Idaho Wetland Conservation Prioritization Plan – 2012

Kootenai National Wildlife Refuge wetland prioritization site. Photo by C. Murphy.

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ABSTRACT

For the wetland conservation component of Idaho Department of Parks and Recreation's State Comprehensive Outdoor Recreation and Tourism Plan, the Idaho Conservation Data Center developed a prioritized list of wetland sites in need of acquisition for long-term conservation and management. The Idaho Wetland Conservation Prioritization Plan considered three broad types of criteria in the evaluation of 202 candidate wetland sites: 1) wetland types; 2) wetland functions and values; and 3) wetland threats and impairments. For each site, a variety of data was analyzed using Geographic Information Systems to evaluate criteria and rank sites. The top 20 wetland sites are summarized in this report.

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KEY WORDS

State Comprehensive Outdoor Recreation and Tourism Plan (SCORTP), wetland, conservation, prioritization, ecological system, Species of Greatest Conservation Need, rare plants, recreational opportunity, landscape integrity, condition, Idaho

SUGGESTED CITATION

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INTRODUCTION

Numerous functions and values derived from wetlands have long been recognized by ecologists and economists (Adamus et al. 1991, Brinson 1993, National Research Council 1995, Novitzki et al. 1996). Wetland functions fall in 3 broad groups: hydrologic (e.g., maintenance of groundwater and stream flows, storage of flood runoff); ecosystem support (e.g., nutrient and element cycling, removal of toxics and sediment, food chain support); and habitat. Numerous values to society, often of high economic value, result from functioning wetlands (National Research Council 1995, Novitzki et al. 1996, and others). These include:

- aesthetics
- agricultural production (e.g., food, livestock, fiber, aquaculture, etc.)
- education and research
- flood alteration (energy dissipation; floodwater attenuation and storage)
- historical and archeological
- medical product production
- open space and recreation
- sediment and shoreline stabilization
- wastewater treatment
- water quality protection
- water supply and low-flow augmentation

Between 1780 and 1980, an estimated 386,000 acres, or 56% of Idaho' wetlands were lost to drainage, dredging, filling, leveling, flooding, and other human-caused alterations (Dahl 1990). However, during the last 25 years the rate of wetlands loss across the nation and Idaho has decreased (Dahl 2009). Increased recognition of the beneficial values and functions of wetlands has led to regulations and policies strengthening wetland conservation. Moreover, due to active wetland restoration, creation, and enhancement, the acreage of certain wetland types has increased in recent years. An important element in this turn around was the passage of the Emergency Wetlands Resources Act (EWRA) of 1986. This led to the creation of the National Wetlands Priority Conservation Plan (NWPCP) which provides a planning framework, criteria, and guidance to help meet requirements of the EWRA.

One purpose of the NWPCP is "to assist decision makers in focusing their acquisition efforts on the more important, scarce and vulnerable wetlands in the Nation" (U. S. Fish and Wildlife Service 1991). An important mechanism for wetland acquisition is use of funds appropriated under the Land and Water Conservation Fund Act (LWCF) of 1965. The EWRA mandates that to be eligible for funding, states must address wetlands as an important recreation and natural

resource in their State Comprehensive Outdoor Recreation and Tourism Plan (SCORTP). Importantly, the EWRA requires consistency between the SCORTP process and the NWPCP. Specifically, states are directed to develop prioritized lists of wetlands that meet three broad criteria. Wetlands must: 1) support rare or declining wetland types; 2) have identifiable threats of loss or degradation of wetland functions; and 3) have diverse and important functions and values (including recreation), or especially high value for specific functions (U. S. Fish and Wildlife Service 1991).

The SCORTP is revised and updated periodically by the Idaho Department of Parks and Recreation (IDPR). The Idaho Wetland Conservation Prioritization Plan is a critical element of SCORTP necessary for meeting the requirements of the EWRA. Since 1992, IDPR has partnered with the Idaho Department of Fish and Game (IDFG) to complete this plan in a way that is consistent with the NWPCP (Pfeifer and Toweill 1992, IDPR 2002, Hahn et al. 2005). For this version, IDFG developed an updated priority list of wetland sites in need of acquisition for long-term conservation and management. This list is intended to be used by both public and private entities for identifying wetlands for protection, management, restoration, and/or enhancement using LWCF appropriations or other means.

In the last 25 years, much new information on the condition, function, and values of Idaho's wetlands has been gathered. Additionally, much advancement in wetland ecology, monitoring and assessment, and spatial analysis has occurred. This updated Idaho Wetland Conservation Prioritization Plan incorporates new data, utilizes the capabilities of Geographic Information System (GIS) analysis, and refines the criteria used to prioritize wetland sites. Through such applied conservation science, important and often irreplaceable wetlands can be identified and protected for the benefit of all Idaho's citizens.

METHODS

Map of potential wetland habitat occurrence

The 2005 prioritization (Hahn et al. 2005) utilized the Idaho Wetlands Information System (IWIS) (Pfeifer and Toweill 1992, Idaho Department of Parks and Recreation 2002) and the IDCDC Conservation Site Database to generate a list of potential wetland sites for ranking. IWIS houses wetland site information for almost 200 sites across Idaho (Pfeifer and Toweill 1992). Sites were identified using lists from past SCORTP processes, the 1987 Environmental Protection Agency (EPA) Idaho Wetlands List, the U. S. Fish and Wildlife Service (USFWS) Priority Wetlands Listing and other documents (e.g., U. S. Fish and Wildlife Service 1990), waterfowl conservation work (e.g., Ratti and Kadlec 1992), and areas identified by IDFG. The IDCDC Conservation Site Database contains spatial and associated ecological information on over 700 sites in Idaho, about two-thirds of which include wetland and/or riparian components.

Sites are ranked by 4 factors: richness, rarity, condition, and viability. Class I sites are the most outstanding, irreplaceable wetlands of highest conservation priority. Class II sites provide valuable habitat and other functions, but impacts may be more noticeable.

However, large gaps in site specific information on Idaho's wetlands exist. For example, no comprehensive surveys have occurred within much of the designated wilderness of central Idaho, nor along most of our designated Wild, Scenic, and Recreation Rivers. No thorough wetland surveys have been done in the following river basins:

- North Fork Clearwater
- Lower Salmon
- Payette (Middle, South Forks)
- Boise (North, Middle, South)
- Mores Creek
- Owyhee
- Bruneau
- Salmon Falls Creek
- Goose Creek
- Raft River

By using only these databases, there may be wetlands of high conservation value that are overlooked due to lack of surveys. For this reasons, we used a model of potential wetland habitat occurrence across all of Idaho (Murphy et al. 2012). This GIS model was based on compilation of existing land cover maps:

- wetland and riparian ecological systems mapped by NW ReGAP (2010; http://gap.uidaho.edu/index.php/gap-home/Northwest-GAP/landcover/)
- wetland and riparian ecological systems mapped by NatureServe (2005)
- named swamps
- named springs
- geothermal springs (Idaho Department of Water Resources)
- National Hydrographic Dataset springs and seeps
- National Hydrographic Dataset swamps and marshes
- National Hydrographic Dataset playas
- water source springs (Idaho Department of Environmental Quality)
- National Wetlands Inventory
- hydric soils
- streams

Any vector layers were converted to raster layers (30 m^2 pixels). The layers were then stacked into one layer representing the potential occurrence of wetland habitats across Idaho (Figure 1). After the model was built results were checked at known wetland sites using aerial imagery.

The model tended to overestimate the extent of wetland habitats due to the inclusion of ecological systems occurring in both upland and wetland settings, as well as certain hydric soils. These systems and soil types were removed from final map. This model allows for all potential wetlands across the state to be assessed equally and objectively. It is important to note that this model has been ground-truthed in only small areas of the state and not all types of wetlands. Where tested against known sites, it correctly predicts the presence of wetlands 80% of the time. The map should not be used to determine the actual boundaries of wetlands, but it can be used as a guide to predicting where wetlands are most likely to occur.

Wetland prioritization criteria

Specific ranking criteria were developed for this process. The criteria are an outgrowth of past SCORTP processes, but include additional criteria for which wetland information was not previously used or available. The criteria, in part, reflect available data sets, but are designed to be consistent with NWPCP guidelines. The criteria can be grouped into 3 areas: 1) wetland types; 2) wetland functions and values; and 3) wetland threats and impairments.

Wetland Types — The diversity of wetland types at a site indicates a site's uniqueness, the breadth of possible wetland functions present, and habitat diversity (Novitzki et al. 1996). The NWPCP requires that the highest priority sites for conservation are those comprised by greater than 50% of wetland types (as classified using Cowardin et al. 1979 to the "class" level) that are rare or declining. Past studies (explained in U. S. Fish and Wildlife Service 1991) showed that Palustrine Emergent (especially in northern Idaho), Palustrine Forested, and Palustrine Scrub-Shrub classes have experienced the most historical and more recent losses (between 1954 and 1974). These were assumed to be the most susceptible wetland types to loss or conversion. However, in Idaho, there are substantial gaps in NWI mapping and many maps are not available in digital format. For this reason, the extent of wetland types (using the Cowardin classification) could not be determined for all wetland sites using NWI. As in Hahn et al. (2005), we determined the extent of wetland types using existing maps of ecological systems and known locations of wetland types from field-sampled vegetation plots.

Ecological systems represent recurring groups of biological communities found in similar physical environments and influenced by similar dynamic ecological processes, such as flooding (Comer et al. 2003). Ecological systems are conceptualized as groups of plant community types that co-occur within landscapes having similar ecological processes, substrates, and/or environmental gradients. Although it is not a direct relationship to Cowardin class, most ecological systems are clearly characterized by a predominant class of wetland (e.g., a riparian shrubland ecological system is predominantly Riverine Scrub-Shrub Wetland, or a wet meadow ecological system is predominantly Palustrine Emergent).

For this prioritization, we limited the analysis to ecological systems known to be rare, much reduced in extent due to human impacts, sensitive to disturbance, difficult to restore, and/or declining in Idaho. These included:

- Boreal Depressional Bog
- Boreal Fen
- Columbia Basin Foothill Riparian Woodland and Shrubland
- Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub-Steppe
- Columbia Plateau Vernal Pool
- Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland
- Inter-Mountain Basins Alkaline Closed Depression
- Inter-Mountain Basins Foothill-Canyon Springs
- Inter-Mountain Basins Foothill-Canyon Springs (geothermal)
- Inter-Mountain Basins Montane-Foothill Ephemerally Moist Alkaline Wetland
- Inter-Mountain Basins Montane-Foothill Ephemerally Moist Meadow
- Inter-Mountain Basins Montane-Foothill Seasonally Flooded Pool
- Inter-Mountain Basins Playa
- North American Arid West Emergent Marsh
- Northern Rocky Mountain Conifer Swamp
- Northern Rocky Mountain Wooded Vernal Pool
- Rocky Mountain Alpine Dwarf-Shrubland
- Rocky Mountain Alpine-Montane Wet Meadow
- Rocky Mountain Montane-Foothill Ephemerally Moist Meadow
- Rocky Mountain Montane-Foothill Springs (geothermal)
- Rocky Mountain Subalpine-Montane Fen
- Rocky Mountain Subalpine-Montane Mesic Meadow
- Rocky Mountain Subalpine-Montane Riparian Woodland
- Rocky Mountain Subalpine-Montane Seasonally Flooded Pool

The extent (mapped in a 30 m^2 pixel raster layer) of these wetland and riparian ecological systems was estimated using GIS analysis of the following maps:

- wetland and riparian ecological systems (NW ReGAP 2010)
- wetland and riparian ecological systems (NatureServe 2005)
- U. S. Geographic Names Information System — springs (USGS 2008; http://inside.uidaho.edu/index.html)
- geothermal springs (Idaho Department of Water Resources)

- National Hydrographic Dataset — springs and seeps
- National Hydrographic Dataset — swamps and marshes
- National Hydrographic Dataset — playas
- Source Water Delineations of Idaho — springs (Idaho Department of Environmental Quality 2011; http://inside.uidaho.edu/index.html)

We also utilized the IDFG Wetland and Riparian Vegetation Plot Database (IDFG 2012) to identify known point locations of the above list of ecological systems. This database includes vegetation stand data for almost 5,000 plots and observations sampled throughout Idaho. Plots are classified by plant association (based on stand composition and structure) and ecological systems (based on plant association and environmental setting). Because points represent plots less than 0.1 ha in area, points were buffered by 1 km-radius to capture the general extent of ecological systems as they occur in a watershed. The resulting polygon layer was then converted to a 30 m^2 pixel raster layer (Figure 1).

Wetland Functions and Values — As required by NWPCP, wetland functions and values must be considered during the wetland prioritization process. All wetlands perform some, but not all functions, and they do not perform specific functions equally (Novitzki et al. 1996). However, few on-the-ground complete wetland functional assessments have been completed in Idaho. For these reasons, assessment of hydrologic and biogeochemical/ecosystem support functions is best done by analyzing threats and impairments for those functions (see next section). For this wetland prioritization, we analyzed the habitat function and recreation value of wetlands; both of which have adequate statewide spatial data.

Wetland Habitat Function: Habitat function was assessed by analyzing the capacity of a wetland to support vertebrate and invertebrate Species of Greatest Conservation Need (SGCN) and special status vascular and non-vascular plants. We queried this information from IDFG's Animal Conservation Database, StreamNet, and Plant Conservation Database housed within the Idaho Fish and Wildlife Information System (IDFG 2012). All data was buffered by 1 km-radius. This ensured that potential wetland habitat for rare species was included, that spatial uncertainty was encompassed, and the entire ecosystem species depend on (from upland to wetland) could be considered. It was assumed that many vertebrate and invertebrate species will move through suitable habitat over time. It was also assumed that the mapped populations of many rare plants could be larger if field surveys in suitable habitat were more complete. Finally, it was assumed that the aquatic ecosystem supporting rare fish is linked to adjacent wetland ecosystems. These data were converted to 30 m^2 pixel raster layers and then combined into one rare species habitat function layer (Figure 2). This layer was then filtered using the map of wetland occurrence to show only those pixels potentially supporting wetlands.

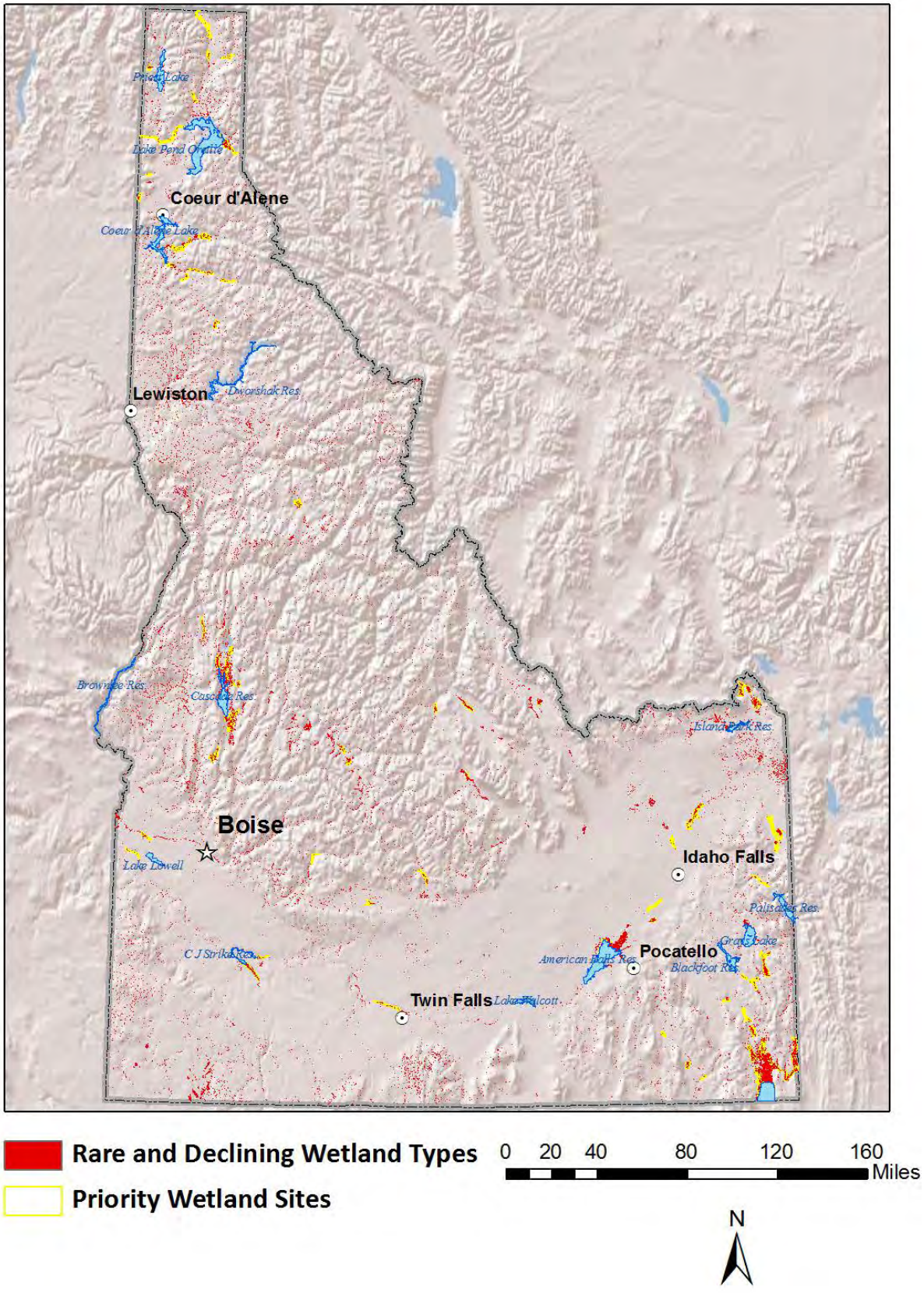

Figure 1. Wetlands supporting rare, sensitive, or declining ecological systems.

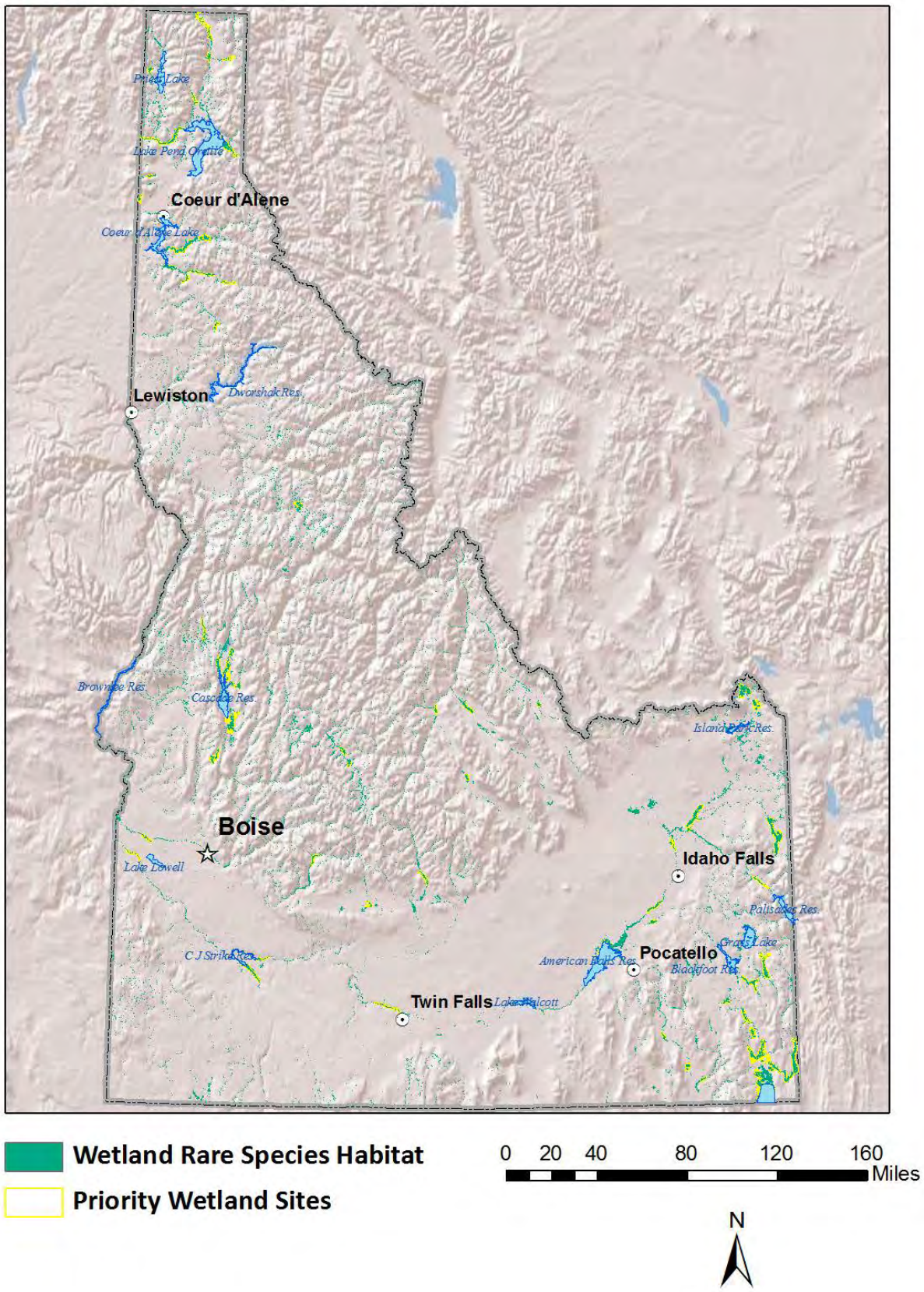

Figure 2. Wetland habitat for Species of Greatest Conservation Need and rare plants.

Wetland Recreational Value: Recreational value of wetlands was estimated by first creating a statewide GIS model of recreational opportunity. The list of potential recreational values analyzed was similar to past wetland prioritization processes (Pfeifer and Toweill 1992, Idaho Department of Parks and Recreation 2002, Hahn et al. 2005):

- boating
- camping
- environmental education
- fishing
- hiking
- hunting
- nature observation and solitude (includes wildlife watching)
- swimming
- proximity to major urban area

Since publication of the last SCORTP, spatial layers mapping the statewide extent of recreation sites have been published. These and other layers (below) were used to inform where the above recreational values occur:

- Boating Facilities of Idaho (IDPR 2006; http://inside.uidaho.edu/index.html)
- Campgrounds of Idaho (IDPR 2008; http://inside.uidaho.edu/index.html)
- Community Parks of Idaho (IDPR 2006; http://inside.uidaho.edu/index.html)
- State Parks / IDPR Sites (IDPR 2006; http://inside.uidaho.edu/index.html)
- Trails of Idaho (IDPR 2011)
- Wildlife Management Areas and Access Areas (IDFG 2012)
- High Intensity Urban Land Use (NW ReGAP 2010)

The recreational opportunity layer was constructed by first buffering the polygons, lines, and points in the above layers by 1 km and 8 km. It was assumed that recreational opportunities were highest the closer the proximity to existing mapped recreation areas. The highest value was within 1 km, the estimated maximum comfortable walking for most adults, and an easy bicycle riding distance. The next highest opportunity occurred 1 - 8 km distance, a close driving distance requiring minimal trip planning and cost. The buffered attributes were then converted to 30 m^2 pixel raster layers. The recreational value of each pixel was calculated by first applying a distance factor (x 2 for $\leq$ 1 km, x 1 for 1 - 8 km) to each recreational opportunity and then summing the total of the weighted opportunities. The result was one statewide recreational opportunity layer (Figure 3). This layer was then filtered using the map of wetland occurrence to show only those pixels potentially supporting wetlands.

Maps of archeologic, historic, and Native American sites of cultural importance were not available. Much of this data is confidentially held for various reasons. Site specific information on these and other wetland values should be researched for future analyses.

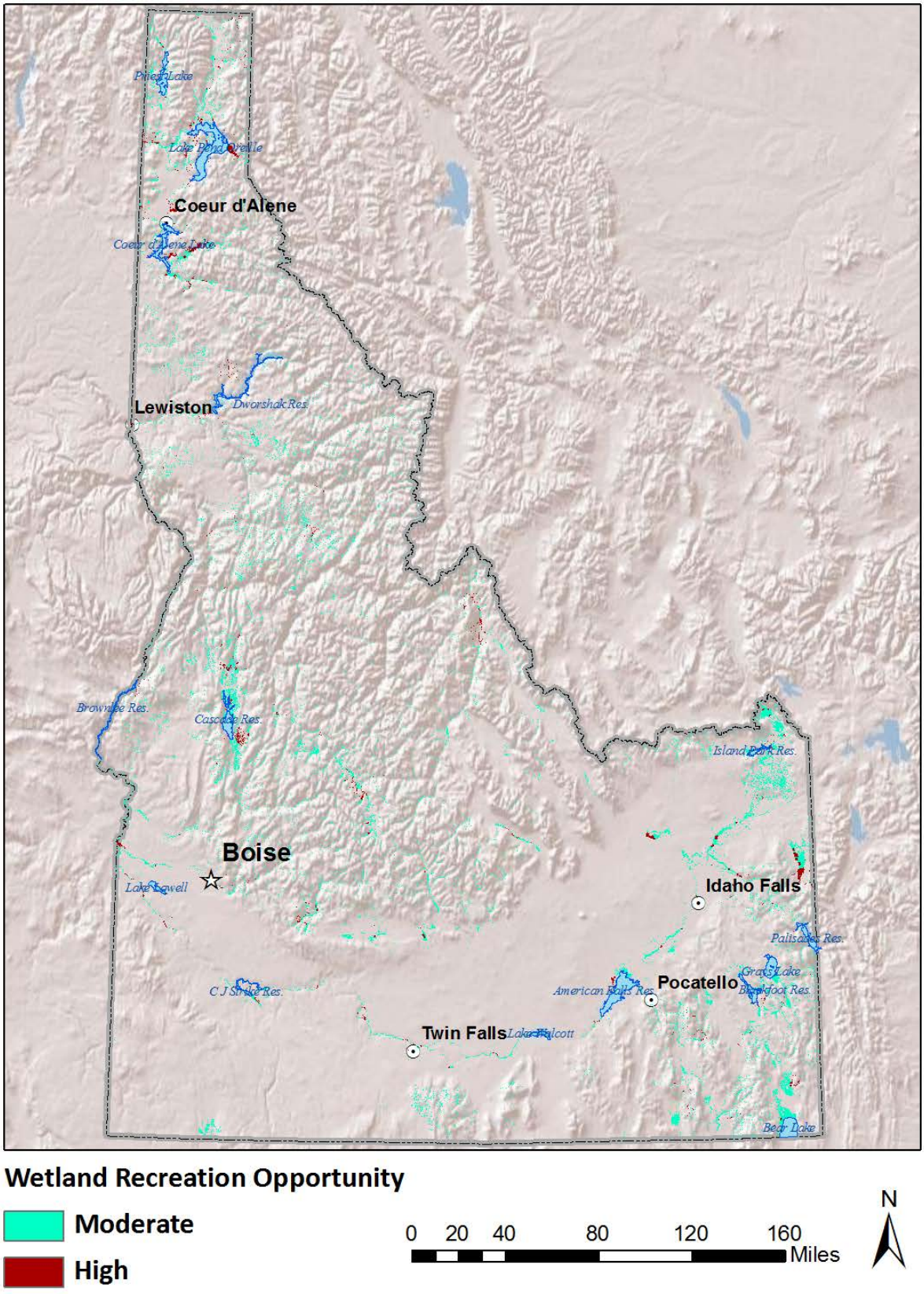

Figure 3. Recreational opportunities of wetlands.

Wetland Threats and Impairments — The NWPCP requires an analysis of threats and impairments to wetland sites. Specifically, threats are defined as the likelihood that all or a portion of a wetland site, and/or over 10% of the site's wetland functions and values, will be destroyed, degraded, or impaired (directly, indirectly, or through cumulative impacts) due to human actions over the next ten years. Threats to wetlands have been well documented by many studies (summarized in U. S. Fish and Wildlife Service 1990 and 1991; Ratti and Kadlec 1992; Kershner et al. 2004). For this project, we used an existing statewide model of landscape integrity developed by Murphy et al. (2012) for estimating wetland threats and impairments.

Landscape-scale wetland threat and impairment assessment has been widely applied, both at the national level (NatureServe 2009) and in various states, including Colorado (Lemly et al. 2011), Delaware and Maryland (Tiner 2002 and 2005; Weller et al. 2007), Minnesota (Sands 2002), Montana (Daumiller 2003, Vance 2009), North Dakota (Mita et al. 2007), Ohio (Fennessy et al. 2007), Pennsylvania (Brooks et al. 2002 and 2004; Hychka et al. 2007; Wardrop et al. 2007), and South Dakota (Troelstrup and Stueven 2007). Most of these landscape-scale analyses use a relatively similar list of spatial layer inputs to calculate metrics for condition analyses. This is a cost-effective, objective way to obtain this information from all wetlands in a broad geographic area. Similar landscape-scale assessment projects in Idaho (Murphy and Schmidt 2010; Murphy et al. 2012) used spatial analysis to estimate the relative condition of wetlands habitats throughout Idaho. We applied results from those projects.

Spatial data sources: Murphy and Schmidt (2010) and Murphy et al. (2012) reviewed literature and availability of spatial data to choose which spatial layers to include in their model of landscape integrity. Spatial layers preferably had statewide coverage for inclusion in the analysis. Nearly all spatial layers were downloaded from the statewide geospatial data clearinghouse, the Interactive Numeric and Spatial Information Data Engine for Idaho (INSIDE Idaho; http://inside.uidaho.edu/index.html). See Murphy et al. (2012) for a complete list of layers used in the landscape integrity model.

Statewide spatial layers were lacking for some important potential condition indicators, such as mine tailings, beaver presence, herbicide or pesticide use, non-native species abundance, nutrient loading, off-highway vehicle use, recreational and boating impacts, and sediment accumulation. Statewide spatial layers were also lacking for two presumably important potential indicators of wetland/riparian condition, recent timber harvest and livestock grazing. To rectify this, GIS models of potential recent timber harvest and livestock grazing were created using National Land Cover Data, grazing allotment maps, and NW ReGAP land cover maps.

Calculation of landscape and disturbance metrics: Murphy et al. (2012) used a landscape integrity model approach similar to that used by Lemly et al. (2011), Vance (2009), and Faber-Langendoen et al. (2006). Spatial analysis in GIS was used to calculate human land use, or disturbance, metrics for every 30 m^2 pixel across Idaho. A single raster layer that indicated threats and impairments for that pixel was produced. This was accomplished by first calculating the distance from each human land use category, development type, or disturbance for each pixel. This inverse weighted distance model is based on the assumption that ecological condition will be poorer in areas of the landscape with the most cumulative human activities and disturbances. Condition improves as you move toward least developed areas (Faber-Langendoen et al. 2006, Vance 2009, Lemly et al. 2011). Land uses or disturbances within 50 m were considered to have twice the impact of those 50 - 100 m away. For this model, land uses and disturbances > 100 m away were assumed to have zero or negligible impact. Because not all land uses impact wetlands the same way, weights for each land use or disturbance type were then determined using published literature (Hauer et al. 2002, Brown and Vivas 2005, Fennessy et al. 2007, Durkalec et al. 2009). See Murphy et al. (2012) for a list of weights applied to each land use or disturbance type. A condition value for each pixel was then calculated. For example, the value for a pixel with a 2-lane highway and railroad within 50 m and a home and urban park between 50 and 100 m would be:

	Weight	x	Distance Factor	=	Impact
2-lane highway =	7.81		2		15.62
railroad =	7.81		2	+	15.62
single family home - low density =	6.91		1	+	6.91
recreation / open space - medium intensity =	4.38		1	+	4.38
	Total Disturbance Value			=	42.53

The integrity of each pixel was then ranked relative to all others in Idhao using methods analogous to Stoddard et al. (2005), Fennessy et al. (2007), Mita et al. (2007), and Troelstrup and Stueven (2007). Five condition categories based on the sum of weighted impacts present in each pixel were used:

1 = *minimally disturbed* (top 1% of wetlands); wetland present in the absence or near absence of human disturbances; zero to few stressors are present; land use is almost completely not human-created; equivalent to reference condition; conservation priority;

2 = *lightly disturbed* (2 - 5%); wetland deviates the least from that in the minimally disturbed class based on existing landscape impacts; few stressors are present; majority

of land use is not human-created; these are the best wetlands in areas where human influences are present; ecosystem processes and functions are within natural ranges of variation found in the reference condition, but threats exist; conservation and/or restoration priority;

3 = *moderately disturbed* (6 - 15%); several stressors are present; land use is roughly split between human-created and non-human land use; ecosystem processes and functions are impaired and somewhat outside the range of variation found in the reference condition, but are still present; ecosystem processes are restorable;

4 = *severely disturbed* (16 - 40%); numerous stressors are present; land use is majority human-created; ecosystem processes and functions are severely altered or disrupted and outside the range of variation found in the reference condition; ecosystem processes are restorable, but may require large investments of energy and money for successful restoration;

5 = *completely disturbed* (bottom 41 - 100%); many stressors are present; land use is nearly completely human-created; ecosystem processes and functions are disrupted and outside the range of variation in the reference condition; ecosystem processes are very difficult to restore.

The resulting layer was then filtered using the map of wetland occurrence to show only those pixels potentially supporting wetlands (Figure 4).

Results of GIS landscape-scale assessment were verified by comparing results with the condition of wetlands determined by in the field using rapid assessment methods. The landscape assessment matched the rapidly assessed condition estimated in the field 61% of the time (Murphy et al. 2012). Thirtyone percent of the sites were misclassified by one condition class and 8% misclassified by two condition classes. These results were similar to an accuracy assessment of landscape scale assessment performed by Mita et al. (2007) in North Dakota. When sites classified correctly and those only off by one condition class were combined (92% of the samples), results were similar to Vance (2009) in Montana (85%). The model of landscape integrity performed much better than the initial prototype model produced for Idaho by Murphy and Schmidt (2010).

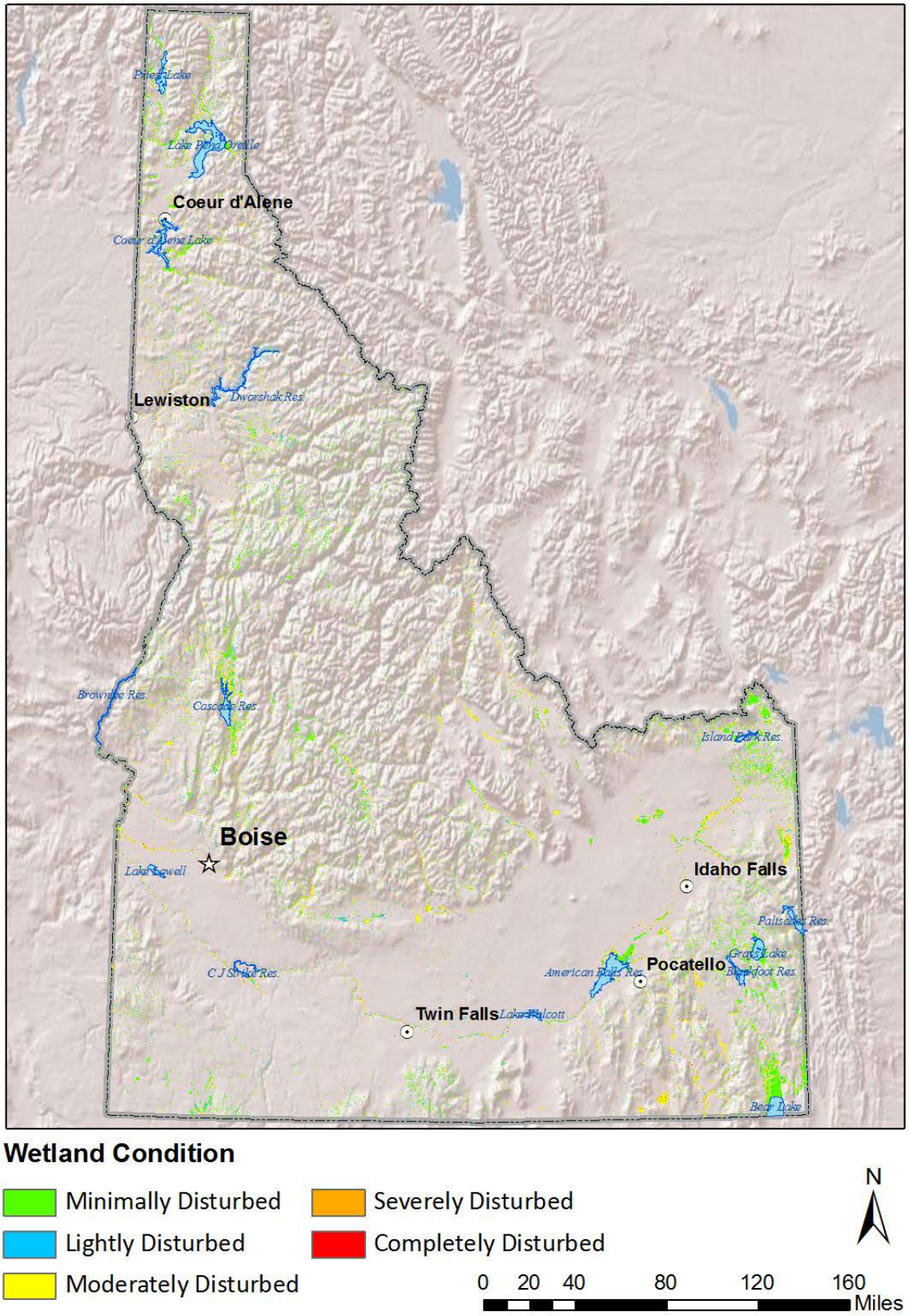

Figure 4. Condition of wetlands predicted by landscape integrity model.

Wetland site prioritization

A series of filters were used to identify wetlands with the highest conservation priority. To pass the first filter, wetland pixels had to meet at least two of the three following criteria:

- wetland pixel supports rare, sensitive, or declining wetland types
- wetland pixel supports rare fish, wildlife, and/or plant species
- wetland pixel has recreational opportunity $\geq$ 2

Pixels meeting the first filter then had to fall in the minimally disturbed, lightly disturbed, or moderately disturbed condition categories based on the landscape integrity model. The next filter was land ownership. Pixels passing the first two filters then had to be located on private land (Figure 5) to be considered in the final wetland prioritization map. The resulting layer was then filtered down to only clusters of pixels that were $\geq$ 80 ac. This was done using the Region Group tool in GIS. Although many smaller clusters of wetland pixels, or even single wetland pixels may meet the first 3 filters, it was determined that the 80 ac threshold be used to target larger wetland blocks whose conservation or restoration would have the largest positive impact on the health of a watershed, ecological connectivity, and local communities.

RESULTS AND DISCUSSION

Sixty large wetland complexes meeting the prioritization criteria and passing all filters were identified (Table 1; Figure 6). Descriptions and maps for all 60 wetlands are in Appendix 1. These 60 sites represent the highest priority wetlands for conservation in Idaho as determined by these methods. Unlike the previous wetland prioritization (Hahn et al. 2005), we did not rank these 60 wetland prioritization sites relative to each other. While it is recognized that each wetland complex provides different functions and values, conservation of any of them would be beneficial and an appropriate use of LWCF dollars. Potential conservation actions often arise opportunistically and do not usually correlate with only the highest ranked sites.

In contrast to previous wetland prioritizations (Pfeifer and Toweill 1992, Hahn et al. 2005) which considered only prior known wetlands, we analyzed all potential locations of wetland occurrence using the same criteria. As a result, 23% of the 60 wetland prioritization sites identified were previously unrecognized for their high functions and values, including:

- Bear River (Riverdale to Highway 91)
- Big Wood River (Hailey to Bellevue)
- Blackfoot River - Blackfoot Equalizing Reservoir
- Camas Creek - Soldier Creek (Fairfield)
- Gold Fork River - Kennally Creek - Little Valley

- Little Payette Lake Outlet
- Little Squaw Creek - High Valley
- Long Valley (Boulder Creek - Willow Creek)
- Nounan Valley
- Pack River (upstream of Highway 95)
- Salmon River - Round Valley (downstream of Challis)
- Snake River (Firth to Blackfoot)
- Valley Creek (upstream of Stanley Lake Creek)
- West Fork Saint Maries River Meadows

Four additional sites had been recognized by prior wetland assessments, but were not included in the 200 sites ranked by the last prioritization (Hahn et al. 2005). Seventy-eight percent of the 60 sites were also ranked in the top 60 of sites analyzed in the prior wetland prioritization (Hahn et al. 2005).

MANAGEMENT IMPLICATIONS

This updated Idaho Wetland Conservation Prioritization Plan incorporated a wide variety of wetland site-related data and utilized the capabilities of GIS to analyze wetland distribution, land uses, recreation opportunities, and biodiversity data. The 60 large wetland complexes presented here can be used to direct the focus of conservation, but should not be the only method used to determine precise locations for conservation. For example, the best parcels to be conserved could lie adjacent to the mapped sites. It must be noted that this analysis is only as complete and accurate as the GIS layers used. Map layers have inaccuracies, land use or ownership may have recently changed, or ecological processes (e.g., flood, fire, etc.) sometimes alter wetlands in the time since land cover maps were published. Results were reviewed against existing site descriptions, but field visits are required for site specific planning.

For this process, wetland sites across the entire state were objectively analyzed. Many wetlands, especially the majority of these 60 wetland complexes, are highly valued by the citizens of Idaho for their wetland functions and recreation values. There are hundreds of additional valuable and important wetlands throughout the state of Idaho; a large number of which are under pressures from land use activities that degrade their functions and values. The 60 sites profiled are only a portion of the many that would greatly benefit from further acquisition, protection, and restoration. GIS map layers generated during this process can be used to locate smaller wetland complexes meeting the prioritization criteria. Map layers are available upon request from IDFG.

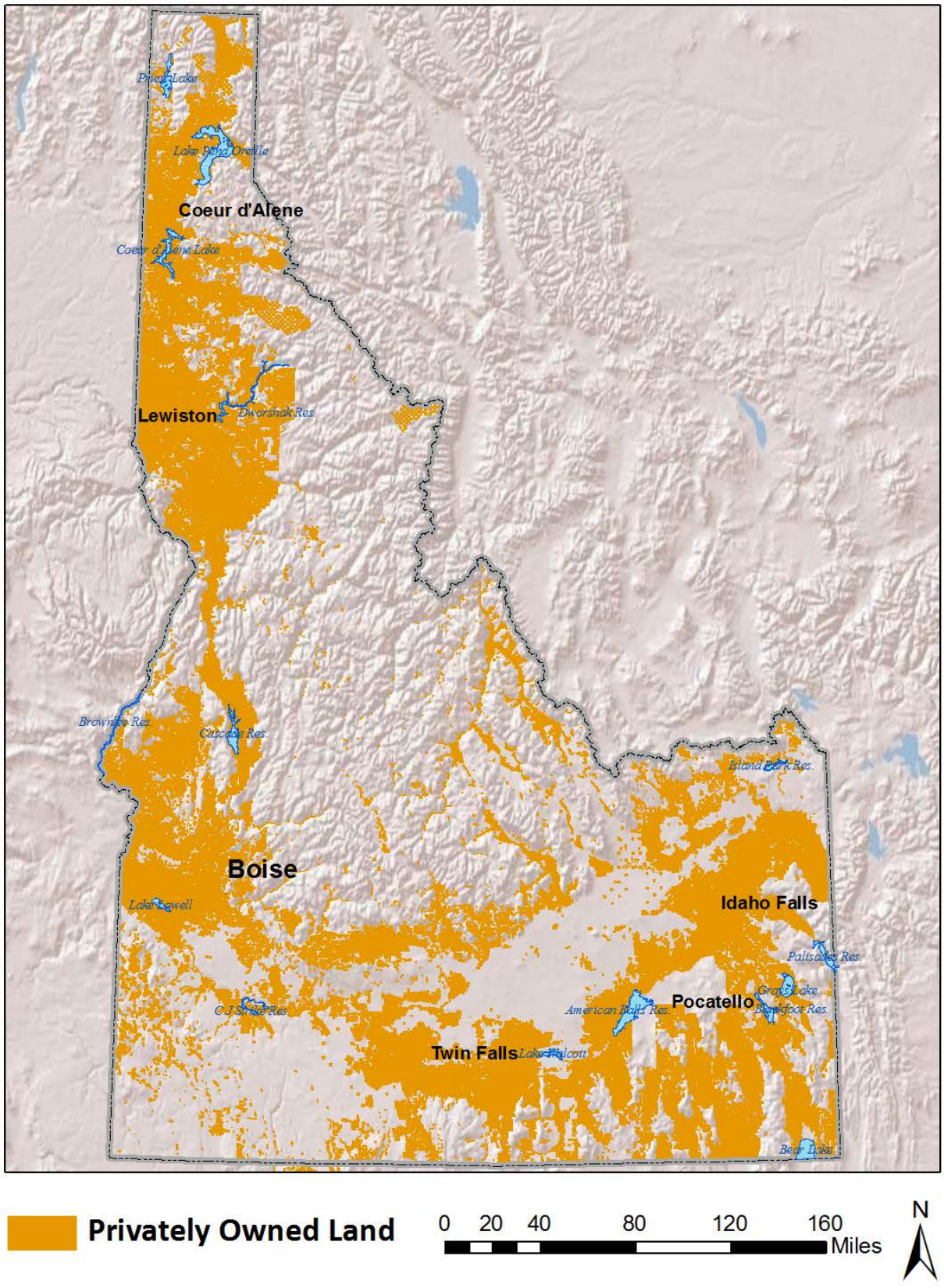

Figure 5. Distribution of privately owned lands in Idaho.

Table 1. Relationship of 60 wetland prioritization sites to prior conservation assessments.

2012 Wetland Prioritizaton Site	IDFG Wetland Conservation Site	IDFG Conservation Priority Class	2005 SCORTP Wetland Prioritization Site (Hahn et al. 2005)	2005 SCORTP Rank
Kootenai River Valley				n/a
Kootenai National Wildlife Refuge	Kootenai National Wildlife Refuge		Kootenai National Wildlife Refuge	24
Kootenai River (Moyie River to Bonners Ferry)			Moyie River Basin	27
Bismark Meadows	Bismark Meadows		Bismark Meadows	34
	Hager Lake Fen	II		
Pack River (upstream of Highway 95)				n/a
Pend Oreille River	Morton Slough		Morton Slough	74
			Muskrat Lake	72
			Keyser's Slough	104
Clark Fork River Delta	Clark Fork Delta	II	Clark Fork River Delta	7
	Denton Slough			
Spirit Lake			Spirit Lake	112
Hauser Lake	Hauser Lake Fen		Hauser Lake	43
Coeur d'Alene River - Cataldo Mission Flats	Rose Lake	II	Cataldo Flats	81
Coeur d'Alene River (Rose Lake to Thompson Lake)	Hidden Lake		Lower Coeur d'Alene River Valley	9
	Thompson Lake	II		
Saint Joe River - River in a Lake	Heyburn State Park		Lower Saint Joe River / River in a Lake	59
	River in a Lake			
Saint Joe River Valley	Saint Joe River		Saint Joe River	20
Saint Joe River (Herrick to Calder)	Saint Joe River		Saint Joe River	20
Saint Maries River Valley			Saint Maries River	84
West Fork Saint Maries River Meadows				n/a
Elk Creek - Elk City Meadows	Elk Creek - Elk City Meadows			n/a
Little Salmon River - Meadows Valley	Meadows Valley		Little Salmon River / Meadows Valley	168
Little Payette Lake Outlet				n/a
North Fork Payette River (McCall to Cascade Reservoir)	North Fork Payette River (McCall to Cascade Reservoir)	II	North Fork Payette River - McCall to Cascade Reservoir	28
Lake Fork Creek	Lake Fork Creek	II	Lake Fork Creek	32
Long Valley (Boulder Creek - Willow Creek)				n/a
Gold Fork River	Gold Fork	II	Gold Fork River (Lake Cascade)	131
Gold Fork River - Kennally Creek - Little Valley				n/a
Long Valley (Cascade to Cabarton)	Willow Creek, Valley County		Willow Creek (Valley County)	110
Little Squaw Creek - High Valley				n/a

Table 1 continued.

2012 Wetland Prioritizaton Site	IDFG Wetland Conservation Site	IDFG Conservation Priority Class	2005 SCORTP Wetland Prioritization Site	2005 SCORTP Rank
Valley Creek (upstream of Stanley Lake Creek)				n/a
Stanley Basin				n/a
South Fork Boise River (Featherville to Paradise Hot Springs)			South Fork Boise River (Featherville to Pine)	80
Camas Creek - Soldier Creek (Fairfield)				n/a
Big Wood River (Hailey to Bellevue)				n/a
Salmon River - Round Valley (downstream of Challis)				n/a
Pahsimeroi River Valley (upstream of May)	Pahsimeroi Valley		Pahsimeroi River Valley	18
Eighteenmile Creek (Lemhi Valley)	Eighteenmile Creek		Eighteenmile Creek	47
Thousand Springs Valley - Chilly Slough	Chilly Slough	II	Big Lost River Valley	2
Henrys Lake	East Shore Henrys Lake	I	Henrys Lake	22
	Henrys Lake White Spruce	II		
Henrys Fork - Flat Ranch	Flat Ranch		Henrys Fork / Flat Ranch	89
Teton Basin	Teton Basin		Teton Basin	6
	Teton Creek Spring			
Henrys Fork (Teton River to Snake River)	Upper Snake River		Upper Snake River / Lower Henrys Fork	1
	Snake River Below Heise Gauge			
South Fork Snake River - Swan Valley	Upper Snake River		Upper Snake River / Lower Henrys Fork	1
Snake River (Roberts to Jefferson - Bonneville County line)				n/a
Snake River (Firth to Blackfoot)				n/a
Blackfoot River - Blackfoot Equalizing Reservoir				n/a
American Falls Reservoir (Snake River to Sterling)	American Falls Reservoir	II	American Falls Reservoir / Fort Hall Bottoms	5
	Sterling	II		
Boise River (Caldwell to Notus)			Lower Boise River Valley / Fort Boise	39
Snake River (Marsing to Homedale)				n/a
C. J. Strike Reservoir - Snake River	C. J. Strike Reservoir	II	C. J. Strike Reservoir	35
C. J. Strike Reservoir - Bruneau River	C. J. Strike Reservoir	II	C. J. Strike Reservoir	35
Snake River (Twin Falls to Niagara Springs)	Niagara Springs		Niagara Springs	82
	Crystal Springs		Crystal Springs	75

Table 1 continued.

2012 Wetland Prioritizaton Site	IDFG Wetland Conservation Site	IDFG Conservation Priority Class	2005 SCORTP Wetland Prioritization Site	2005 SCORTP Rank
Marsh Creek - Marsh Valley (Downey)	Marsh Valley		Marsh Valley	54
Oxford Slough	Oxford Slough	II	Oxflord Slough / Swan Lake	94
Bear River (Riverdale to Highway 91)				n/a
Blackfoot River - Upper Valley - Lanes Creek	Blackfoot River		Upper Blackfoot River / Upper Valley / Lanes Creek	56
Blackfoot River - Lower Valley - Slug Creek			Upper Blackfoot River (Lower Valley / Woodall Springs)	67
Alexander Reservoir - Soda Springs	Soda Springs Natural Scenic Area		Soda Springs Natural Scenic Area	100
Bear River (Georgetown Summit to Eightmile Creek)				n/a
Nounan Valley				n/a
Bear Lake Valley	Big Timbers		Bear Lake Wetlands	3
Thomas Fork Valley - Bear River	Thomas Fork Valley	II	Thomas Fork Valley	52
Bear Lake	Bear Lake	I	Bear Lake Wetlands	3

Table 1 continued.

2012 Wetland Prioritizaton Site	Important Bird Area	National Wildlife Refuge	IDFG Wildlife Management Area
Kootenai River Valley	Boundary Creek WMA		Boundary Creek
Kootenai National Wildlife Refuge	Kootenai National Wildlife Refuge	Kootenai	
Kootenai River (Moyie River to Bonners Ferry)			
Bismark Meadows			
Pack River (upstream of Highway 95)			
Pend Oreille River	Morton Slough		Morton Slough
			Pend Oreille
Clark Fork River Delta	Clark Fork Delta		Pend Oreille
	Denton Slough		
Spirit Lake			
Hauser Lake			
Coeur d'Alene River - Cataldo Mission Flats			
Coeur d'Alene River (Rose Lake to Thompson Lake)			Coeur d'Alene River
Saint Joe River - River in a Lake	Heyburn State Park		
Saint Joe River Valley			
Saint Joe River (Herrick to Calder)			
Saint Maries River Valley			Saint Maries
			Saint Maries River Access Area
West Fork Saint Maries River Meadows			
Elk Creek - Elk City Meadows			
Little Salmon River - Meadows Valley			
Little Payette Lake Outlet			
North Fork Payette River (McCall to Cascade Reservoir)			
Lake Fork Creek			
Long Valley (Boulder Creek - Willow Creek)			
Gold Fork River			
Gold Fork River - Kennally Creek - Little Valley			
Long Valley (Cascade to Cabarton)			
Little Squaw Creek - High Valley			

Table 1 continued.

2012 Wetland Prioritizaton Site	Important Bird Area	National Wildlife Refuge	IDFG Wildlife Management Area
Valley Creek (upstream of Stanley Lake Creek)			
Stanley Basin			
South Fork Boise River (Featherville to Paradise Hot Springs)			
Camas Creek - Soldier Creek (Fairfield)			
Big Wood River (Hailey to Bellevue)			
Salmon River - Round Valley (downstream of Challis)			
Pahsimeroi River Valley (upstream of May)			
Eighteenmile Creek (Lemhi Valley)			
Thousand Springs Valley - Chilly Slough	Chilly Slough Wildlife Management Area		Chilly Slough
Henrys Lake			
Henrys Fork - Flat Ranch			
Teton Basin	Teton Basin		Rainier Access Area
			Teton Creek / Bates Bridge Access Area
			Fox Creek Easement Access Areas
Henrys Fork (Teton River to Snake River)	Cartier Slough Wildlife Management Area		Cartier Slough
			Beaver Dick
			Warm Slough Access Area
South Fork Snake River - Swan Valley	Snake River Area of Critical Environmental Concern		
Snake River (Roberts to Jefferson - Bonneville County line)	Snake River Area of Critical Environmental Concern		
Snake River (Firth to Blackfoot)			
Blackfoot River - Blackfoot Equalizing Reservoir			
American Falls Reservoir (Snake River to Sterling)	American Falls Reservoir		Sterling
Boise River (Caldwell to Notus)			
Snake River (Marsing to Homedale)	Deer Flat National Wildlife Refuge	Deer Flat	
C. J. Strike Reservoir - Snake River	C. J. Strike Wildlife Management Area		C. J. Strike
C. J. Strike Reservoir - Bruneau River	C. J. Strike Wildlife Management Area		Bruneau River - C. J. Strike
			Hot Creek Ranch - C. J. Strike
Snake River (Twin Falls to Niagara Springs)			Niagara Springs

Table 1 continued.

2012 Wetland Prioritizaton Site	Important Bird Area	National Wildlife Refuge	IDFG Wildlife Management Area
Marsh Creek - Marsh Valley (Downey)			
Oxford Slough	Oxford Slough	Oxford Slough	
Bear River (Riverdale to Highway 91)			
Blackfoot River - Upper Valley - Lanes Creek			Blackfoot River
Blackfoot River - Lower Valley - Slug Creek			
Alexander Reservoir - Soda Springs			
Bear River (Georgetown Summit to Eightmile Creek)			Georgetown Summit
Nounan Valley			
Bear Lake Valley			
Thomas Fork Valley - Bear River			
Bear Lake	Bear Lake National Wildlife Refuge	Bear Lake	

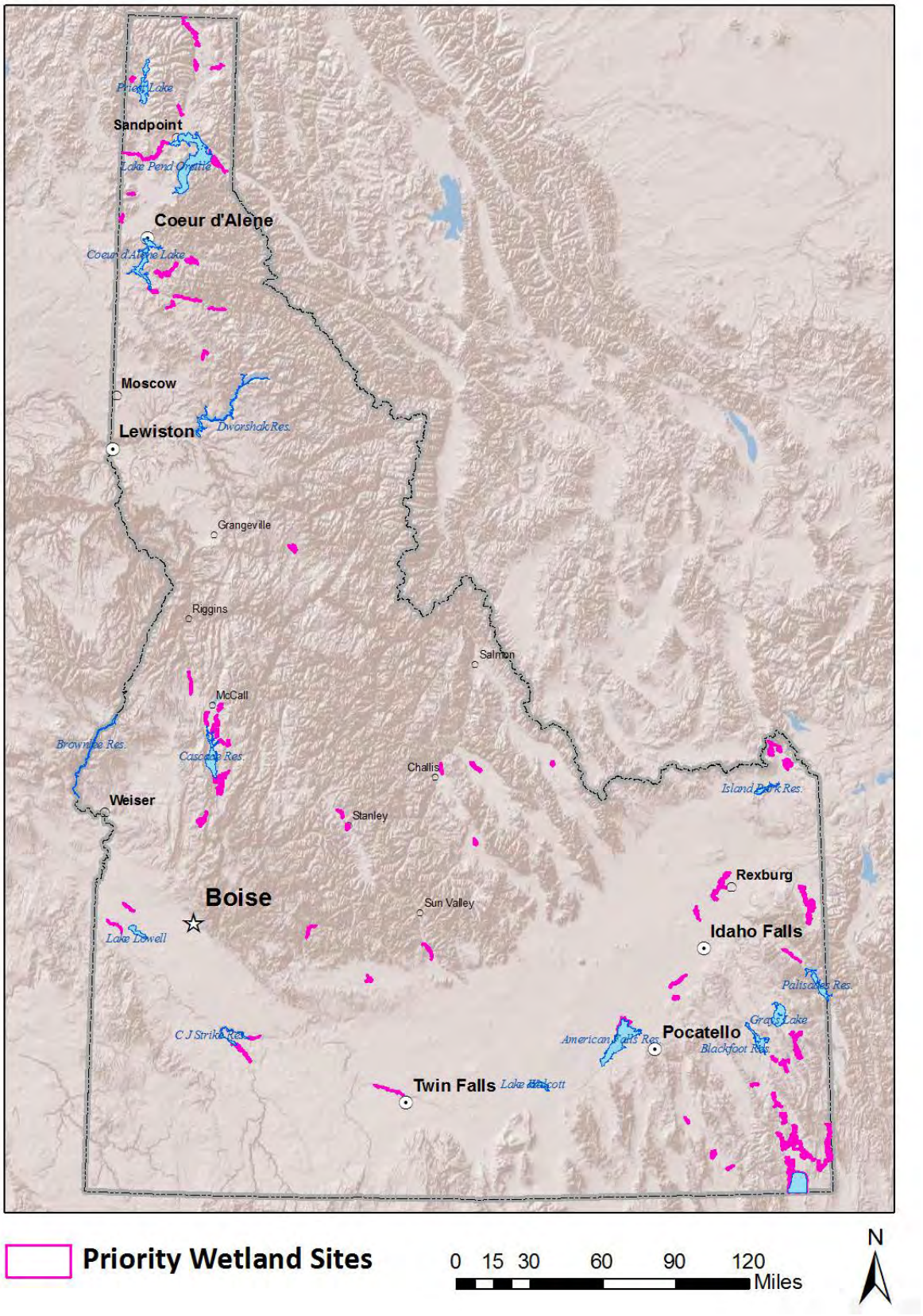

Figure 6. Distribution of 60 wetland prioritization sites.

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APPENDIX

Descriptions and maps of 60 conservation priority wetlands

Idaho Panhandle Sites

Kootenai River Valley — This site is comprised of the Kootenai River banks and stands of cottonwood on point bars within the remnant floodplain. Included in the site are wet meadows and riparian woodland and shrubland. Riverine floodplain is included where Trout Creek enters the Kootenai River, one of the only areas not completely developed for agriculture. The Kootenai River is mostly constrained by levees built to protect agricultural lands from annual flooding. However, potential for restoration exists on lands adjacent to the river, especially in depressions and old meander scars. For example, marshes fed in part by Kootenai River hydrology have been restored at Boundary Creek, Smith Creek, and Ball Creek. Thousands of migrating waterfowl and other birds utilize the Kootenai River Valley during migration. In addition to a high concentration of waterbird species, the Kootenai River supports an endemic white sturgeon population and a suite of other rare fish species.

Kootenai National Wildlife Refuge — The Kootenai National Wildlife Refuge is in the former floodplain of the Kootenai River. Water is diverted into the refuge from Myrtle Creek and pumped from Deep Creek and the Kootenai River to maintain over 800 acres of permanent ponds, marshes, meadows, and waterfowl food plots. Narrow bands of black and eastern cottonwoods line the banks of creeks and the Kootenai River and small patches of Bebb's willow are present. Ponds within the refuge support extensive marshes of cattail and hardstem bulrush. Wet meadows are mostly dominated by reed canarygrass, while drier areas support a mix of pasture grasses. Opportunities for conservation and restoration exist on private lands. There is a high concentration of waterbird species, including a black tern colony, in the area.

Kootenai River (Moyie River to Bonners Ferry) — This reach of the Kootenai River has numerous patches of remnant floodplain. There are many alluvial bars and islands where cottonwoods and willows can establish. Riparian woodland and shrubland occupies stable terraces and islands within the remnant floodplain. Wet meadows occupy gaps in the tree and shrub habitat. The Kootenai River is habitat for several globally rare fish species.

Bismark Meadows — This site occurs in the glacial carved Priest Lake basin. Bismark Meadows contains a unique mosaic of peatland (fen) communities along the low-gradient, meandering Reeder Creek. The most extensive community within the mosaic is shrub carr. Interspersed among the scrub-shrub wetlands are sedge-dominated rich fens supporting bog cranberry and other rare plant species. Bismark is one of the few valley peatlands in north Idaho that formed along low gradient streams and not around a pond or lake. Grizzly bear utilize the area. The site is adjacent to Hager Lake, a peat-filled glacial kettle pond that contains one of the more extensive floating mats in Idaho.

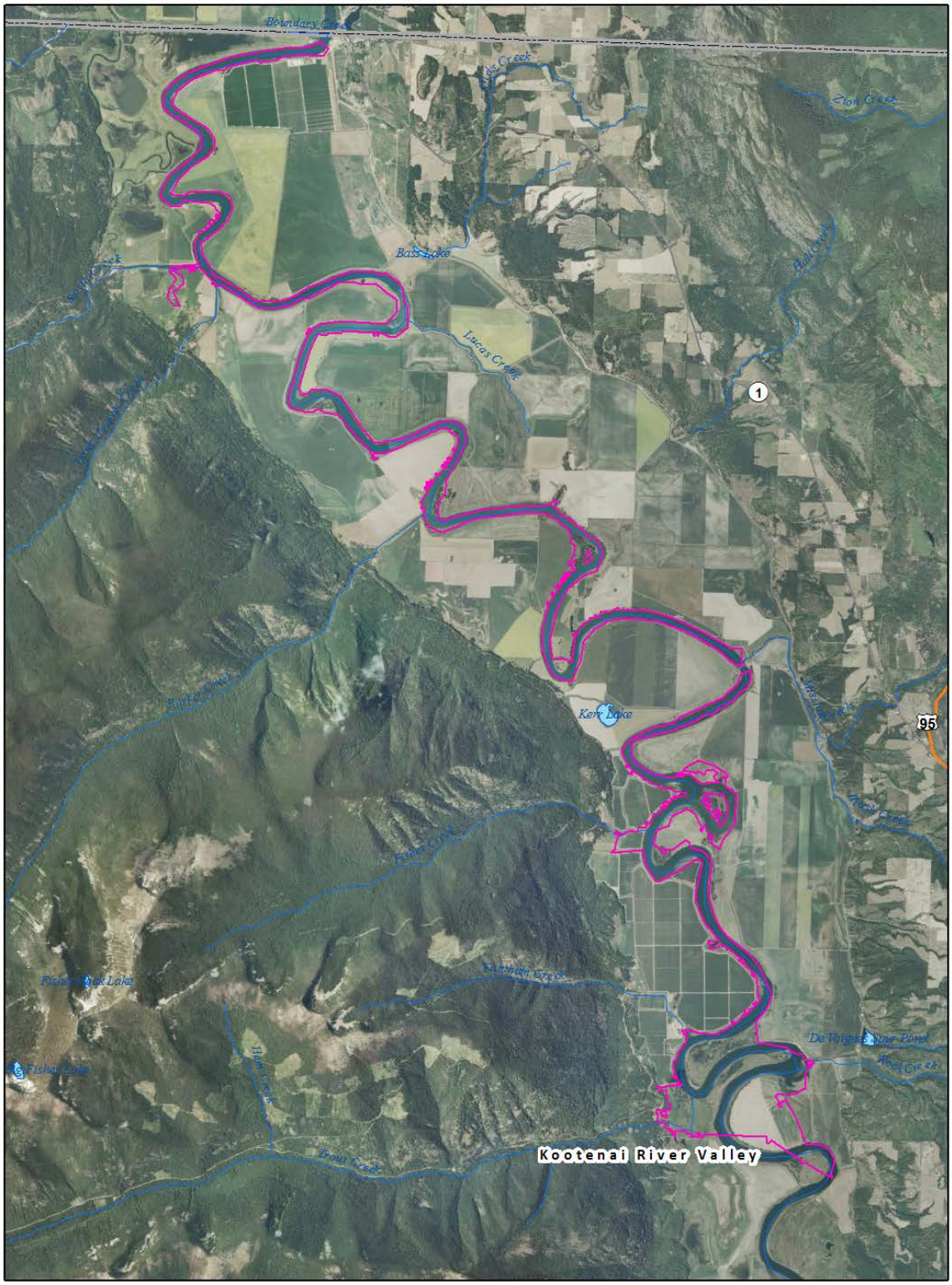
Pack River (upstream of Highway 95) — Large amounts of sandy alluvium are carried by the river and deposited on numerous alluvial point and channel bars as it meanders through the

wide valley. Western red cedar and black cottonwood woodlands and willow - alder – redosier dogwood shrublands form a discontinuous riparian belt. Valley bottom and floodplain not supporting woody vegetation are grassy meadows. Although recovering from historic logging impacts, current land uses (e.g., rural housing, roads) in the watershed influence valley bottom condition. Restoration opportunities exist. The area is rich with wildlife, including grizzly bear. Bull trout are present.

Pend Oreille River — This site includes marshes and meadows fringing the Pend Oreille River. Wet meadows are dominated by reed canarygrass and sedges. Occasional marsh patches, comprised of cattails and hardstem bulrush, are also present. Pondweed species characterize the aquatic vegetation. The transition to uplands is somewhat abrupt with a narrow band of thinleaf alder leading to coniferous forests dominated by western redcedar and grand fir. The area is important for many waterbird species and migrating waterfowl. Bald eagles winters along the shores and backwater sloughs of the Pend Oreille River. The site is of general biodiversity interest and valued for recreation.

Clark Fork River Delta — The Clark Fork River forms a delta where it enters Lake Pend Oreille. The numerous islands support mature western redcedar and grand fir forest, black cottonwood bottomland forest, willow and red-osier dogwood riparian shrublands, and wet meadows. Wettest areas are dominated by marsh, while reed canarygrass dominates many meadows (especially where water levels have been manipulated). Migrating and wintering waterfowl are supported in large numbers (counts as high as 60,000 ducks, 15,000 Canada Geese, and 2,000 tundra swans, as well as grebes; common loon nesting occurs). Lake Pend Oreille is an important wintering area for bald eagles, with over 300 present in the delta by early December. Lake Pend Oreille is also an important nesting area for ospreys, with the greatest densities occurring in the Clark Fork River delta. There is a high concentration of colonial nesting birds. Globally rare plant species are supported. The area has very high recreation opportunities.

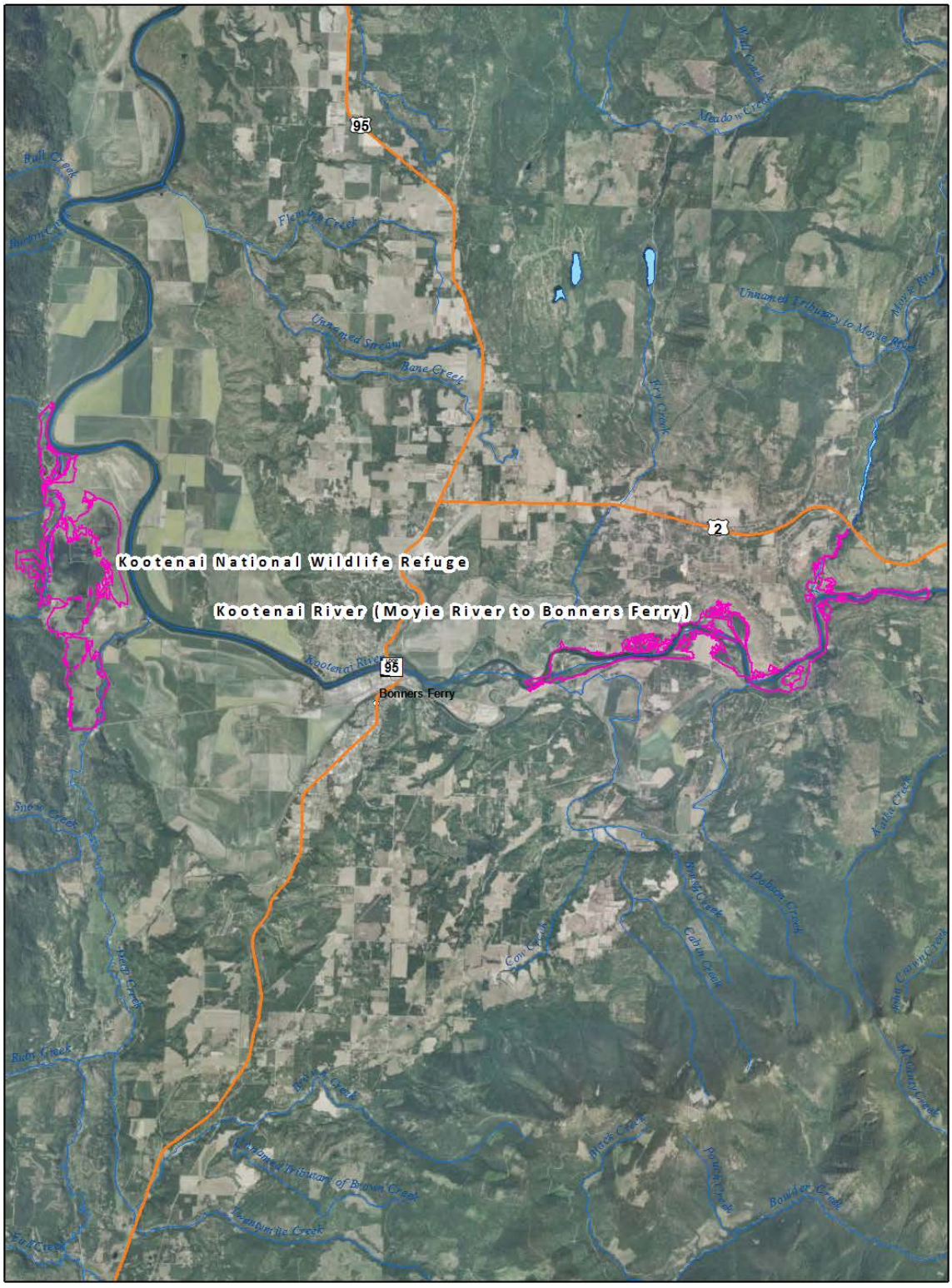
Typical Clark Fork Delta black cottonwood riparian woodland. Photo by C. Murphy.

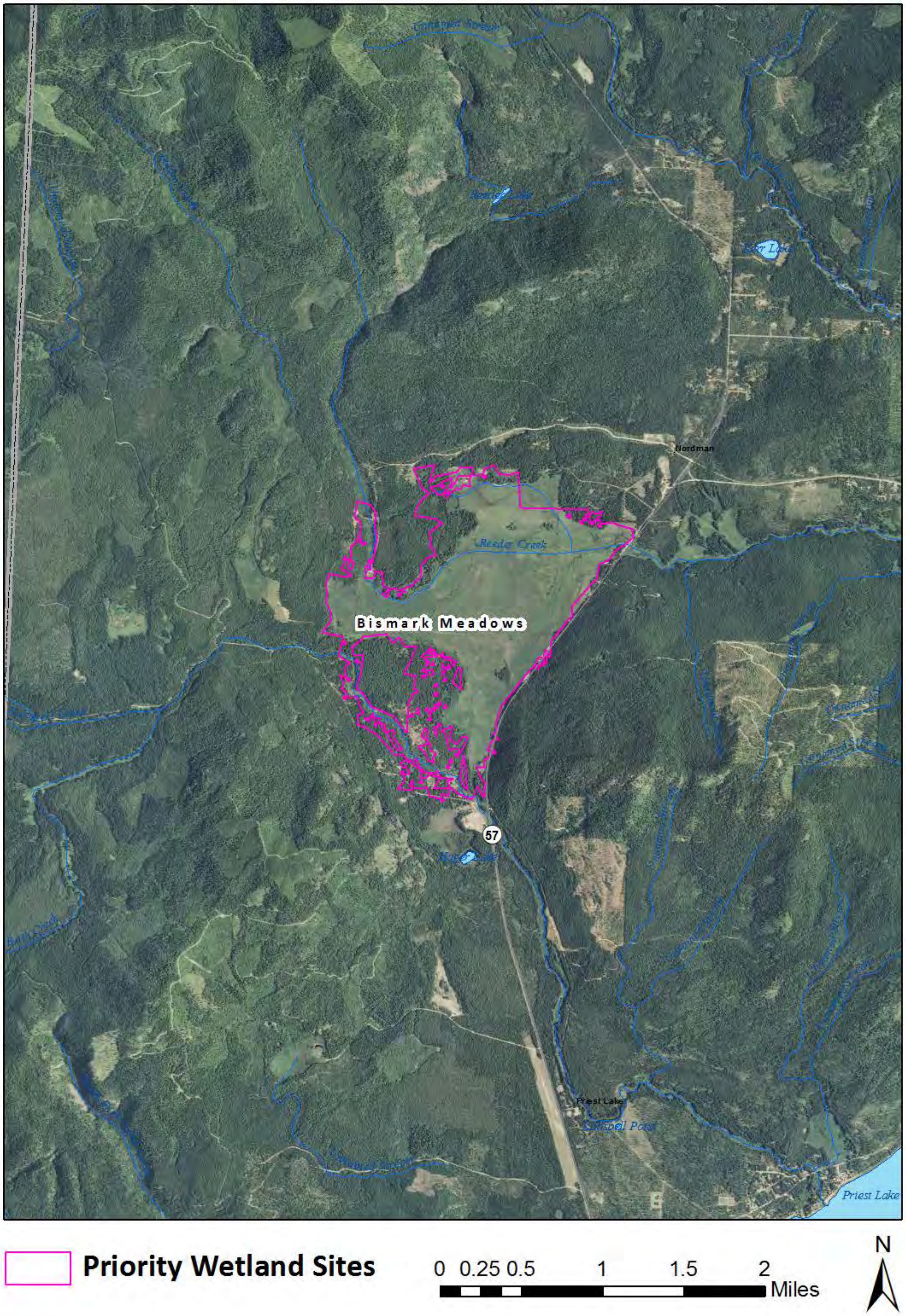


Priority Wetland Sites

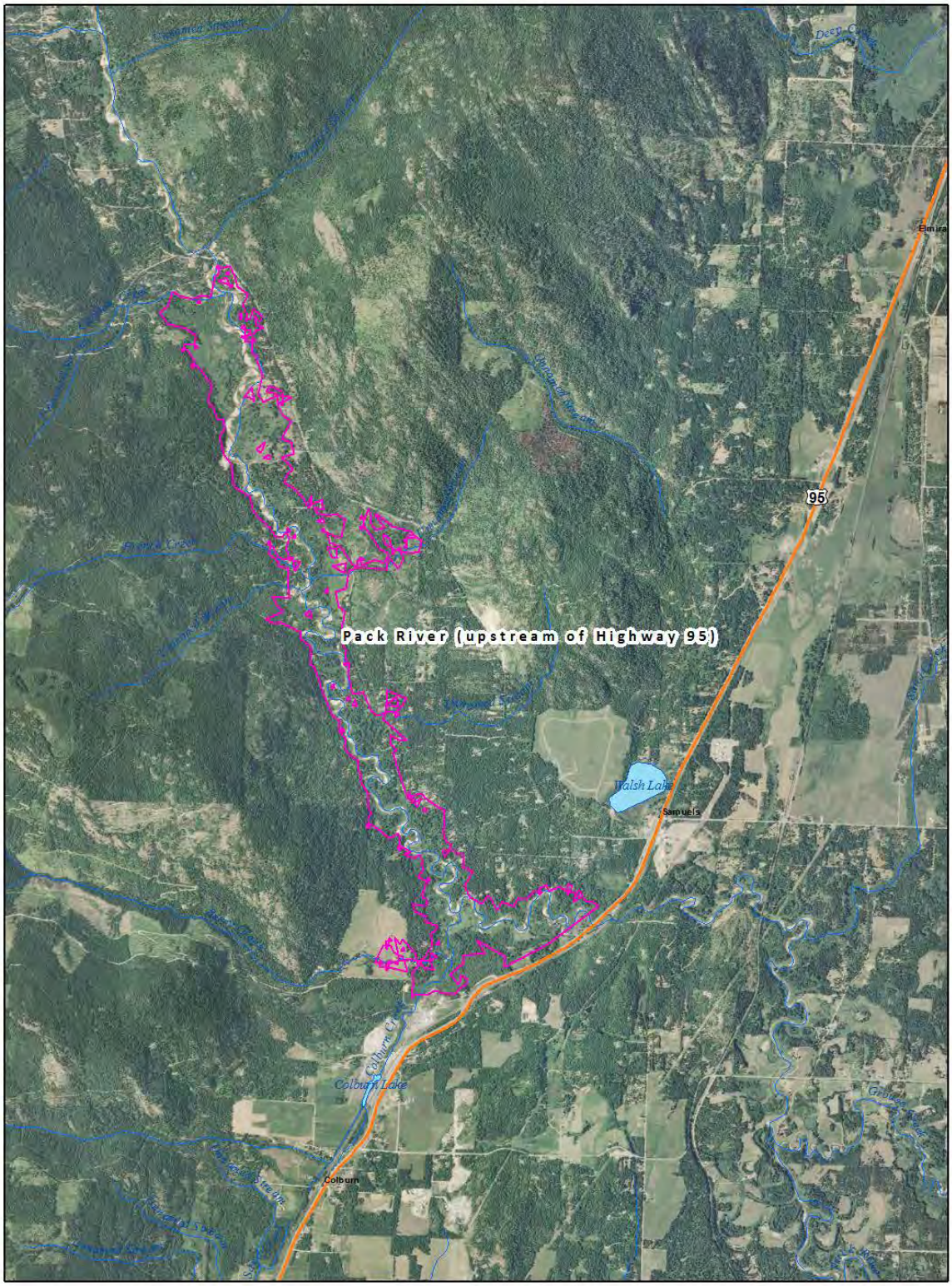
0 0.45 0.9 1.8 2.7 3.6
Miles

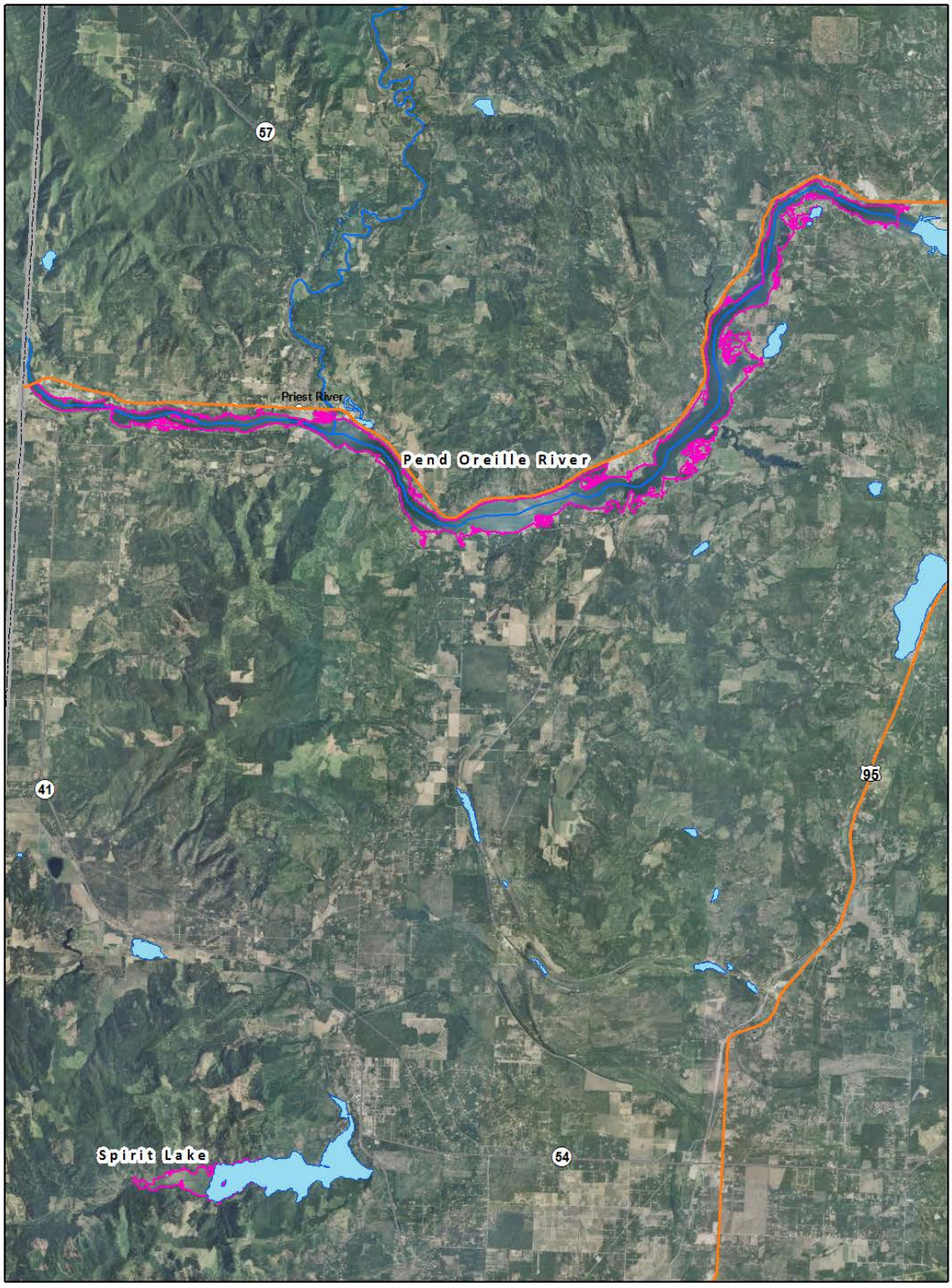
N


95
2
Kootenai National Wildlife Refuge
Kootenai River (Moyie River to Bonners Ferry)
95
Bonners Ferry
Priority Wetland Sites
0 0.5 1 2 3 4
Miles
N



Nordman
Reeder Creek
Bismark Meadows
57
Priest Lake
Priest Lake
Priority Wetland Sites
0 0.25 0.5 1 1.5 2
Miles
N


Pack River (upstream of Highway 95)
95
Elmira
Samuels
Colburn
Colburn Lake
Walsh Lake
Priority Wetland Sites
0 0.25 0.5 1 1.5 2
Miles
N



Priority Wetland Sites

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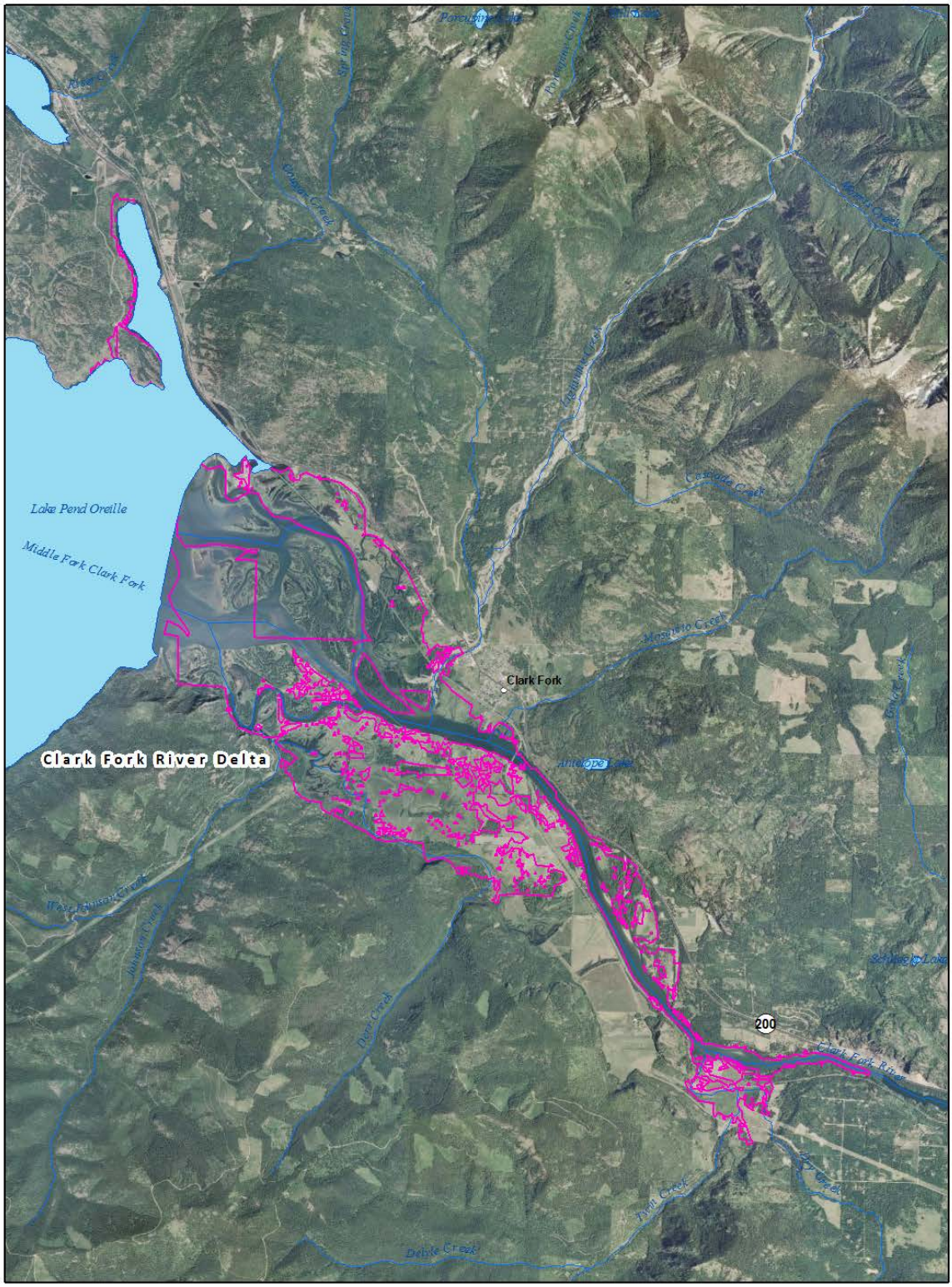

Lake Pend Oreille
Middle Fork Clark Fork
Clark Fork
Clark Fork River Delta
Cascade Creek
Mosquito Creek
Trout Creek
Deble Creek
200
Priority Wetland Sites
0 0.45 0.9 1.8 2.7 3.6
Miles
N

North-central Idaho Sites

Spirit Lake — A vast shrub-dominated wetland occupies the valley bottom where Brickel Creek enters Spirit Lake. Riparian shrubland extends up Brickel Creek. Patches of wet meadow and marsh occur in depressions and saturated areas. Peat accumulation and floating mats are likely to occur in these settings. Brickel Creek has been channelized, appearing to drain a portion of the wetland that is used as moist pasture. Opportunities for restoration exist. Habitat for globally rare plant species is present.

Hauser Lake — Hauser Lake receives water from several small, apparently ephemeral streams from adjacent hills. An extensive valley fen and floating mat occupies the shallow bays on the western and southwestern margins of the lake. This fen is characterized by woollyfruit sedge, threeway sedge, buckbean, purple marshlocks, roundleaf sundew, and *Sphagnum* moss. Rare plants are present. The margins of the fen are covered with a dense shrub carr dominated almost exclusively by rose spiraea, with occasional thinleaf alder. Toward the lake, the fen becomes dominated by beaked sedge and reed canarygrass, transitioning to river bulrush, common spikerush, and woollyfruit sedge in shallowly flooded areas. Cattail and hardstem bulrush marsh occurs in deeper water. Other areas are characterized by reed canarygrass meadow. The lakebed is densely vegetated with aquatic species, including Rocky Mountain pondlily, water shield, pondweed species, common bladderwort, and common waterweed.

Coeur d'Alene River - Cataldo Mission Flats — This section of the Coeur d'Alene River valley has extensive marshes and wet meadows. A high diversity of marsh and aquatic plant communities fill floodplain depressions, sloughs, and old oxbows of the river. Common reed is widespread in these marshes. Black cottonwood gallery forests and riparian shrubs, especially rose spiraea, line the river, its backwater sloughs, islands, and associated marshes. During large flood events these wetlands receive deposits of contaminated sediments from historic mining in the upper watershed. Toxic elements are stabilized by the dense marsh vegetation. The site is important bird habitat and includes a rare black tern colony.

Coeur d'Alene River (Rose Lake to Thompson Lake) — The reach of Coeur d'Alene River downstream of Cataldo supports significant wetlands important for recreation, as well as bird and wildlife habitat. Extensive and diverse marsh, peatland, black cottonwood gallery forest, moist conifer forest, and willow - birch riparian habitats occur in and adjacent to the floodplain. Most marshes and peatlands are associated with lakes occurring in the valley. Some lakes support floating and fixed peat mats of *Sphagnum* moss and sedge, with rose spiraea around their margins. Lakes are usually hydrologically connected to the floodplain. On the river, hydrologic processes are natural, but flood and erosion control developments have altered connectivity to the floodplain in some areas. Historic mining in the upper watershed has contributed contaminated sediments to the system that are deposited in this stretch of the river and stabilized by wetland vegetation. Maintenance of wetland and riparian habitat in this

site is critical for shoreline stabilization and water quality improvement. There is a high concentration of waterbird and colonial nesting bird species, including black terns.

Scrub-shrub wetland at Rose Lake in Coeur d'Alene River valley. Photo by C. Murphy.

Saint Joe River - River in a Lake — Natural levees along the Saint Joe River create a "river in a lake" where it enters the south end of Lake Coeur d'Alene. The levees support extensive riparian forests dominated by both black cottonwood and quaking aspen. Stands of trees frequently have a native grass understory dominated by bluejoint and sedges. Some shrub stands are present, including rose spiraea and Bebb's willow. Marshes and aquatic beds occur in the river channel and lake fringes, characterized by hardstem bulrush, narrowleaf water plantain, Rocky Mountain pondlily, and pondweeds. These diverse and productive wetlands support a high concentration of waterbird species and globally rare plants. There are high recreation opportunities.

Saint Joe River Valley — This site includes the valley of the lower Saint Joe River as it meanders across a wide alluvial valley. Riparian black cottonwood trees line the banks and larger stands occur on point bars within the remnant floodplain. Included in the site are numerous meadows and marshes. Although most wetlands have been converted to agricultural-related uses in the downstream half, intact marshes and wet meadows occur upstream where they fill old meander scars and depressions in the valley bottom. Riparian and floodplain woodland and shrubland habitats are also more plentiful in the upstream half of the site. The river is often constrained by levees built to protect agricultural lands from flooding. However, potential for restoration exists on lands adjacent to the river. The site has habitat for globally rare plant species. High recreation opportunities exist.

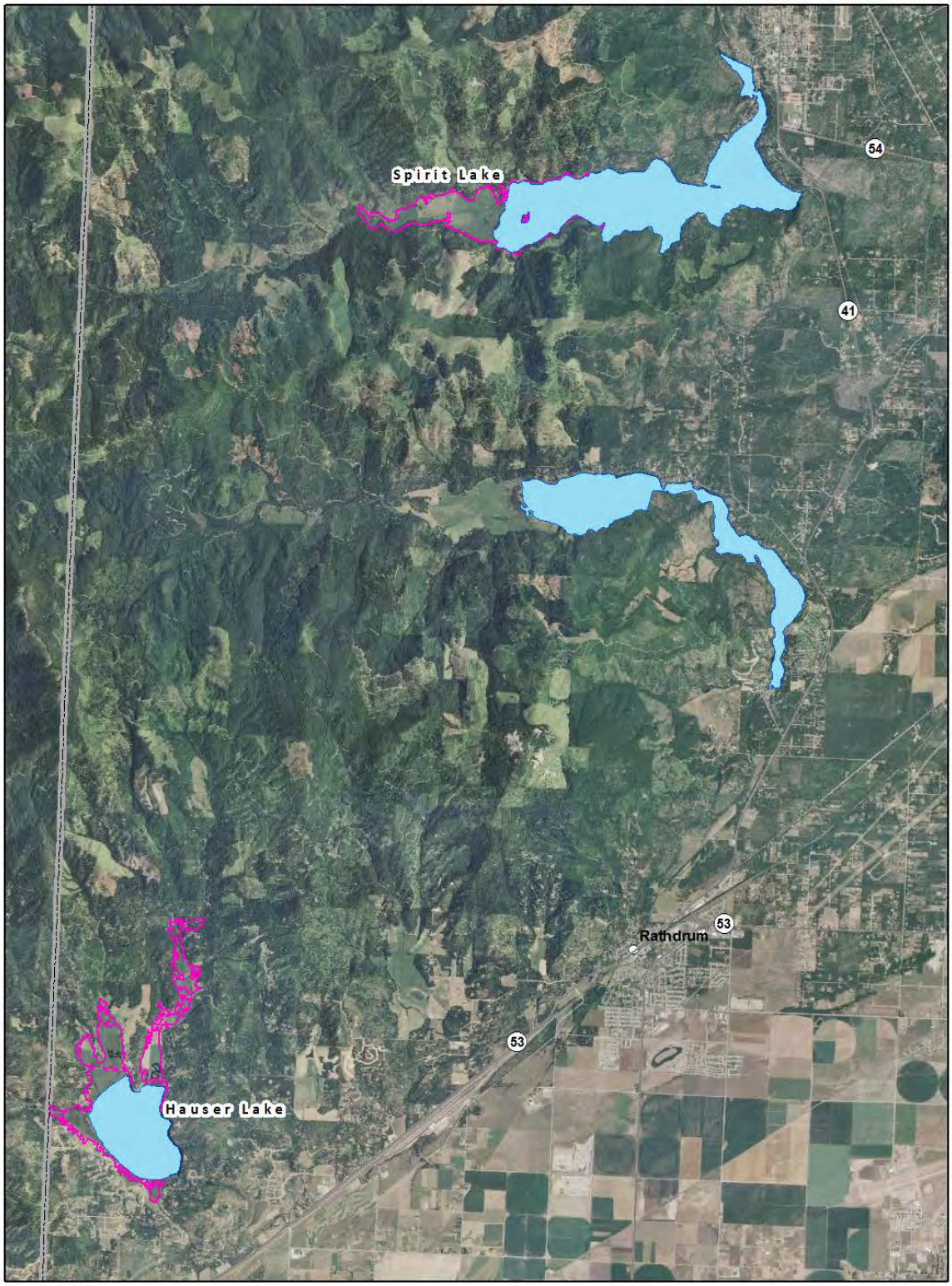
Saint Joe River (Herrick to Calder) — The floodplain in this reach of the Saint Joe River supports a nearly continuous riparian corridor of black cottonwood forest with an understory dominated by redosier dogwood, alderleaf buckthorn, and redosier dogwood. The river has a natural

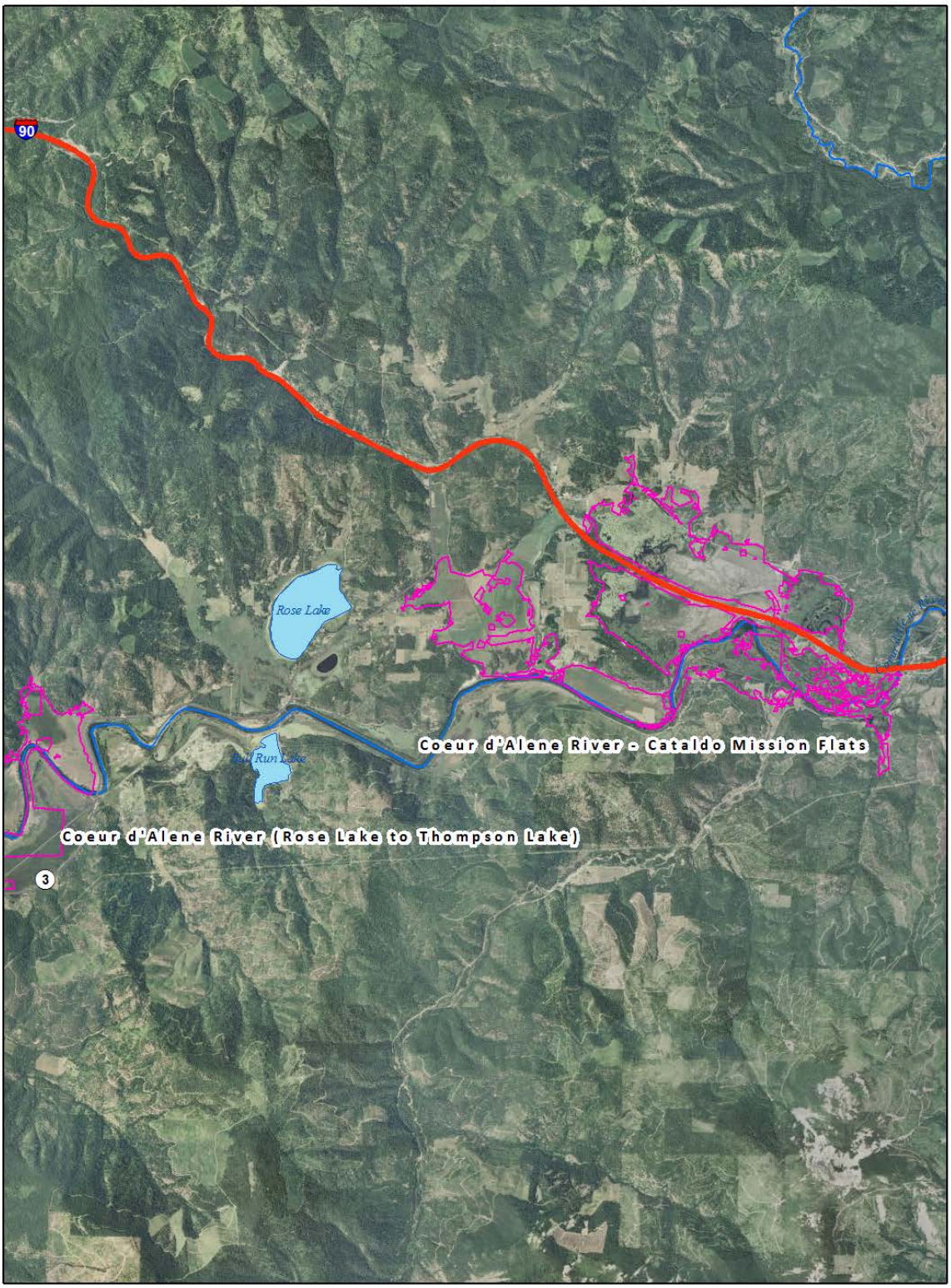
hydrologic regime. Annual flooding and alluvial deposition create many cobble bars and islands that support dusky willow and black cottonwood reproduction. Wet meadows dominated by non-native reed canarygrass and creeping bentgrass are common. There is habitat for harlequin duck, Coeur d'Alene salamander, and globally rare plant species. The river supports a valued native cutthroat trout fishery.

Saint Maries River Valley — The Saint Maries River valley immediately upstream of the confluence with the Saint Joe River is a wide wetland complex supporting marsh, riparian woodland and shrubland, and meadow habitat. Cattails are common in marshes, while sedges and rushes occupy wet meadows. Backwater sloughs and oxbow ponds are present. Black cottonwood and western red cedar trees occur on levees and higher terraces. Although the lower Saint Maries River has a levee system, the whole valley can flood during extreme flood events. Portions of the valley bottom have been drained for agricultural-related uses. Restoration opportunities exist. Habitat for globally rare plant species is present.

West Fork Saint Maries River Meadows — The meadows in the vicinity of Clarkia lie in an ancient lake bed. Mesic and wet meadows cover the valley bottom. Forks of the Saint Maries River are sinuous and low gradient, flooding parts of the meadow in the spring. Portions of the meadows turn blue with the bloom of camas in the spring. Many of the meadows are used as pasture and include seeded grasses. Alder and other shrubs form patchy riparian shrubland on some stream banks. There is habitat for Coeur d'Alene salamander, a rare amphibian. Globally rare plant species habitat is also present.

Elk Creek - Elk City Meadows —This large wet meadow complex is fed by several perennial creeks (Big Elk Creek, Little Elk Creek, Monroe Creek, Swale Creek), along with ephemeral streams. These water sources flow through broad, flat bottomed alluvial valleys. Large areas of the wetland complex were managed for hay production or used as seasonally moist cattle pasture. Introduced hay and forage grasses (especially bentgrasses) dominate most areas; however, relict wet meadow vegetation is occasionally present. Forested and scrub-shrub wetlands are relatively rare. Small patches of shrubs, including Lemmon's willow, and occasionally trees, such as Engelmann spruce, are present. Although current wetland functions are somewhat reduced, there are excellent opportunities for restoration. The area is rich with wildlife. The site also supports a globally rare plant species.

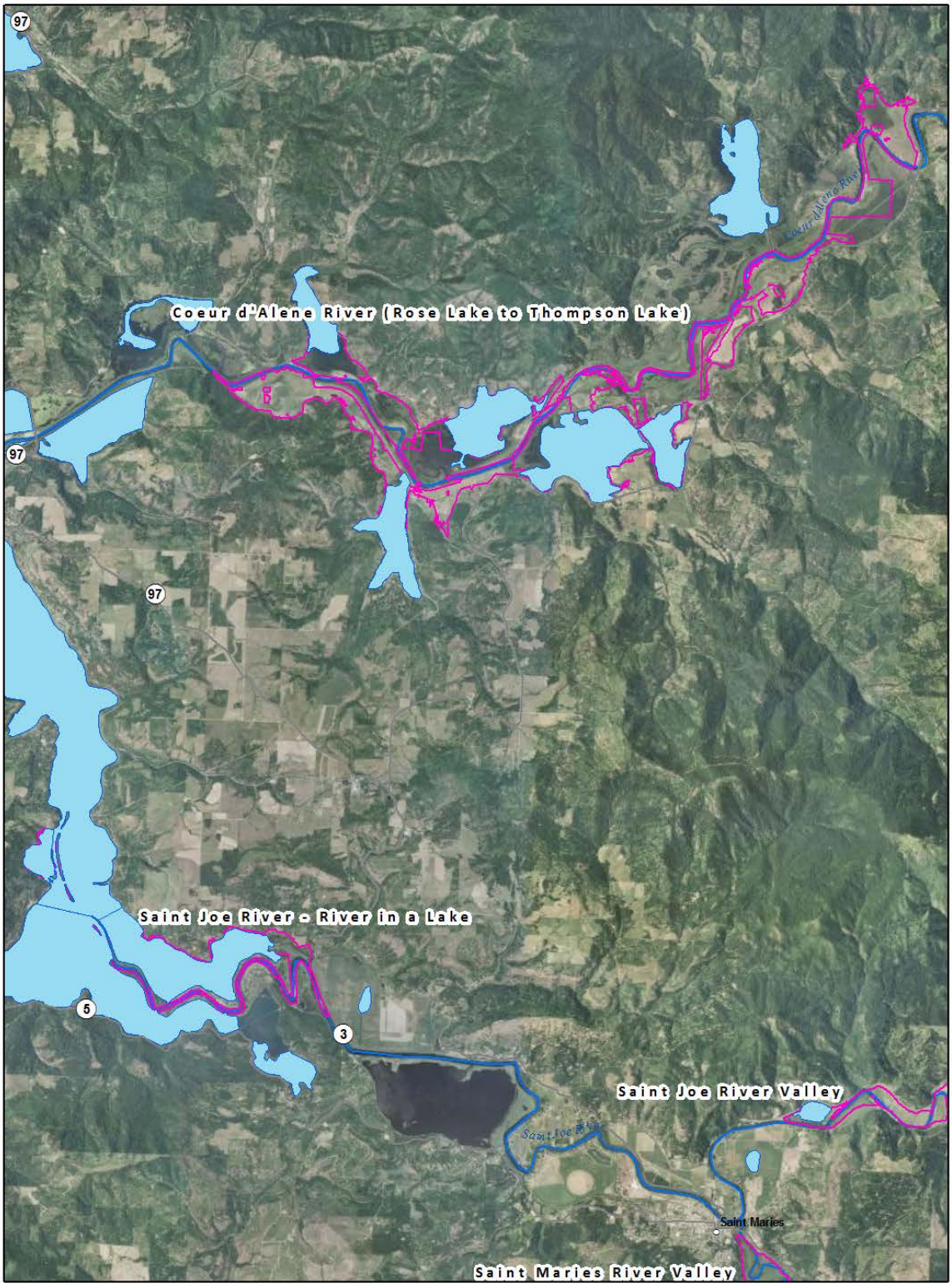

Spirit Lake
Hauser Lake
Rathdrum
54
41
53
53
Priority Wetland Sites
0 0.5 1 2 3 4
Miles
N



Priority Wetland Sites

0 0.4 0.8 1.6 2.4 3.2
Miles

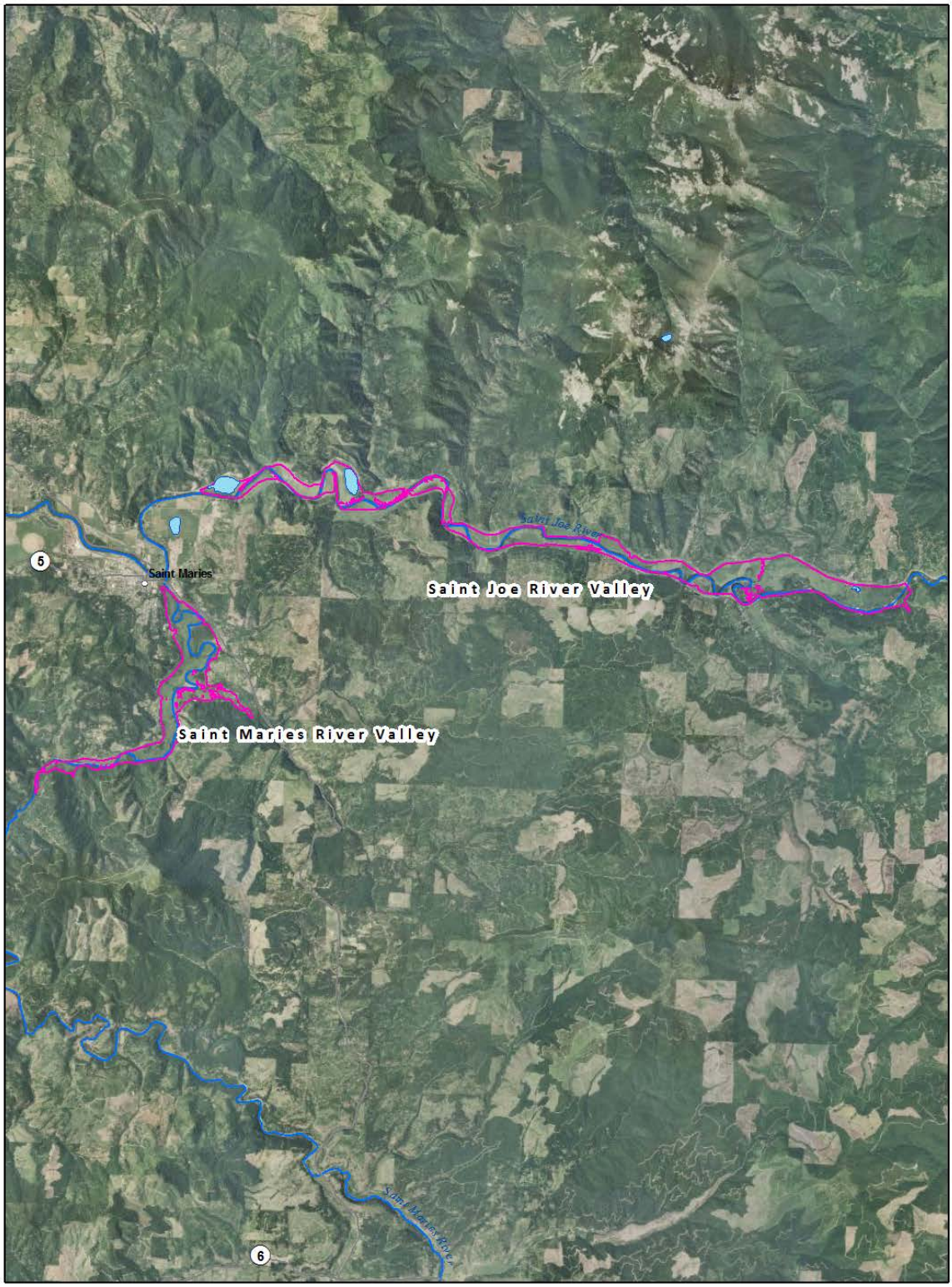
N

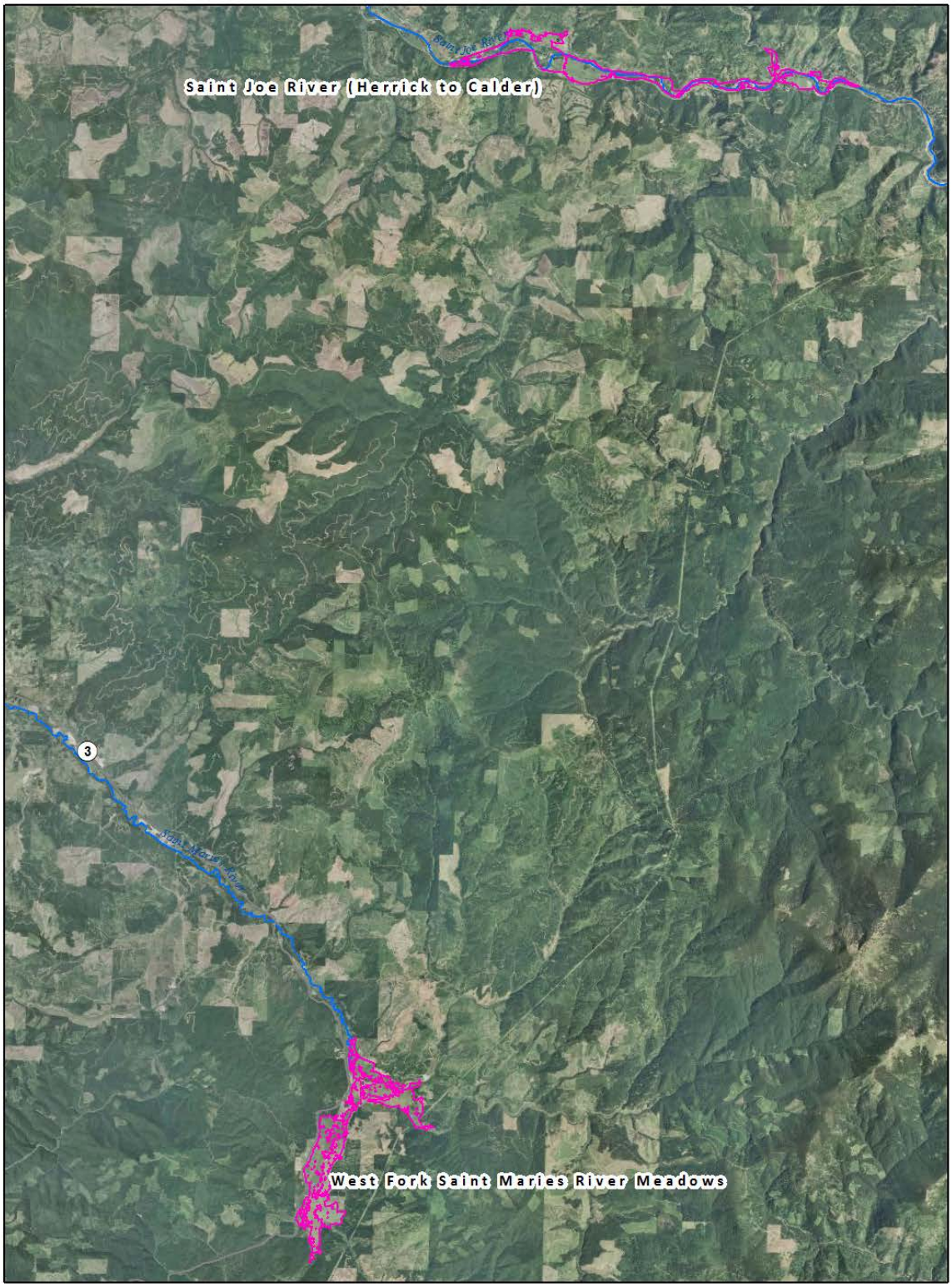


Priority Wetland Sites

0 0.40.8 1.6 2.4 3.2
Miles

N

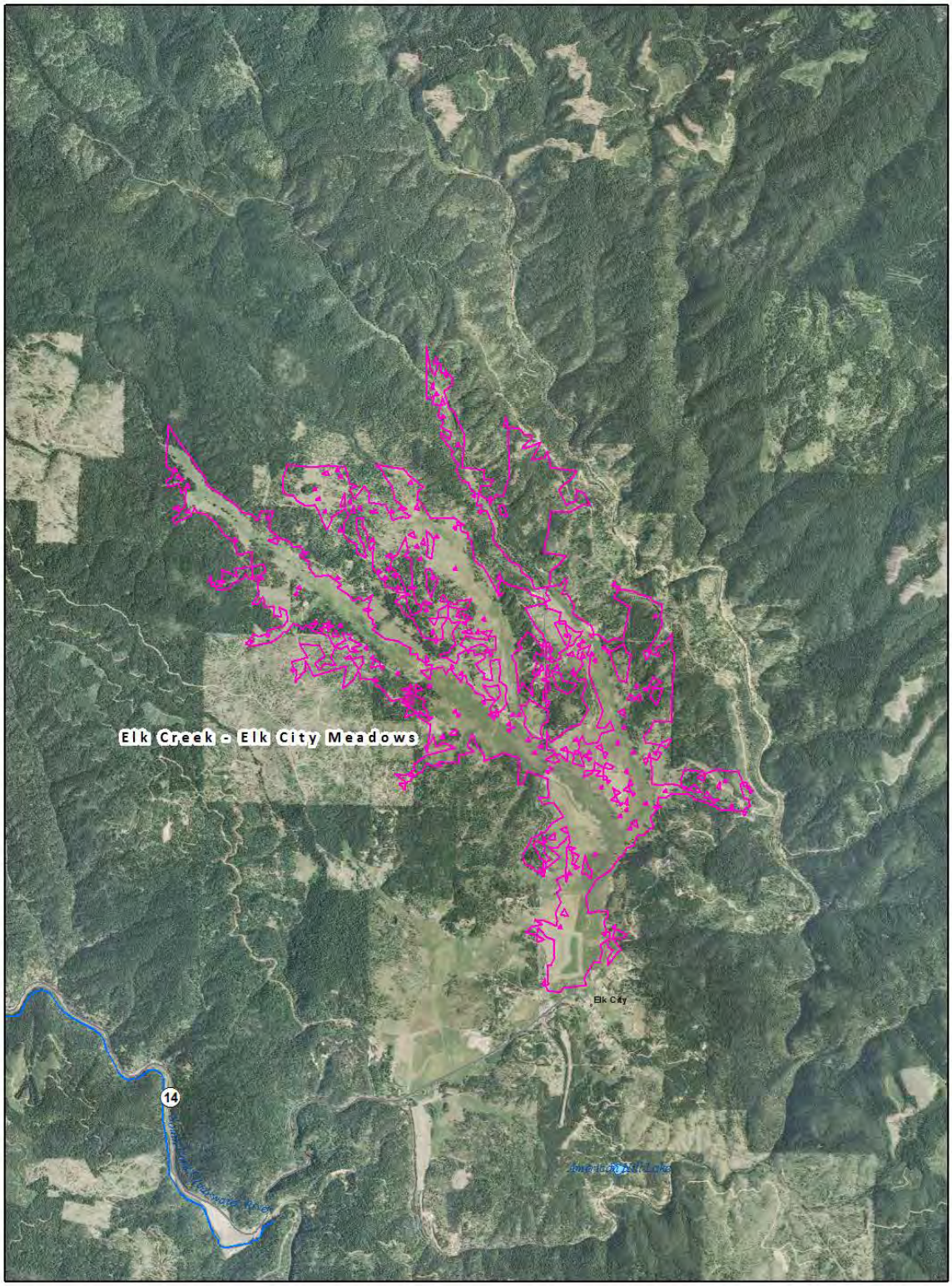

Saint Joe River
Saint Maries
Saint Joe River Valley
Saint Maries River Valley
5
6
Priority Wetland Sites
0 0.5 1 2 3 4
Miles
N



Priority Wetland Sites

0 0.5 1 2 3 4 Miles

N



Priority Wetland Sites

0 0.25 0.5 1 1.5 2 Miles

N

West-central Idaho Sites

Little Salmon River - Meadows Valley — Meadows Valley occurs in the wide valley of the meandering Little Salmon River. The area is characterized by wet meadows with patches of tufted hairgrass with interspersed swales, seasonal pools, and flood overflow wetlands occupying old meander scars. Beaked sedge dominates annually flooded or saturated depressions. Swales and meander scars that pool water early in the summer, but which are dry by fall support narrowleaf burred and common spikerush. There are several seeps and streams entering the site from toeslopes. These often have small patches of Bebb's willow, black hawthorn, or other shrubby vegetation. The area is commonly utilized for livestock grazing. Other than widespread black hawthorn, riparian shrubs, especially willows, are patchy. Some areas are currently being restored. A geothermal spring is present. Habitat for northern Idaho ground squirrel habitat and globally rare plant species also occurs.

Little Payette Lake Outlet — This site covers wet meadow and riparian woodland located where Lake Fork Creek exits Little Payette Lake. Lake Fork Creek meanders through a valley where its floodplain supports lodgepole pine, black cottonwood, and aspen riparian woodlands, interspersed willow shrublands, and sedge, rush, and grass meadows. There are large wet meadows at the southern end of the site.

Floodplain of North Fork Payette River. Point bar alluvial deposits support black cottonwood and willow reproduction. Photo by M. Jankovsky-Jones.

North Fork Payette River (McCall to Cascade Reservoir) — The North Fork Payette River meanders has created a broad riparian wetland (up to 1 mile wide) as it meanders from McCall to Cascade Reservoir. The wetland includes a complex mosaic of aquatic bed, emergent, scrub-shrub, and forested wetlands on landforms carved by the river. Coarse sandy alluvium deposits are sites for black cottonwood and willow regeneration. Logjams are common on the river (especially the lower reaches near the reservoir) and contribute to the development of new channels. Old oxbows and former channels support open water habitat dominated by Rocky Mountain pondlily. Other abandoned meanders are filled with swards of beaked and aquatic sedge. Stands of willows are also common and plant diversity is high. Former meanders are sometimes occupied by peatlands dominated by bog birch, analogue sedge, and Cusick's sedge.

These peatlands are sometimes fed by seeps and springs emanating from the valley walls. Better drained terraces support wet meadows of Baltic rush and tufted hairgrass. Quaking aspen and moist conifer stands border wetlands. Globally rare plant species are present.

Lake Fork Creek — Lake Fork Creek flows into the north end of Cascade Reservoir. The floodplain supports emergent, scrub-shrub, and forested wetland habitats. Wetlands are best developed in side channels, backwater sloughs, and old oxbows in the valley bottom rather than adjacent to the Lake Fork channel. Seasonally saturated benches support Lemmon's willow, Geyer's willow, and meadows of tufted hairgrass, Baltic rush, and Nebraska sedge. Seeps and springs emanate at toeslopes along valley walls and support stands of cattail, aquatic sedge, willows, and peatlands. Peatlands often occur in old oxbows. These fens are characterized by rose spiraea, bog blueberry, bog birch, and willows with understories of analogue sedge, beaked sedge, few-flowered spikerush, mud sedge, and *Sphagnum* moss.

Valley wall springs feeding a peatland in an old oxbow of Lake Fork Creek. Photo by M. Jankovsky-Jones.

Long Valley (Boulder Creek - Willow Creek) — The area of Long Valley just east of the town of Donnelly supports an extensive wet and mesic meadow complex. Much of the area is used as hay meadow and pasture. Boulder Creek is a low-gradient, highly sinuous stream flowing through the center of the area. It feeds some of these meadows during flood events. Willow Creek occurs at the southeast edge of the area. The wettest meadows follow the floodplain of Boulder Creek. Scattered willows and lodgepole pine occur in the valley of Boulder Creek. Many of the meadows are utilized for livestock grazing. Seeded grasses, including reed canarygrass, are widespread. Restoration opportunities are present. Recreation opportunities are high, due to the proximity to Donnelly.

Gold Fork River — The lower Gold Fork River supports a rich suite of wetland and riparian habitats, including fens of high conservation concern. Extensive shrublands consisting of Lemmon's willow, Geyer's willow, Booth's willows, and other species, interspersed by meadows, occur in the Gold Fork River floodplain and adjacent seasonally flooded areas. Patches of cattail marsh occur in permanently or semi-permanently flooded depressions. Areas

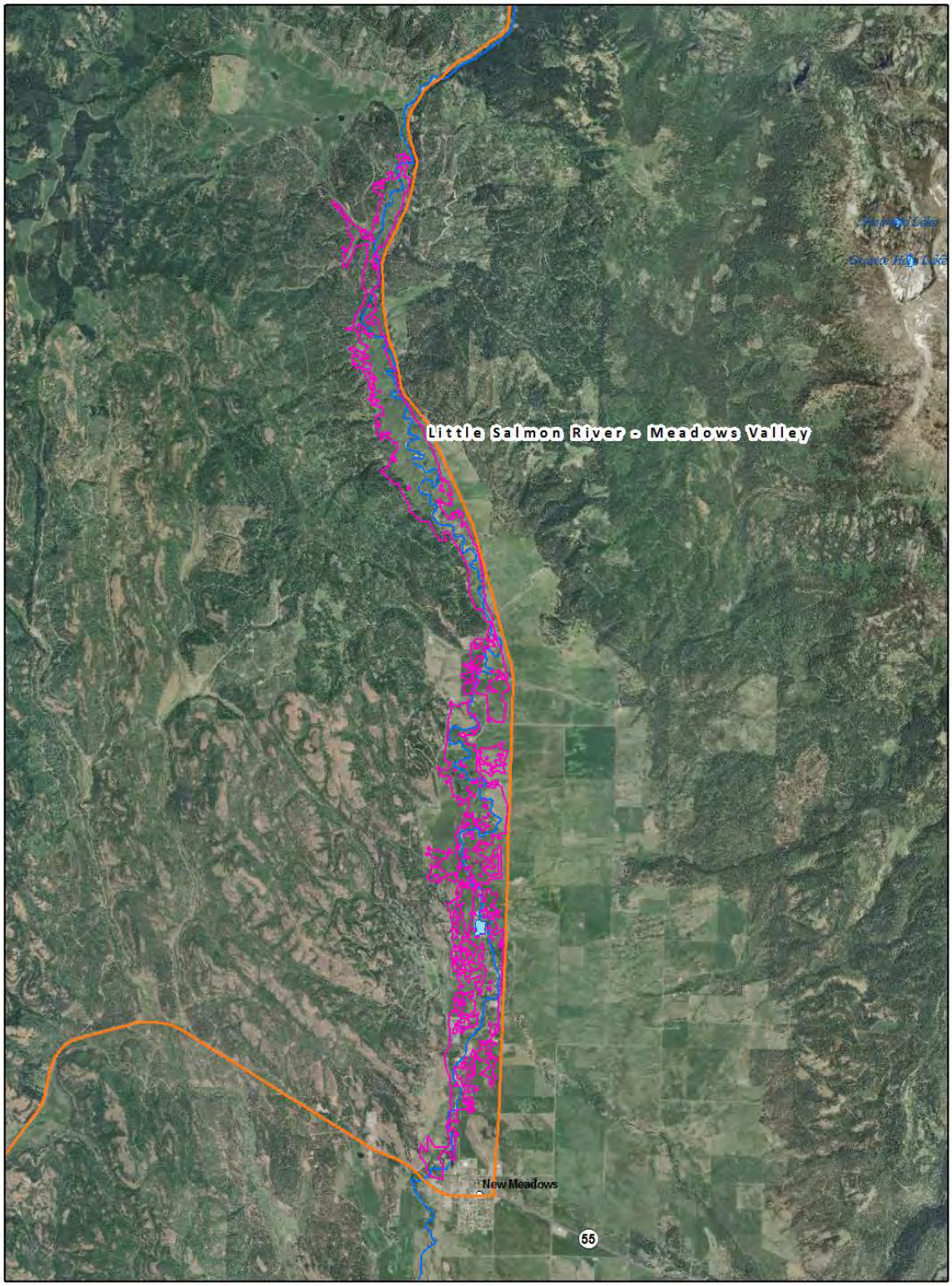
of constantly high groundwater support *Sphagnum* moss-dominated peatlands (poor fens). These fens include mosaics of bog birch, analogue sedge, and other sedges.

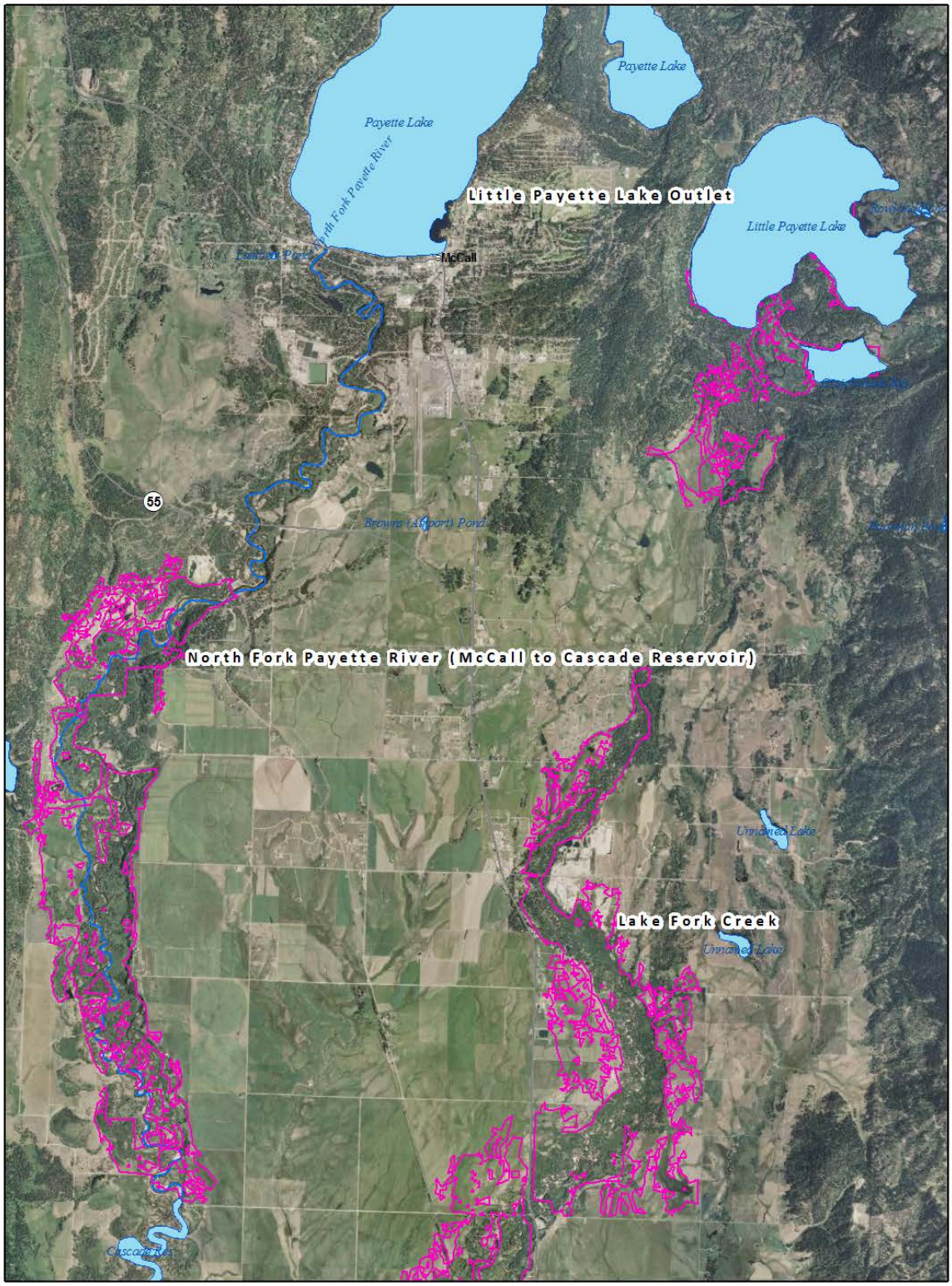
Gold Fork River - Kennally Creek - Little Valley — A meadow and shrub wetland complex occupies Little Valley at the confluence of Kennally Creek and the Gold Fork River. These sinuous streams meander through their valleys, depositing sand and gravel bars in slow moving areas. Willows colonize many of these bars, as well as stream banks and seasonally flooded ground south of the Gold Fork River. Wet meadows of sedge and Baltic rush typify much of the wettest valley bottoms, including meander scars of the streams. Mesic meadows that dry by early summer also occur. Lodgepole pine is common at the edges of meadows and willow bottoms. Most of the site is a cattle ranch. Water has been diverted to irrigate hayfields and cattle pasture. Opportunities for restoration exist.

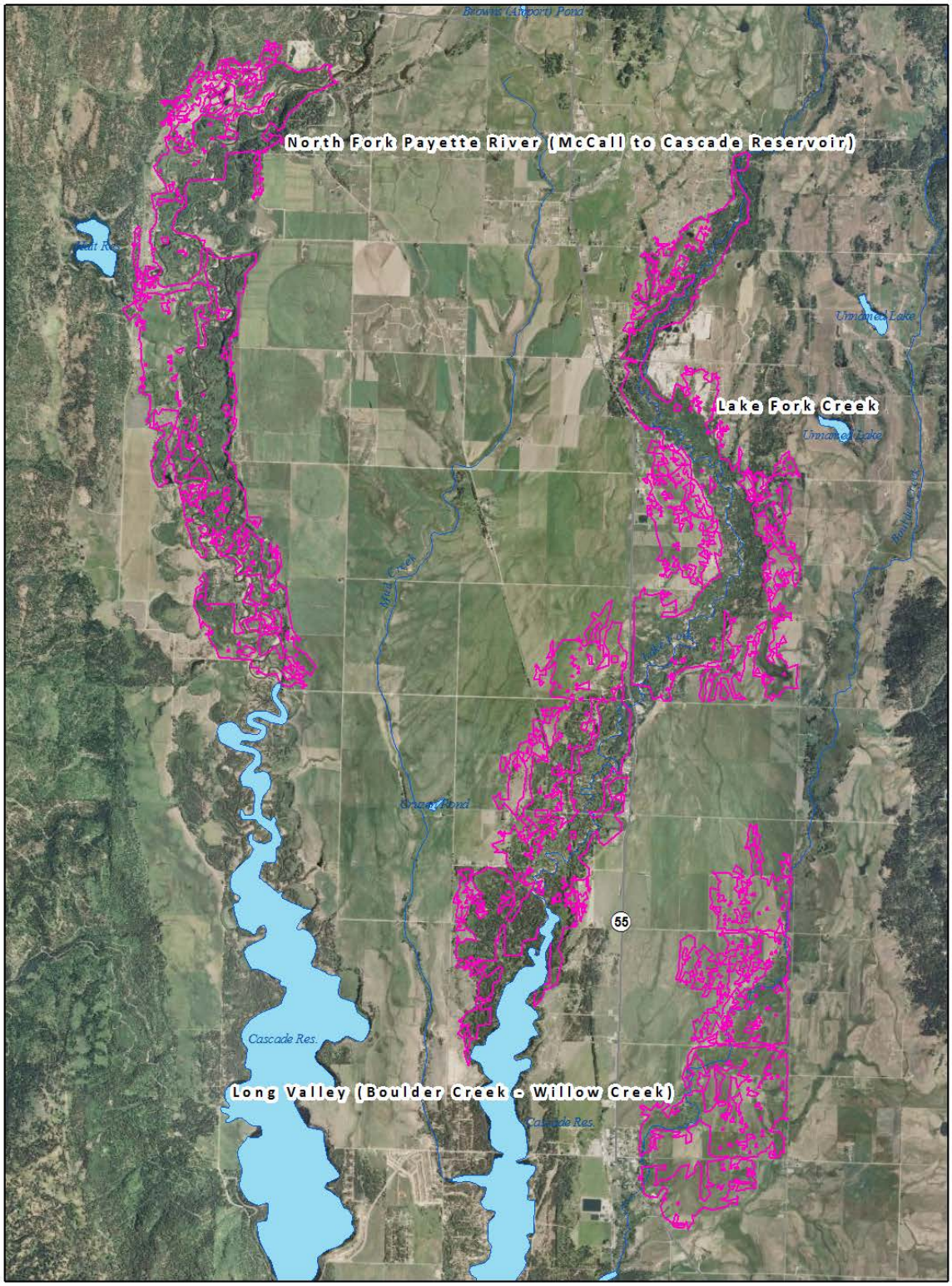
Long Valley (Cascade to Cabarton) — This area includes a mosaic of wet meadows, moist pasture, and riparian woodland and shrubland in the valley of the North Fork Payette River near the southern tip of Cascade Reservoir. Forested wetlands include stands of lodgepole pine. Scrub-shrub wetlands dominated by Geyer's willow are common. Large areas of wet meadows are present and characterized by stands of few-flowered spikerush, beaked sedge, aquatic sedge, Nebraska sedge, tufted hairgrass, and smallwing sedge, on a wet to dry gradient. Non-native species, such as reed canarygrass, smooth brome, and meadow foxtail, are widespread in pastures. There is habitat for the federally Threatened northern Idaho ground squirrel.

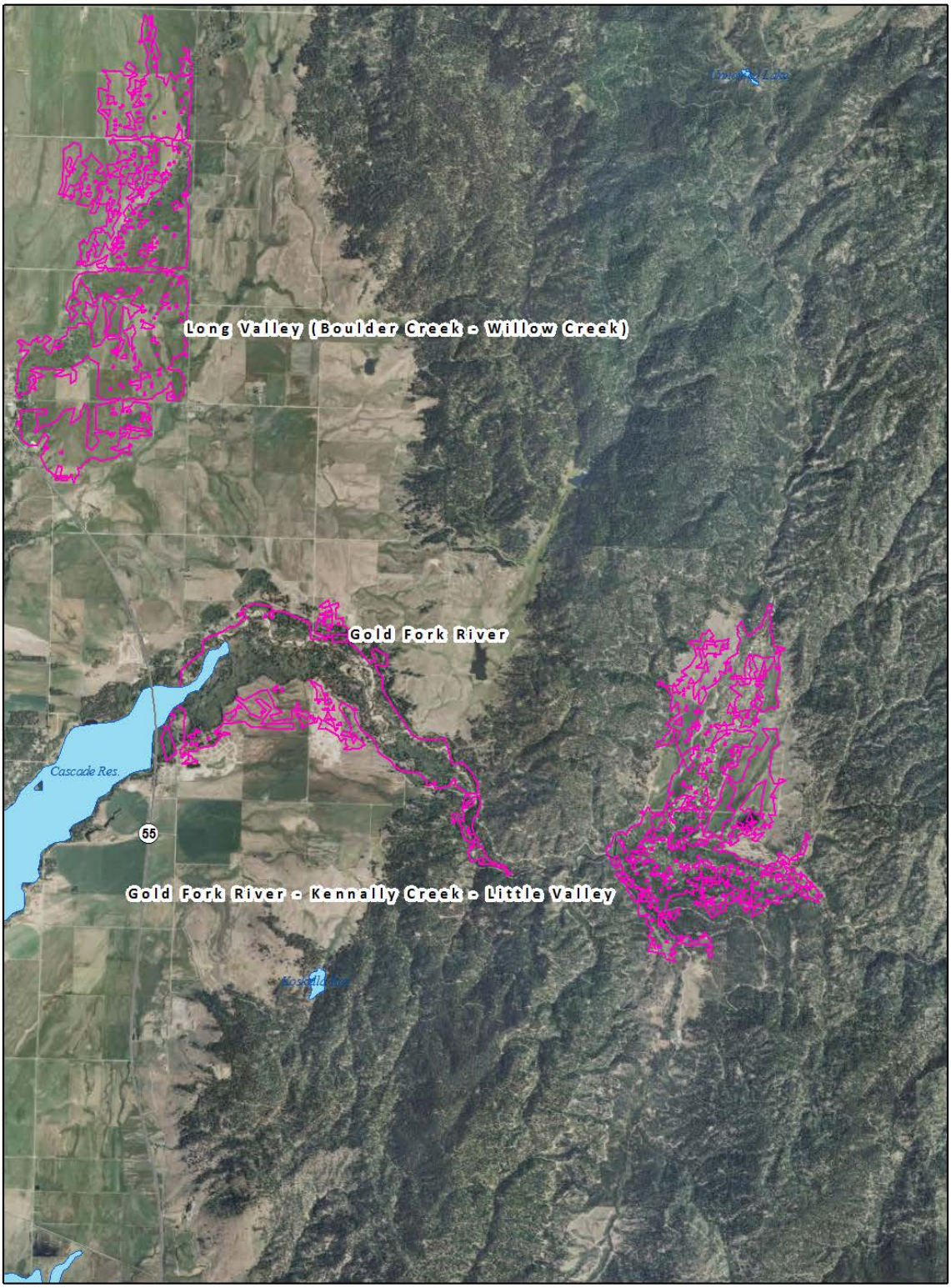
Tufted hairgrass wet meadow at southern end of Cascade Reservoir. Photo by M. Jankovsky-Jones.

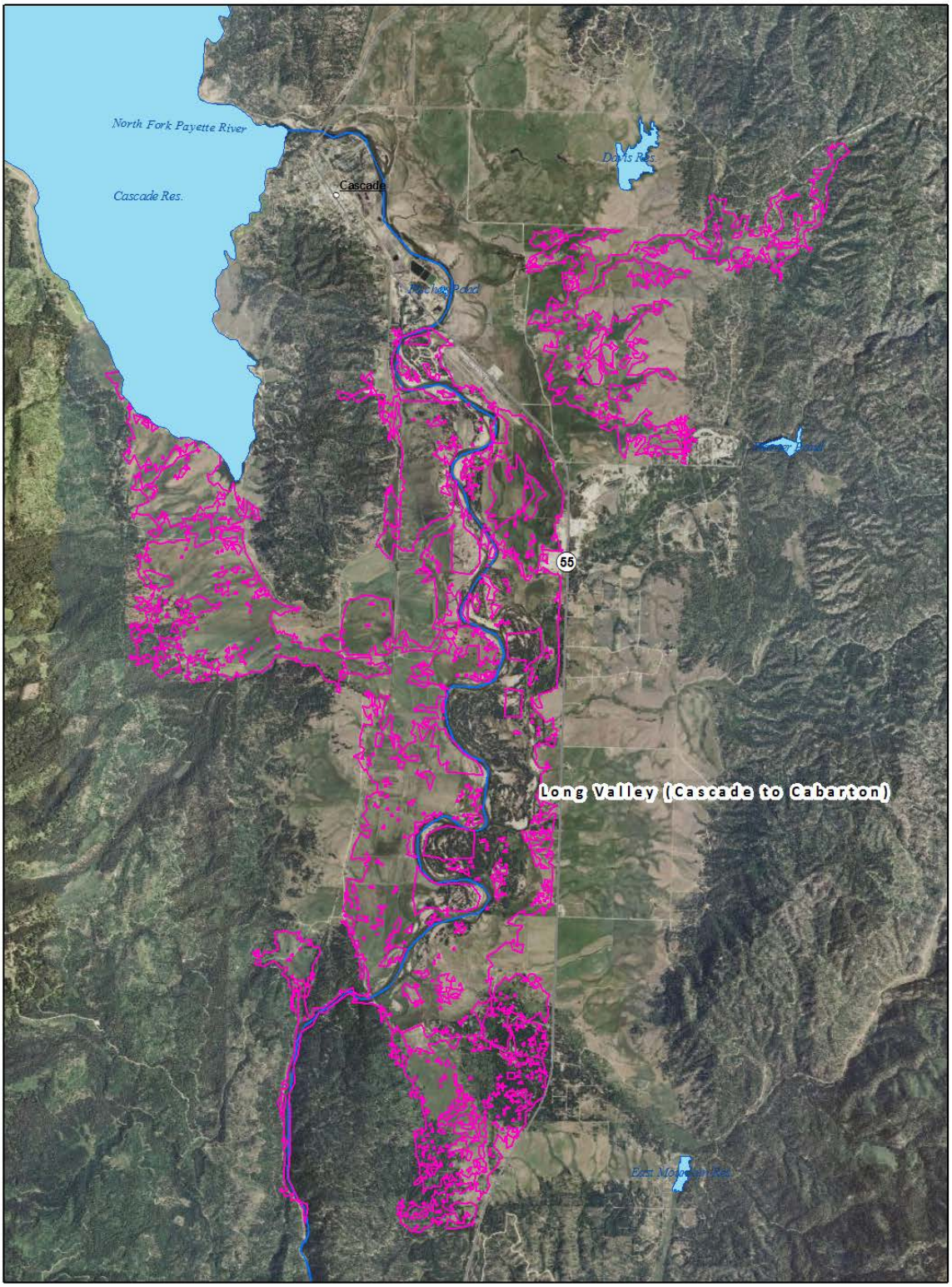
Little Squaw Creek - High Valley — High Valley supports an extensive wet and mesic meadow complex. Little Squaw Creek and its tributaries are low-gradient, highly sinuous streams that feed these meadows during snowmelt runoff. The wettest sedge meadows align with the floodplains of these streams. Small, marshy areas occupy saturated depressions. Drier, ephemerally moist meadows occupy higher ground. Shrublands dominated by Booth's and Geyer's willows are also present. Many of the meadows are utilized as livestock grazing pasture. There are about 10 small reservoirs within the site, as well as rural housing. Restoration opportunities are present.


Little Salmon River - Meadows Valley
New Meadows
55
Priority Wetland Sites
0 0.350.7 1.4 2.1 2.8
Miles
N


Payette Lake
Payette Lake
North Fork Payette River
Little Payette Lake Outlet
Little Payette Lake
McCall
55
Browns (Airport) Pond
North Fork Payette River (McCall to Cascade Reservoir)
Unnamed Lake
Lake Fork Creek
Unnamed Lake
Cascade Res
Priority Wetland Sites
0 0.4 0.8 1.6 2.4 3.2
Miles
N


North Fork Payette River (McCall to Cascade Reservoir)
Lake Fork Creek
Long Valley (Boulder Creek - Willow Creek)
Cascade Res.
55
Priority Wetland Sites
0 0.4 0.8 1.6 2.4 3.2
Miles
N

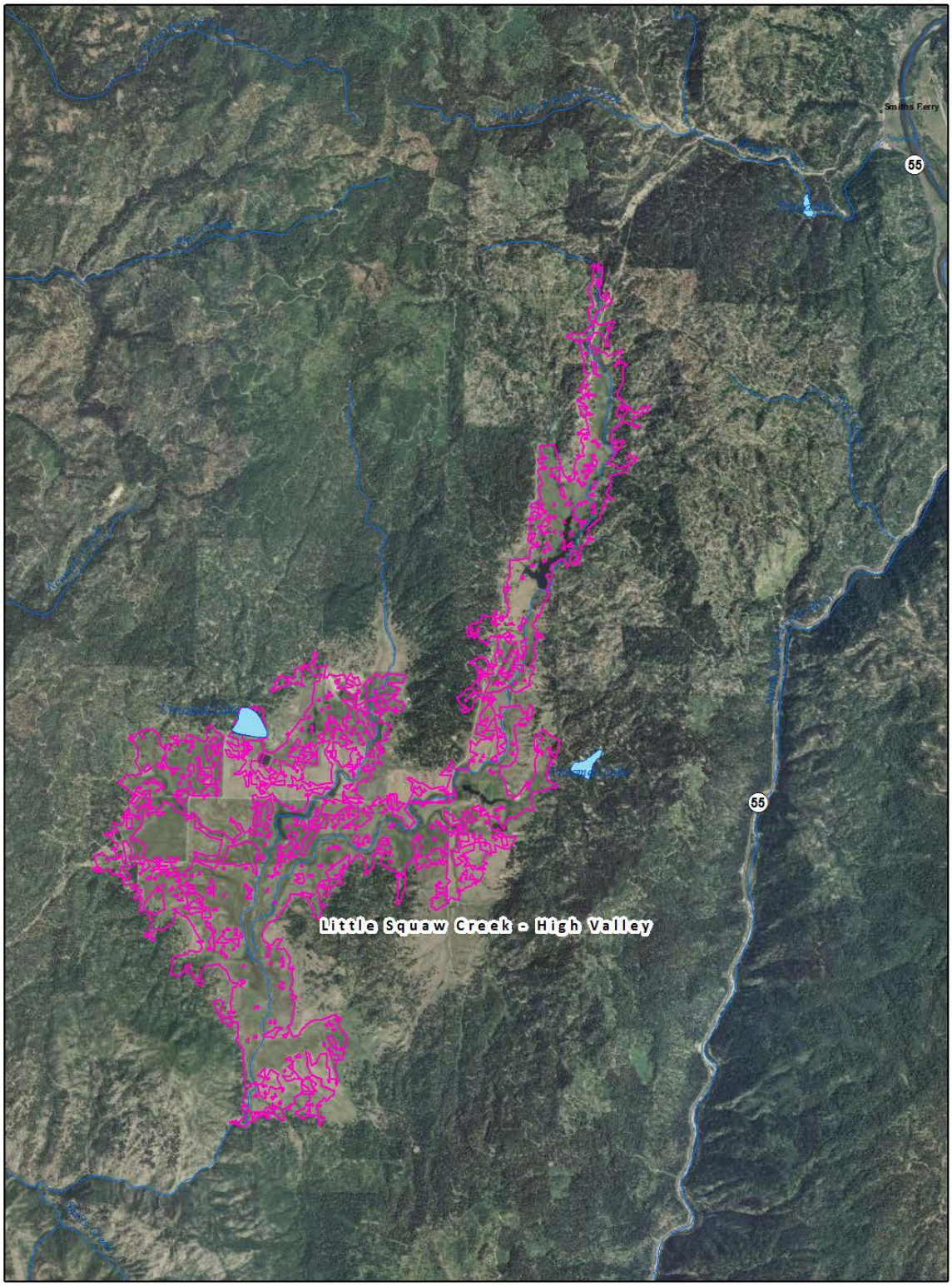

Long Valley (Boulder Creek - Willow Creek)
Gold Fork River
Cascade Res.
55
Gold Fork River - Kennally Creek - Little Valley
Priority Wetland Sites
0 0.4 0.8 1.6 2.4 3.2
Miles
N



Priority Wetland Sites

0 0.45 0.9 1.8 2.7 3.6 Miles

N



Priority Wetland Sites

0 0.35 0.7 1.4 2.1 2.8
Miles

N