GOSHEN (LOWER NORTH PLATTE) WETLANDS COMPLEX

Regional Wetlands Conservation Plan

Goshen Wetlands Working Group

Wyoming Bird Habitat Conservation Partnership

Version 1.2

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Table of Contents

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

ACEP. . . . . Agricultural Conservation Easement Program
ALE. . . . . Agricultural Land Easement (replaces GRP, FRPP under the ACEP)
BLM . . . . . U.S Bureau of Land Management
BMP. . . . . Best Management Practice
BOC . . . . . Board of Control (State Engineer's Office)
CRP . . . . . Conservation Reserve Program
CWA . . . . . Federal Clean Water Act of 1972
DEQ . . . . . WY Department of Environmental Quality
DEQ/WQD. . . . . DEQ Water Quality Division
DU . . . . . Ducks Unlimited
EPA . . . . . U.S. Environmental Protection Agency
EQIP. . . . . Environmental Quality Incentives Program
GWC . . . . . Goshen Wetlands Complex
IWJV . . . . . Intermountain West Joint Venture
LWCF . . . . . Land and Water Conservation Fund
NAWCA . . . . . North American Wetland Conservation Act
NGO. . . . . Nongovernmental Organization
NGPJV. . . . . Northern Great Plains Joint Venture
NPS . . . . . Nonpoint Source
NRCS . . . . . Natural Resources Conservation Service
PFW . . . . . Partners for Fish and Wildlife
PIF . . . . . Partners in Flight
SCORP . . . . . Statewide Comprehensive Outdoor Recreation Plan
SEO . . . . . WY State Engineer's Office
SGCN . . . . . Species of Greatest Conservation Need
SWANCC. . . . . Solid Waste Agency of Northern Crook County, Illinois
SWAP . . . . . State Wildlife Action Plan
SWG . . . . . State Wildlife Grants
TNC. . . . . The Nature Conservancy
USACE or COE . . . . . U.S. Army Corps of Engineers
USDA . . . . . U.S. Department of Agriculture
USFWS. . . . . U.S. Fish and Wildlife Service
USGS . . . . . U.S. Geological Survey
UW. . . . . University of Wyoming
WGFD. . . . . Wyoming Game and Fish Department
WHIP . . . . . Wildlife Habitat Incentives Program
WHMA. . . . . Wildlife Habitat Management Area
WPDG . . . . . Wetland Program Development Grant
WRE. . . . . Wetland Reserve Easement (replaces WRP under the ACEP)
WRP. . . . . Wetlands Reserve Program
WWNRT. . . . . Wyoming Wildlife and Natural Resource Trust Account
WY . . . . . Wyoming

INTRODUCTION

The Goshen Wetlands Complex (GWC) encompasses the North Platte River Corridor and a low-lying basin known as Goshen Hole in central and southern Goshen County, southeast Wyoming (Fig. 1). The GWC is the westernmost extension of the Platte River / Rainwater Basin Area of Continental Significance identified in the North American Waterfowl Management Plan (NAWMP 2012, Soulliere et al. 2012). The region is an important migration corridor and mid-latitude stopover habitat for waterfowl, waterbirds, and numerous other avian species. Orabona et al. (2016) reported breeding by 12 species of ducks and 19 species of waterbirds and shorebirds within GWC. At least 56 vertebrate species of greatest conservation need use the area's wetlands, riparian and riverine habitats (WGFD 2017a). The GWC also received one of the highest species diversity rankings in a wetland assessment study by The Nature Conservancy (Copeland et al. 2010). For these reasons, the GWC has been identified as one of 9 priority complexes in Wyoming that warrant conservation emphasis (WY Joint Ventures Steering Committee 2010). The GWC is also the State's most important waterfowl hunting location in terms of hunters, total harvest, and recreation days. The region has high recreation value due to its proximity to the State's major population centers including cities of Cheyenne, Laramie, Wheatland, and Torrington. Several agencies and organizations are involved in ongoing wetland and riparian habitat conservation efforts within the GWC. Those efforts include wetland construction and enhancement, outreach and technical assistance, easement purchases, and conservation incentives. Major purposes of this regional plan are to characterize the landscape and wetlands of the GWC, outline conservation objectives and strategies, identify resources to accomplish those objectives, and enhance collaboration and conservation delivery by key partners.

GENERAL DESCRIPTION AND LAND USE

The exterior boundary of the GWC encompasses 491 mi^2. Goshen Hole is among the lowest elevations of Wyoming, ranging from 4,000-4,600 ft above sea level. Topography is level to gently rolling, bounded by escarpments (Goshen Rim) rising approximately 500 ft on the south and west sides. Average annual rainfall is 14-16 inches and the average growing season is 121-140 days (Curtis and Grimes 2004). Soils originate predominantly from sand and clay outwash or "pediments" transported by prevailing winds and surface runoff from the escarpments (e.g., Bear Mountain and Sixty-six Mountain) on the south and west (Adams 1902, Rapp et al. 1957). GWC also includes the alluvial floodplain of the lower North Platte River from the Wyoming-Nebraska state line upstream to Guernsey Reservoir.

The dominant land use is agriculture, predominantly irrigated and non-irrigated crops and native rangeland. Based on the 2012 agricultural census approximately 96% of Goshen County is in farm ownership (USDA 2014). Lands classified as cropland, encompass 17% of the county area, Harvested crops are grown on slightly over half (53%) of the cropland. About 45% of the available cropland is irrigated. Livestock forage (hay, grass) is the dominant crop, accounting for

48% of the total harvested cropland. Wheat and corn account for 15% and 27%, respectively. The remaining 10% is comprised of dry edible beans, sugar beets, oats, barley, and sunflowers. Substantial acreages are enrolled in the Conservation Reserve Program (CRP). As of September, 2017, 75,055 acres were enrolled in active CRP contracts in Goshen County (Source: USDA Farm Service Agency – CRP Enrollment by County: https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/Conservation/Excel/CRP%20Rental%20Payment%20History%20By%20County1.xlsx?CRP+Rental+Payment+History+by+County). When the first version of this plan was completed in 2014, 106 additional acres were enrolled in the Wetland Reserve Program (WRP). The WRP was repealed in 2014 and replaced by the Agricultural Conservation Easement Program (ACEP). ACEP consolidated the former Farm and Ranch Lands Protection Program (FRPP), Grassland Reserve Program (GRP), and WRP. Current figures on Wetland Reserve Easements through the ACEP are unavailable online.

Ecological Cover Types

Herbaceous planted and cultivated fields are the dominant ecological cover type in the Goshen Hole region (Comer et al. 2003). Natural cover types include remnants of Northwestern Great Plains Mixedgrass Prairie and stringers of Western Great Plains Riparian/Floodplain. Undisturbed sites in good condition are dominated by fescues (*festuca spp.*), western wheatgrass (*Pascopyrum smithii*), and needlegrass (*Nassella spp.*). Shrub components include snowberry (*Symphoricarpos spp.*), fringed (prairie) sagewort (*Artemisia frigida*), and sand sage (*Artemisia fillifolia*). Cottonwood (*Populus deltoides*) and willow (*Salix spp.*) dominate wooded areas along the larger streams and the North Platte River. Native species within the riparian understory include Switchgrass (*Panicum virgatum*) and big bluestem (*Andropogon gerardii*). Cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola spp.*), and annual forbs typically invade upland sites that are disturbed or in poor condition. Salt cedar (*Tamarix spp.*), Russian olive (*Elaeagnus angustifolia*), Canada thistle (*Cirsium arvense*), and smooth brome (*Bromus inermis*) often dominate in degraded riparian sites.

Hydrology

Horse Creek is the principal watershed draining most of Goshen Hole. This perennial stream originates in the southern foothills of the Laramie Mountain Range and flows generally north and east, joining the North Platte River approximately 5 mi east of the Wyoming-Nebraska line. Bear Creek and Fox Creek are major tributaries with watersheds extending south and west of the GWC. Other tributaries include Dry Creek, Cherry Creek, Corn Creek, Lone Tree and Box Elder Creek, all intermittent prairie streams. The average annual discharge of Horse Creek at Lyman, Nebraska near the Wyoming State Line is 54,200 acre-ft based on stream gauging records since 1931. (Source: USGS/Neb. Dept. Nat. Res. flow records available at: http://dnrdata.dnr.ne.gov/Canal/Stream/Monthly.asp?ids=06677500). Annual discharges have exceeded 40,000 acre-ft during 75% of the years of record. Peak average monthly discharges of 9,608 and 9,751 acre-ft occur during June and September, respectively. January is the low

discharge month, averaging 1,547 acre-ft. Flows in Horse Creek are influenced heavily by irrigation withdrawals and return flows during summer months.

Wetlands and Other Water Resources

Prior to settlement, the wetlands of Goshen Hole were predominantly scattered springs and seeps, intermittent pools and oxbows along prairie streams, and isolated playas formed by wind action. Rapp et al. (1957) described the surface in many places as mantled with slope-wash material, which is pockmarked by windblown depressions. Since the beginning of the 20th century, human activities have both eliminated and created wetlands in the region. Overall, the number of semi-permanent and permanent palustrine wetlands has likely increased due to the influence of irrigation projects, reservoir construction, and habitat areas developed through various federal and state programs (Fig. 1).

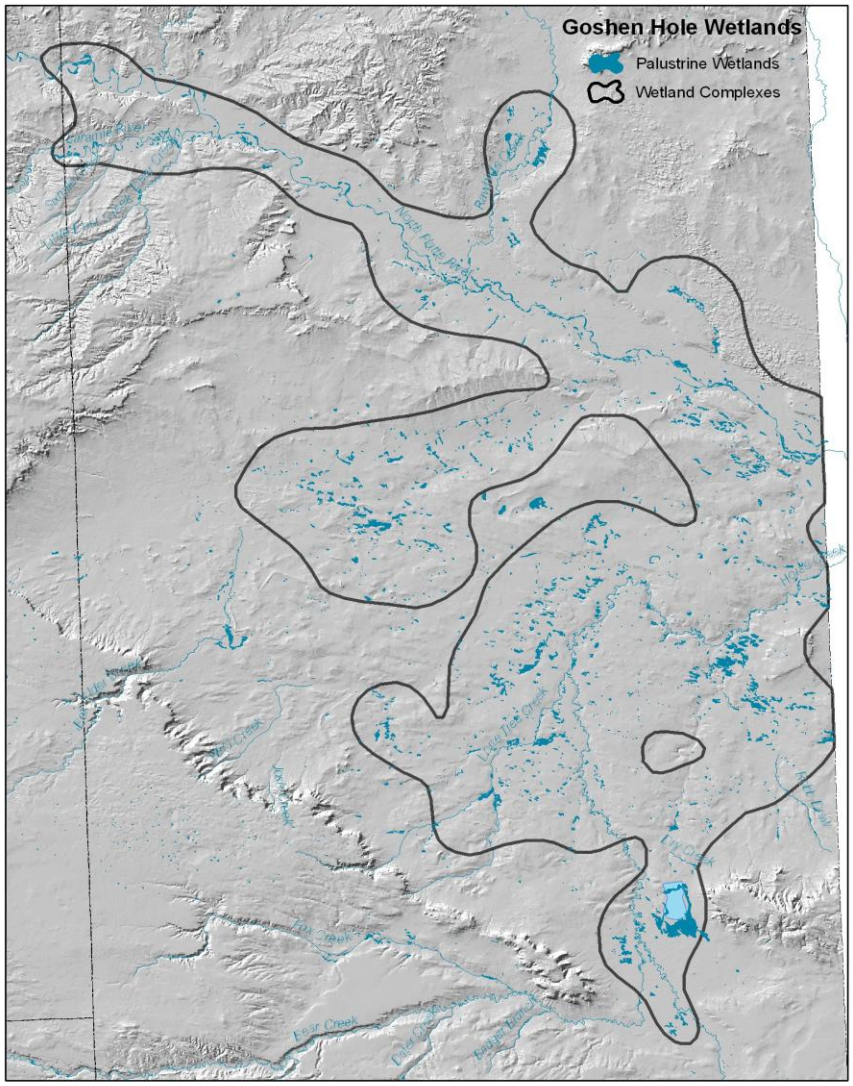

Fig. 1. GWC (from Copeland et al. 2010).

The irrigation canals and distribution systems were largely completed in the early 1900s (Fig. 2). The Fort Laramie Canal, which diverts flow from the North Platte River into the northern portions of Goshen Hole, was completed in 1929. The central and southern portions of Goshen Hole are irrigated by diversions from Horse Creek and its tributaries. The Horse Creek Diversion was completed in 1923. Hawk Springs Reservoir, with a surface area of 1,280 acres and capacity of 16,735 acre-ft, is the largest storage facility . Surface areas and capacities of the larger reservoirs in Goshen Hole are summarized in Table 1.

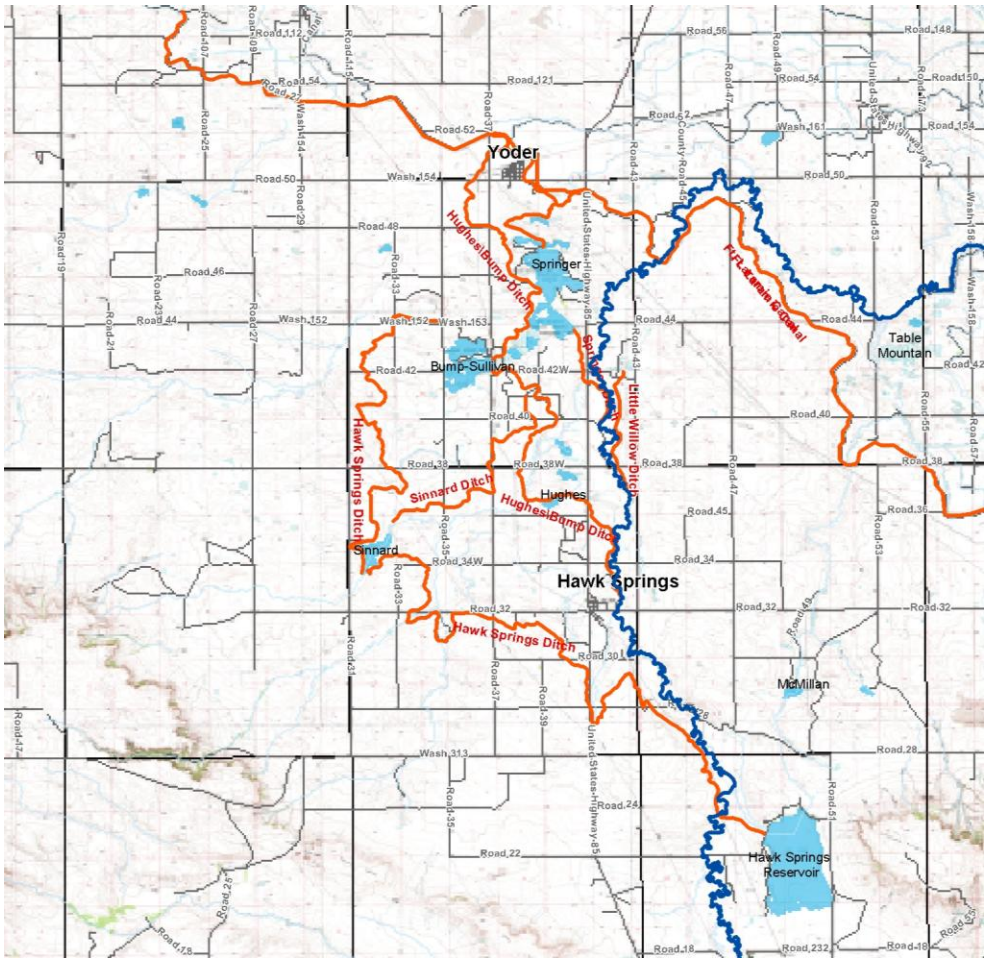

Fig. 2. Horse Creek irrigation system and eastern segment of the Fort Laramie Canal.

Wetlands associated with irrigation include margins of storage reservoirs, seepage areas along canals and ditches, and natural or constructed basins that capture return flows from flood-irrigated fields and pastures. In some cases, irrigation runoff augments flows within streams that were historically dry by mid-summer, thereby extending the flow period and sustaining enhanced wetland hydrology. Wetlands that existed prior to 1980 are reflected in the National Wetland Inventory (NWI) database for Goshen County. However, the NWI database does not include wetlands built since then.

Numerous wetlands have been built or enhanced on Wildlife Habitat Management Areas (WHMAs) owned by the Wyoming Game and Fish Commission, and on private lands in conjunction with Farm Bill programs administered through the Natural Resource Conservation Service (NRCS), and the Partners for Fish and Wildlife Program administered through the U.S. Fish and Wildlife Service (USFWS). Ducks Unlimited (DU) has also designed, built, and funded several wetland projects on WHMAs and private lands in Goshen Hole.

The composition of palustrine wetlands within the GWC, based on 1980 imagery, is summarized in Table 2. Since 2000, roughly 400 acres of wetland habitat and more than 1,000 acres of upland habitat have been restored through the effort of partners including DU, NRCS, USFWS, and WGFD (Mark Hogan, *pers*. *comm*.).

Table 1. Large reservoirs in the Goshen Complex.

Facility Name	Surface Area (at capacity)	Capacity	Uses
Hawk Springs Reservoir	1,280 acres	16,735 acre-ft	irrigation storage, fisheries, waterfowl refuge, public recreation
Springer (Goshen Hole) Reservoir	681 acres	5,183 acre-ft	irrigation storage, fisheries, waterfowl refuge, public recreation
Bump-Sullivan (Goshen Nos. 1&2) Reservoir	150 acres	1,929 acre-ft	irrigation storage, fisheries, waterfowl hunting, public recreation
Glomill (Miller) Reservoir	260 acres	1,561 acre-ft	private lake, irrigation storage, fisheries, waterfowl hunting
Sinnard Reservoir	100 acres	1,540 acre-ft	private lake, irrigation storage, fisheries, waterfowl hunting
Packer Lake	80 acres	255 acre-ft	irrigation storage, fisheries, waterfowl hunting, public recreation
TOTALS	**2,551 acres**	**27,203 acre-ft**	

Table 2. Surface areas of wetlands based on NWI classifications in the GWC (Tibbets et al. 2016).

NWI Code	NWI Wetland and Waterbody type	Area of Wetlands and Waterbodies Identified by the NWI (Acres)	Percent of GWC Area
PFO	Forested Wetland	257	0.08%
PEM	Freshwater Emergent Wetland	5760	1.83%
PAB	Freshwater Pond	535	0.17%
L1/2	Lake	1,147	0.37%
R2/3/4	Riverine	1.138	0.36%
PSS	Shrub Wetland	447	0.14%
PUB/US	Unconsolidated Bottom/Shore	385	0.12%
Totals		9669	3.08%

Managed Wetlands and Riparian Habitats

The Wyoming Game & fish Department (WGFD or "Department") manages three Wildlife Habitat Management Areas (WHMAs) within the GWC. Extensive wetland areas have been built on Springer and Table Mountain WHMAs. Rawhide WHMA encompasses a riparian tract along a 6 mile reach of the North Platte River between Torrington and Lingle.

Springer WHMA. The Springer WHMA is located 15 miles south of Torrington. Springer was acquired in 1948 to establish a waterfowl refuge and provide upland habitat and pheasant hunting opportunities. The existing WHMA encompasses 2,413 acres including 1,331 acres under fee title ownership, 600 acres managed by the U.S. Bureau of Land Management, and 482 acres of easements across private property. (Lands under BLM ownership are in the process of being transferred to the Wyoming Game and Fish Commission). Two reservoirs, Springer and Bump-Sullivan, serve both as waterfowl habitat and irrigation storage (Table 1). Extensive wetlands have been built on the area since the mid 1970s, including several that were established as mitigation for the Cheyenne Stage II Water Project. At least 8 diked wetland basins cover approximately 160 acres. Ducks Unlimited was a partner in the construction of several wetlands known as the "Welnitz Ponds." Numerous species of waterfowl and shorebirds nest on the Springer WHMA and additional species rest, feed and stage there during migration. A substantial portion of the WHMA, including Springer Reservoir, becomes a refuge for a large population of wintering Canada geese after it is closed to waterfowl and pheasant hunting in mid-November each year.

Table Mountain WHMA. Table Mountain WHMA is located 15 miles southeast of Torrington. Table Mountain was established in 1962 to provide public hunting opportunity and year round habitat for waterfowl and upland game birds. The existing WHMA encompasses 1,736 acres including 175 acres under fee title ownership and 1,561 acres managed by the U.S. Bureau of

Land Management. (Lands under BLM ownership are being transferred to the Wyoming Game and Fish Commission). The WHMA contains 189 acres of ponds and 245 acres of wetlands consisting of at least 11 basins. Several wetlands were constructed in a cooperative project with Ducks Unlimited. A variety of waterfowl and shorebirds nest on this WHMA and many additional species rest, feed, and stage there during migration. A portion of Table Mountain (Pond 1) is closed to hunting after mid-November to provide a secure rest area used by several thousand wintering Canada geese and mallard ducks.

Rawhide WHMA. Rawhide WHMA is located along the North Platte River 2 miles south of Lingle. Lands comprising the WHMA were originally acquired in the late 1970s to mitigate riparian habitat inundated by construction of Grayrocks Reservoir on the Laramie River. The Rawhide WHMA encompasses 807 acres under fee title ownership and 11 acres of access easements. The major purposes of this WHMA are to conserve native riparian habitat and associated wildlife, and to provide hunting, fishing, and wildlife viewing opportunities for the public. Over 6 river miles and the confluence of Rawhide Creek provide year round habitat for waterfowl, upland game birds, and a variety of nongame birds. Wetlands include shallow backwaters along the North Platte River and several oxbows off the main channel. This stretch of river is an important corridor and rest area for ducks and geese that migrate through SE Wyoming, and it provides open water for wintering waterfowl. The lower North Platte River is also an important migration corridor for shorebirds and neotropical migratory birds.

Waterfowl Refuges. Historically, the Department established several seasonal hunting closures to create security areas for ducks and geese within the GWC. Most have persisted to the present day. Hawk Springs Reservoir has been closed to waterfowl hunting since at least 1949; Springer Reservoir since 1950; Table Mountain Pond No. 1 since 1964; Miller (Glomill) Lake since 1965; and the North Platte River between the 2 crossings of Hwy 157 (upstream from the Rawhide WHMA) since 1979. Sinnard Reservoir was closed beginning in 1963, but the closure was removed in 1999 at the landowner's request.

Private Lands Program. The U.S. Fish and Wildlife Service (USFWS) and Natural Resources Conservation Service (NRCS) have supported wetland projects on private lands through several cost share programs. These include the Wetlands Reserve Program (WRP, consolidated into the ACEP after 2014), Partners for Fish and Wildlife (PFW), and Wildlife Habitat Incentives Program (WHIP) among others. Approximately 4,000 acres of private lands in the Goshen Hole area are currently enrolled in management agreements with 50 individual cooperators (Fig. 3). Roughly 30% (1,200 acres) of this area is wetland and the remainder is upland buffers. The hydrology of most constructed wetlands on private lands (about 85%) depends on irrigation runoff or enhanced groundwater table.

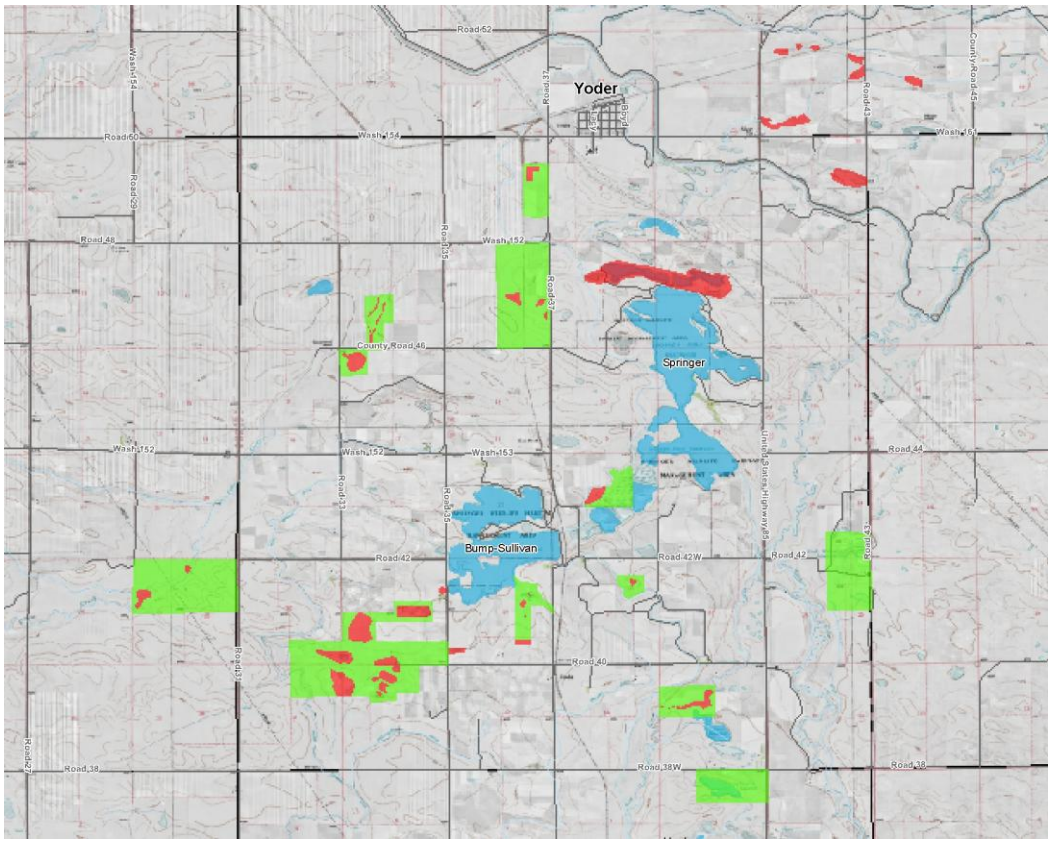

Fig. 3. Lands under USFWS Partners' program agreements in Goshen Hole.

WETLAND-ASSOCIATED WILDLIFE

Goshen Hole contains habitat for the Preble's meadow jumping mouse (*Zapus hunsonius preblii*), currently listed as "threatened," and wet meadow habitat for the threatened Ute's Ladies'-tresses (*Spiranthes diluvialis*) (Mark Hogan, *pers*. *comm*.). The USFWS Partners for Fish and Wildlife program has focused on restoring wetlands and adjacent upland habitats (shortgrass prairie) for an assortment of ground nesting species including Mountain plovers (*Charadrius montanus*), McCown's longspur (*Rhynchophanes mccownii*), Bobolinks (*Dolichonyx oryzivorus*) and a variety of waterbirds. The Wyoming State Wildlife Action Plan (WGFD 2017a) identifies 56 vertebrate species of greatest conservation need (SGCN) that utilize wetland, riparian, and stream habitats in the Goshen Hole area (Table 3).

Table 3. Species of greatest conservation need (WGFD 2017a) that use wetland, riverine or riparian habitats in the GWC.

Birds

American Bittern * (*Botaurus lentiginosus*)
American White Pelican (*Pelecanus erythrorhynchos*)
Bald Eagle * (*Halaieatos leucocephalus*)
Bewick's Wren (*Thryomanes bewickii*)
Black-billed Cuckoo * (*coccyzus erythropthalmus*)
Black-crowned Night-Heron * (*Nycticorax nycticorax*)
Black Tern (*Chlidoniuas niger*)
Blue Grosbeak * (*Passerina caerulea)*
Caspian Tern (*Hydropogne caspia*)
Cattle Egret (*Bubulcus ibis*)
Clark's Grebe (*Aechmophorus clarkia*)
Common Loon (*Gavia immer*)
Common Yellowthroat * (*Geothlypis trichas*)
Forster's Tern (*Sterna forsteri*)
Franklin's Gull (*Leucophaeus pipixcan*)
Great Blue Heron * (*Ardea herodias*)
Lewis's Woodpecker * (*Melanerpes lewis*)
Long-billed Curlew * (*Numenius americanus*)
MacGillivray's Warbler * (*Geothlypis tolmiei*)
Merlin (*Falco columbarius*)
Mountain Plover * (*Charadrius montanus*)
Purple Martin (*Progne subis*)
Red-eyed Vireo (*Vireo olivaceus*)
Snowy Egret (*Egretta thula*)
Upland Sandpiper * (*Bartramia longicauda*)
Virginia Rail * (*Rallus limicola*)
Western Grebe * (*Aechmophorus occidentalis*)
White-faced Ibis (*Plegadis chihi*)
Willow Flycatcher (*Epidonax traillii*)
Yellow-billed Cuckoo * (*Coccyzus americanus*)

Mammals

Eastern Red Bat (*Lasiurus borealis*)
Little Brown Myotis (*Myotis lucifigus*)
Long-eared Myotis (*Myotis evotis*)
Long-legged Myotis (*Myotis volans*)
Meadow Jumping Mouse (*Zapus hudsonius*)
Northern Long-eared Myotis (*Myotis septentrionalis*)
Preble's Meadow Jumping Mouse (*Z. hudsonius preblei*)
Townsend's Big-eared Bat (*Coprynorhinus townsendii*)
Western Small-footed Myotis (*Myotis ciliolabrum*)

Reptiles

Eastern Spiny Softshell (Apalone spinifera spinifera)
Plains Garter Snake (*Thamnophis radix*)
Prairie Racerunner (*Aspidoscelis sexlineata viridis*)
Red-sided Garter Snake (*Thamnophis sirtalis parietalis*)
Smooth Green Snake (*Opheodrys vernalis*)
Western Painted Turtle (*Chrysemys picta belli*)

Amphibians

Great Plains Toad (*Anaxyrus cognatus*)
Northern Leopard Frog (*Lithobates pipiens*)
Plains Spadefoot (*Spea bombifrons*)
Western Tiger Salamander (*Ambystoma mavortium*)

Fish

Bigmouth Shiner (*Notripis dorsalis*)
Brassy Minnow (*Hybognathus hankinsoni*)
Central Stoneroller (*Campostoma anomalum*)
Common Shiner (*Luxilus cornutus*)
Flathead Chub (*Hybopsis gracilils*)
Goldeye (*Hiodon alosoides*)
Iowa darter (*Etheostoma exile*)
Northern Plains Killifish (*Fundulus kansae*)
Orangethroat darter (*Etheostoma spectabile*)
Plains Topminnow (*fundulus sciadicus*)
Sauger (*Sauger Canadensis*)
Shovelnose Sturgwon (*Scaphirhynchus platorynchus*)
Suckermouth Minnow (*Phenacobius mirabilis*)

***Bird species known to breed in the GWC (based on Orabona et al. 2016).**

The Wyoming Game and Fish Department conducted duck breeding pair surveys from the early 1950s through 1999 based on a stratified random sample design consisting of 58 count blocks throughout the state. The Yoder count block (72 mi^2) is located in the west central portion of the GWC. Based on surveys conducted from 1970-1999, the average density of duck breeding pairs in the Yoder count block ranked 3rd in the state (13.6 indicated pairs per mi^2), and 2nd when tallied for dabbling duck species (8.8 indicated pairs per mi^2). Seventeen species of ducks have been documented in the area. The most common are mallard (*Anas platyrhyncos*), teal [blue-winged (*Anas discors*), green-winged (*Anas carolinensis*), and cinnamon (*Anas cyanoptera*) combined], northern pintail (*Anas acuta*), gadwall (*Anas strepera*), and northern shoveler (*Anas clypeata*) in decreasing order of abundance. A substantial wood duck population also breeds in the area based on captures during summer duck banding operations in 2016 and 2017. The Department suspended breeding pair counts after 1999 due to budget constraints and because Wyoming is not within the traditional survey area the USFWS uses to monitor continental breeding populations and habitat conditions.

Northern pintails are a species of concern nationally due to declining populations. Haukos et al. (2006) documented the Goshen Complex is an important spring stopover area used by pintails that winter along the Rio Grande River, New Mexico.

Over 200,000 Canada geese (*Branta canadensis*) from the Hi-Line and Short Grass Prairie populations migrate through Goshen Hole during the fall/winter period and a substantial number of Hi-Line geese overwinter there in typical years. On average, >26,000 dark geese have been counted in the Goshen Hole region during mid-winter waterfowl surveys since 2001 (WGFD 2005, 2010, 2017b). A high count of 68,424 was recorded in January, 2014. Over 30,000 ducks, mostly mallards, are also counted annually. Over 100,000 snow (*Chen caerulescens*) and Ross' (*Chen rossii*) geese stage in Goshen Hole during return migration in March through early April each year.

OTHER PLANS AND INITIATIVES IN GOSHEN COUNTY

Ducks Unlimited's Platte River/Rainwater Basin Initiative

http://www.ducks.org/conservation/platte-river-and-rainwater-basin/platte-river-and-rainwater-basin-initiative

The GWC is within Ducks Unlimited's Platte River Initiative. This focal area has enormous importance to migrating waterfowl and shorebirds, and is part of DU's Southern Great Plains priority area. DU's business plan for SE Wyoming outlines work the organization expects to accomplish in upcoming years.

DU has restored over 8,656 acres of wetlands and associated uplands in Goshen County. DU is able to hold conservation easements through its land trust, Wetlands America Trust (WAT). As of 2018, WAT holds two easements in Wyoming, both in Goshen County, totaling 168 acres. WAT also has a revolving land program whereby DU holds fee simple properties of high

conservation value for a period of 5 years before they are revolved out to conservation buyers. Currently WAT holds one property in Goshen County encompassing 342 acres. For many years, DU's programmatic focus has been to provide technical assistance to landowners and agencies, and in some cases, funds to restore wetlands. Now, the program is highly focused on restoration and enhancements throughout Wyoming, with Goshen County remaining a priority.

Focus on a specific landscape has already had positive impact on wetland conservation with more than $6 million generated for wetland improvement projects to date within the GWC (DU 2017). Success depends on diverse partnerships with local landowners, state agencies, and other conservation organizations, and a focused mission. The program also depends on DU to deliver projects with dedicated staff rather than disbursing funds to other organizations as in the past.

Water quantity and quality are crucial to the future of wetlands. DU will work with the state and other organizations to assure water is available for wildlife through wetlands. In 2009, DU was awarded a grant from the WGFD Habitat Trust Fund to identify additional sources of water for wetland restoration, management and maintenance at Table Mountain and Springer WHMAs. A final report was released in 2012. The report analyzed 12 alternatives and concluded 3-4 options have potential to substantively improve water availability and management on the WHMAs (AVI 2012).

DU anticipates wetland restoration programs will grow in the county as news of successful projects proliferates through local talk. In 2017, DU was awarded a $1 million Standard NAWCA grant (Pathfinder Partnership). Funds have been used in part to complete critical infrastructure rehabilitation at Table Mountain WHMA and to secure water rights at Bump-Sullivan Reservoir on the Springer WHMA. Over the next several years, DU will continue to partner with WGFD to pursue implementation of additional wetland conservation projects in Goshen County and elsewhere. DU is planning to apply for a second standard NAWCA grant, Pathfinder Partnership II, to continue work in southeast Wyoming

DU Wetland Specialist Position

WGFD has identified a dedicated staff position as a capacity building priority for wetland conservation and management in Wyoming. In 2016, WGFD was awarded a 2-year grant to fund a wetland biologist position that will engage in program building activities, including conservation planning and technical support services. The position is subcontracted through Ducks Unlimited. Funding was obtained through the U.S. Environmental Protection Agency (EPA) Wetland Program Development Grants (WPDGs) – See: https://www.epa.gov/wetlands/wetland-program-development-grants. While the position has statewide responsibilities, substantial attention is given to the GWC. Prescriptive wetland management, restoration and enhancement plans will be a major work product, and will include plans developed for the Table Mountain and Springer WHMAs. The position also completed a statewide Wetland Program Plan for voluntary restoration and protection that was approved by

EPA in February, 2018. The program plan will give the state access to additional funding (Tier 1 funding) for eligible wetland program development activities. A system is also being developed to track wetland restoration and protection projects. WGFD is applying for a second 2-year grant in 2018 to continue supporting the position and further build the State's wetland program.

USFWS Partners for Fish and Wildlife Program

The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife (PFW) Program was established in 1987 to promote on-the-ground wetland restoration projects on private lands. The Wyoming program description can be downloaded from: https://www.fws.gov/mountain-prairie/refuges/wyomingPFW.php

The Partners Program identifies 9 focus areas in Wyoming where the majority of staff time is expended to implement conservation projects (USFWS 2017). The focus areas include Wind River, Goshen Hole, Bear River, Laramie Plains, Upper Green River, Upper Sweetwater/Red Desert, Powder/Tongue River, Laramie Plains, and Black Hills Mixed Grass focus area. Prior to the PFW 2012 strategic plan, Partners staff expended approximately 70% of their time in two staffed focus areas – Wind River and Goshen Hole. The remaining 30% was allocated among the other 6 focus areas. With relocation of Partners staff from Goshen Hole to the Laramie Plains and assignment of additional staff to the Bear River, staff time and attention has shifted more to those areas. The WY Partners Program is also investing staff resources heavily in the Sage-grouse Initiative [https://www.sagegrouseinitiative.com/].

The current PFW strategic plan (USFWs 2017) contains updated 5-year targets (through 2021) for each focus area. Cumulative statewide goals are to restore/enhance: 1,145 acres of wetlands; 71,000 acres of upland habitat; 65 miles of riparian habitat; and 12.1 miles of in-stream habitat. Current 5-year targets for Goshen Hole are to restore/enhance 20 acres of wetlands, 500 acres of uplands (sagebrush, aspen), and 1.0 miles of riparian/stream.

Intermountain West Joint Venture (IWJV)

Habitat Joint Ventures are intended to provide Joint Venture partnerships with a roadmap for the protection, restoration, enhancement, and management of habitat needed to support populations of birds at desired levels. [https://iwjv.org/2013-implementation-plan]. A major purpose of the Wyoming Coordinated 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 Wyoming Implementation Plan can be downloaded from: https://iwjv.org/sites/default/files/wy_coord_imp_plan.pdf. The GWC is one of 48 priority bird habitat conservation areas identified in the plan. The plan does not provide Specific conservation goals for Goshen Hole and other individual conservation areas. Instead, goals are listed at the statewide level. Through its capacity grants program, IWJV provided over $200,000 to support wetland program building in Wyoming. Three capacity grants (a project readiness

assessment and two grants funding a DU/NRCS cooperative position) have supported wetland conservation efforts within the GWC.

As of this plan update, NAWCA funding for wetland conservation within the Goshen Complex has exceeded $1 million. In 2008 Ducks Unlimited was awarded a $75,000 small grant (Wyoming North Platte Wetlands Initiative) to restore and enhance degraded seasonal wetlands, intermittent streams and warm-water sloughs in the Goshen area. [https://www.fws.gov/birdhabitat/Grants/NAWCA/Small/Wyoming.shtm].
DU has also received three multi-state, NAWCA Standard U.S. grants of $1 million each (Platte River Wetlands Partnership I, II and III). The multi-state grant area involves the South and North Platte River confluence region predominantly within the Playa Lakes Joint Venture, but also includes Goshen County, WY. Some funding from the three standard grants has been used to support wetlands work in Goshen CO.
[http://www.fws.gov/birdhabitat/Grants/NAWCA/Standard/US/Wyoming_Std.shtm].
In 2017, DU was awarded a $1 million Standard NAWCA grant (Pathfinder Partnership I), which included funding to rehabilitate wetland infrastructure and to secure wetland water rights within the GWC. [https://www.fws.gov/migratorybirds/pdf/grants/nawcaprojects160908.pdf].
A second application is planned to fund phase 2 of the Pathfinder Partnership projects.

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 Goshen Hole Wetland Complex is within Bird Conservation Region 18 (Shortgrass Prairie). The 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 are described in the plan and could improve wetland conditions for priority species if implemented within the GWC. The Wyoming Bird Conservation Plan can be accessed at: https://wgfd.wyo.gov/Wildlife-in-Wyoming/More-Wildlife/Nongame-Birds/Bird-Conservation-Plan.
The wetland component can be downloaded from:
https://wgfd.wyo.gov/WGFD/media/content/PDF/Wildlife/Nongame/Birds/WYBCP_WETLANDS.pdf.

Wyoming 2017 State Wildlife Action Plan

The State Wildlife Action Plan (SWAP) is a long-range plan to conserve Wyoming's Species of Greatest Conservation Need (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 et al. 2005, 2007) for the ecological systems (Comer et al. 2003) mapped within Wyoming. The Goshen Hole Wetland Complex received a comparatively low habitat quality or "condition" score. This is not unexpected because the ranking system is

based on departure from natural or undisturbed conditions, and this watershed has been extensively converted to cultivated cropland. Wetlands in Goshen Hole area are also considered highly vulnerable to development impacts. However, 30 of the 33 avian SGCN that utilize wetlands and riparian habitats have been observed within the GWC and 15 are known to breed there (WGFD 2017a, Orabona et al. 2016). Eleven of the 17 mammalian SGCN that utilize wetlands have also been documented within the Goshen Complex. The GWC, including the Lower North Platte River, has been identified as a key habitat area based on presence of avian and mammalian SGCN (WGFD 2005:86, Oakleaf et al. 1996). The SWAP does not provide conservation objectives or actions specific to the GWC.

The 2017 State Wildlife Action Plan can be downloaded from: https://wgfd.wyo.gov/Habitat/Habitat-Plans/Wyoming-State-Wildlife-Action-Plan.

The wetland component can be downloaded from: https://wgfd.wyo.gov/WGFD/media/content/PDF/Habitat/SWAP/Terrestrial%20Habitat%20Types/Wetlands.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.

TNC completed a statewide inventory of wetlands throughout Wyoming (Copeland et al. 2010). The project was funded through the EPA's Section 319 nonpoint source program. A major objective was to provide a decision support system for determining where to focus habitat conservation, management, and enhancement efforts in Wyoming. Information from the study was also used to develop a wetland component for the 2010 State Wildlife Action Plan (WGFD 2010), subsequently updated in the 2017 State Wildlife Action Plan (WGFD 2017a). The TNC study identified Functional wetland complexes based on several criteria including mean wetland patch size, mean wetland densities, and distance between wetlands. The protection status of wetlands was based on land status and special management designations such as wilderness areas, national parks, and conservation easements. Wetland condition was assessed using indices that included distances to potential sources of impairment such as roads, dams, and pipelines, surface water use, and contaminant records such as pesticide applications. However, site-specific data were not collected to assess the condition of individual wetlands. Future site conditions were modeled and "at risk" areas identified based on vulnerability to climate change, rural residential development, and oil and gas potential. The GWC ranked 4th in terms of species diversity, but received a comparatively low integrity score based primarily on land use influences.

TNC has also been actively involved in landscape conservation within the Goshen Hole area. TNC recently acquired the Lone Tree Ranch, a 1,408-acre property consisting of native

mixedgrass prairie and riparian habitats along Lone Tree Creek. A conservation easement has been placed on the property to protect it from future subdivision or conversion to other intensive land uses. The property has been sold into private ownership with the easement attached, enabling a traditional ranching operation to continue.

Goshen Complex Wetland Profile and Condition Assessment

Tibbets et al. (2016) summarized results of the first level 2 wetland profile and condition assessment for the Goshen Hole Wetland Complex (GWC). Objectives were:

1. Create a landscape level wetland profile of the Goshen Hole Basin;
2. Conduct a statistically valid, field-based assessment of wetland condition;
3. Model the distribution of wetland conditions throughout the basin; and
4. Determine key wetland habitat features and resources important to wetland-dependent wildlife species.

The study was based on a rigorous field survey protocol applied within a sample of randomly-selected sites. Field data collection was completed during 2014-2015.

The Study was funded through an EPA Wetland Program Development Grant. (Refer to https://www.epa.gov/wetlands/wetland-program-development-grants for additional information about this grant program). Level 2 assessments evaluate the condition of individual wetlands based on field sampling that focuses on easy-to-measure indicators including anthropogenic disturbances (also known as "stressors"). Level 2 Rapid Assessment Methods (RAMs) provide on-site assessments of wetland condition with comparatively limited effort (Fennessy et al. 2007). Common RAMs estimate the ecological condition of a wetland landscape by integrating metrics that focus primarily on hydrology, and on physical and biological structure.

Tibbets et al. (2016) estimated wetlands and water bodies total 9,669 acres or approximately 3% of the total land area within the GWC. Sixty-six percent of the wetlands are freshwater emergent wetlands, which include irrigated hayfields. Over 70% of wetlands are privately owned.

The four wetland subgroups identified within the GWC were: riparian woodland and shrubland; emergent marsh; wet meadow; and playa and saline depressions. All ecological subgroupings were dominated by C-ranked wetlands, meaning there was evidence of moderate levels of disturbance and deviation from reference condition. Two percent of the 68 study sites in the GWC were A-ranked (no or minimal impact), 21% were B-ranked (slight impact), 69% were C-ranked (moderate impact), and 9% were D-ranked (significantly impacted). Playas and saline depressions were the least disturbed wetland types followed by riparian woodland and shrublands. The highest proportion of D-ranked sites was wet meadows comprising 10 % of sampled wetlands.

The most widespread disturbances (stressors) were presence of invasive plant species and impacts from grazing by domestic and native herbivores (such as soil compaction). Agricultural production and development, including presence of unpaved roads and irrigation infrastructure, were the next most common stressors. Although irrigation and related agricultural activities are generally considered disturbance factors, water availability to wetlands is also enhanced by irrigation, especially in semi-arid and arid regions. Indeed, many wetlands currently exist solely or primarily as a byproduct of irrigation practices.

Wyoming Wildlife and Natural Resources Trust

In 2005, the Wyoming Legislature created the Wyoming Wildlife and Natural Resource Trust (WWNRT). WWNRT is funded from interest earned on a permanent account, by donations, and by legislative appropriations. Its 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. WWNRT funds can also be used to meet the non-federal match requirements of other funding programs including NAWCA grants, WHIP, and SWG.

In 2007, WWNRT funded a Goshen Basin Wetland Project in partnership with Ducks Unlimited. This project reestablished and created shallow-water wetlands in Goshen County, adding approximately 600 acres of prime breeding, nesting, and migration habitat. The WWNRT also funded the Goshen County Coordinated Resource Management Program in partnership with the Goshen County Weed and Pest District. This is a coordinated effort to control invasive plant species and re-establish native grassland and wetland ecosystems.

WWNRT funds cannot be used for fee simple acquisition of real property or to purchase water rights. Information about the WWNRT and application procedures is available at: http://WWNRT.state.wy.us/

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 (WDSPCR 2014). Under LWCF guidelines, the SCORP document must include a wetlands component, which the Wyoming Game and Fish Department has prepared during each plan update.

The LWCF is authorized through September 30, 2018, to accrue $900 million annually from multiple sources. However, these credited monies cannot be spent unless appropriated by Congress (except a portion of the state grant funds). Congress determines the level of discretionary appropriations each year, and yearly appropriations have fluctuated widely since the origin of the program. Of the total revenues that have accrued throughout the history of the program ($38.0 billion), less than half have been appropriated ($17.5 billion). Nearly all of the revenue is derived from oil and gas leasing in the Outer Continental Shelf. To our

knowledge, no LWCF grants have been expended to acquire , restore or enhance wetlands in Goshen County or the remainder of Wyoming. The potential to utilize LWCF funds for wetland acquisition and improvements to support wetland-based recreation needs to be further explored.

NORTH PLATTE RIVER DECREE AND RECOVERY IMPLEMENTATION PROGRAM

Two interstate legal agreements that regulate water availability and use within the North Platte River system can impose significant constraints on wetlands projects within the GWC. They include the North Platte River Decree and the Platte River Recovery Implementation Program. Both agreements limit new depletions of flows within the North Platte River drainage.

North Platte River Decree

The North Platte River Decree of 1945, as modified in 2001, places a maximum cap on the amount of water that can be diverted from the North Platte River and its tributaries in Wyoming. Wyoming is allotted 25% of the river's natural flow between Guernsey Dam and Tri-State Dam (WY SEO 2006). Wyoming is not allowed to use more than 1,280,000 acre-feet above Pathfinder Dam and 890,000 acre-feet between Pathfinder and Guernsey Dam in any ten year period. Groundwater that is hydrologically-connected to the North Platte River is also covered by the decree. However, flows in Horse Creek, which drains Goshen Hole proper, are exempted from the decree.

Platte River Recovery Implementation Program

The Platte River Recovery Implementation Program, signed in 2006, was established through a cooperative agreement between the States of Wyoming, Nebraska, and Colorado. The purpose of the program is to provide Endangered Species Act (ESA) compliance for water users to minimize impacts on whooping crane (*Grus Americana*), piping plover (*Charadrius melodus*), interior least tern (*Sternula antillarum*) and pallid sturgeon (*Scaphirhynchus albus*). The program provides a streamlined consultation process under Section 7 of the ESA to address depletion-related impacts. The program area covers the entire North Platte River drainage in Wyoming and also includes the Horse Creek drainage in Goshen Hole. The USFWS has issued a guidance document regarding wetland activities and depletions in the Platte River Basin (USFWS 2008).
[http://www.fws.gov/platteriver/Documents/platte%20wetland%20guidance%204Sep2008.pdf]

Under the implementation program, a depletions analysis is required for all new or expanded water-related activities that commenced on or after July 1, 1997. Project Proponents can also elect to complete independent Section 7 consultations rather than participate in the implementation program. If the water-related activity will result in increased depletions and is not covered by Wyoming's depletions plan, the project proponent may be required to develop a

mitigation plan to offset the depletion. Generally, mitigation is required for all new impoundments over two (2) acres at the high water line unless the inflow source is determined not to be hydrologically connected (WY SEO 2009). All new impoundments located in the alluvium of a river or stream will require mitigation for evaporation depletions regardless of size.

The U.S. Fish & Wildlife Service views wetland creation and enhancement projects as activities that potentially cause new or increased depletions of Platte River flows (USFWS 2008). However, the Service has determined restoration of wetlands that existed historically in the same location, and projects mitigating wetland losses at a nearby location, are not likely to adversely affect the federally-listed species covered by the N. Platte River Recovery Program. Therefore, such projects will not normally require depletion offsets under the Program.

Waters that are not hydrologically-connected to the North Platte River or its tributaries are exempted from the Recovery Implementation Program. "*De minimis*" uses resulting in less than 0.1 acre-ft/year of flow depletion are also exempted. The SEO has identified areas within the North Platte River and Horse Creek watersheds where groundwater is not considered hydrologically-connected to the North Platte River and therefore need not be subjected to a depletions analysis. Maps of these "green areas" can be downloaded from: http://seo.wyo.gov/documents-data/maps-and-spatial-data (WY SEO 2009). Surface waters emanating from springs within the green areas are also not considered hydrologically-connected to the North Platte River.

THREATS TO WETLANDS

Conditions that potentially impact wetlands within the Goshen Complex, and the degree of risk they pose, are summarized in Table 4.

Table 4. Threats to wetlands in the Goshen Complex.

Stressor:	Low	Moderate	High	Extreme
Climate Change/Drought				X
Conversions to Center Pivot Irrigation			X	
Irrigation Conveyance Improvements		X		
Insufficient water supplies to existing wetlands projects				X
Insufficient Resources to Manage or Maintain Existing Wetlands Projects			X	
Agricultural Practices Not Meeting BMPs		X		
Rural Subdivisions		X		
Weakened Regulatory Protections			X	
Invasive Species		X		
Disturbances Associated with Recreational Use	X			

Water Supplies

The water source for about 85% of human-created wetlands in the GWC (including wetlands on the Game and Fish Commission's WHMAs) is derived directly or indirectly from irrigation. Stream flows within the Horse Creek watershed are heavily appropriated. Approximately 40,000 acres of farmland are irrigated by diversions from Horse Creek and its 2 major tributaries – Bear Creek and Fox Creek (Gary Mehling *pers*. *comm*.). Adjudicated water rights in these 3 streams account for 1,125 ft^3/second of cumulative diversions. (Cumulative diversions include reuse of return flows by downstream irrigators). Significant amounts of water also leak or evaporate from earthen canals and ditches. Up to 30-40% is lost in several lateral ditches within the Horse Creek Irrigation District (WWDC 1998) and cumulative losses can reach 75% before water is delivered onto some fields (Horse Creek Conservation District, *pers*. *comm*.). A study of the conveyance infrastructure identified 14 problem segments along supply ditches, of which 6 were recommended for repairs and improvements. However, construction has been forestalled due to lack of funding. When less water is available to flood-irrigate agricultural fields, the return flows that feed into several manmade wetlands are also diminished.

Although natural and constructed wetlands within the GWC were generally in good condition throughout the 1980s to mid 1990s, that timeframe coincided with several wetter than normal years. From 2000 through 2008, SE Wyoming was impacted by the most severe drought on record. Water supplies dwindled and wetlands sustained by irrigation flows decreased dramatically or disappeared altogether. Springer Reservoir, Bump-Sullivan Reservoir, and all wetlands on the Springer WHMA became dry or nearly dry. Wetlands on the Table Mountain WHMA also remained predominantly dry for an extended period of years. A series of recent wet years replenished water supplies throughout the area and wetlands are once again functioning. Periodic seasonal drying enhances wetland productivity by exposing organic substrates and releasing bound nutrients. However, the multi-year extended drought resulted in loss of wetland bird productivity and recreation opportunity, and possibly loss of migration memory by some species which may require some years to restore. Securing adequate, dependable water supplies will enable managers to manipulate wetland water regimes in a prescriptive, staggered framework that will avoid another landscape-scale impact from extended drought in the future.

Center Pivot Conversions

Large-scale conversions from flood irrigation to center pivot sprinkler systems will likely reduce water supplies to a number of wetlands in the Goshen Hole area. Center pivot systems are a more efficient method of irrigating crops, but yield substantially less surface runoff into wetland basins. Federal funding assistance is available through the NRCS Environmental Quality Incentives Program (EQIP) to convert flood irrigation to center pivot systems. Although this is a water conservation program, its impact on wetlands has not been fully recognized or mitigated. At one time, wetlands on the Springer WHMA collected substantial return flows from adjacent

flood-irrigated fields. The amount of runoff has decreased since several fields were converted to center pivot sprinkler systems.

Irrigation Delivery (Conveyance) Improvements

System upgrades to improve water delivery (e.g., installing canal linings or buried pipelines) will eliminate "seepage" wetlands along ditches and canals. Such impacts can be mitigated by constructing or enhancing other wetlands and this approach should be advocated in publicly funded rehabilitation projects. On the other hand, increasing water delivery may improve wetland management on Department WHMAs and could also yield greater irrigation return flows to other wetlands.

Insufficient Resources to Manage or Maintain Existing Wetland Projects

To sustain natural or manmade wetlands in a productive condition, it is important to manage the watershed through appropriate farming, grazing, and erosion control practices, and to periodically monitor site conditions. Infrastructure components such as dikes, ditches and water control structures also require periodic maintenance to be kept in functioning condition. Wetland productivity can be further enhanced through a prescribed regime of water level manipulations and if necessary, by actively manipulating wetland vegetation. For many years, the Department had limited resources to manage and maintain productive wetlands on Department habitat areas. In some cases, water control structures and fences lapsed into disrepair; dikes were damaged by erosion, rodent, and livestock activity; and personnel were not always available to monitor livestock distribution and attend to water management. This has been addressed by assigning responsible personnel to oversee each WHMA throughout the state. However funding and other resource limitations will continue to be a challenge. Seasonal shortages of water and withdrawals from multiple purpose reservoirs on some WHMAs can also challenge the Department's ability to implement favorable water management.

Agricultural Activities Not Meeting Best Management Practices

Although many wetlands in the GWC were created and are maintained by irrigation, some agricultural activities can also adversely affect the quality and function of wetlands. For example, sediment washing from tilled fields and heavily grazed pastures can decrease the lifespan and impair water quality of wetlands. Water quality is also affected by agrichemical runoff including fertilizers, pesticides, herbicides, and animal wastes. Livestock grazing within wetland basins removes vegetation cover, damages root mats, and can accelerate shoreline and dike erosion. Appropriate best management practices have been developed to avoid or minimize many of these impacts. For example, maintaining a protected buffer of intact shoreline and upland vegetation cover is the most effective means of filtering sediment and contaminant runoff, and protects 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, though this practice is not widespread in SE Wyoming. Best management practices that improve wetland quality and function, especially the retention of grassy buffers, should be encouraged. For a comprehensive treatise on wetland management practices, see NRCS (2003).

Rural Subdivisions

Rural residential construction is growing in Goshen County. While not an immediate threat, this type of development is expected to increase in the foreseeable future. Some isolated wetlands could be eliminated by drainage or filling at construction sites. Roads, buildings, fences and disturbances such as increased traffic, human activity, mowing, and higher predator densities can adversely affect the habitat suitability of nearby wetlands for many sensitive species. Loose pets, cats in particular, can be especially problematic for wetland dependent wildlife.

Compromised Regulatory Protections

Two U.S. Supreme Court decisions, Solid Waste Agency of Northern Crook County (SWANCC) in 2001 and Rapanos and Carabell in 2006, have modified the federal interpretation of "waters of the United States" subject to regulation by the U.S. Army Corps of Engineers (COE) and the Environmental Protection Agency (EPA). Wetlands lacking a "significant nexus" to navigable waters are no longer protected under the Clean Water Act (CWA). This revised interpretation has eliminated regulatory protections for many "isolated wetlands" such as playas. However the Swampbuster Provision of the Food Security Act continues to provide some incentive-based protection in agricultural regions. An operator who converts a wetland to crop production can lose eligibility for certain USDA program benefits including loans, subsidies, crop insurance, and price support programs. However, Swampbuster has no bearing on non-agricultural activities that impact isolated wetlands. The SWANCC and Rapanos decisions have significant implications elsewhere, but their impact on Goshen Hole wetlands is expected to be just moderate in the foreseeable future.

In 2015, the EPA and COE published revisions to clarify the definition of "Waters of the United States." [80 FR 37054; 40 CFR 401.11 – https://www.gpo.gov/fdsys/pkg/FR-2015-06-29/pdf/2015-13435.pdf]. The 2015 revised definition [FR 80:37125] was:

> *"'waters of the United States' means: (i) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (ii) All interstate waters, including interstate wetlands; (iii) The territorial seas; (iv) All impoundments of waters otherwise identified as waters of the United States under this section; (v) All tributaries, as defined in paragraph (l)(3)(iii) of this section, of waters identified in paragraphs (l)(1)(i) through (iii) of this section; (vi) All waters adjacent to a water identified in paragraphs (l)(1)(i) through (v) of this section, including wetlands, ponds, lakes, oxbows, impoundments, and similar waters; (vii) All waters in paragraphs (l)(1)(vii)(A) through (E) of this section where they are determined, on a cases-specific basis, to have a significant nexus to a water identified in paragraphs (1)(i) through (iii) of this section."*

The above definition would have extended Clean Water Act jurisdiction to tributaries and waters with a "significant nexus" to waters of the United States. However, the revised regulatory definition has been stayed by the U.S. Court of Appeals for the Sixth Circuit. In response, EPA, Department of Army, and Army Corps of Engineers resumed nationwide use of the agencies' prior regulations defining "waters of the United States." On February 28, 2017, the President of the United States issued an Executive Order directing EPA and Department of the Army to review and rescind or revise the 2015 Rule. EPA, Department of Army, and the Army Corps of Engineers are in the process of reviewing the 2015 rule and considering a revised definition of "waters of the United States" consistent with the Executive Order.

Nonnative and Invasive Species

Nonnative plants spreading into wetlands, riparian zones, and adjacent watersheds often produce undesirable changes in habitat conditions. Problem species include tamarisk or salt cedar (*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 several others. These nonnative plants often outcompete desirable native plants and potentially create unsuitable habitat for species of endemic wildlife. Although some invasive trees and shrubs such as tamarisk and Russian olive can provide cover, nest sites, and forage, they also attract higher densities of predators, which adversely impact ground-nesting birds and small mammals adapted to open grassland ecosystems. Native vegetation should generally be emphasized when wetland projects are built. Invasive plants should be eradicated, where possible, and their further spread vigorously controlled. The Goshen County Weed and Pest District has actively controlled Russian olive and salt cedar with several projects funded through the WWNRT.

Recreational Use of Wetlands

Disturbances associated with human activity near wetlands can be a problem in densely populated or heavily used areas. In some portions of the state, recreational boating has become a significant source of disturbance impacting habitat effectiveness of wetlands along stream and lake margins. However, Goshen County is a predominantly rural landscape with a low human population density. For most of the year, disturbances associated with human activity remain at a very low level and are almost nonexistent on private wetland areas. Moderate to heavy hunting pressure on WHMAs can affect the distribution of migratory game birds and their use of wetlands for feeding and resting during the fall and early winter. The Department has established key area closures to serve as refuges for species that are sensitive to hunting pressure. As the human population continues to increase in SE Wyoming, recreational disturbance may become a larger problem in the future. On the other hand, allowing reasonable public access for wildlife-dependent recreation fosters a cultural appreciation for the value of wetlands and builds support for wetland conservation programs.

CONSERVATION OBJECTIVES

The following objectives are recommended to conserve and manage wetlands and riparian habitats within the GWC:

1) Build partnerships within the local community area to support wetland conservation efforts while maintaining traditional agricultural uses of the land.
2) Restore and improve water supplies to assure functional wetlands are sustained most years and to provide additional management options within existing wetland projects and on Commission-owned WHMAs. This is a top priority for the GWC, where susceptibility to climate change, drought impacts and water shortages has increased within the past few decades.
3) Work with conservation districts to improve the efficiency of irrigation delivery systems while mitigating impacts to irrigation-dependant wetlands such as seepage areas along canals.
4) Secure additional funding and match funding to support ongoing and future wetlands conservation and enhancement projects through DU, USFWS, NRCS, TNC, WWNRT, WGFD, and other partners.
5) Strive for no net loss of existing wetlands within the GWC. Increase the wetland habitat base primarily through restoration of historically-drained and converted wetlands, and where sufficient water can be secured, through creation of additional wetlands.
6) Negotiate additional conservation easements and other instruments to protect important wetlands and riparian areas potentially vulnerable to future development.
7) Increase capacity to maintain and manage wetlands including those on Commission-owned WHMAs. Develop or implement plans to maintain wetlands in properly functioning condition, fulfill habitat requirements of target species, and optimize wetland productivity.
8) Provide additional public access opportunities for wetland-dependent recreation such as waterfowl hunting, fishing, and wildlife viewing.
9) Work with landowners to implement wetland and watershed “best management practices” that will improve water quality and sustain/enhance wetland functions and values throughout the GWC.
10) Increase the capacity of NRCS to deliver wetlands and riparian habitat conservation projects funded by Farm Bill Programs. Investigate the potential for applying interim or mid-contract management to develop habitat projects on CRP lands.

CONSERVATION STRATEGIES

Form a Watershed Management and Wetland Working Group

Additional human resources are needed to broaden wetland conservation capacity and should include participation from the local community area. A community-based network would

connect interested citizens, landowners, and local/regional organizations with funding sources and technical expertise. Some obvious players in the Goshen Hole area are the landowner community, conservation districts, sportsmen and bird enthusiasts, local businesses, and organizations such as the Goshen County Two-Shot Goose Hunt, Goshen County Rooster Boosters, Goshen County Strutters (Wild Turkey Federation Chapter), and Goshen County Sportsmen's Club. Other key partners include Ducks Unlimited, The Nature Conservancy, Intermountain West Joint Venture (IWJV), Wyoming Audubon, U.S. Fish and Wildlife Service Partners for Fish and Wildlife Program, Natural Resource Conservation Service, Goshen County Cooperative Extension Service (UW), Board of Control Division 1 (WY State Engineer's Office), and Wyoming Game and Fish Department. The working group would meet periodically to:

- develop and reinforce partnerships;
- receive updates on wetland work planned or being done in the Goshen Hole area by all partners;
- provide a venue whereby landowners and irrigation districts with wetland conservation opportunities can connect with organizations, programs and funding sources to assist them;
- identify opportunities for improving functional integrity of existing wetlands by addressing water delivery, watershed management, wetland maintenance and management, and other issues;
- identify opportunities and develop priorities for collaborative projects; and
- participate in strategic landscape planning at the local and regional levels;

Improve Water Supplies

Recurring drought and limited water supplies are the most significant and acute threat to wetlands in the GWC. The quantity of water delivered to storage facilities, pastures, and cultivated fields has a direct bearing on hydrology of many if not most wetlands in the region. The following strategies are recommended to improve water supplies and delivery:

- Form a Goshen Hole Watershed Management and Wetlands Working Group comprised of a coordinator and members from the landowner community, agencies, and NGOs such as sportsman groups (see prior strategy).
- Support delivery system improvement projects that incorporate wetland conservation assurances.
    - Fabric liners will reduce seepage and increase delivery efficiency in irrigation ditches and canals, but will potentially cost several hundred thousand dollars per lineal mile.
    - Feasibility is probably limited to short, problem segments within the overall delivery system (WWDC 1998).
    - Partial funding for system upgrades may be available from the Wyoming Water Development Commission.
    - Match funding is possibly available from NAWCA, State Wildlife Grants, Wildlife and Natural Resources Trust Account, and other sources if wetland conservation benefits can be demonstrated.

- Wetlands sustained by seepage or leaks from irrigation ditches should be identified and wetland losses resulting from linings or other improvements should be mitigated in publicly funded projects.
- If buried pipeline is installed, it should be limited to short segments of canal that address the most severe seepage problems. This is also the most efficient use of available funding.
- Lining canals with concrete is discouraged. Concrete lining is very expensive, frequently damaged by subsidence and frost heaving, and can result in significant loss of habitat. Concrete-lined canals also pose barriers to wildlife movements and can entrap some animals.

– Establish water-harvesting features such as windrows and shrub stands to accumulate snowdrifts. On wetland construction sites, grade surface contours to capture runoff and direct it into wetlands.
– Develop groundwater wells to augment surface water supplies into constructed wetlands.
  - Wells developed in the Lance Formation in south-central Goshen County can yield a maximum of 100 gpm (approximately 0.2 cfs) or potentially 0.4 acre-ft per day (Rapp et al. 1957).
  - Wells developed in the valley fill deposits along Horse Creek and Bear Creek yield up to 500-1,000 gpm (approximately 1-2 cfs) or 2-4 acre-ft per day (Rapp et al. 1957). However, wells in alluvial aquifers are generally treated as surface water diversions subject to surface water rights. Percolation from irrigated fields and seepage from canals are substantial sources of recharge to shallow aquifers and can enhance availability of groundwater in some locations.
  - Groundwater use is subject to the same priority preference prescribed in law for surface water rights [Ref: W.S. 41-3-906].
  - Appropriations of groundwater for stock or domestic use of 25 gpm or less (.056 cfs) have preference over all other uses.
  - State water law imposes comparatively little restriction on drilling and pumping groundwater unless the well is drilled within a groundwater control area [Ref: W.S. 41-3-913] or unless it interferes with another well having a higher priority or with a surface water right. A well that interferes with another well used for domestic or stock watering purposes, or interferes with a well having a senior appropriation date, may be ordered to cease or reduce withdrawals [Ref: W.S. 41-3-911].
  - New wells in the Platte River Basin, including Goshen Hole, are subject to depletion analysis and mitigation requirements prescribed under the Platte River Recovery Implementation Program (USFWS 2008). However, wells drilled into groundwater aquifers that are not hydrologically-connected to the North Platte River are exempted (USFWS 2008; WY SEO 2009).
  - Deep wells drilled into the Fox Hills Formation are exempt from the Plate River Recovery Program. Potential water yield is up to 100 gpm (AVI 2012) and could potentially increase options for wetland management on a local basis (e.g., on Wildlife Habitat Management Areas).

– Maintain existing water rights in good standing on Commission-held lands.
    - An adjudicated water right must be exercised at least once in each 5-year period, when water is available, to protect it from abandonment proceedings [Ref: W.S. 41-3-401].
– Lease or acquire property (from willing sellers) on which water rights can be managed to enhance wildlife habitat.
    - An irrigation water right is always attached to the land.
    - Except as otherwise provided, a water right for the direct use of the natural unstored flow of any stream cannot be detached from the land, place or purpose for which it was acquired [Ref: W.S. 41-3-101].
    - Return flows of water from irrigated crops and pastures (including habitat areas) can be captured within created wetland basins that are properly permitted through the WY State Engineer's Office.
– If available, lease or purchase stored water (Hawk Springs Reservoir, Bump-Sullivan, Sinnard Reservoir, Glomill Reservoir, Springer Reservoir) to directly or indirectly enhance water supplies to wetlands [Ref: W.S. 41-3-320]. Stored water is owned by the Irrigation District and can be transferred or sold provided it is applied to the same or similar use(s) for which it was originally permitted, or if a change in use is approved by the Board of Control.
– Investigate potential for temporary water transfers from other users to augment water supplies on Commission-owned and private wetlands [Ref: W.S. 41-3-110]. Such transfers may be approved for periods of up to 2 years.
– Investigate potential to exercise existing water rights within permitted wetland impoundments at times of year (e.g. early spring/late summer) that are more beneficial for wetland management. This could potentially be achieved through water exchanges with other users [Ref: W.S. 41-3-106].
– File for "in-stream" flows to maintain native fish populations and sustain wetland habitats in smaller streams [Ref: W.S. 41-3-1001].
– Encourage formal recognition of "wildlife habitat" as a beneficial use in addition to the legislatively recognized use of "fisheries maintenance."
    - "Beneficial use," means that use by which the water supply of a drainage basin is depleted when usefully employed by the activities of man. Wildlife habitat qualifies as a beneficial use under this broad definition. However, the use of an adjudicated water right cannot be changed from another designated use to support wildlife habitat under current law.
    - Explore potential for new legislation providing that water rights may be acquired and their use changed to support wildlife habitat (W.S. 41-3-1007). Such legislation would be patterned after the instream flow statute (W.S. 41-3-1001)
– Network with 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 improve water delivery to wetlands within the Goshen Hole area.
– Investigate a range of potential funding sources to help improve water delivery systems, including North American Wetlands Conservation Act, Ducks Unlimited, Agricultural Conservation Easement Program (ACEP), Partners for Fish and Wildlife, Landowner Incentive

Program, State Wildlife Grants, Wildlife and Natural Resources Trust, Wyoming Mineral Trust Fund, Water Development Account, energy mitigation funds, and others.

Note: The Agricultural Conservation Easement Program was established as part of the 2014 Farm Bill to combine the Wetland Reserve Program (WRP), Grassland Reserve Program (GRP) and Farm and Ranch Land Protection Program (FRPP) into a single, coordinated program. Ultimately, the ACEP will provide two conservation components – Agricultural Land Easements (ALEs) and Wetland Reserve Easements (WREs) – that combine the purposes and functions of the WRP, GRP and FRPP.

Build Additional Wetland Projects

The highest priority in Goshen Hole is to restore and enhance existing wetlands by addressing water supply and land use issues. However, opportunities to build additional wetlands should be pursued in sites with secure and adequate water supplies. The USFWS Partners for Fish and Wildlife Program and NRCS have provided funding and technical assistance to construct wetlands on private lands since the 1980s in Goshen County. Ducks Unlimited has also been actively involved in wetland construction and conservation, on both Department-managed and private lands. Specific strategies include:

- Coordinate with Ducks Unlimited to identify and promote viable new wetland projects as part of the Platte River and Rainwater Basin initiative.
- Coordinate with the USFWS Partners for Fish and Wildlife Program and NRCS to identify and promote additional wetland projects on private lands.
- Support adequate Congressional appropriations to fund the Wetlands Reserve Program (now part of the ACEP – see above), Conservation Reserve Program, Wildlife Habitat Incentives Program, Partners for Fish and Wildlife Program, State Wildlife Grants, North American Wetlands Conservation Act, and the Land and Water Conservation Fund.
- Encourage wetland projects that increase public access for wetland-based recreation. Such projects can be constructed on accessible public lands, Commission-managed lands, or private lands under agreement, such as lands enrolled in the Department's Private Lands / Public Wildlife Program. Providing additional opportunities for the public to use and enjoy wetlands will foster additional support for wetland conservation and restoration.

Establish conservation easements, where appropriate, to protect important and unique wetlands and riparian areas

Much of the riparian habitat along the North Platte River is vulnerable to subdivision, particularly in the Torrington and Lingle areas. Although the Department's Rawhide WHMA currently protects a 6-mile corridor, areas upstream and downstream could potentially be developed. Other wetlands throughout Goshen Hole are protected to some degree by agricultural incentives programs (Swampbuster provision of the Food Security Act). Nearly all the wetland projects constructed under the USFWS private lands program are placed under conservation agreements ranging from 10-30 years in duration. It may be desirable to negotiate

longer-term management agreements and to retain upland buffers surrounding some of the larger and more important projects in order to assure wetlands remain in proper functioning condition.

- Negotiate conservation easements to protect additional riparian habitats along segments of the North Platte River.
- Identify additional wetland/riparian habitats that are sufficiently unique or important within the Goshen Complex to warrant protection through long-term conservation easements.
- Negotiate longer-term conservation agreements to protect existing wetland projects and surrounding upland buffers on private lands, especially where existing agreements will expire.

Improve long-term management and maintenance of wetland projects

- New wetland projects should include an instrument assigning responsibility for long term maintenance, and assurance that adequate funding and other resources will be available to support management and maintenance. Wetland conservation easements should incorporate a similar maintenance agreement.
- Through agency extension and outreach programs, provide technical and financial assistance to implement wetland and watershed best management practices on private lands.
- Where appropriate, wetland projects should incorporate access control features such as fencing necessary to manage livestock distribution and public use.
- Detailed plans should be developed to maintain and manage wetlands on Department WHMAs. Plans should address:
    - Appropriate objectives such as food production, nesting/brood habitat, security areas, migration resting/staging areas, sensitive [SGCN] species, and public recreation;
    - Personnel and work units responsible for management and maintenance;
    - Prescriptive water level regimes to achieve management objectives;
    - Farming practices and moist soil management;
    - Wetland and upland vegetation treatments and noxious weed control;
    - Grazing management;
    - Inspection, maintenance, and repair of dikes and water control apparatus;
    - Public use and facilities maintenance;
    - Management activity schedules including periodic inspections;
    - A monitoring plan to assess progress toward management goals and objectives; and
    - Identification of funding, administrative, and environmental constraints to plan implementation, including how to address them.
- Adaptively adjust management regimes including water level manipulations and farming practices, as necessary to achieve management objectives and optimize productivity.

Apply wetland and watershed "best management practices."

- Encourage landowners, agencies and organizations with stewardship responsibilities to implement wetland and watershed "best management practices" (BMPs).
- Provide technical support, 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.
- Some useful BMP and wetland design references include: Oneale (1993); Welsch et al. (1995); WY DEQ (1997, 1999, 2004); Brockmann (1999); NRCS (2003); Interagency Workgroup on Wetland Restoration (2003); Nicholoff (2003); McKinstry et al. (2004); Niemuth, et al. (2004); Tessmann (2004); USEPA (2005).
- The Wyoming Department of Environmental Quality, Water Quality Division, also maintains a Watershed Management program. The following documents can be downloaded from http://deq.wyoming.gov/wqd/non-point-source/resources/mgt-practices/:
  - Livestock/Wildlife Best Management Practice Manual
  - Cropland Best Management Practice Manual
  - Silviculture Best Management Practices
  - Urban Best management Practice Manual
  - Stream and Lakeshore Restoration Best Management Practice Manual
  - Wyoming Forestry Best Management Practices

  Also see:
  - Wyoming Nonpoint Source Management Plan Update http://deq.wyoming.gov/media/attachments/Water%20Quality/Nonpoint%20Source/Reports%20%26%20Documents/2013_wqd-wpp-Nonpoint-Source_Wyoming-Nonpoint-Source-Management-Plan.pdf
  - Wyoming Statewide Wetland Mitigation Bank Guidelines for Interpretation and Implementation. http://deq.wyoming.gov/media/attachments/Water%20Quality/CWA%20Section%20401%20-%20Turbidity%20-%20Wetland/Guidance/wqd-wpp-Wetland-Banking_wetland-guidelines.pdf

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