LARAMIE PLAINS WETLANDS COMPLEX

Regional Wetland Conservation Plan

Hutton Lake NWR – Photo by Ann Timberman

Version 1.0

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INTRODUCTION

General Description and Land Use

The exterior boundary of the Laramie Plains Wetland Complex (LPWC) encompasses 1,480 mi^2 within Albany and Carbon Counties in south-central Wyoming (Fig. 1 – Copeland, H. 2010 pers. Comm.). Laramie Plains is an intermountain basin ranging from 6,400 to 8,000 ft above sea level (Google Earth 2010). Topography is level to gently rolling, bounded by the Laramie Mountains on the east and northeast, the Medicine Bow River from the town Medicine Bow south to the Snowy Mountain Range on the west, and the Snowy and Laramie Mountain Ranges on the south (Hayden 1871). Average annual rainfall is 10-16 inches and the average growing season is 81-100 days (Curtis and Grimes 2004). Soils are typically Aridisols with clay-enriched subsoils (Haplocambids) (Munn an Arneson 1999).

Agriculture is the dominant land use and consists predominantly of irrigated and non-irrigated crops and native rangeland. Based on the 2007 agricultural census, approximately 67% of Albany County is in farm ownership (USDA National Agricultural Statistics Service). Lands classified as cropland encompass 4% of the county area, with the majority (78%) consisting of harvested cropland. Irrigated lands comprise 5% of the county area, of which 32% is harvested cropland. Pastureland, excluding woodland pasture, encompasses 45% of the county area, of which 8% is irrigated. In terms of market value of agricultural products sold, 90% was from livestock and their products. Livestock forage (hay, grass) is the dominant crop, accounting for 99.7%, of the total harvested cropland.

Approximately 43% of Carbon County is in farm ownership. Lands classified as cropland encompass 2% of the county area, with the majority (70%) consisting of harvested cropland. Irrigated lands comprise 3% of the county area, with 85% of the irrigated acreage being harvested cropland. Pastureland, excluding woodland pasture, encompasses 31% of the county area, with 5% irrigated. In terms of market value of agricultural products sold, 96% was from livestock and their products. Livestock forage (hay, grass) is the dominant crop, accounting for 99.4%, of the total harvested cropland.

Very few ranches in the LPWC receive payments for participation in Farm Bill conservation programs. The Freedom of Information Act prohibits listing the CRP acreage for Albany County. There is one Conservation Reserve Enhancement Program (CREP) participant in Carbon County (Source: USDA Farm Service Agency monthly enrollment reports: http://content.fsa.usda.gov/crpstorpt/rmepeii_r1/WY.HTM).

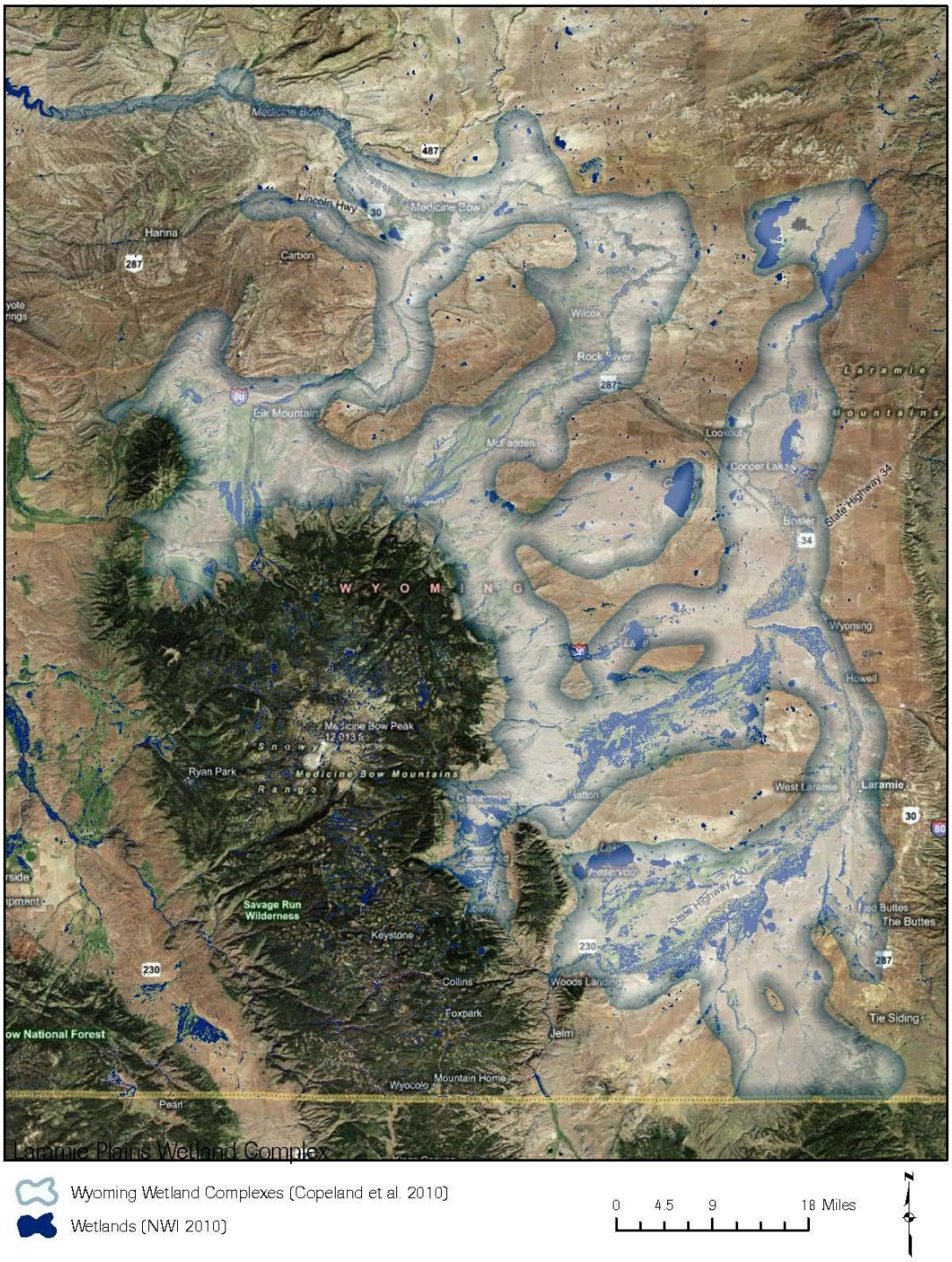

Fig. 1. Laramie Plains Wetland Complex (Copeland et al. 2010).

Ecological Cover Types

The Laramie Basin ecoregion is a broad intermountain valley dominated by mixed-grass prairie with areas of sagebrush steppe/shrubland. The Basin is within the Inter-Mountain Basins Semi-Desert Grassland ecological system. This system includes the driest grasslands found throughout the Intermountain West and occurs on xeric sites on a variety of landforms including swales, playas, mesas, alluvial flats, and plains. The dominant vegetation (perennial bunch grasses and shrubs) is drought-resistant. Scattered shrubs and dwarf-shrubs characteristically grow throughout the basin (NatureServe 2011) and include greasewood (*Sarcobatus vermiculatus*), rabbitbrush (*Chrysothamnus* spp.), and sagebrush (*Artemisia spp*.) (USFWS 2007). Native grassland vegetation includes needle-and-thread (*Hesperostipa comata*), western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), Indian ricegrass (*Achnatherum hymenoides*), and other mixedgrass prairie species.

Big sagebrush (*Artemisia tridentata wyomingensis*), rabbitbrush, prickly pear cactus (*Opuntia* spp.), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Idaho fescue (*Festuca idahoensis*) dominate on fine textured soils in portions of the LPWC that are classified as sagebrush steppe/ shrubland. Juniper (*Juniperus* spp.) and mountain mahogany (*Cerocarpus* ssp.) dominate on rock outcrops (Griffith et al. 2011).

Greasewood dominates near drainages on stream terraces and flats, and may form rings around more sparsely vegetated playas. Sites with greasewood typically have saline soils, a shallow water table, and are flooded intermittently but remain dry most of the growing season. The water table remains high enough to sustain vegetation despite salt accumulations.

Barren and sparsely vegetated playas with generally <10% plant cover are scattered throughout the Basin. Salt crusts are common in playas, small salt grass beds are often established in depressions, and sparse shrubs grow around the margins. These systems flood intermittently. Impermeable alkaline to saline clay hardpans preclude surface water from infiltrating and standing water eventually evaporates. Salt encrustations can occur on the surface. Salinity varies greatly depending on soil moisture, and has a major influence on species composition. Characteristic vegetation includes greasewood (*Sarobatus vermiculatus*) and salt grass (*Distichlis spicata*).

Riparian habitats are associated with alluvial soils along many lotic bodies throughout the Basin. Water sources mostly originate as snowmelt or irrigation return flows. Dominant woody species include cottonwood (*Populus spp*.) and willow (*Salix spp*.). Salt cedar (*Tamarix spp.*), and Russian olive (*Elaeagnus angustifolia*). Less desirable grasses and forbs often invade degraded sites (NatureServe 2011).

Hydrology

The Laramie and Medicine Bow Rivers are the principal watersheds draining the LPWC. The Laramie River is a perennial stream originating from within the Rawah Mountains of Colorado. It flows generally north and east, joining the North Platte River at Fort Laramie. Major tributaries of the Laramie River include the Little Laramie River, Willow Creek, Sand Creek, Fourmile Creek, Fivemile Creek, and Sevenmile Creek. The Medicine Bow River is a perennial stream originating from the north end of the Snowy Range and flows generally to the north and west, joining the North Platte River at Seminoe Reservoir. Major tributaries of the Medicine Bow River include Rock Creek, Foote Creek, Wagonhound Creek, Muddy Creek, and the Little Medicine Bow River. The average annual runoff in the Upper Laramie River subbasin was 99,740 acre-ft based on stream gauging records from 1972-2001 (WWDC 2006). The average annual run-off in the Medicine Bow River near Hanna was 128,000 acre-ft based on stream gauging records from 1939-2010. June and May are peak discharge months. During those months, streamflow in the Laramie River near Bosler averages 692 and 266 cfs, respectively. Streamflow in the Medicine Bow River near Hanna averages 659 and 548 cfs, respectively.

September and January are the low discharge months. During those months, streamflows in the Laramie River near Bosler average 30 and 46 cfs, respectively. Streamflows in the Medicine Bow River near Hanna average 28 and 32 cfs, respectively (USGS 2011).

Wetlands and Other Water Resources

Prior to settlement, wetlands within the Laramie Basin consisted mainly of scattered springs and seeps, intermittent pools and oxbows along rivers and streams, and isolated playas that were formed either by tectonic disturbances or the result of wind action. Since the beginning of the 20th century, human activities have both eliminated and created wetlands in Basin. Flood irrigation of hayfields in the Laramie Basin created many wetlands, both ephemeral and permanent, over the last century (Peck et al. 2004). The number of semi-permanent and permanent palustrine wetlands is greater today because of irrigation projects and reservoir construction (Fig. 1).

The predominant source of water in the Laramie Basin is snowmelt runoff from adjacent mountains. This water usually reaches wetlands via irrigations systems, either through ditches, as groundwater (interflow) derived from leaky ditches or flood irrigation, or by sprinklers drawing from confined aquifers that are recharged by mountain snowmelt at basin peripheries (Lovvorn and Hart 2004).

Irrigation canals and ditch systems throughout the Laramie Basin were largely completed in the late 1880s and early 1900s (WWDC 2006). The distribution of irrigated lands in the Laramie Basin is shown in Fig. 2. The Pioneer Canal was constructed in 1879 and enlarged in 1884 and through 1909-1912. It diverts water from the Laramie River about 3 miles downstream of

Woods landing, and provides irrigation water to approximately 18,360 acres. Several additional diversions that are each permitted to convey ≥ 50 cfs of flow include: Lake Hattie Supply Canal (water source - Laramie River), Lake Hattie Supply Canal #2 (Little Laramie River), High Line Canal within the Pioneer Canal System (Laramie River), North Canal from Lake Hattie (Canal No. 1) (Laramie River), King Ditch (Laramie River), Caldwell & Gardiner (Laramie River), Riverside No. 2 (Laramie River), Dowlin (Laramie River), Oasis Canal (Laramie River), Bellamy Canal (Little Laramie River), Poverty Flat (Little Laramie River), and the Dutton-Laramie Canal (Dutton Creek). Information about irrigation and ditch systems in the Medicine Bow River drainage is not available the Platte River Basin Water Atlas. Fig.3 illustrates the distribution of irrigated lands in this drainage (WWDC 2006).

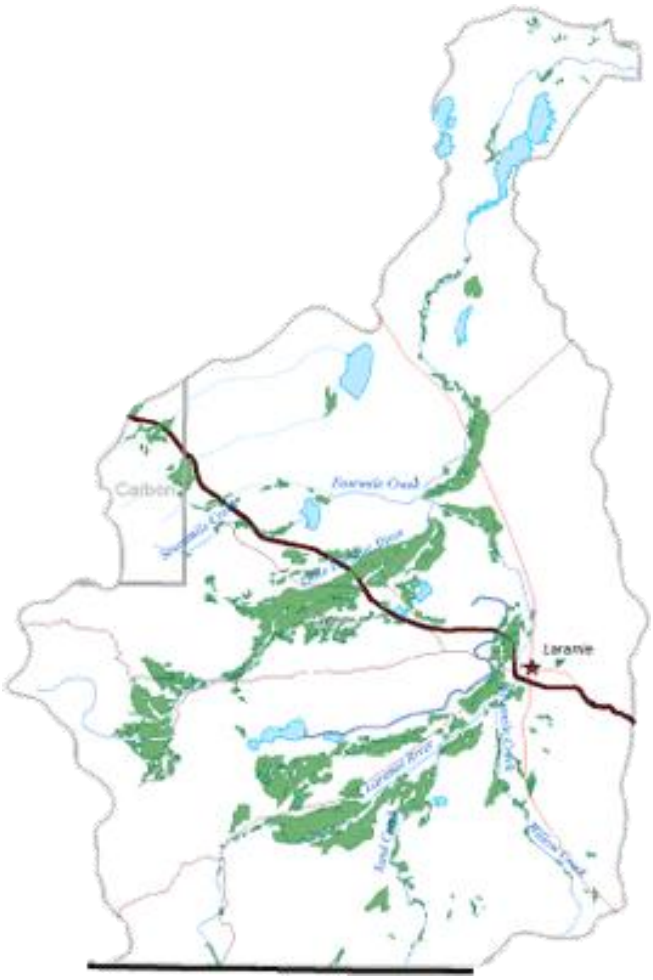

Fig. 2. Irrigated lands in the Upper Laramie Subbasin of the North Plate River.

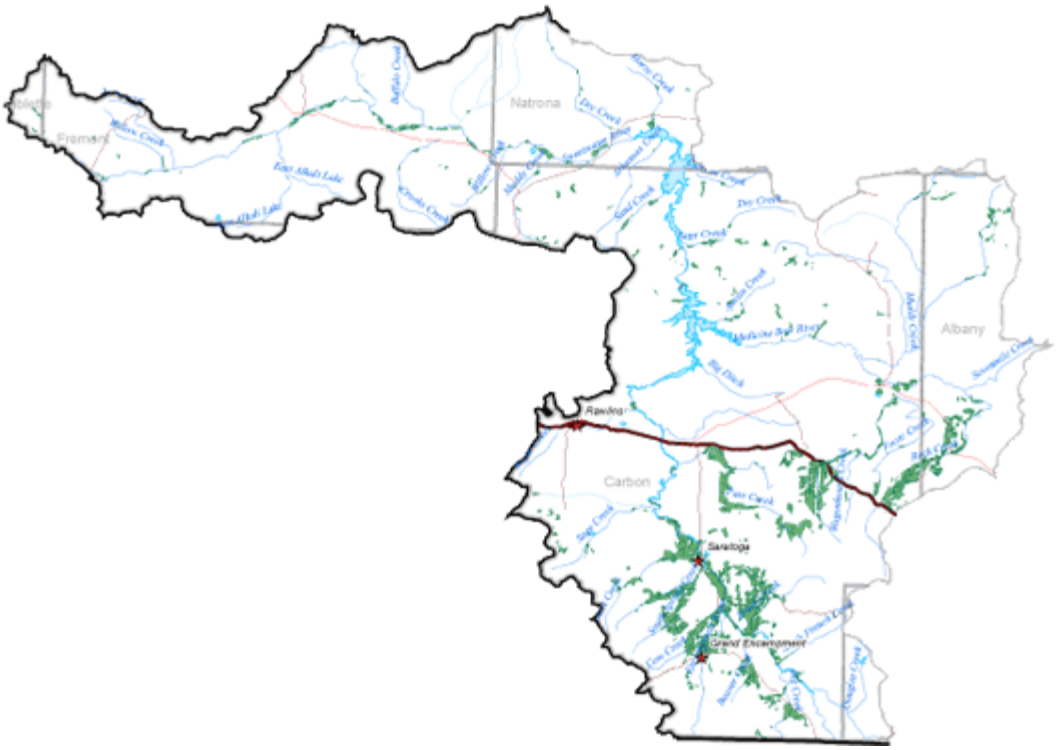

Fig. 3. Irrigated lands in the Medicine Bow River drainage.

Wetlands associated with irrigation include margins of storage reservoirs, seepage areas along canals and ditches, and natural or constructed basins that directly capture return flows from flood-irrigated fields and pastures and indirectly from groundwater table enhancement. In some cases, irrigation runoff augments flows within streams that were historically dry by mid-summer, thereby extending the flow period and sustaining wetland areas. Wetlands that existed prior to 1980 are reflected in the U.S. Fish and Wildlife Service's National Wetland Inventory (NWI) database for Albany and Carbon Counties. However, wetlands built since then are not in the NWI database.

Wheatland Reservoir No. 2, with a capacity of 98,934 acre-ft, is the largest storage feature. Storage capacities of the larger reservoirs in the Laramie Plains area are summarized in Table 1.

Average evaporation from lakes is 127 cm/yr or 5 times the total annual precipitation of 26 cm/yr, so many lentic wetlands in the Laramie Plains are saline (Lovvorn and Hart 2004). Lentic wetlands can be separated into oligosaline and mesosaline wetlands based on salinity levels. Oligosaline wetlands generally receive recharge from irrigation each year. The mesosaline

wetlands do not receive dependable flow each year and can vary from oligosaline to mesosaline, depending on water supply. The biota is affected not only by the higher mean salinity but also by the much wider variation in hydroperiod and salinity. In the Laramie Basin oligosaline lakes have a fringe of hardstem bulrush (*Scirpus acutus*), whereas mesosaline lakes are surrounded by unvegetated mudflat. Oligosaline lakes are dominated by muskgrass (e.g., *Chara globularis*, *C. aspera*). Mesosaline lakes are dominated by submersed fennelleaf (sago) pondweed (*Stuckenia pectinata*), with widgeongrass (*Ruppia maritime*) occurring in those lakes at the upper mesosaline range.

Table 1. Larger reservoirs (>1500 acre-feet capacity) in the Laramie Plains area.

Reservoir Name	Capacity (acre-feet)	Surface Acre (at capacity)	Source	Uses
Wheatland No. 2	98,934	5,000	Laramie River	Irrigation, domestic
Wheatland No. 3	47,429	4,792	Laramie River	Irrigation, stock
Lake Hattie	65,260	3,032	Laramie River and Little Laramie River	Irrigation, municipal, industrial, fish propagation, flood control, power, domestic
James Lake	8,990	900	Little Laramie River	Irrigation
Twin Buttes	3,912	334	Mortensen Draw	Fish propagation, recreation
Twelve Mile	3,420	20	Laramie River	Irrigation
Pierce	3,206	199	Rock Creek	Irrigation, stock, domestic
Bosler Reservoir (Diamond Lake)	1,967	284	Bosler Slough	Recreation, fish propagation, stock

The composition of wetlands (both natural and human-created) within the LPWC is summarized in Table 2 based on 1980 imagery. This summary does not include wetlands constructed on private and public-owned lands since that time. About 15% of the LPWC is irrigated. Copeland et al. (2012) scored assigned scores of 70 and 34, respectively, for ecological integrity (100= most intact) and vulnerability (100 = most vulnerable to future impacts). Approximately 4% of the wetlands within the LPWC are protected.

Table 2. Composition of wetlands within the Laramie Plains Wetland Complex based on 1980 imagery.

Wetland Type	**Number**	**Total area**
Freshwater emergent wetland	6,302	65,792 acres
Freshwater forested/shrub wetland	1,668	7,206 acres
Freshwater pond	2,209	2,164 acres
Lake	235	21,333 acres
Other	755	1,316 acres
Riverine	648	2,298 acres
TOTALS	11,817	100,108 acres

Sixty-seven major (≥50 gpm) irrigation wells are permitted in the Upper Laramie Subbasin. Many are also permitted for stock use. The permitted individual yields range from 50 to 4,500 gpm, and the cumulative permitted yield is 46,111 gpm. Three 3 major (≥ 50 gpm) irrigation/stock wells are permitted in the Medicine Bow River drainage.

Environmental uses of water within the Platte River Basin include maintenance of minimum stream flows and reservoir storage rights to for fish and wildlife habitat. Wyoming State Engineer's Office Instream Flow Filings, US Forest Service Instream Bypasses, Minimum Reservoir Releases, and Water Appropriations are potential tools available to state and federal agencies to produce and protect fisheries habitat in the Platte River Basin. One instream flow filing has been submitted within the Upper Laramie River subbasin. The filing is located near Woods Landing on 3.94 miles of the Laramie River. One instream flow filing has been submitted within the Medicine Bow River drainage. The filing is located near Arlington on 8.50 miles of Wagonhound Creek. No USFS instream bypass points are located in the LPWC and no minimum release requirements have been placed on any reservoirs. A small number of water rights have been permitted to maintain fisheries and wildlife habitat. Permits for fish and wildlife uses in the LPWC are included in the Table 3 (WWDC 2006).

Table 3. Water appropriations for fish and wildlife in the Laramie Plains Wetland Complex.

Name	Appropriation	Source	Appropriator(s)	Beneficial Uses
Lake Hattie Canal No. 1	300 ac-ft	Laramie River	WGFC*	Fish, recreation
Lake Hattie Reservoir	300 ac-ft	Laramie River	WGFC	Fish, recreation
Twin Buttes Reservoir	3912 ac-ft		WGFC	Fish, recreation
Hutton Lake First Enlargement	1.6 cfs	Sand Creek	USFWS	Irrigation, wildlife

*Wyoming Game and Fish Commission

Managed Wetlands and Riparian Habitats

The Wyoming Game and Fish Commission (WGFC) has one Wildlife Habitat Management Area (WHMA) within the LPWC. The portion of the Wick/Beumee WHMA north of Interstate Highway 80 is within the Complex boundary. This area is located 6 miles southeast of Elk Mountain and 5 miles west of Arlington. The WHMA was established in the early 1960s to provide winter range for elk. In 1988, additional property was added including 8,459 acres of year-round public access to Bear Creek Cattle Company lands on the north side of I-80. Drainages of Wagonhound and Foote creeks run though the property. The WGFD has fee title to only the Wick portion south of the Interstate.

The WGFC also maintains 12 Public Access Areas within the LPWC (Table 4). Ownership of these areas varies. The Department has fee title to some, whereas others are managed through landowner agreements or cooperative management agreements with the Bureau of Land Management. All are located within wetland or riparian areas.

Table 4. WGFD Public Access Areas in the LPWC.

Alsop Lake	Laramie River – Monolith
Diamond Lake	Leazenby Lake
East Allen Lake	Meeboer Lake
Gelatt Lake	Rock Creek
Lake Hattie	Twin Butte Reservoir
Laramie River – Jelm	Wheatland Reservoir #3

The WGFD owns and manages one conservation easement (CE) within the LPWC. The Riverbend Ranch Conservation Easement contains 5,760 acres on the Laramie River and is located about 15 miles southwest of Laramie on State Highway 230. Most of Caldwell Lake is located in this CE.

National Wildlife Refuges.

Three national wildlife refuges – Bamforth, Hutton Lake, and Mortenson Lake NWRs – are located within the LPWC. These refuges protect complexes of wetlands that provide resting, migration, and breeding habitat for migratory birds. In addition, Mortenson Lake NWR is critical habitat for the endangered Wyoming toad (*Bufo baxteri*).

Bamforth NWR is located in a natural depression northwest of Laramie. The bottom is dominated by saline flats, small ponds, and Bamforth Lake (250 acres), which comprises half the Refuge. Much of the other half is upland habitat. Wetlands have received little active management at Bamforth since the refuge was established in 1932. Prior to 1950, Bamforth Lake was an important habitat area sustained by a fairly dependable water source. Howerver, as Wheatland Irrigation District developed and expanded, the major water supply was curtailed

because the refuge had junior water rights. With the loss of water, the refuge's value as migratory bird habitat diminished.

Hutton Lake NWR (Fig. 4), located southwest of Laramie, consists of five impoundments and surrounding uplands adjacent to the floodplain of the Laramie River. Three distinct basins were originally present on the refuge. Dikes were constructed to create two additional impoundments. A diversion structure was installed in Sand Creek to move appropriated water from the creek to the refuge, and ditches were dug between the other lakes to facilitate water transfer between them. A lack of dependable water supplies to this refuge has been a constant problem. Because the Service does not own senior water rights, water levels in refuge wetlands depend on natural runoff and willingness of some adjoining landowners to share their rights. There has not been any active management of water levels on the refuge for the past 30 years.

Fig. 4. Hutton Lake National Wildlife Refuge

Mortenson Lake NWR consists of four lakes, positioned in a west to east line, that share a common water supply. The Refuge also contains a saline playa and an irrigation-dependent impoundment – Harmon Reservoir. In 1992, a cooperative agreement was established to exchange water rights with an adjacent landowner for grazing privileges. Under this agreement, refuge staff direct grazing to benefit the Wyoming toad and receiving water for refuge management purposes. The agreement remains in effect (USFWS 2007).

Refuge personnel continue their efforts to acquire conservation easements and lands in order to protect and improve Wyoming toad habitat.

WETLAND-ASSOCIATED WILDLIFE IN THE LARAMIE PLAINS AREA

Critical habitats for the endangered Preble's meadow jumping mouse (riparian areas) and Wyoming toad (wetlands) are present in the Laramie Plains. The Wyoming State Wildlife Action Plan (WGFD 2010) identifies 38 species of greatest conservation need (SGCN) that utilize wetland, including riparian and stream, habitats in the Laramie Plains area (Table 5).

The WGFD conducted duck breeding pair surveys from 1955 through 1999 based on a stratified random sample comprised of 58 count blocks throughout the state. Four count blocks are located within the LPWC. The Elk Mountain count block is located immediately southeast of the town of Elk Mountain; the Laramie River count block extends from the town of Laramie north to the Howell Bridge; the Wheatland No. 1 count block is the Laramie River from the Wheatland Reservoir No. 2 dam to the gauging station north of the reservoir and the north end of Wheatland Reservoir No. 3; and the Wheatland No. 2 count block is the Rock Creek Lakes complex extending north for about 8 miles.

Based on surveys conducted from 1984-1999, the average density of breeding ducks in the Wheatland No. 1 count block ranked highest in the state when tallied for all duck species (32.1 indicated pairs per mi^2) and all dabbling duck species (29.7 indicated pairs per mi^2), and ranked 3rd when tallied for all diving duck species (1.9 indicated pairs per mi^2). Fifteen species of ducks were documented. The most abundant were gadwall (*Anas strepera*), northern pintail (*Anas acuta*), American wigeon (*Anas americana*), teal [blue-winged (*Anas discors*), green-winged (*Anas carolinensis*), and cinnamon (*Anas cyanoptera*] combined], northern shoveler (*Anas clypeata*), mallard (*Anas platyrhynchos*) , and lesser scaup (*Aythya affinis*) in decreasing order. Canvasback (*Aythya valisineria*), lesser scaup, northern pintail, and redhead (*Anas americana*) ducks are species of greatest conservation need (Table 5). Breeding pair densities of these four species are shown in Table 6. Breeding pair counts were suspended after 1999 due to budget cuts and because Wyoming is not within the traditional area the USFWS surveys to monitor continental breeding populations and habitat conditions.

Canada geese (*Branta canadensis*0 that breed within the LPWC are predominantly from the Hi-line Population. From 2002-2011, an average of 378 indicated breeding pairs and 904 total geese were counted in the area during April surveys. During June and July, Canada geese of the Rocky Mountain Population migrate to Wheatland Reservoirs # 2 and #3 to molt. An average of 9,040 molting geese were counted at both reservoirs combined during periodic surveys from 1986 through 2010.

Table 5. Species of greatest conservation need that use wetland, including riparian, habitats in the Laramie Plains area.

Birds

American bittern (*Botaurus lentiginosus*)
Bald eagle (*Haliaeetus leucocephalus*)
Barrow's goldeneye (*Bucephala islandica*)
Black-crowned night-heron (*Nycticorax nycticorax*)
Black tern (*Chlidoniuas niger*)
Canvasback (*Aythya valisineria*)
Caspian tern (*Hydropogne caspia*)
Clark's grebe (*Aechmophorus clarkia*)
Common loon (*Gavia immer*)
Forster's tern (*Sterna forsteri*)
Franklin's gull (*Leucophaeus pipixcan*)
Lesser scaup (*Aythya affinis*)
Northern pintail (*Anas acuta*)
Redhead (*Aythya americana*)
Sandhill crane (*Grus canadensisi*)
Snowy egret (*Egretta thula*)
Virginia rail (*Rallus limicola*)
White-faced ibis (*Plegadis chihi*)
Willow flycatcher (*Epidonax traillii*)

Mammals

Big brown bat (*Eptesicus fuscus*)
Eastern red bat (*Lasiurus borealis*)
Little brown myotis (*Myotis lucifigus*)
Northern river otter (*Lontra Canadensis*)
Preble's meadow jumping mouse (*Zapus hudsonius preblei*)
Vagrant Shrew (*Sorex vagrans*)

Reptiles

Greater short-horned lizard (*Phrynosoma hermandesi*)
Smooth green snake (*Opheodrys vernalis*)

Amphibians

Wyoming toad (*Bufo baxteri*)
Northern leopard frog (*Lithobates pipiens*)

Fish

Bigmouth shiner (*Notropis dorsalis*)
Brassy minnow (*Hybognathus hankinsoni*)
Common Shiner (*Luxilus cornutus*)
Iowa darter (*Etheostoma exile*)

Crustaceans

Calico crayfish (*Astacus pellucidus*)
Fairy shrimps
Tadpole shrimps

Mollusks

Aquatic snails
Pill clams
Stagnicola pondsnails

Table 6. Breeding duck densities and density rankings of Laramie Plains count blocks.

Block	Elk Mountain	Laramie River	Wheatland No. 1	Wheatland No. 2
Area (mi^2)	30	16	21	40
AIBPD – All spp*	1.9	16.4	32.1	4.8
Rank**	34	4	1	17
ATD – All spp*	3.2	31.8	72.7	10.4
AIBPD – Dabler	1.6	14.2	29.7	4.0
Rank**	35	3	1	19
ATD – Dabler	2.7	26.5	66.8	8.5
AIBPD - Diver	0.3	2.0	1.9	0.7
Rank**	19	2	3	11
ATD – Diver	0.5	4.9	4.0	1.9
AIBPD – CANV	15	2	8	10
AIBPD – LESC	17	5	2	10
AIBPD – NOPI	23	3	1	9
AIBPD – REDH	37	3	7	8

* Includes mergansers and American coots.
** Ranks are based on relative density position among the 58 count blocks
Key:
AIBPD = average indicated breeding pair density
ATD = average total density
CANV = canvasback
LESC = lesser scaup
NOPI = northern pintail
REDH = redhead

OTHER PLANS AND INITIATIVES

Ducks Unlimited.

The LPWC is within the Northern and Southern Rockies/Colorado Plateau – a level III priority area identified by Ducks Unlimited. LPWC contains some of the most productive waterfowl breeding habitat in North America. Habitat issues include rapid development that threatens wetlands and upland nesting cover; diversions of ground and surface water to support a growing human population; significant hydrologic alterations including dams and flood control levees that impact riverine systems; and conversion of agricultural lands to residential or other non-agricultural uses. Irrigation associated with agricultural operations has created and sustained many wetlands in this arid climate. When agricultural lands are converted, agricultural food sources, upland nesting cover, and irrigation-maintained wetlands are lost. DU is currently (summer, 2014) preparing an application for a standard NAWCA grant to fund projects in both the Laramie Plains and Goshen wetland complexes.

Natural Resources Conservation Service (NRCS).

The USDA-NRCS works with private landowners to conserve natural resources, primarily on private lands, although projects on state and federal land can be funded though some of their programs (e.g., Environmental Quality Incentives Program – EQIP). NRCS conservation planners provide technical assistance to help agricultural producers achieve their objectives while sustaining or enhancing the natural resources on their property. NRCS collaborates with many partners to establish conservation goals, recommend conservation practices and designs, and provide technical assistance to people who work the land.

NRCS' voluntary conservation programs help people sustain agricultural productivity and environmental quality by providing financial assistance for implementing conservation practices. For example, the wetlands reserve program (WRP) offers landowners the opportunity to protect, restore, and enhance wetlands and surrounding uplands. WRP is an underutilized program in WY for a variety of reasons, including program restrictions and NRCS staffing capacity. The only WRP easement in the Laramie Plains is the Buford foundation wetland. The Farm and Ranch Lands Protection Program (FRPP) and possibly the Grassland Reserve Program (GRP) have been used to fund some conservation easements in the Laramie Plains. However, these two programs are not wetland-focused and provide no direct financial assistance for wetland enhancement or creation as WRP does. They simply protect the property from future residential development. For additional information go to: http://www.wy.nrcs.usda.gov.

Laramie Rivers Conservation District.

The 34 Conservation Districts throughout Wyoming were established beginning in 1941 to assist landowners and resources users with conservation practices and to provide leadership in natural resource management issues and efforts. Conservation Districts today offer a wide variety of programs and services to assist anyone interested in conservation. They also play a key role in federal land management planning processes and federal and state legislative and administrative initiatives affecting local conservation and land use activities. For additional information go to: http://www.LRCD.net.

USFWS Partners for Fish and Wildlife Program.

The U.S. Fish and Wildlife Service's Partners Program was established in 1987 to promote on-the-ground wetland, riverine, and upland restoration and enhancement projects on private lands. The Wyoming program description can be downloaded from: http://www.fws.gov/mountain-prairie/pfw/wy/.

Partners Program focal areas for wetland projects include the Laramie Plains, Wind River, Goshen Hole, Bear River, Upper Green River, Upper Sweetwater/Red Desert, Powder/Tongue

River, Laramie Plains, and Black Hills Mixed Grass focus area. Statewide goals are to restore/enhance: 1,125 acres of wetlands; 121,700 acres of upland habitat; 119 miles of riparian habitat; and 98 miles of in-stream habitat. Much of the wetland work accomplished to date has been in the upper Wind River Basin and the Goshen Hole Wetland Complex.

Intermountain West Joint Venture (IWJV): Coordinated Implementation Plan for Bird Conservation in Central and Western Wyoming (BCRs 10, 16, 18).

The major purpose of the Wyoming Implementation Plan is to assist the IWJV Management Board in reviewing and ranking various habitat protection, restoration and enhancement projects for funding through the North American Wetlands Conservation Act (NAWCA) and other programs. The IWJV Wyoming Implementation Plan can be downloaded from: http://iwjv.org/sites/default/files/wy_coord_imp_plan.pdf.

The LPWC is one of 48 priority bird habitat conservation areas identified in the plan. Habitat conservation goals and objectives are listed at the statewide level. As of this publication, the IWJV Management Board has not recommended projects for NAWCA funding within the LPWC area. However, DU is currently preparing an application for a standard NAWCA grant to fund projects in both the Laramie Plains and Goshen wetland complexes.

Wyoming Partners in Flight (PIF): Wyoming Bird Conservation Plan: Version 2.0.

Major purposes of the Wyoming Bird Conservation Plan are to identify priority species and habitats, and to establish objectives for bird populations and habitats in Wyoming. The LPWC is within Bird Conservation Region 16 (Southern Rockies/Colorado Plateau). The conservation plan describes conceptual objectives at statewide and landscape scales. However, goals and strategies are not stepped down to regional and local levels. A number of wetland best management practices recommended in the plan could improve wetland conditions for priority species if implemented within the LPWC. The Wyoming Bird Conservation Plan can be accessed at: http://www.blm.gov/wildlife/plan/WY/menu.htm. The wetland component can be downloaded from: http://www.blm.gov/wildlife/plan/WY/Wetlands.htm.

Wyoming 2010 State Wildlife Action Plan (SWAP).

The Wyoming's State Wildlife Action Plan (SWAP) is a long-range plan to conserve Wyoming's SGCN, and was developed to meet the requirements of the Congressionally-authorized State Wildlife Grants (SWG) Program. The plan identifies SGCN, key habitats, and conservation challenges statewide. Habitat quality or "intactness" was estimated using a modeling approach (Copeland 2005) for ecological systems (Comer et al. 2003) within Wyoming. The LPWC area received a medium habitat quality (integrity) score. Nineteen of the 25 avian SGCN that utilize wetlands and riparian habitats are found within the Complex and 15 are known to breed there

(Cerovski et al. 2004). Six of the 17 mammalian SGCN that utilize wetlands have also been documented within the LPWC. The North Platte River Basin has been identified as a key habitat area based on presence of avian and mammalian SGCN (WGFD 2010). The SWAP does not provide specific objectives or conservation actions for the LPWC.

The Wyoming 2010 State Wildlife Action Plan (can be downloaded from: http://wgfd.wyo.gov/wtest/Departments/Wildlife/pdfs/SWAP_2010_FULL_OCT0003090.pdf.

The Nature Conservancy

The mission of The Nature Conservancy (TNC) is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. TNC does this primarily through acquisitions of lands and easements to protect important representative communities and habitats in their natural state.

The Nature Conservancy developed a statewide wetland evaluation and risk assessment that served as the basis of a wetland component incorporated into the State Wildlife Action Plan (WGFD 2010). The main purpose of TNC's wetland database is to determine where to focus conservation actions. Functional wetland complexes are identified based on several evaluation criteria including mean wetland patch size, mean wetland densities, and distance between wetlands. Another layer examines the protection status of wetlands within various terrestrial habitat types. The risk assessment is based on distances to features that may impair wetland functions, for example, distances to roads, dams, pipelines etc. This broad-brush, quantitative approach can be further refined. For example, weights of the evaluation criteria can be altered. However, the approach doesn't provide a site-specific evaluation of wetland conditions. Future site conditions will be modeled and "at risk" areas identified. Public recreation values and wildlife values are additional wetland functions or "services" that can be included in the modeling approach. The conceptual modeling process is described by Copeland et al. (2007). TNC is currently conducting a Level II wetland assessment funded by an EPA wetland Program Development grant (http://water.epa.gov/grants_funding/wetlands/grantguidelines/). This study will yield data and information to support conservation planning and modeling efforts.

The Nature Conservancy completed the Shirley Basin – Laramie Rivers Conservation Plan in 2008 (Pocewicz and Lathrop 2008). Although the plan encompassed an area larger than the LPWC, it contains a lot of useful information and identifies threats, objectives, and targets for terrestrial and aquatic habitat conservation. A summary of the plan can be found at: http://conpro.tnc.org/1616.

Wyoming Wildlife and Natural Resource Trust

The Wyoming Legislature created the Wildlife and Natural Resource Trust (WNRT) in 2005. The WNRT is funded by interest earned on a permanent account, as well as by donations and legislative appropriations. The purpose is to enhance and conserve wildlife habitat and natural resource values throughout the state. Any project designed to improve wildlife habitat or natural resource values is eligible for funding. Wetland projects can be funded under this program. Projects with multiple partners and cost share contributions tend to rank higher in the selection process. WNRT (state source) funds are potentially eligible to meet the non-federal match requirements of other funding programs including NAWCA grants, WHIP, and SWG.

In 2010, the WNRT funded a Laramie Plains River Restoration Project in partnership with the Laramie Rivers Conservation District, City of Laramie, and Laramie Beautification. This was phase 3 of an ongoing project to mechanically improve stream function by increasing the quantity of deep pools for fish, and by reducing or eliminating stream bank erosion on 3.6 miles of the river. The WNRT also funded the Seminoe Reservoir project in partnership with the Medicine Bow Conservation District. This project removed several miles of saltcedar from the Medicine Bow River.

WNRT funds cannot be used for fee simple acquisition of real property or to purchase water rights. Information about the WNRT and application procedures is available at: http://wwnrt.wyo.gov/.

Wyoming Statewide Comprehensive Outdoor Recreation Plan

The Statewide Comprehensive Outdoor Recreation Plan (SCORP) is prepared and updated every 5 years to maintain state eligibility for Land and Water Conservation Fund (LWCF) grants. Under LWCF guidelines, the SCORP document must include a wetlands component, which the WGFD has prepared during each plan update. At a minimum, the wetland component must: 1) be consistent with the National Wetland Priority Conservation Plan prepared by the U.S. Fish and Wildlife Service; 2) provide evidence of consultation with the state agency responsible for fish and wildlife resources; and 3) contain a listing of those wetland types that should receive priority for acquisition. To our knowledge, no LWCF grants have been expended to acquire or enhance wetlands in Wyoming. The detailed inventory and prioritization of wetland areas was deleted from the 1995 version of the plan and a generalized list of water basins was substituted. The potential utilization of LWCF funds for wetland acquisition and improvements to support wetland-based recreation needs to be investigated.

THREATS TO WETLANDS

Activities and conditions that may adversely impact wetlands within the Laramie Plains Wetland Complex are identified and qualitatively ranked in Table 7.

Table 7. Threats to wetlands in the Laramie Plains Wetland Complex.

List of Threats	Severity of Threat				Potential for Improvement[†]
	Low	Moderate	High	Extreme	
Climate Change/ Drought				X	L
Water Supply				X	M
Compromised Regulatory Protections				X	M
Loss of Ranch Acreage to Subdivision/Changes in Agricultural Water Rights or Uses			X		M
Rural Residential Developments			X		L
Water development projects			X		M
Channel Alterations, Structures or Modifications in Floodplains			X		M
Transportation Infrastructure			X		M
Energy Development/Resource Extraction			X		M
Agricultural Operations			X		M
Livestock Grazing Practices			X		H
Invasive Plant Species		X			M
Management/Maintenance at Existir Wetland Projects			X		M
Disturbances Associated with Recreational Use		X			M
Irrigation Conveyance Improvements		X			M
Center Pivot Conversions	X				L
Public Awareness and Support			X		H
Available Funding for Monitoring, Protection, Mitigation			X		H

[†] "L" = low; "M" = moderate; "H" = high potential for improvement

Climate Change/Drought

Periodic drought is a natural climatic event and an important driver of wetland ecology in the West. Drying cycles restore productivity of wetlands by oxidizing organic matter and releasing bound nutrients from wetland substrates. However, the frequency, intensity, and duration of drought cycles have increased markedly since the 1980s. These climatic shifts are producing undesirable

changes in wetland hydrology, including long-term loss of functional wetlands in several regions. Climatologists predict frequency and severity of drought will increase as global warming continues.

Annual evaporation exceeds precipitation by 2-5 times in most Wyoming basins. Consequently, isolated natural wetlands (predominantly shallow playas) can remain completely dry for extended periods during a drought cycle. Riverine systems fed by mountain snowpack or springs have more dependable water supplies, but are also impacted by low flows during extended drought cycles. Wetlands associated with irrigation can be insulated from drought so long as water continues to remain available. However, wetlands dependent on irrigation, especially permitted wetland impoundments with junior appropriation dates, can remain dry for extended periods when there are water shortages (WJVSC 2010).

Water Supplies

About 65% of the wetlands in the Laramie Plains depend directly or indirectly on irrigation (Peck and Lovvorn 2001). Although natural and constructed wetlands within the LPWC were generally in very good condition throughout the 1980s to early 1990s, that timeframe coincided with several wetter than normal years. From 2002 through 2008, water supplies had dwindled and wetlands supplied by irrigation flows ceased functioning in many cases. (When less water is available to flood-irrigate agricultural fields, return flows and shallow groundwater tables that feed into wetlands are also diminished). Higher precipitation during 2010 and 2011 returned functionality to most of these wetlands.

Stream flows within the North Platte River watershed are heavily appropriated. Significant amounts of water also leak or evaporate from earthen canals and ditches. Other important water supply issues include stream dewatering, conversion of agricultural water rights to domestic uses, and legal decisions (the Platte River Endangered Species Lawsuit). The Tri-State Platte River Endangered Species Recovery Implementation Program could require water contributions from the Laramie Plains.

Compromised Regulatory Protections

Two U.S. Supreme Court decisions, Solid Waste Agency of Northern Crook County (SWANCC) (2001) and Rapanos and Carabell (2006) recently modified the federal interpretation of “waters of the United States” subject to regulation by the U.S. Army Corps of Engineers and the Environmental Protection Agency. Pursuant to those cases, isolated wetlands “lacking a significant nexus” to navigable waters no longer receive protection under the Clean Water Act. The revised interpretation removes regulatory protections for some isolated, playa-type wetlands in the Laramie Plains area. The Swampbuster Provision of the Food Security Act will continue to afford some measure of protection. An operator who converts a wetland to agricultural production can lose eligibility for certain USDA program benefits including loans, subsidies, crop insurance, and price support programs. However, Swampbuster does not apply

to non-agricultural practices that impact isolated wetlands. The SWANCC and Rapanos decisions have significant implications elsewhere, but their impact on wetlands in the Laramie Plains is expected to be only moderate in the foreseeable future (Tessmann 2008).

Loss of Ranch Acreage to Subdivision; Changes in Agricultural Water Rights or Uses

Working ranches contribute to maintaining habitats needed by many species in the Laramie Plains. Changes in water storage and irrigation practices, or diversion of water for residential developments or cities, could reduce or eliminate wetlands and affect riparian areas (Pocewicz and Lathrop 2008).

Rural Residential Development

Rural residential construction has been present in the Laramie Plains for some time. Although currently at a moderate to high threat level, this type of development is expected to increase in the foreseeable future. Under current legal interpretation, isolated wetlands can be drained or filled without a permit at construction sites. In addition, rural residential construction is often situated within and near riparian corridors, which are appealing locations and often the only private land available for development in central Wyoming. Additional wetlands are lost when fields are no longer irrigated or water rights for agriculture are converted to domestic use. Infrastructure such as roads, buildings, power lines, and fences, along with associated disturbance can impair the suitability of wetlands and riparian habitats for sensitive wildlife. Loose pets, especially cats, also pose a serious threat to wildlife near subdivisions (Tessmann 2008, WJVSC 2010). These types of developments lead to additional habitat fragmentation and degradation.

Water Development Projects

Included in this threat category are publicly funded water projects that change the hydrology of an existing system. Examples are dams and water diversions. Project supporters often fail to recognize or acknowledge the downstream impacts of these projects through time. Flow stabilization and attenuation of peak floods alter channel-forming processes that are critical to form and maintain oxbow wetlands, pools, braided channels, point bars, and other natural habitat features.

Channel Alterations, Structures or Modifications in Floodplains

Developments in floodplains alter natural ecological and geomorphologic functions, especially in stream channels. Modifications and structures such as riprap, car bodies, bridges, bridge approaches, culverts, irrigation diversions, dikes, levees, elevated roadways and railroad grades, sand/gravel operations, and other barriers fully or partially alter natural flood regimes by affecting flow dynamics. Functional alterations that prevent point bar creation significantly reduce cottonwood/willow regeneration.

Levees and other elevated developments constrain flow to the main channel, preventing water from spreading onto the floodplain during high runoff periods. This disrupts the natural tendency of the channel to shift and form meanders and braids that are essential for maintenance and formation of floodplain wetlands. Smaller braided channels that are critical spawning and nursery habitat for trout and other species become severed from the main channel and fish access is blocked. Flow energy is also concentrated within the main channel, leading to downstream channel destabilization, more frequent flooding, and the need for additional stabilization projects, which in turn impact even more wetlands and riparian areas (WJVSC 2010).

Transportation Infrastructure

Properly sited and designed roads pose little threat to wetlands. However highway projects involving stream and floodplain crossings often require filling portions of wetlands, installing culverts, and armoring streambanks. Roadbeds and culverts can affect larger areas of wetland by intercepting and channeling surface and groundwater flow. Road improvements can also impact "isolated" wetlands in drainage ditches, borrow pits, gravel quarries, and where surface drainage may have been impounded by the original roadbed, however such features may also provide opportunities to create wetlands as mitigation for road construction impacts. Other impacts associated with road improvements may include disturbance effects from increased traffic, which can displace sensitive species. Roadways also become a barrier to less mobile wildlife such as amphibians and turtles, resulting in additional habitat fragmentation for those species. Heavy traffic near wetlands can become a significant source of mortality for concentrations of wildlife that are attracted to those areas. Finally, salt, oil, and other pollutants washing from roads can impair water quality in small streams and wetlands (WJVSC 2010).

Energy Development; Resource Extraction

Wind energy development includes turbine, roads, transmission lines, and disturbance and can result in wildlife habitat fragmentation and cumulative impacts (i.e., increased access for recreation and increased invasive species) (Pocewicz and Lathrop 2008).

Wyoming has over 50% of class 6 and 7 wind resources, and ranks 7th nationally in wind power generating potential factoring in land status and environmental constraints. Interest in Wyoming's wind resources is escalating rapidly. Projections indicate 4,000 megawatts of power generating capacity may be added to the existing 800 megawatts within the next few years. Typical turbines have a power generating capacity of approximately 1.5 megawatts and require approximately 50 acres of land per turbine. Therefore, the land area of wind farms in Wyoming could potentially reach 160,000 acres or more.

The potential impact of wind energy facilities is largely dependent upon site selection and setback distances. Turbines situated too close to wetlands and open water can cause waterfowl, waterbirds,

and shorebirds to displace from otherwise suitable habitat. Collision mortalities are also more frequent if turbines and associated powerlines are located near migration corridors, refuges, and feeding and resting sites.

The U.S. Fish and Wildlife Service identified avian collisions as a major issue related to wind farm construction near the Horicon National Wildlife Refuge in Wisconsin. As a result, the project sponsor was required to set all wind turbines back at least 2 miles from the refuge property boundary. To reduce impacts on wetlands, the U.S. Fish and Wildlife Service recommends that turbines never be constructed in or adjacent to wetlands, including lakes, ponds, marshes, sloughs, swales, swamps, or potholes. Turbine locations should also avoid obvious flight paths between larger (20 acres or greater) wetlands or sloughs or other known migratory bird corridors or flight paths. The Service further recommends turbines not be located in areas where birds are highly concentrated such as wetlands, state or federal refuges, private duck clubs, staging areas, rookeries, leks, roosts, riparian areas along streams, and landfills. Known daily movement flyways such as between roosting and feeding areas, and areas with a high incidence of fog, mist, low cloud ceilings, and low visibility should also be avoided.

Sand and gravel operations that are sited in floodplains also have potential to impact wetlands and riparian habitats. However, it is likely this type of mining has produced a net gain of wetlands and open water habitats relative to the acreages that were impacted, because it was a common practice in the past to convert abandoned or reclaimed gravel quarries into ponds and small lakes. Many of these impoundments have developed wetland margins of varying width depending on steepness of the basin slope. It is likely the conversion of pits into open water habitats has produced a net loss of riparian habitats (WJVSC 2010).

Agricultural Operations

Agricultural operations have directly or indirectly created many of the wetlands that exist in the Laramie Plains today. Although some agricultural activities adversely affect the quality and function of wetlands, appropriate management practices can avoid or minimize those impacts. Sediment washing directly into wetlands from tilled fields and heavily grazed pastures can decrease their lifespan and impair water quality. Water quality is also affected by agrichemical runoff including fertilizers, pesticides, herbicides, and animal wastes. Heavy grazing within wetland basins and along shorelines removes vegetation cover and damages root mats. Left intact, this vegetation is the most effective means of filtering sediment and contaminant runoff, and protecting shorelines from excessive wave action and erosion. Wetland vegetation also provides essential nesting and hiding cover as well as forage for wildlife. In some regions, isolated wetlands continue to be drained and converted to agricultural production, although this practice is not currently widespread in south central Wyoming. A high percentage of the manmade wetlands within the Laramie Plains exist as a direct benefit of agriculture and

irrigation infrastructure. Best management practices that improve wetland quality and function, especially the retention of grassy buffers, should be encouraged (Tessmann 2008).

Livestock Grazing Practices

Improper grazing by domestic livestock has been a dominant factor causing loss and degradation of wetland margins and riparian systems throughout the western U.S. Uncontrolled livestock spend a disproportionate time within wetland margins and riparian areas where they find water, succulent forage, and favorable micro-climates including shade, wind reduction, and higher humidity. For these reasons, the risk of damage to wetlands and riparian habitats is high, particularly under season-long grazing strategies. Excessive grazing within wetland basins can remove vegetation cover, damage root mats, increase turbidity and siltation, over load the system with nutrients, and destroy nests of ground-nesting birds. However, adverse impacts are avoided or minimized by implementing appropriate grazing management systems and best management practices and by regulating distribution of cattle (WJVSC 2010).

There are some circumstances in which grazing has been used as a management tool to benefit a wildlife species at risk. For example, chorus frogs can serve as a vector for chytrid fungus and are attracted to densely vegetated wetland margins. This reduces habitat suitability for Wyoming toads (Mindy Meade personal communication, Mindy Reeder et al 2012, Zack Walker personal communication). Intensive grazing removes shoreline cover and discourages chorus frogs from using habitat that is being managed for Wyoming toad recovery.

Invasive Plant Species

Habitat function of wetlands, riparian zones, and adjacent watersheds can be impaired by invasive and nonnative plants such as tamarisk (*Tamarix spp.*), Russian olive (*Elaeagnus angustifolia*), cheatgrass (*Bromus tectorum*), smooth brome (*Bromus inermus*), leafy spurge (*Euphorbia esula*), Russian thistle (*Salsola kali*), halogeton (*Halogeton glomeratus*), field bindweed (*Convolvulus arvensis*) and many others. These nonnative plants often outcompete desirable native plants, potentially creating unsuitable habitat conditions for species of native wildlife. Invasive trees and shrubs such as tamarisk and Russian olive do provide cover and forage beneficial to some wildlife, but can also increase predator densities, which adversely affect ground-nesting birds and small mammals adapted to open grassland ecosystems. They also greatly increase transpiration rates, and potentially draw down the alluvial water table. Nonnative and invasive plants should be eradicated where possible, and their further spread should be vigorously controlled (Tessmann 2008).

Management/Maintenance of Existing Wetland Projects

Engineered structures such as dikes and ditches require periodic maintenance to be kept in proper functioning condition. In addition, created wetlands and surrounding watersheds must be managed through a prescribed regime of water level manipulations, vegetation treatments, and proper grazing practices to sustain the wetlands in a productive condition. For many years, resources needed to manage and maintain constructed wetlands on WGFD habitat and public access areas were limited. In some cases, water control structures and fences lapsed into disrepair, dikes were damaged by erosion and rodent activity, and personnel have not been available to monitor livestock distribution and use, or attend to water management. Funding and other resource limitations continue to be a problem (WJVSC 2010).

Recreational Use of Wetlands

Disturbances associated with recreation in and near wetlands can be a significant problem in densely populated or heavily used areas. The Laramie Plains remains a predominantly rural area with a low human population density. For most of the year, disturbance associated with human activities remains at very low levels, and is almost nonexistent on private wetland areas. Moderate to heavy hunting pressure on WHMAs and Public Access Areas can affect the distribution of migratory game birds and their use of wetlands for feeding and resting during the fall and early winter. However, allowing seasonal access for wildlife-dependent recreation instills within the public an appreciation for wetlands and maintains a strong base of support for wetland conservation programs **(**WJVSC 2010). In addition, wetlands created and managed for this purpose provide habitat benefits throughout the remainder of the year, including the critical spring migration period. As the human population continues to increase in south central Wyoming, disturbance may become a more significant factor in the future, especially within and near subdivisions and urban areas which are sources of year-round disturbance.

Irrigation Conveyance Improvements

Efforts to improve water delivery efficiency (e.g., by installing canal and ditch linings or buried pipelines) will potentially eliminate “seepage wetlands” adjacent to ditches and canals. Impacts to seepage wetlands can be mitigated by constructing or enhancing other wetlands, and this approach should be advocated where public funds are used for rehabilitation projects.

Center Pivot Conversions

Large-scale conversions from flood irrigation to center pivot sprinkler systems is unlikely to impact wetlands in the Laramie Plains. The lack of grain crops makes conversion less likely.

Public Awareness and Support

Wetlands conservation has received a great deal of national attention since the 1960s and this is reflected in the numerous federal programs and landmark legislations designed to protect and restore the nation's wetlands and other waters. However, public awareness and vigilance are matters of ongoing urgency as efforts modify the intent and interpretation of these legislations continue. In addition, there is a need for greater awareness of floodplain functions and services, including the importance of maintaining healthy riparian systems and instream flows. Such awareness can only be achieved through a program of continuing education, public outreach, and effective use of media resources (WJVSC 2010).

Funding Availability

In Wyoming, wetlands conservation is not limited by the availability of funding nearly so much as by the constraints placed on how funds can be used. Major sources of funding for wetlands conservation include the North American Wetlands Conservation Act, NRCS Wetlands Reserve Program, USFWS Partners for Fish and Wildlife program, and the Wyoming Wildlife and Natural Resource Trust Account. However, funding from these programs is primarily for construction and cannot generally be applied to increase staff capacity for project planning, permitting, and administration. The lack of personnel resources dedicated to grant writing, project planning, and implementation limits the ability to capture the available funds to get more projects done on the ground (WJVSC 2010).

Farm Bill conservation programs are also available for easement/acquisition efforts. These programs far exceed other federal sources of conservation funding. Easement programs like the FRPP and GRP are helping to conserve millions of acres of important landscapes across America. Wyoming Stock Growers has several conservation easements in the Laramie Plains using FRPP and GRP dollars.

The federal Land and Water Conservation Fund (LWCF) was established in 1965 to take a portion of the revenues from offshore oil and gas leasing and reinvest them in onshore conservation. It has been an important source of funding for federal and state acquisitions of land and easements, often purchasing land acquired by land trusts (Land Trust Alliance 2012); e.g., TNC and the Mortenson NWR expansion.

WETLAND CONSERVATION OBJECTIVES

The following objectives are established to conserve and manage wetlands within the Laramie Plains Wetland Complex:

1) Negotiate conservation or easements or other instruments to protect important wetlands and riparian areas potentially threatened by development. This is the top priority for the Laramie Plains Wetland Complex.

2) Abate residential and energy development threats to riparian and wetland ecosystems.

3) Build partnerships within the local community to support wetland conservation efforts while maintaining traditional agricultural uses of the land and water.

4) Maintain or enhance water supplies for wetlands.

5) Minimize development in the floodplain of all lotic systems.

6) Maintain high quality wetland and riparian habitats through reduction of invasive plant species and appropriate grazing management.

7) Secure adequate funding to implement wetland conservation efforts, including assistance and outreach programs, and public education regarding ecological services of wetlands and working ranches.

8) Provide additional opportunities for wetland-dependent recreation such as waterfowl hunting and wildlife viewing.

9) Implement wetland and watershed “best management practices” to sustain and enhance wetland functions throughout the Laramie Plains Wetland Complex.

10) Increase the habitat quality of Hutton Lake and Mortenson NWRs by negotiating conservation easements or fee title acquisitions to protect key adjoining lands from development. This would include expansion of water rights for Hutton Lake NWR.

11) Promote and seek opportunities for riparian corridor restoration (e.g., cottonwood regeneration)

12) Promote and establish fish passage and screening solutions at problem irrigation diversions. Continue to seek opportunities for increased flows in the Laramie River through Laramie during the summer months to maintain habitat values.

CONSERVATION STRATEGIES

The following strategies are established to achieve the objectives listed above.

1. Secure permanent conservation easement from willing landowners, and develop partnerships and agreements with federal land management agencies, State Land Board and private landowners, etc. to protect wetland and riparian habitat.

   Much of the riparian habitat along the Laramie River is vulnerable to ongoing subdivision in the Laramie and Woods Landing areas. Although the Department's Riverbend Ranch Conservation Easement currently offers some protection, areas upstream and downstream remain unprotected. It may be desirable to negotiate longer-term management agreements to retain upland buffers surrounding some of the larger and more important wetland projects, in order to assure wetlands remain in proper functioning condition.
   - Negotiate conservation easements to protect riparian and adjacent upland habitats along segments of Rock Creek, the Little Laramie River, the Laramie River, and the Medicine Bow River.
   - Negotiate conservation easements to protect additional wetland and upland habitats adjacent to the Hutton Lake and Mortenson Lake National Wildlife Refuges.
   - Negotiate conservation easements to protect wetland and upland habitats at and adjacent to Wheatland Reservoir Nos. 2 and 3.
   - Evaluate whether additional wetland/riparian habitats within the Laramie Plains Complex are sufficiently unique or important to warrant protection through long-term conservation easements.
   - Negotiate longer-term conservation agreements to protect wetland projects and surrounding upland buffers on private lands.

2. Abate development impacts.
   - Work with industry, land managers, and government agencies to minimize the biological impacts of wind development.
   - Limit development around Wheatland Reservoir Nos. 2 and 3 to retain at least a 300-yard protected buffer above the high water line to prevent further fragmentation and disturbance.
   - Work with interested landowners and potential buyers to keep working ranches that are at risk of disposal into subdivision and development.
   - Influence county and state planning and zoning to conserve open space and discourage ranch subdivision.
   - Discourage development along the Laramie and Medicine Bow Rivers within a sufficient distance above the high water line to prevent further fragmentation and disturbance.

3. Foster local partnerships and traditional uses.
    - Keep water rights in the hands of ranchers/irrigators through strategies to reduce ranch subdivision.
    - Through outreach to the general public and municipalities, increase awareness of the importance of wetlands and water conservation.
    - Reduce water losses and improve water quality through improved stewardship practices.
    - Coordinate strategies related to the North Platte River system. Consult with the Wyoming Water Development Commission, Platte River Recovery Agreement, and North Platte Water User's Association (Pocewicz and Lathrop 2008).

4. Drought and depleted water supplies are the most significant and acute threat to wetlands in the Laramie Plains Complex. The quantity of water delivered to storage facilities and irrigated pasture has a direct bearing on hydrology of many wetlands in the region. The following strategies are recommended to maintain or enhance water supplies and delivery:
    - Work with agencies, irrigation districts, and landowners to maintain stream flows needed to sustain healthy stream and riparian habitat function. A healthy riparian system will store a great deal of water and buffer climatic changes.
    - Support irrigation system rehabilitation and improvement projects that incorporate wetland considerations and other wildlife habitat benefits.
    - Establish water-harvesting features such as windrows and shrub stands to accumulate drifting snow. On wetland construction sites, grade surface contours to capture runoff and direct it into wetlands.
    - When geologically feasible, develop groundwater wells to augment surface water supplies and provide additional management capabilities for constructed wetlands.
    - Maintain existing water rights in good standing on WGFD-held lands.
    - Lease or acquire property on which water rights can be managed to enhance wildlife habitats.
    - Lease or purchase stored water (e.g., within Wheatland Reservoir Nos. 2 and 3, and Lake Hattie) to directly or indirectly enhance water supplies to wetlands.
    - Investigate potential for temporary water transfers from other users to augment water supplies on WGFD-owned and private wetlands. Such transfers may be approved for periods of up to 2 years.
    - Investigate potential for water exchanges with other users to fulfill existing water rights at times of year (e.g. early spring/late summer) that are more beneficial for wetland management. The Wyoming Water Development Program (W.S. 41-2-112) also encourages development of water facilities [in part] "for preservation and development o0f fish and wildlife resources."
    - Investigate potential for a short-term water leasing program to fulfill regional environmental water needs without sacrificing local ecological resources (Peck et al. 2003).

- File “in-stream” flow rights with present day priority dates to maintain native fish populations and sustain wetland habitats in smaller streams. These will become increasingly important in the future.
- Seek formal recognition of “wildlife habitat” as a designated beneficial use, in addition to the legislatively recognized use of “fisheries maintenance.” Wildlife habitat is currently acknowledged as a beneficial use for which a water right can be issued by policy of the respective boards of control. The statutory authorization for a Wyoming Water Development Program [W.S. 41-2-112] encourages development of water facilities (such as reservoirs), in part, “for preservation and development of fish and wildlife resources.”
- Collaborate with potential partners including Conservation Districts, Joint Ventures, Ducks Unlimited, USFWS, NRCS, WY Water Development Commission, private landowners, and local/regional conservation organizations to identify and fund projects that will maintain or enhance water delivery to existing and new wetlands within the Laramie Plains area.
- Investigate a range of potential funding sources to maintain or enhance water delivery, including North American Wetland Conservation Act, Wetland Reserve Program, Ducks Unlimited, Partners for Fish and Wildlife, Landowner Incentive Program, State Wildlife Grants, Wildlife and Natural Resource Trust, Wyoming Mineral Trust Fund, Water Development Account, energy mitigation funds, and others.
- Establish a Laramie Plains Water Management and Wetlands Working Group comprised of a part or full time coordinator and members from the landowner community, agencies, and NGOs such as sportsman groups (Tessmann 2008).

5. Developments in floodplains can alter natural ecological and geomorphic functions, especially in stream channels.
   - Maintain or restore stream channels and riparian corridors to replicate their natural form and function.
   - Support government and private conservation programs and actions that foster sustainable land management practices in riparian areas.
   - Always encourage and apply riparian best management principles.
   - Utilize conservation easements and engage in collaborative processes to avoid and mitigate development-related impacts.
   - Work with the WY Department of Transportation, County Commissioners, County Road and Bridge Departments, and Railroads to minimize and mitigate impacts of new and existing roads, tracks, bridges, and streambank stabilization projects.
   - Develop alternative recommendations for bank stabilization projects to avoid or minimize structures (such as levees, revetments, or breakwaters) and rip-rap. Support efforts to restore existing rip-rap areas to a natural condition.
   - Negotiate “sloughing conservation easements” that will allow the steam channel to naturally meander (MFWP 2005). Sloughing conservation easements have been used along the Yellowstone River in Montana. The landowner is paid to allow the river to

meander by making no attempt to stop the river's lateral movement in any manner. Lateral river movement is very important for point bar establishment and resulting cottonwood regeneration.

6. Invasive plant species and grazing management.
   - Mechanically, chemically, and biologically treat infested areas to control invasive plant species (WGFD 2009).
   - Increase financial support for coordinated resource management (CRM), weed and pest control, educational activities, and mapping efforts. Identify and pursue potential sources of funding (Pocewicz and Lathrop 2008).
   - Participate in partnerships and support efforts to eradicate or reduce the abundance of invasive or exotic species.
   - Prevent introduction and spread of noxious weeds.
   - Implement restoration efforts to return native grasses and forbs in areas infested by nonnative plants.
   - Create a stable native seed source for grass restoration (MFWP 2005).
   - Promote grazing management strategies that disperse herbivory to restore upland, riparian, and channel function. This may require exclosure (e.g., corridor and tract) fencing of riparian areas.
   - Riparian grazing plans should include diligent monitoring to assure appropriate forage utilization levels are not exceeded on a seasonal basis. This is especially important to protect cottonwood and willow regeneration.

7. Secure adequate funding to support wetland conservation efforts. Human resources will be needed to accomplish wetland conservation and should include participation from the local community area.
   - A network should be developed to connect interested citizens, landowners, and local/regional organizations with funding sources and technical expertise. The working group would meet periodically.
   - Support, or write, applications for available wetland related funding.
   - Encourage and support conservation group involvement with wetland conservation efforts in the LPWC.
   - Support the use of Farm Bill conservation programs administered by the NRCS/FSA.
   - Support additional staff resources to administer grants and/or Farm Bill conservation programs.
   - Support adequate Congressional appropriations to fund the Wetland Reserve Program, Conservation Reserve Program, Partners for Fish and Wildlife Program, Landowner Incentive Program, State Wildlife Grants, and the National Wetland Conservation Act.

8. Increase access for wetland-based recreation opportunities.
    - Develop a brochure that highlights wetland/bird viewing opportunities in the LPWC. The brochures could be distributed at motels, information booths, and chambers of Commerce.
    - Develop a brochure that describes publically-accessible lands in the LPWC. The document would provide information about the locations, boundaries, restrictions, and allowed activities.
    - Encourage additional public access through special provisions in conservation easements, leases, or other access programs.

9. Best management practices.
    - Encourage landowners, agencies and organizations with stewardship responsibilities to implement wetland and watershed "best management practices."
    - Provide technical support and assistance, and where appropriate, funding to implement BMPs.
    - Disseminate wetland and watershed BMP information through publications, bulletins, web sites, extension services, and one-on-one contacts.
    - Pertinent BMP references include: McKinstry et al. (2004), Oneale (1993), Nicholoff (2003), U.S. Environmental Protection Agency (2005), Welsch et al. (1995), Wyoming Department of Environmental Quality (1997, 1999, 2004, 2013), Brockmann (1999), Niemuth, et al. (2004), and Tessmann (2004).
    - The Wyoming Department of Environmental Quality, Water Quality Division, also maintains a Watershed Management program. The following documents can be downloaded from http://deq.state.wy.us/wqd/watershed/nps/NPS.htm:
        - Wyoming Nonpoint Source Management Plan Update
        - Hydrologic Modifications Best Management Practices
        - Grazing Best Management Practices
        - Cropland, Pasture/Hayland and Animal Waste Best Management Practices
        - Silviculture Best Management Practices
        - Urban Best management Practices for Nonpoint Source Pollution
        - Wyoming Statewide Wetland Mitigation Bank Guidelines for Interpretation and Implementation. http://deq.state.wy.us/wqd/watershed/Downloads/Wetlands/wet_guidelines.pdf

10. Expansion of Hutton Lake and Mortenson NWRs. Secure permanent conservation easements from willing landowners, and develop partnerships and agreements with federal land management agencies, State Land Board and private landowners to protect adjacent wetland and riparian habitat.
    - Negotiate longer-term conservation agreements to protect wetlands and surrounding upland buffers on private lands adjacent to the Hutton Lake and Mortenson National Wildlife Refuges.
    - Negotiate additional water rights from willing sellers.

11. Riparian corridor restoration.
    - Reconnect detached habitats. In streams that have been hydrology altered by stabilized flows and where levees have been constructed, reconnecting oxbows, side channels, and backwaters to the active channel can raise the water table and sustain healthier riparian vegetation (WGFD 2009).
    - Coordinate with Ducks Unlimited to identify and promote viable new wetland projects as part of the Northern and Southern Rockies/Colorado Plateau conservation priority areas.
    - Coordinate with the NRCS/ USFWS Partners for Fish and Wildlife Program to identify and promote additional wetland projects on private lands.
    - Encourage projects that will provide additional public access for wetland-based recreation. Such projects can be constructed on accessible public lands, Department-managed lands, or private lands under agreement, such as lands enrolled in the Department's Public Lands / Private Wildlife Program.
    - Work with partners and willing landowners to manage and restore beaver populations needed to recover and maintain riparian and stream habitat conditions.
    - Through extension/outreach programs of the WGFD, USFWS, NRCS, and DEQ/WQD, provide technical and financial assistance to implement wetland and watershed best management practices on private lands.
    - Adjust management regimes including water level manipulations and farming practices, as necessary to achieve management objectives and optimize productivity.
    - Wetland projects should incorporate fencing and other control features to manage livestock distribution and public use.
    - Use riparian fencing to protect vegetation and improve grazing management options. Fencing is often the only thing needed to recover and dramatically improve riparian habitat conditions. If management changes are insufficient to achieve desired results, reclamation may be necessary. Plant grasses, shrubs, and trees appropriate for the ecological site and its elevation.
    - Leave riparian buffers undisturbed whenever possible. Healthy riparian zones absorb and store large quantities of water, providing healthy vegetation that in turn protects riparian soil and the stream system. Once this sensitive balance has been lost from a disturbed riparian zone, it can take a very long time to recover. Work with the City and County Planning and Zoning to recognize the importance of riparian zones and limit actions/developments that harm this valuable habitat type.
    - Riparian habitat should also be protected from fires used to clear vegetation from irrigation ditches and remove residual crop residue. Invasive species often replace the more desirable native vegetation in frequently burned areas.

12. Discourage culverts, dams, irrigation diversions, and other in-stream structures that fully or partially impede fish movement and reduce connectivity of habitat.
    - Remove or modify barriers to restore passage for native fish.

- Screen or modify irrigation diversions and other water intakes in a manner that prevents entrainment of fishes (MFWP 2005).

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