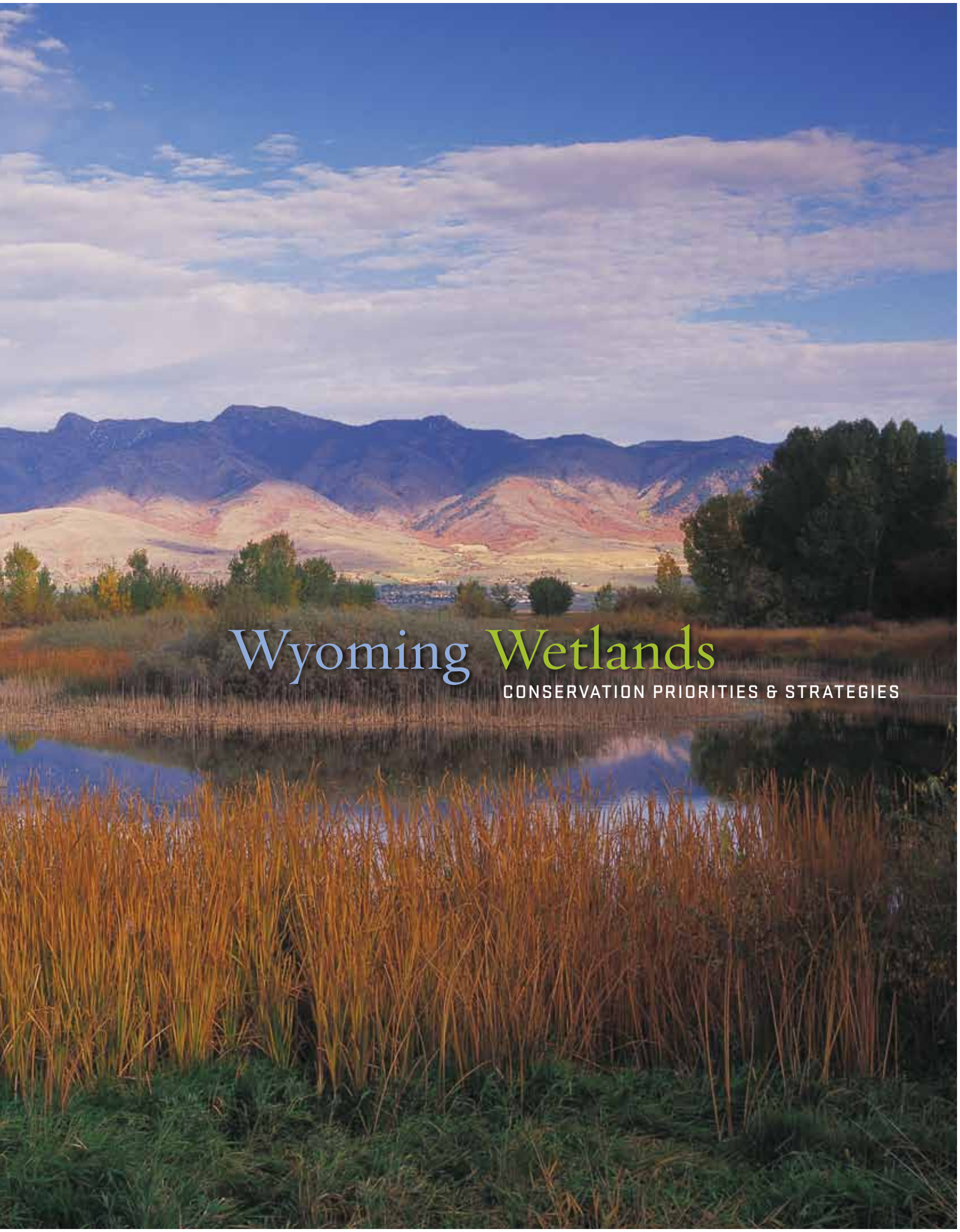


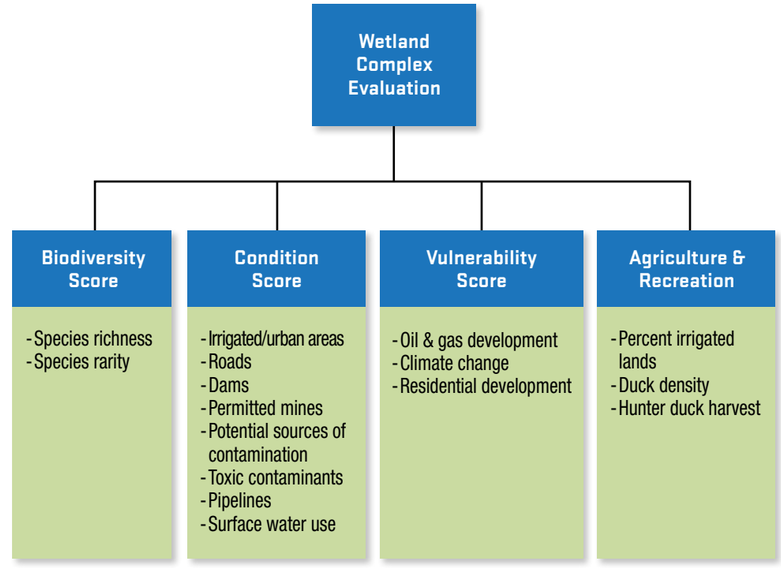
Wyoming Wetlands

CONSERVATION PRIORITIES & STRATEGIES

Wyoming Wetlands

INTRODUCTION

Wetlands serve many critical functions including natural flood control, carbon storage and retention, pollution (i.e. nutrients, sediments, heavy metals) transformation, and wildlife habitat. Wetlands produce commodities that have significant economic value such as clean water, fisheries, timber, peat and recreation opportunities. In the Intermountain West, more than 140 bird species and 25 mammal species are either dependent on or associated with wetlands (Gammonley, 2004). Approximately 90% of the wildlife species in Wyoming use wetlands and riparian habitats daily or seasonally during their life cycle, and about 70% of Wyoming bird species are wetland or riparian obligates (Nicholoff et al., 2003). Despite these values to society, wetlands remain highly threatened ecosystems (Dugan, 1990).



Conceptual model of GIS-based wetland complex evaluation.

STUDY OBJECTIVE

Conduct a landscape-scale geospatial assessment of wetlands in Wyoming by identifying and mapping 'wetland complexes' and quantifying the relative importance of these complexes in terms of biodiversity, recreational potential, agricultural influence, current condition, and vulnerability to future environmental changes (see Copeland et al. 2010).

METHODS SUMMARY

- We based our wetland delineation and classification on the National Wetlands Inventory (NWI) maps of palustrine wetland systems (freshwater pond, freshwater emergent wetland, and freshwater forest/shrub wetland). The highest density clusters (greater than 1 wetland/km^2) were delineated as wetland complexes.
- We calculated summary statistics on the area and number of wetlands according to hydroperiod (permanent, semi-permanent, temporary or unknown) both statewide and within terrestrial biomes (Temperate Conifer Forests, Deserts and Xeric, Shrublands, and Temperate Grasslands).
- ***Species diversity and rarity:*** Complexes were scored according to their relative importance for species diversity and rarity based on data from Wyoming's 2005 Comprehensive Wildlife Conservation Strategy.
- ***Current condition:*** We used indicators of current human activities (i.e. agriculture, roads, oil and gas wells, pollution, and urban areas) to assess the regional landscape context relative to wetlands.
- ***Vulnerability:*** We represented vulnerability to future impacts based on three dominant land-use changes in Wyoming: oil and gas development, rural residential subdivision, and climate change.
- ***Agriculture:*** We calculated the total area and percent of irrigated lands within each complex.
- ***Recreation:*** We used duck harvest data from the Wyoming Game and Fish Department to calculate the mean annual duck harvest (2002 to 2005) within each waterfowl management area.

RESULTS

Our results indicate there are 280,591 wetlands in Wyoming, totaling 371,758 surface hectares. In all, we identified 221 wetland complexes. The majority (67%) of wetlands are classified as temporary. Low elevation wetland complexes are the least protected, in the poorest ecological condition, and the most vulnerable to future land use changes. Agricultural irrigation has influenced the hydrology of many wetlands in Wyoming, including more than 50% of the wetland area in four different complexes. Working as a multi-agency partnership, the Wyoming Joint Ventures Steering Committee identified 9 of the 221 wetland complexes as statewide priorities.

CONCLUSIONS

This assessment will provide a tool that decision-makers can use to more effectively allocate limited resources to conserve, manage and restore Wyoming's wetlands. Our findings will assist efforts by other agencies and organizations to protect and restore wetlands and wetland-dependent wildlife. Finally, the results will be incorporated into Wyoming's 2010 update of the State Wildlife Action Plan. Ultimately, the analysis will help guide actions to abate non-point source pollution and accomplish wetland conservation — both in terms of the types of actions needed and geographic priorities. Our analysis provides a consistent, defensible methodology to understand the distribution and protection of wetlands across Wyoming and obtain information necessary to build effective strategies for wetlands conservation.

Mapping Our Priorities

PRIORITY AREAS MAP

Map of priority wetland complexes selected by the Wyoming Joint Ventures Steering Committee, a multi-agency partnership, which identified 9 of the 221 wetland complexes as statewide priorities.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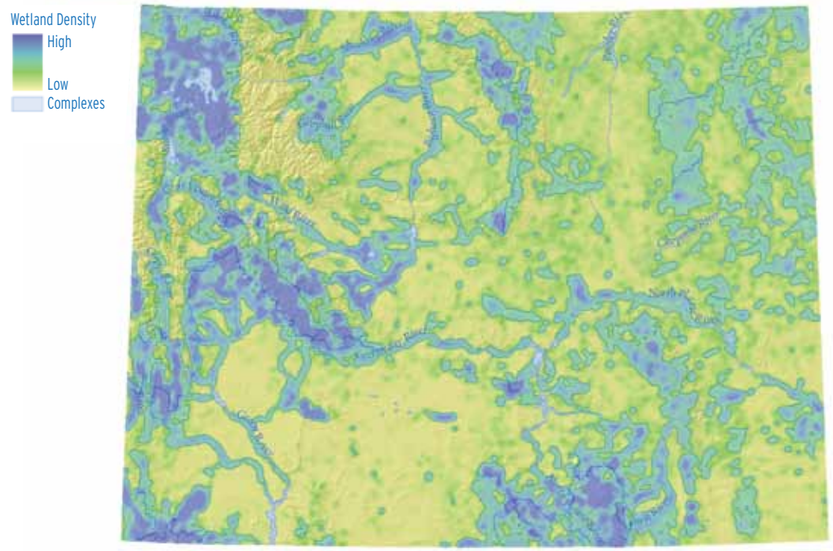
WETLAND DENSITY MAP

Map of all wetland complexes shown with wetland density. Wetland density was generated for palustrine wetland types using a 5 km search radius and kernel sampling method. The highest density areas (wetland densities greater than 1/km^2) were selected as wetland complexes.

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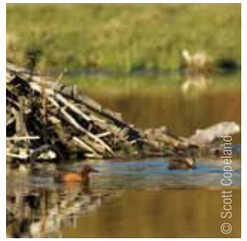
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Wetlands by hydroperiod, habitat type, and class

Hydroperiod classification	Number	Hectares	Total (%)	Protected (%)
Permanent	13,696	6,991	5%	45%
Semi-permanent	75,723	27,373	27%	12%
Temporary	186,646	325,264	67%	20%
Unknown	4,526	12,129	2%	18%
Major habitat type	**Number**	**Hectares**	**Total (%)**	**Protected (%) (within type)**
Deserts and Xeric Shrublands	98,503	216,564	35%	5%
Temperate Conifer Forests	125,088	122,109	45%	39%
Temperate Grasslands, Savannas and Shrublands	56,981	32,946	20%	1%
Class	**Number**	**Hectares**	**Total (%)**	**Protected (%) (within type)**
Freshwater Emergent Wetland	153,263	271,556	55%	21%
Freshwater Forested/Shrub Wetland	37,946	72,546	14%	19%
Freshwater Pond	89,382	27,656	32%	16%
TOTAL	**280,591**	**371,758**		

Bear River

NUMBER OF WETLANDS: 4,721
ACRES OF WETLANDS: 40,059
KEY VULNERABILITIES: Some grazing practices, invasive weeds (grasses), energy development, rural residential development

CONSERVATION AND MANAGEMENT STRATEGIES

In 2009, The Nature Conservancy's Utah and Wyoming chapters convened a group of agencies and organizations interested in developing a comprehensive Conservation Plan for the entire Bear River watershed. When completed, the plan will identify key threats and strategies for the watershed. The primary threats identified in that plan will likely include rural residential subdivisions, energy and utility corridors, and water management issues.

Historically, natural wetlands were primarily associated with the river and riparian zone. However, agricultural operations (flood irrigation, temporally segregated haying and grazing) created and maintain many of the wetlands currently important to waterfowl and shorebirds throughout the valley. Because of the agricultural influence, management strategies include maintaining or enhancing existing hydrology and ensuring sustainability of farms and ranches through conservation easements or other landowner assistance programs.

COMPLEX DESCRIPTION

The Bear River Wetland Complex follows two segments of the Bear River between Evanston and Cokeville in southwest Wyoming. Flowing south from the Wyoming Range, the Bear meanders through a broad, flat floodplain with numerous oxbows and old channels. These riparian and wetland habitats, including Cokeville Meadows National Wildlife Refuge, are critical stopover and nesting habitat for numerous shorebirds and waterfowl. Over 65 species of wetland-associated birds such as Sora-rail, Forster's tern, greater sandhill crane, redhead, trumpeter swan and Wilson's phalarope have been observed at Cokeville Meadows. The refuge is considered an Audubon Important Bird Area. The refuge also supports one of the highest densities of nesting waterfowl in Wyoming. It was historically recognized as the best redhead duck production area in the state and is situated along one of the species' major migration routes to the Texas Gulf Coast.

The Bear River Complex also supports numerous other diving and dabbling duck species such as northern pintail, canvasback and cinnamon teal. Other wetland-associated species recognized for their uniqueness include colonies of white-faced ibis, snowy egret, long-billed curlew, black tern, great blue heron, American bittern, and black-crowned night heron. Bald eagles commonly use the area in spring and fall. The occasional whooping crane has been sighted in the summer. Riparian areas support populations of neotropical migrants including the olive-sided flycatcher, western wood peewee and yellow warbler.

BEAR RIVER STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
12%	2%	30	4	71	24

Goshen

NUMBER OF WETLANDS: 2,791
ACRES OF WETLANDS: 7,149
KEY VULNERABILITIES: Rural residential subdivision, climate change, invasive species

COMPLEX DESCRIPTION

The Goshen Wetland Complex in southeast Wyoming encompasses 491 square miles of rolling hills, cultivated fields and mixed-grass prairie in the Goshen Hole Basin and floodplain of the lower North Platte River. Bounded on the south and west by a 500-foot escarpment called Goshen Rim, the area's elevation is among the lowest in the state, ranging from 4,000-4,600 feet above sea level. With an average annual rainfall of 14-16 inches, the Goshen Complex contains 7,149 acres of wetlands. Interestingly, many ecologists believe the number of wetlands in this area has actually increased since Goshen Hole was settled and developed into an agriculture-based economy in the early 20th century. Currently, about 85 percent of human-created wetlands in the Goshen Complex depend directly or indirectly on irrigation.

Thirty-two vertebrate species listed as statewide species of conservation concern depend on Goshen wetland habitats. The North Platte River is a significant migration corridor for birds, and this complex, which is part of the lower North Platte Waterfowl Management Area, is the fourth most diverse in Wyoming. In addition, the density of duck breeding pairs is the third highest in the state. Biologists also count an average of 19,000 dark geese and 30,000 ducks (mostly mallards) during annual mid-winter surveys. Roughly 200,000 Canada geese migrate through the complex area each year. The US Fish and Wildlife Service's Partners for Fish and Wildlife program has focused on restoring habitats in the region for various ground nesting birds such as mountain plover, McCown's longspur and bobolinks, as well as an assortment of waterbirds. In addition, the Goshen Complex is also home to the Preble's meadow jumping mouse (listed as threatened in Colorado) and Ute ladies'-tresses orchids.

CONSERVATION AND MANAGEMENT STRATEGIES

The most significant threats to wetland integrity in the Goshen Complex derive from climate change, rural subdivision, and loss of federal protection for "isolated" wetlands. Though in good condition during wetter-than-normal years in the 1980s and early 1990s, many Goshen wetlands dried up during a protracted drought from the late 1990s to 2009. In addition, sales of agricultural properties to land developers have accelerated in the last decade. Strategies that could enhance wetland protection include partnering with local conservation districts to improve irrigation conveyance systems, acquiring conservation easements, and supporting efforts to provide additional incentives for isolated wetlands.

GOSHEN STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
33%	4%	32	3	56	29


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Green River Basin

NUMBER OF WETLANDS: 21,199
ACRES OF WETLANDS: 174,192
KEY VULNERABILITIES: Energy development, rural residential development, water development projects (water impoundment)

CONSERVATION AND MANAGEMENT STRATEGIES

Historically, agriculture and recreation were the principal land uses in the Green River Basin. A recent boom in energy development has led to dramatic growth in both industrial and residential construction. Dense networks of new roads, pipelines, power lines and subdivisions now dominate large portions of the landscape. Due to this rapid development, altered water and soil chemistries and increased sedimentation have become significant threats to aquatic habitats in the valley. Wetland habitats are also adversely impacted by landscape fragmentation and disturbance from human activity. Demands on the basin's water to supply expanded irrigation and municipal use in adjacent states, and proposed water storage projects within Wyoming, could also have profound impacts in future years. As this growth continues, impacts should be mitigated through the creation of new wetland areas, restoration of riparian habitats, management of waterways, and the negotiation of conservation easements in important wildlife habitats.

COMPLEX DESCRIPTION


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The Green River Basin Wetland Complex encompasses highly diverse ecosystems ranging from 13,000-ft. mountain peaks and alpine tundra to high desert at 7,000-ft. elevation. Extensive ribbons of riparian habitats along the Green River and its tributaries provide important nesting grounds and migration corridors for a multitude of avian species. Among the most ecologically significant features in this glacially-formed valley are the thousands of acres of wetlands and lakes that provide breeding habitat for waterfowl, shorebirds and water birds. Wetlands include oxbows, sloughs, potholes, irrigated wet meadows, reservoirs and spring-created wetlands.

The Green River Basin is recognized worldwide for its diverse wildlife and waterfowl populations. Species of conservation concern include common loon, trumpeter swan, white-faced ibis, bald eagle, peregrine falcon, greater sage-grouse, mountain plover, long-billed curlew, greater sandhill crane, canvasback, lesser scaup, northern pintail, redhead and willow flycatcher. The river is also inhabited by populations of native fish such as the Colorado cutthroat trout, bluehead sucker and leatherside chub. The Wyoming Game and Fish Department successfully established a nesting population of free-ranging trumpeter swans here in 2003. Cygnet production in the Green River Basin is now the highest in the state. Wetlands also provide significant nesting and breeding habitat for local populations of ducks and geese, contributing significantly to Wyoming's status as one of the highest production states in the West.

GREEN RIVER BASIN STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
13%	8%	36	6	69	81


© Randy Craft/TNC

Laramie Plains

NUMBER OF WETLANDS: 8,980
ACRES OF WETLANDS: 83,094
KEY VULNERABILITIES: Wind power development, rural residential development, invasive species, water rights issues

COMPLEX DESCRIPTION

The highly diverse Laramie Plains Wetland Complex lies within an intermountain basin encompassing large intact expanses of mixed-grass prairie and sagebrush steppe. The many lakes and wetlands throughout this complex are important breeding, staging and stopover habitats for migrating waterfowl, shorebirds and colonial waterbirds. Braided channels and oxbows of the Laramie River, which meanders through the basin, also create extensive emergent wetland habitat for wetland-dependent species such as cinnamon teal, northern pintail, canvasback, redhead, lesser scaup, American bittern and Forster's Tern.

Preble's meadow jumping mouse, listed as federally threatened in Colorado, occupies riparian areas throughout much of the Laramie Range and Basin. The USFWS manages three satellite refuges in the Laramie Basin that are part of the Arapaho National Wildlife Refuge complex. Mortensen Lake Wildlife Refuge was established in 1993 to protect the only remaining wild population of the federally endangered Wyoming toad. Two older refuges – Hutton Lake and Bamforth – are managed primarily as migratory bird habitat. The complex includes three Wyoming Game and Fish priority areas and three Audubon Important Bird Areas. Additional species of conservation concern documented in the complex include bald eagle, greater sage-grouse, Brewer's sparrow, sage thrasher, sage sparrow, peregrine falcon, prairie falcon and burrowing owl.


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CONSERVATION AND MANAGEMENT STRATEGIES

The Shirley Basin-Laramie Rivers Conservation Plan, which contains the Laramie Plains Wetland Complex, was completed in 2008 through a partnership of conservation organizations and federal agencies. The plan identifies several key strategies for conserving wetland integrity, including maintaining ranchers' water rights and improving water quality through land stewardship practices. The plan also identifies a need to locate additional reintroduction sites for the Wyoming toad through new partnerships between willing landowners, the Laramie Rivers Conservation District, and the USFWS.

Ongoing rural residential construction and increasing interest in wind energy development threaten to further fragment intact wildlife habitats, especially in lower elevation grassland and sagebrush ecosystems. Immense opportunities exist for land trusts and government entities to assist with conservation easements that preserve family ranches and associated wildlife habitats.

LARAMIE PLAINS STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
15%	4%	32	4	70	34

Little Snake River

NUMBER OF WETLANDS: 2,521
ACRES OF WETLANDS: 11,654
KEY VULNERABILITIES: Rural residential development, energy development

CONSERVATION AND MANAGEMENT STRATEGIES

Oil and gas development has expanded on a massive scale within the watershed of the Little Snake River and Muddy Creek, and interest in rural residential properties is also growing. Together, these two factors comprise leading threats to the integrity of wetlands and other habitats throughout the Little Snake River Complex. Industrial-scale wind energy development is also planned in nearby areas. Resort development in Steamboat Springs, Colorado has promoted an increase in subdivisions for "ranchette" vacation homes and guest ranches within the Little Snake River watershed. This kind of development not only fragments these fragile ecosystems, but also has potential to alter stream flows and irrigation practices that maintain wet meadows and floodplain wetlands. Developers sometimes often drain and fill in wetlands to make way for homes and infrastructure. Although only 30% of the complex is privately-owned, private ranches contain a disproportionate percent of the wetlands and riparian habitats. Local land trusts have negotiated conservation easements on many ranches, but additional work remains.

Rapid development of oil and natural gas, including coal bed methane fields, has the potential to impact water quality, alter soil and water chemistry, and increase sediment deposition and salinization in riparian habitats, thereby impairing the suitability of nearby wetlands and riparian habitats for sensitive species. Energy companies also continue to file water rights that could greatly inhibit in-stream flows and degrade wetland ecosystems; however, there may be opportunities to mitigate impacts through such means as using produced water to create or enhance wetland hydrology.

COMPLEX DESCRIPTION

The Little Snake River Wetland Complex covers an area of 900,000 acres on the west side of the Sierra Madre Mountains in south-central Wyoming. The complex includes diverse habitats such as aspen glades, mixed mountain shrub, sagebrush steppe, and riparian galleries of cottonwood and willow at lower elevations. The watershed of the Little Snake River is home to several rare species including native Colorado River cutthroat trout and Gibbens beardtongue. It is also the only place in Wyoming with Gambel oak. Breeding populations of the following bird species of conservation concern can be found in suitable habitats within the Little Snake Wetland Complex: Columbian sharp-tailed grouse, greater sage-grouse, greater sandhill crane, great blue heron, canvasback, redhead, pintail and willow flycatcher. In addition to the Colorado River cutthroat trout, other native fish includebluehead sucker, flannel-mouth sucker, roundtail chub, mountain sucker and speckled dace.

LITTLE SNAKE RIVER STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
10%	1%	14	1	75	62

Northeast Wyoming

NUMBER OF WETLANDS: 4,101
ACRES OF WETLANDS: 5,371
KEY VULNERABILITIES: Climate change, reduced stream flows, mining runoff, some grazing practices

COMPLEX DESCRIPTION

The Northeast Wyoming Wetland Complex covers an area of 562,000 acres bordering the Bear Lodge Mountains in Crook County. The complex contains a diversity of habitats including mixed- and short-grass prairie, sagebrush steppe, coniferous forest, deciduous woodland, and wetland and riparian ecosystems. Principal streams are the Little Missouri River, Lower Belle Fourche River and Beaver Creek. Approximately 230 vertebrate species are known to occupy suitable habitats with the complex, which include breeding habitat for 157 birds, 56 mammals, and 16 reptiles and amphibians. Many are identified as species of concern by the Wyoming Game and Fish Department. The density of breeding ducks is among the highest in Wyoming (greater than 10 pairs per square mile) and includes 14 species, the most abundant are teal, American wigeon, gadwall, mallard and northern shoveler.

CONSERVATION AND MANAGEMENT STRATEGIES

From 1947 to 1964, extensive areas of abandoned mine spoils were left by pre-law bentonite mining in the region. Hundreds of small, isolated ponds and wetlands developed within pits and depressions on the old mine spoils. During the 1980s and 1990s, the Wyoming Abandoned Mine Lands Program began filling and reclaiming many of these wetlands that, at the time, were considered jurisdictional under Section 404 of the Clean Water Act. In order to offset the negative impacts of removing these small wetlands, the USFWS and Wyoming DEQ embarked on a project to retain and enhance most of the remaining wetlands through enlargement, stabilization and exclosure fencing. Though the wetlands and riparian habitats in this complex are in relatively good condition, unregulated use by livestock has impaired habitat quality in several areas. Increased with-drawals for irrigation along the Little Missouri River and the Belle Fourche River have also reduced riparian woodlands and wet meadow habitats.

The primary strategies for protecting and enhancing wetlands and riparian habitats are to: 1) ensure that instream flow requirements are met and maintained; 2) work cooperatively with livestock operators, where appropriate, on livestock management plans; 3) acquire conservation easements in areas with high potential for development; 4) cooperate with private livestock operators to create and rehabilitate small ponds that benefit duck populations; and 5) ensure wetland conservation projects are designed to maximize benefits to all priority migratory birds.

Although several Farm Bill programs (i.e. WRP, WHIP, EQIP, CSP, GRP and WREP) can be applied to protect and enhance wetlands, organizational capacity is lacking to apply for the funds that are available through these programs.

NORTHEAST WYOMING STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
3%	0%	23	2	76	42

Red Desert

NUMBER OF WETLANDS: 456
ACRES OF WETLANDS: 2,997
KEY VULNERABILITIES: Energy development, some grazing practices

Upper Snake River

NUMBER OF WETLANDS: 1,919
ACRES OF WETLANDS: 8,554
KEY VULNERABILITIES: Rural residential development, water diversion and channeling, levee construction

CONSERVATION AND MANAGEMENT STRATEGIES

Energy development poses the greatest threat to the integrity of the Red Desert and its riparian communities. The Jack Morrow Hills are particularly susceptible as more than 45 percent of the area has high potential for oil and gas development, and 156 wells are already in production. Several studies have demonstrated that disturbances associated with oil and gas activities can cause wildlife to displace from otherwise suitable habitats, ultimately leading to population-level declines for some species. Wetlands and meadow areas are adversely affected by contaminant runoff, sedimentation, and road and culvert construction. Reclamation of disturbed sites is also much more challenging in a desert environment. Important strategies for mitigating oil and gas impacts are to confine disturbance and infrastructure to the smallest practicable footprint and develop more effective technologies for reclaiming arid lands.

Opportunities exist to better control and enhance livestock grazing management in the Red Desert, which is largely unfenced. The open range allows uninhibited daily and seasonal movements and migrations by wildlife, a positive result. However, the absence of fencing affords little control over animal grazing distribution, especially within delicate riparian and wetland areas. The recently proposed Bush Rim Springs Protective Fencing Project would protect and rehabilitate four spring sites and improve water quality while continuing to allow the unrestricted movement of wildlife.

COMPLEX DESCRIPTION

The Red Desert of southwest Wyoming is one of the largest unfenced regions in the Continental U.S. Spanning the Great Divide Basin, this desert consists predominantly of public lands administered by the BLM. The predominant habitat is sagebrush steppe with numerous "sky islands" of rock, hidden springs and seeps. Some low mountain ranges contain stands of limber pine and aspen with an understory of deciduous shrubs such as chokecherry and antelope bitterbrush. The 55-mile long Killpecker Sand Dunes, the largest active dune system in the U.S. and second largest in the world, is home to unique dune vegetation (i.e. desert begonia and vetch), seasonal wetlands, and "dunal ponds" created by melting snow drifts buried and insulated under the sand. Wetland areas in the desert provide important brood-rearing habitat and foraging areas for the greater sage-grouse, as well as breeding, nesting, and foraging areas for many other neotropical migrants. Due to the remoteness of the area, over 365,000 acres qualify for Wilderness designation.

COMPLEX DESCRIPTION

The Upper Snake River Wetland Complex includes a 96-mile corridor of federally-designated Wild and Scenic River spanning the headwaters in Yellowstone National Park to Palisades Reservoir in Alpine, Wyoming. The river and its varied ecosystems include fir, pine and aspen forests in the mountains — some rising to over 13,000 feet — and sagebrush and bunchgrass in the valleys.

The Upper Snake River Basin is recognized worldwide for the diverse wildlife and mega-fauna that inhabit the area. The Snake River and its tributaries are the last remaining stronghold of the indigenous Snake River cutthroat trout. Twelve other native fish live in the drainage in addition to five species of amphibians, six native reptiles and two native mussels. Wetlands in the Snake River Basin provide significant nesting and breeding habitat for a resident population of trumpeter swans as well as several species of ducks and Canada geese. Migratory and resident birds designated as Species of Concern in Wyoming include: common loon (only nesting habitat in the state), trumpeter swan, white-faced ibis, bald eagle, peregrine falcon, greater sage-grouse, long-billed curlew, greater sandhill crane, canvasback, lesser scaup, northern pintail, redhead and willow flycatcher.

CONSERVATION AND MANAGEMENT STRATEGIES

Twenty-two miles of dikes were built along the Snake River for flood protection in the 1950s. These structures reduced the floodplain area by 90%, from 25,000 acres to just 2,500 acres, throughout Jackson Hole and profoundly impacted fish and wildlife habitats along the river. The increased water velocity, instability of river islands and banks, and loss of overland flooding and channel meander have reduced desirable habitat by an estimated 80 to 90 percent since 1956 (Army Corps of Engineers 2000). Accelerated growth in residential construction and recreational demands over the past 20 years have also resulted in loss of wetland and riparian habitat for wildlife in the basin.

Important opportunities to maintain and improve habitat in the basin include: management and restoration of riparian and riverine habitats; enhancement and restoration of cutthroat trout habitat; development of shallow-water wetland ponds for trumpeter swans and other waterfowl/birds; and management of development along the river corridor and its tributaries. Conservation easements on large ranch properties are also an important tool for protecting and improving important wildlife habitats.

RED DESERT STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
0%	24%	8	0	85	34

UPPER SNAKE RIVER STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
12%	39%	32	4	70	44


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Wind River Basin

NUMBER OF WETLANDS: 8,853
ACRES OF WETLANDS: 37,588
KEY VULNERABILITIES: Some grazing practices, agrichemical runoff and waste, water diversion, invasive species, energy development

CONSERVATION AND MANAGEMENT STRATEGIES

Though the Wind River Basin provides excellent habitat for many varieties of native fish, declines of these species are well documented. Most of the remaining populations are highly fragmented and confined to headwater environments. In addition, the conversion of land to support agricultural production has contributed to wetland degradation, and also added new wetlands through irrigation. However, agrichemical runoff such as fertilizers, pesticides and animal wastes can impair water quality, and sediment runoff from farms can reduce the lifespan of wetlands. Wetlands converted to pastures are at risk of damage from unmanaged use by livestock, which often concentrate in or around wetlands because of the abundance of vegetation, water and microclimate conditions.

Recent projects and partnerships have had a positive impact on the health of wetland ecosystems in the Wind River Basin. A 1998 Memorandum of Understanding created a partnership between the USFS and the Shoshone and Northern Arapahoe tribes to address a wide variety of habitat projects for fish and wildlife species. Restoration and enhancement projects have centered on emergent wetlands and riparian corridors, as well as species-specific projects targeting Yellowstone cutthroat trout, willow flycatchers, moose, grizzly bear and others. More than 960 acres of wetland habitats have been restored, including 17 miles of river habitat for fish migration. The protection of wetlands depends on maintaining partnerships to increase the pace and extent of wetland enhancement and restoration projects.

COMPLEX DESCRIPTION

The Wind River Basin Wetland Complex covers an area of 800,000 acres northeast of the Wind River Mountains in central Wyoming. The complex includes diverse habitats such as mixed mountain shrub, sagebrush steppe, and riparian galleries of cottonwood and willow at lower elevations. The area serves as seasonal migration routes and regionally important breeding ground for waterfowl, songbirds, rare colonies of bats and remnant populations of the Yellowstone cutthroat trout. Many avian species of conservation concern in Wyoming have been documented to breed here, including: American bittern, greater sandhill crane, great blue heron, black-crowned night heron, snowy egret, canvasback, redhead, northern pintail, Barrow's goldeneye, harlequin duck, American white pelican, Clark's grebe, Caspian tern, Forster's tern, long-billed curlew, white-faced ibis and mountain plover. A robust population of greater sage-grouse also inhabits sagebrush shrublands throughout the complex. The basin supports one of the largest agricultural regions in Wyoming containing over 260,000 acres of irrigated croplands and hay fields.


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WIND RIVER BASIN STATISTICS

Percent Irrigated of the Wetland Complex	Percent of Wetlands Currently Protected	Number of Wetland Species of Concern	Number of Rare Wetland Species of Concern	Overall Integrity Score (0 = Low, 100 = High)	Overall Vulnerability Score (0 = Low, 100 = High)
27%	7%	40	6	65	97


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Working Together

SUGGESTED CITATION

Copeland, H., S. Tessmann, M. Hogan, S. Jester, A. Orabona, S. Patla & K. Sambor, J. Kiesecker 2010. Wyoming Wetlands: Conservation Priorities and Strategies. Lander, Wyoming: The Nature Conservancy.

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Copeland, H., S. Tessmann, E. Girvetz, L. Roberts, C. Enquist, A. Orabona, S. Patla & J. Kiesecker (2010) A geospatial assessment on the distribution, condition, and vulnerability of Wyoming's wetlands. *Ecological Indicators*, 10, 869-879.

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