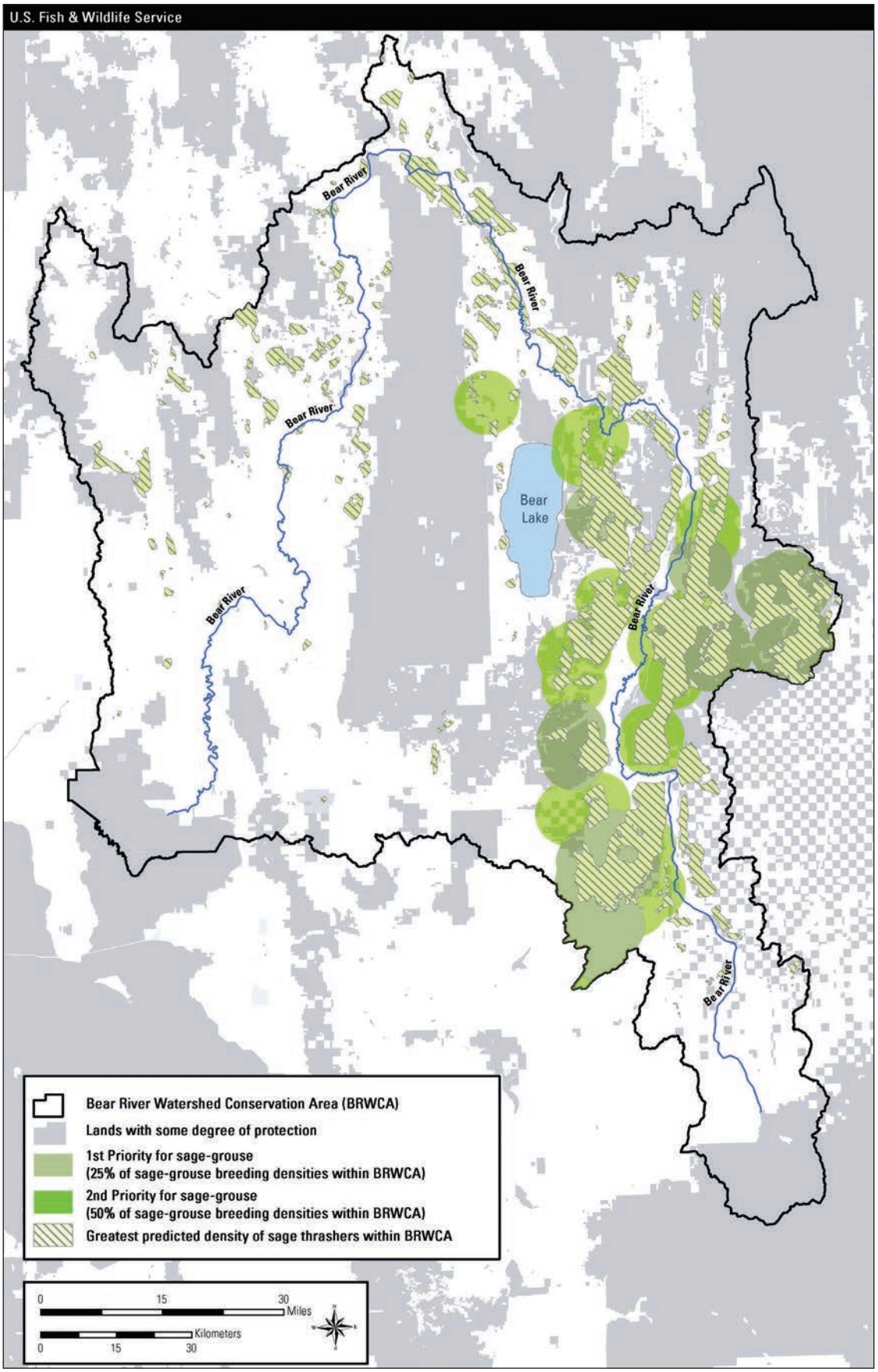

Figure 10. Map of predicted sage thrasher and sage-grouse densities in the Bear River Watershed Conservation Area in Idaho, Utah, and Wyoming. *Source: HAPET West.*

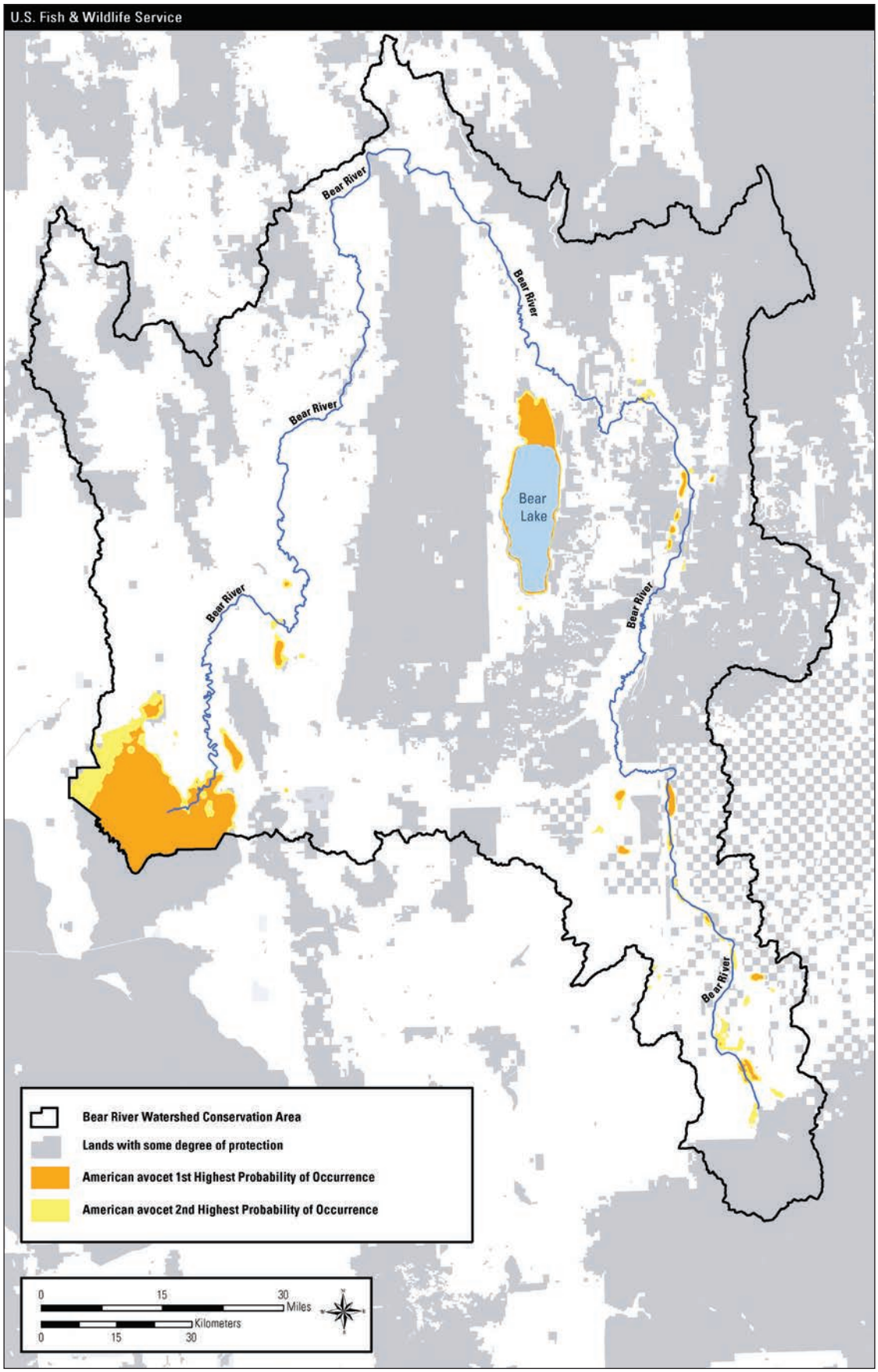

Figure 11. Map of predicted American avocet densities in the Bear River Watershed Conservation Area in Idaho, Utah, and Wyoming. *Source: HAPET West.*

Bonneville Cutthroat Trout Models—For Bonneville cutthroat trout populations, the Service used models prepared by Trout Unlimited that evaluated species densities and genetic purity in Bear River watershed streams.

Ensuring the long-term survival of native cutthroat trout in an era of rapid environmental change requires a diverse conservation portfolio that spreads the risk of loss in an uncertain future across a variety of habitats, populations and management approaches. Rangewide diversity for native trout includes genetic integrity, life history diversity, and geographic (or ecological) diversity.

The Service worked with Trout Unlimited's existing data and assessment tools for modeling Bonneville cutthroat trout habitat and species status for streams within the conservation area. The Trout Unlimited management portfolio has multiple examples of these elements of diversity and large patches of interconnected habitat for resiliency to attempt to reduce the threat of biodiversity loss because of climate change. The 3–R framework (Schafer and Stein 2000) used by Trout Unlimited provides a structure for describing existing levels of diversity for a subspecies:

- *Representation*—saving existing elements of diversity
- *Resiliency*—having sufficiently large populations and intact habitats to facilitate recovery from large disturbances and rapid environmental change
- *Redundancy*—saving enough different populations so that some can be lost without jeopardizing the subspecies

All the drainages in the Trout Unlimited dataset were classified as historically having contained Bonneville cutthroat trout. The next level of differentiation between streams where Bonneville cutthroat trout have been observed compared to those that were classified as having conservation populations. Trout Unlimited identified conservation populations of Bonneville cutthroat trout based on their ecological value, unique adaptation, or tendency to reach a large size (personal communication, Paul Burnett, Trout Unlimited). Population densities and genetic status were used by the Service to create a matrix of conservation prioritization (see table 3). The matrix in table 3 was used to rank the relative status of Bonneville cutthroat trout populations and to determine the conservation priorities displayed in the Bonneville cutthroat trout population status map (see figure 12):

- *First Priority*—Conservation population streams with a combined genetic and populations score of "5"
- *Second Priority*—Conservation population streams with a combined genetic and populations score of "4"
- *Third Priority*—Conservation population streams with a combined genetic and populations score of "3"
- *Fourth Priority*—Conservation population streams with a combined genetic and populations score of "2"
- *Fifth Priority*—Conservation population streams with a combined genetic and populations score of "1"

Priority Categories

The Bear River Watershed Conservation Area has been classified into three categories from the highest to lowest resource conservation priority based on modeling results from HAPET and Trout Unlimited data (see figure 13 for the top two categories).

Table 3. Matrix of Bonneville cutthroat trout fish densities and ranking criteria for genetic purity.

		Density (number of fish) per linear mile or per 10 acres of habitat for lake populations				
		Over 400	*151–400*	*50–150*	*0–50*	*Unknown*
*Genetic purity**	Criteria rank	5	4	3	2	1
unaltered, not tested–unaltered	5	5	4	4	3	3
90–99%	4	4	4	3	3	2
	3	4	3	3	2	2
80–89% not tested hybridized	2	3	3	2	2	1
< 80%	1	3	2	2	1	1

**Value definitions for genetic purity and population density were derived from Trout Unlimited "Conservation Success Index: Bonneville Cutthroat Trout: Sub-Watershed Scoring and Rule Set." The combined value of the averaged density and genetic purity rankings were rounded down to the next lowest number.*

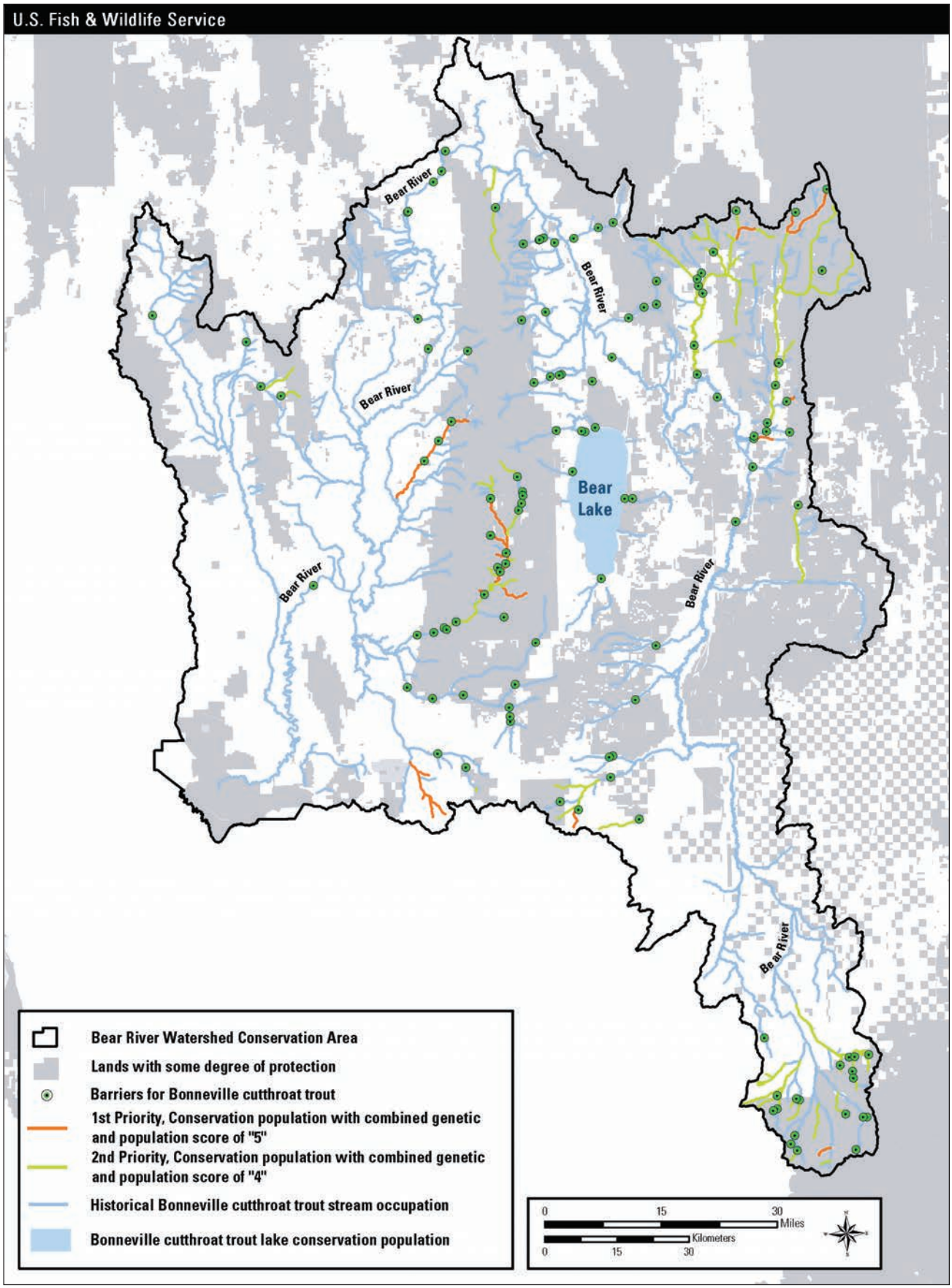

Figure 12. Map of the presence of Bonneville cutthroat trout in the Bear River Watershed Conservation Area in Idaho, Utah, and Wyoming. *Source: Trout Unlimited.*

- *High Conservation Rank*: Key wetland, riparian, grassland, and shrub habitat where the highest densities of the four focal species representing Federal trust resources (migratory birds and threatened and endangered species) occur.

- *Medium Conservation Rank*: Key wetland, riparian, grassland, and shrub habitat where the moderate to high densities of the four focal species representing Federal trust resources occur.

- *Low Conservation Rank*: Low to high densities of the four focal species representing Federal trust resources.

Marxan-Based Conservation Value Modeling

The conservation planning software Marxan (Ball et al. 2009) can be used to model a wide range of management and conservation scenarios. The Marxan analysis was designed to answer the question, "what areas beyond the current collection of protected lands should be focus areas for conservation, based upon the goals of this project?" This question was answered through spatial data that represent the conservation targets, as well as landscape integrity and connectivity.

The Service used a Marxan model incorporating the HAPET models for sage thrasher, greater sage-grouse, and American avocet along with the Bonneville cutthroat trout model based on data provided by Trout Unlimited (see figure 13). The sage thrasher and greater sage grouse models represent upland habitat, while Bonneville cutthroat trout and American avocet models represent riparian/stream and wetland habitats, respectively.

In addition, Marxan modeling was used to incorporate crucial wetland and riparian habitat depended on by a wide variety of migratory bird species, including white-faced ibis, yellow warbler, flycatchers, and yellow-billed cuckoo, for which there is insufficient data available to develop other types of models based on bird densities and abundance. The Marxan analysis allowed a habitat-based approach to be used to generate an alternate method of identifying likely areas of habitat used by migratory birds.

The Marxan model also allowed the Service to incorporate information provided by State partners and local organizations on important spawning and wintering areas for Bonneville cutthroat trout and key migration corridors for mule deer, elk, and moose. Maintaining connectivity between habitat types and between larger areas of protected lands in the watershed and the region increases ecological resiliency and helps to ensure a functional landscape in a rapidly changing world.

The Marxan model identifies important areas for fish and wildlife conservation based on an area's contribution to meeting the project's conservation goals. Goal levels that span a range of potentials were assessed. For some conservation features, such as priority winter rearing areas for Bonneville cutthroat trout, the mapped area was small relative to other species that occupy a larger range. Therefore, a goal level of conserving 90 percent of stream miles known to support Bonneville cutthroat trout was kept constant across all Marxan runs. Table 4 describes conservation targets, data sources, and how conservation goals were set for three different runs of the Marxan model.

Another feature of the Marxan model is that it seeks to minimize constraints to the overall conservation design. For this analysis, the constraint was "ecological integrity" based on the NatureServe Landscape Condition of the Conterminous United States (Comer and Hak 2009). This data set integrates stressors from human land uses including transportation corridors, urban and industrial development, mining, and modified land cover. The Marxan model minimizes the inclusion of areas with

Table 4. Conservation targets and goals for the Bear River Watershed Conservation Area in Idaho, Utah, and Wyoming.

Conservation target	*Conservation goal level*				*Notes and source*
	Measure	Low	Medium	High	
sage thrasher	potential bird density	30%	50%	80%	density models, HAPET modeling
sage-grouse	potential bird density	30%	50%	80%	top 25% density, Doherty 2010
		30%	50%	80%	top 50% density, Doherty 2010
American avocet	potential bird density	30%	50%	80%	density models, HAPET modeling
Bonneville cutthroat trout	stream miles	30%	50%	80%	multiple, conservation success index
		90%	90%	90%	priority areas, expert-based
		90%	90%	90%	winter rearing, expert-based
emergent wetlands	acres	30%	50%	80%	National Wetland Inventory and GAP
riparian zones	acres	30%	50%	80%	National Wetland Inventory and GAP

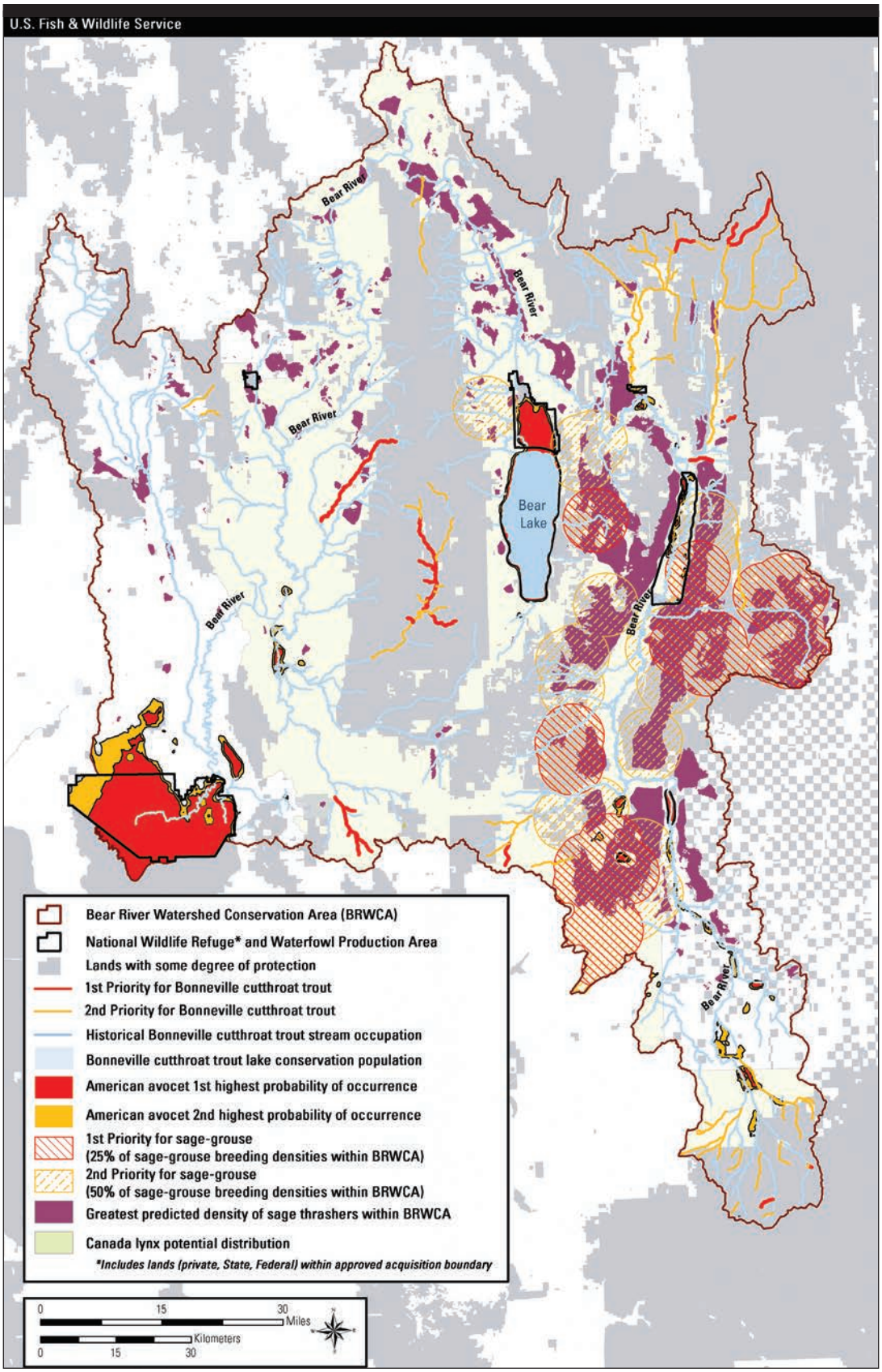

Figure 13. Map of combined species priority areas for the Bear River Watershed Conservation Area in Idaho, Utah, and Wyoming. *Source: Bonneville cutthroat trout (Trout Unlimited); bird modeling (HAPET West); Canada lynx (county-level data from Ecological Conservation Online System development group).*

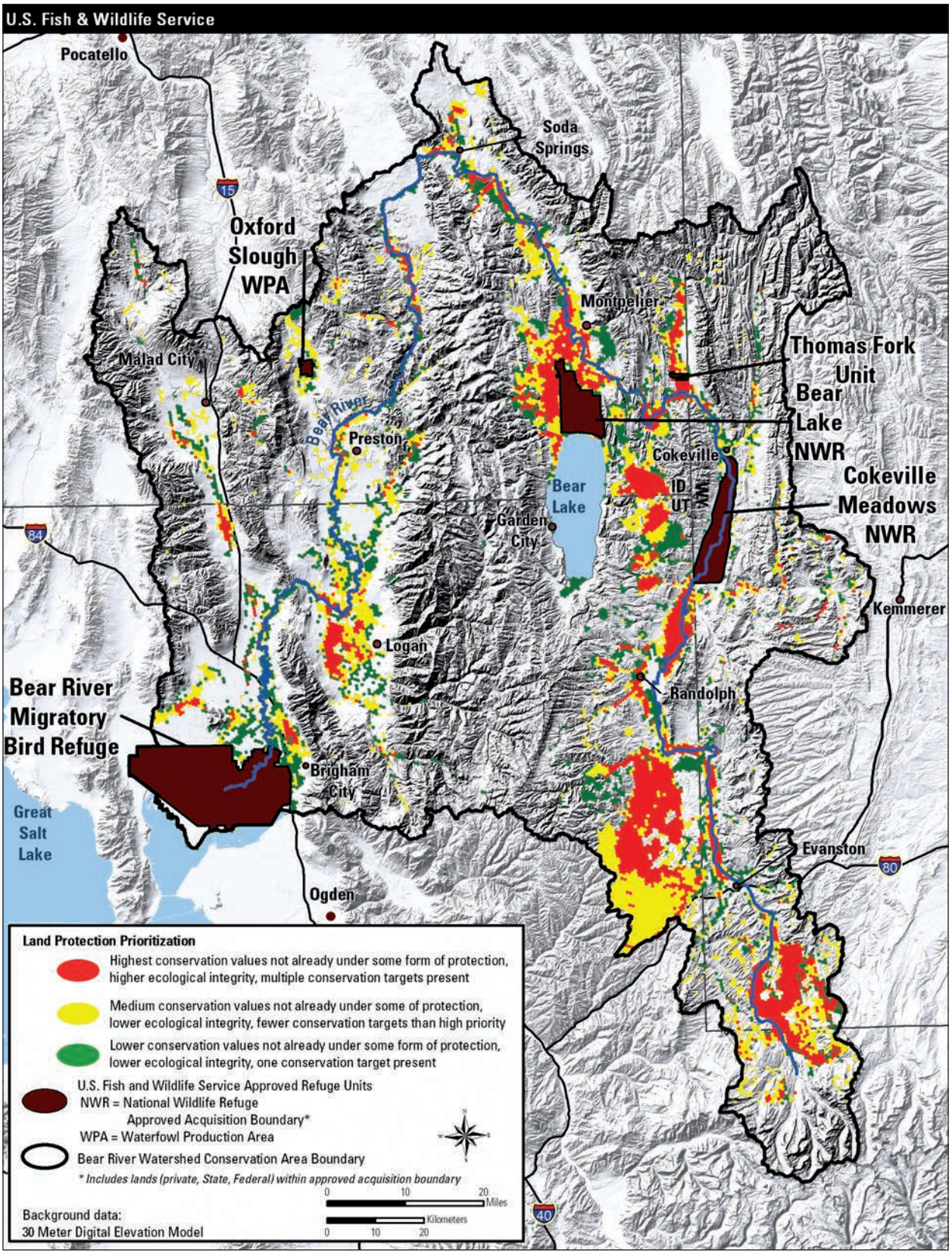

Figure 14. Map of conservation ranking priority areas for the Bear River Watershed Conservation Area in Idaho, Utah, and Wyoming.

low ecological integrity into areas prioritized for conservation. Therefore, areas across all goal levels selected by the Marxan model are in relatively better ecological condition than non-selected areas.

The Marxan model attempts to find a near-optimal selection of areas to meet a goal of conserving 30 percent of each conservation target. Areas selected in the 30-percent "low" goal level represent areas in the best condition. More areas must be added to meet the 50 percent and 80 percent goals, so the selection is expanded to areas in a lower level of condition. This has implications for understanding the results described below. Priority 3 areas have few areas with high selection frequency at the 30-percent goal level.

Another Marxan variable is "connectedness" of the solution. By setting the connectivity variable properly, Marxan will force potential conservation areas to be adjacent. For example, conservation goals could be met with widely distributed areas, but a more efficient spatial solution is to meet conservation goals in a spatially cohesive and connected design.

The Marxan analysis was designed to answer the question, "what areas beyond the current collection of protected lands should be focus areas for conservation, based upon the goals of this project?" Therefore, currently protected lands were "locked out" of the analysis. In other words, current Refuge System lands and other federal and state lands (U.S. Forest Service, Bureau of Land Management, and National Park Service) were not assessed for their conservation value in this Marxan analysis.

Marxan Results. One of the key results from the Marxan modeling is the "selection frequency" of a given spatial planning unit. A spatial planning unit that has a high selection frequency indicates that it must be protected to meet conservation goals, based on input criteria. In other words, it is irreplaceable and conservation goals cannot be met in an efficient manner without protecting such areas. The four conservation ranks described below are also displayed in figure 14.

- *High Conservation Rank*: High irreplaceability across all goal levels, higher ecological integrity, and multiple conservation targets present.
- *Medium Conservation Rank*: Moderate irreplaceability across all goal levels, lower ecological integrity, and fewer conservation targets than high priority.
- *Low Conservation Rank*: Not irreplaceable across all goal levels, lower ecological integrity, and one conservation target present.
- *No Conservation Rank*: Not selected with the data that are now available.

The data were separated into five distinct groups based on their selection frequency multiplied by the number of conservation targets present. The top three groups represent areas with the highest conservation value. The high priority group represents areas that (1) are connected, (2) are landscapes in the best condition possible, (3) contain multiple conservation targets, and (4) are irreplaceable across all goal levels. The lowest priority group represents areas of conservation value but for typically one conservation target, although more may be present. The landscape condition will be lower and may not be irreplaceable across all goal levels.

The conservation ranking reflected in figure 14, with potential acres shown in table 5, will be used for initial prioritization of acquisition efforts in the conservation area. Subsequently, the Service will reevaluate priorities as resource conditions in the watershed change, as research needs are met, and as new decision-support tools become available.

Table 5. Protection priority category acreages for acquisition in the Bear River Watershed Conservation Area in Idaho, Utah, and Wyoming.

Description	*Priorities for easements Private: nonprotected*
Priority 1 high conservation rank	289,861 acres
Priority 2 medium conservation rank	385,362 acres
Priority 3 low conservation rank	244,777 acres
Total	920,000 acres

Integrated Conservation Delivery

Over the years, the staff from the three national wildlife refuges worked with a wide variety of agencies, nongovernmental organizations, and private landowners on wildlife conservation issues and opportunities. Partners for Fish and Wildlife biologists have worked with landowners on habitat restoration projects and developing partnerships that provide the foundation for a successful easement program. The ongoing involvement of the Partners for Fish and Wildlife program, LCCs, and many partner organizations and agencies will be essential for the effective delivery of sustainable conservation programs. Application of the Strategic Habitat Conservation framework will build on existing partnerships and support the development of new partnerships for

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Butterfly on marsh vegetation.

delivering conservation throughout the region. The spatially explicit decision-support tools being developed will allow for greater flexibility, increased responsiveness, and improved efficiency in meeting Service and partner conservation delivery needs.

The Bear River Watershed Conservation Area will serve as a model for engagement in that it will work with landowners, nongovernmental organizations, State agencies, and Federal agencies. Education is a key part of engagement. The Bear River Migratory Bird Refuge has an extensive educational program that teaches children and adults about ecological functions, the importance of wetlands, and the diversity of plant and animal life and conservation.

Monitoring and Adaptive Management

Wetland and upland conservation easements are an essential tool for protecting important wildlife habitat on a landscape scale. The detailed LPP developed in conjunction with the EA provides the information necessary to carry out the conservation action of acquiring conservation easements on the "best of the best" habitat for priority species. As understanding of the functional relationships between priority species and habitats increases, the Service will adapt the strategies used to target acquisition of the highest priority habitat for meeting the population objectives of priority species.

Contributions of conservation easements and other management actions toward meeting population goals for priority trust species will be evaluated using spatially explicit models, allowing estimation of population size on conservation easements and other land parcels of interest. This will allow the Service and conservation partners to evaluate the contribution of the program to meeting population goals and to refine conservation delivery to ensure greatest efficiency. Spatially explicit models will also enable the Service to show the contribution of the conservation area to national and continental population goals for priority species.

The Service will work with the Great Basin, Great Northern, and Southern Rockies LCCs and numerous other partners to develop and refine predictive population models. The results of Breeding Bird Surveys and the annual monitoring the Service conducts on waterfowl, breeding shorebirds, other waterbirds, grassland birds, and raptors on the three wildlife refuges and other appropriate State and local surveys will be used to assess the effectiveness of the conservation easement program.

Evaluation of the assumptions and uncertainties identified through the biological planning, conservation design, and conservation delivery elements will be addressed by the Service in cooperation with partners such as nongovernmental organizations and universities.

Research

Although the importance of the Bear River watershed for migratory birds is widely recognized, there are knowledge gaps about the area resources. More Breeding Bird Survey routes, completion of the National Wetlands Inventory database, and incorporating information and research results from the large number of conservation agencies and organizations in the region will help to assess conservation needs and priorities in the region.

Research and monitoring emphasis will be placed on the highest priority species with the greatest degree of uncertainty about limiting factors and the effectiveness of management actions at minimizing and reducing limiting factors. Data from existing surveys such as the Breeding Bird Survey will be evaluated and incorporated into spatial models. When necessary, more data will be collected to evaluate assumptions used in the modeling process and assessments will be adjusted accordingly. These methods will provide an estimate of the population response of trust species on project (easement) lands and on noneasement properties.

Sociocultural Considerations

Much of the land cover in the conservation area consists of a mix of public lands and large tracts of privately owned ranchlands and croplands. Private ranchlands and croplands provide dual benefits by supplying wildlife habitat on working landscapes. These valuable landscapes are threatened by residential development. In 2000, the American Farmland Trust identified 4 million acres of prime ranchlands[1] in Idaho, 3.4 million acres in Utah, and 2.6 million acres in Wyoming as being vulnerable to low-density residential development by the year 2020, with ranchlands located in high-mountain valleys and mixed grassland areas surrounding the Rocky Mountains at highest risk of conversion. Within the Rocky Mountain Region (which has 263 counties in Idaho, Montana, Wyoming, Utah, Colorado, Arizona, and New Mexico), Uinta County, Wyoming, and Summit County, Utah, ranked in the top 25 counties for acres of strategic ranchland[2] at risk (American Farmland Trust 2000).

Conserving the ranching heritage of the Bear River Watershed Conservation Area will help make sure that wildlife populations are sustained and are available for long-term enjoyment by the American public.

Public Involvement and Coordination

The Service involves the public to get input on proposals and to make sure issues are addressed while conducting an environmental analysis that follows the National Environmental Policy Act.

Public Scoping

Six public scoping meetings were held in Idaho, Utah, and Wyoming in May 2011. Public comments were taken in Cokeville and Evanston, Wyoming; Brigham City and Logan, Utah; and Preston and Montpelier, Idaho, to identify issues to be analyzed for the proposed action. Approximately 130 landowners, members of various organizations, and elected representatives attended the meetings. Additionally, 10 letters providing comments were received by mail or email. A total of 327 comments and questions were received on the project proposal.

Refuge staff contacted tribal, Federal, State, and local officials as well as conservation groups that expressed an interest in the future of the Bear River watershed. Approximately 675 fact sheets were distributed, and they were also available on the refuges' Web sites.

Public meetings were held to discuss the draft EA and LPP for the project.

National Environmental Policy Act

As a Federal agency, the Service must comply with provisions of the National Environmental Policy Act. Under the act, an EA is required to evaluate reasonable alternatives that meet stated objectives and to assess the possible impacts to the human environment. The EA (appendix A) served as the basis for determining whether implementation of the project constituted a major Federal action significantly affecting the quality of the human environment.

Land Protection Plan Distribution and Availability

The Service distributed the draft EA (with the associated LPP in the same volume) to the project mailing list, which includes Federal and State legislative delegations, tribes, agencies, landowners, private groups, and other interested individuals.

Copies of the LPP along with the EA are available on the project Web site or by contacting the Service by email, postal mail, phone, or in person.

Project Web site: www.fws.gov/mountain-prairie/planning/lpp/ut/brr/brr.html

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[1]*Prime ranchlands are defined as ranchland with quality agricultural land and desirable wildlife characteristics.*

[2]*Strategic ranchlands are defined as both prime and threatened ranchlands. Threatened ranchlands are located in rural areas projected to grow to suburban density within 20 years or are along major road corridors in counties with growth rates greater than 10 percent per decade.*

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