# SALT RIVER WETLAND COMPLEX

# Regional Wetland Conservation Plan

*Salt River Riparian Habitat – Photo by Mark Gocke*

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**Final**

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**A regional step-down plan of the**
***Wyoming Wetlands Conservation Strategy***

***Prepared for the Wyoming Bird Habitat Conservation Partnership***

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# INTRODUCTION

## General Description

The Salt River Wetland Complex (SRWC) is defined by the Salt River Drainage in Wyoming. The Salt River drainage, is a fifth order watershed located in western Wyoming and eastern Idaho. It is bordered by the Salt River Range on the east, the Gannett Hills on the south, and the Webster and Caribou Ranges on the west. The main stem of the Salt River rises in the Salt River Range and flows about 72 miles north, ultimately emptying into Palisades Reservoir near the town of Alpine. Along most of its course the river meanders through the 35 mile long by 4 mile wide Star Valley, often nicknamed "Little Switzerland" (Gelwicks et al. 2002). "Salt River drainage" and "Star Valley" are used interchangeably throughout this document.

## History

As late as 1876, Native Americans (Shoshoni, Bannock, Ute, and Crow) visited the Star Valley in summer and fall to hunt elk, bison and deer. During pre-settlement times, the valley was dominated by broad grassy flats and sagebrush uplands, giving way to aspen stands and mountain shrub patches on south and west facing slopes of ridges that extend into the valley. Conifer and aspen forests dominated the mountain ranges bordering either side. Willow communities and likely some cottonwoods dominated riparian areas along the river banks and wetlands, old oxbows and meandering river channels. According to Granville Stuart, the Snake (Shoshoni) Indians interchangeably called the Salt River "To-sa car-nel" and "Ona-bit-a-pah." The former meant "white lodges" in reference to a number of small white geyserite cones left along the river by extinct mineral springs. "Ona-bit-a-pah," was translated to mean "salt water," referring to the salt ledges and saline hot springs along two of the principal tributaries – Crow and Stump creeks (Kennington and Hamblin 1989, Glewicks et al 2002, Star Valley Conservation District 2005).

Trappers frequented Star Valley in the early 1800's in search of beaver, bison, and salt from the mineral springs near Stump Creek. Emigrants traveled through the valley along the Lander Cut-off of the Oregon Trail in the 1840s. However, the harsh winter weather precluded settlement until 1881-1882 when tie-hackers built cabins near Grover and the mouth of the Salt River while cutting ties for the Utah Northern Railroad. Salt mines were also developed around Stump Creek. The first homesteaders arrived in the Star Valley Basin in 1879. Farming communities were established by immigrants from Utah in subsequent years, with the first settlements near Tin Cup Creek and Auburn. The early settlers began installing infrastructure to irrigate farmland (Kennington and Hamblin 1989).

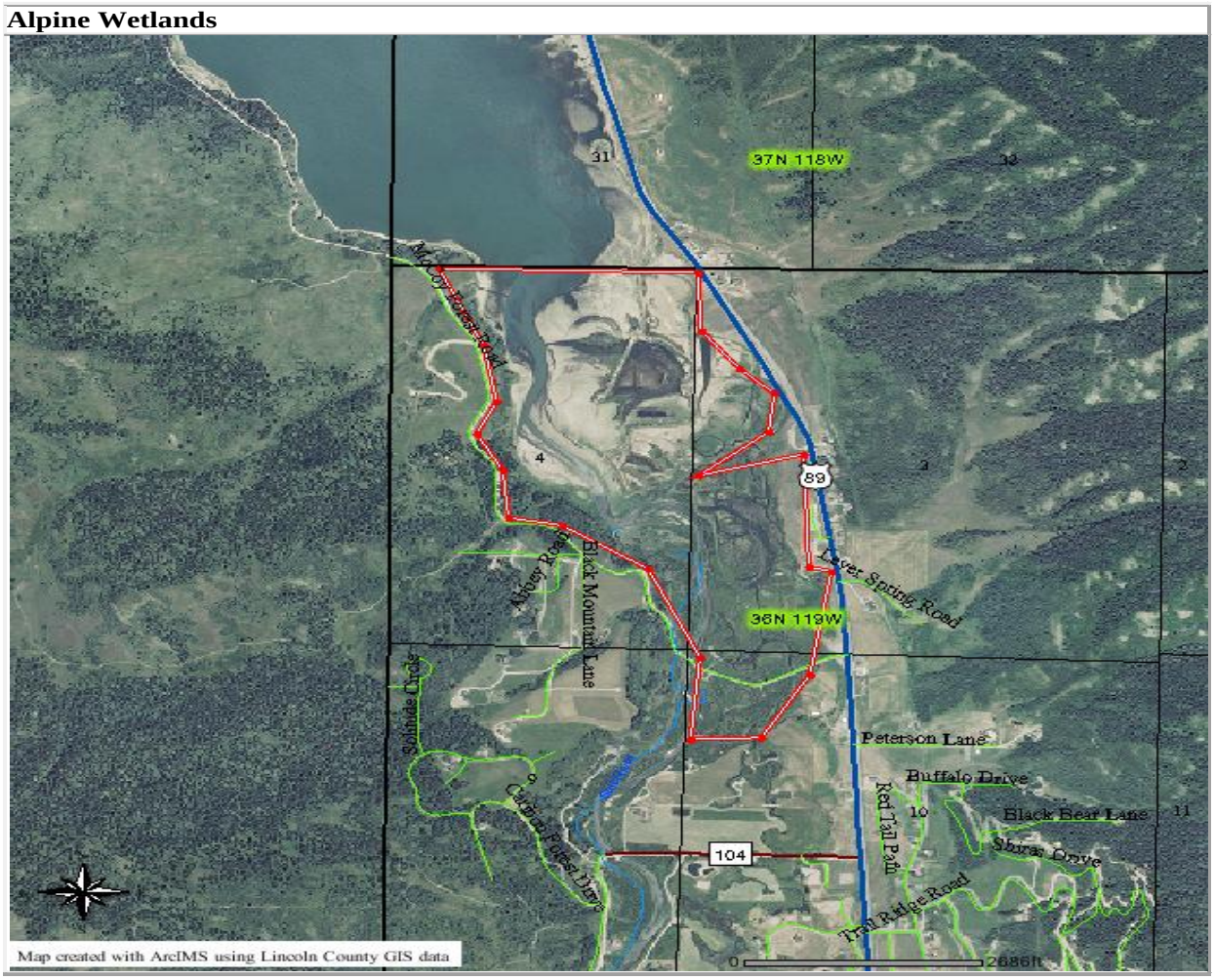
In the early 1900's the East Side Canal company was formed and the largest ditch in the valley was constructed to divert water from the Salt River at The Narrows approximately 3 miles south of Thayne. The ditch supplies water to irrigate farmland from The Narrows to 5 miles north of Etna. The diversion dam currently in operation was constructed in 1991. Water projects have enabled valley residents to develop an agricultural economy. Dairy farms became an important industry and irrigation expanded and improved production of native hay, pasture, alfalfa and barley fields (Sando et al. 1985). A cheese factory was built in Thayne and discharged waste into Flat Creek causing significant pollution that affected quality of irrigation water and caused frequent fish kills.

This effluent was successfully treated after a waste treatment facility was constructed in 1985. Solid waste from the treatment facility was spread on fields to fertilize cropland. The cheese factory operated until 2008 (Gelwicks et al 2002).

The practices described above supported a sound farming economy but caused significant degradation of the riparian community and associated wetlands. An extensive willow (*Salix spp*) removal effort during the 1950's reduced willow coverage along the river from 61% to 39% in the upper valley and from 70% to 46 % in the lower valley between 1939 and 1964 (Miller 1971). Control activities included bulldozing, chemical spraying and overgrazing by livestock. In 2000, a similar study found willow coverage along the Salt River increased from an average of 49% 1970 to 57% in 2000. However, the estimated willow coverage was 77% in 1939 prior to large scale willow removal programs designed to increase pasture. The willow removal has increased stream bank erosion, widened the stream channel by 7-10% (avg), and directly or indirectly caused loss of suitable fish habitat and riparian shrub habitat (Gelwicks et al 2002). A hydropower plant was constructed between Etna and Alpine after Lower Valley Power and Light was incorporated in 1937. The diversion dam became a barrier to brown trout (*Salmo trutta*) and whitefish (*Prosopium williamsoni*) moving up the Salt River from the Snake River and later from Palisades Reservoir. The power plant was decommissioned in 1967 and the dam was removed in 1972 (Gelwicks et al. 2002).

The Bureau of Reclamation operates Palisades Reservoir, which inundates the confluence of the Salt, Snake and Greys River. Construction began in 1946 and was completed in 1958. The reservoir has a surface area of 16,150 acres and a total capacity of 1,401,000 acre feet – the majority located in Idaho. The project was designed as a multi-purpose facility for irrigation, recreation, and flood control on the Snake River in Idaho (Gelwicks et al 2002).

Irrigation demand in Idaho drives management of Palisades Reservoir. In dry years, water is drawn down to a level that exposes the original river beds of the Salt and Greys rivers, and the bed of the Snake River is exposed along the reservoir bottom at least a mile into Idaho. A wetland complex dominated by willows and reed canary grass was originally present at the lower end of the Salt River, below the high water mark of Palisades Reservoir near the McCoy Creek road. Prior to the completion of Palisades Reservoir, the area was a natural wetland with several oxbows and old river channels that intermittently flowed during runoff events. The project area contained 20 acres of wetlands, 45 acres of willows, and 65 acres of grassland above the high water mark. However, when the reservoir level dropped at least 118 acres of mudflats were exposed in the areas that were originally part of the wetland (Anderson 1992). In 1992 the Bureau of Reclamation, in cooperation with the Caribou-Targhee National Forest and the Wyoming Game Fish Department, funded a wetland enhancement project to create permanent wetlands downstream of the McCoy Creek Road. Most of the funding came from Public Law 102-27, which provided federal funding to relieve problems caused by the prolonged drought (Bureau of Reclamation 1992). A series of 6 shallow water ponds and dikes with water control structures was constructed and a 3,210-foot canal and 2,400 feet of irrigation ditches were rehabilitated to supply water to the ponds. The 360-acre project was completed in1993 (Anderson 1992). The series of ponds, sloughs, and permanent wetlands total about 254 acres, including 85 surface acres of water when ponds are full (Fig. 1).




Approximately 360 acres.

Fig. 1. Alpine wetlands at the confluence of the Salt River and Palisades Reservoir.

## Climate

The Star Valley has a relatively cool climate. The annual temperature averages 38 degrees F in Afton, WY. Monthly averages range from 16 degrees F in January to 62 degrees F in July (Owenby and Ezell 1992). Annual maximum temperatures averaged 90 degrees F and ranged from 83 degrees F in 1993 to 96 degrees F in 2000. Annual minimum temperatures averaged -22 degrees F and ranged from -33.7 degrees in 1985 to -10 degrees in 1986. Precipitation is evenly distributed throughout the year, and averages 20 inches on the valley floor and 40 inches at high elevations (Othberg 1984 in Gelwicks et al. 2002). Wind speeds are relatively calm on the valley floor due to the influence of surrounding mountains (Gelwicks et al 2002).

## Land Ownership

Approximately 55% (325,896 acres) of the Salt River watershed lies within Wyoming and approximately 45% (266,642 acres) is in Idaho. About 68% of the watershed, (402,926 acres) is federally owned and managed by either the U.S. Forest Service or the Bureau of Land Management. Nearly all the remaining lands 32% (189,612 acres) are privately-owned, with some scattered State parcels.

## Land Uses

Farming and ranching remain the dominate land uses, but residential subdivisions and 5-20 acre horse properties have replaced many farms in the lower valley and foothills in the northern part of the valley. Some of these developments encroach the riverfront between Alpine and Thayne where rural farmland has given way to second home development. Towns and other residential areas in the Star Valley have also become bedroom communities housing workers from Jackson Hole. In 2015, over 1,000 workers commuted to Jackson from the valley (Bank of Star Valley 2015)

Rangelands account for roughly 66,000 acres of the watershed. An additional 360,000 acres of National Forest are within allotments that are also grazed. Generally, grazing lands are located in a narrow margin surrounding the valley floor, although they are more extensive on the west side of the upper valley. Much of the riparian and wetland habitat is used for livestock grazing after native hay has been cut. Rangelands on the east side of the valley and between Spring Creek and Stump Creek on the west side are also important habitat for wintering wildlife. South and west facing slopes with shallow and stony soils are especially important. Vegetation in these areas provides habitat for mule deer, elk, and moose. Barley, alfalfa / brome grass hay, and native hay are the principal crops grown on about 18,400 acres (Star Valley Conservation District 2005).

# WETLAND CHARACTERISTICS OF THE SALT RIVER DRAINAGE

Distribution of wetlands in the Salt River drainage is illustrated in Fig. 2. Composition (number and area) of both natural and created wetlands is summarized in Table 1. Open water areas (lakes) comprise nearly 58% of the total area. This summary is based on 1980 imagery and does not include wetlands constructed on private and public lands since that time. About 15% of the SRWC is irrigated and 4% of the wetlands are protected. The complex has an overall ecological integrity score of 70/100 with 100 being highest condition (Copeland et al. 2010). Vulnerability to future impacts is rated 34/100 with 100 being most vulnerable.

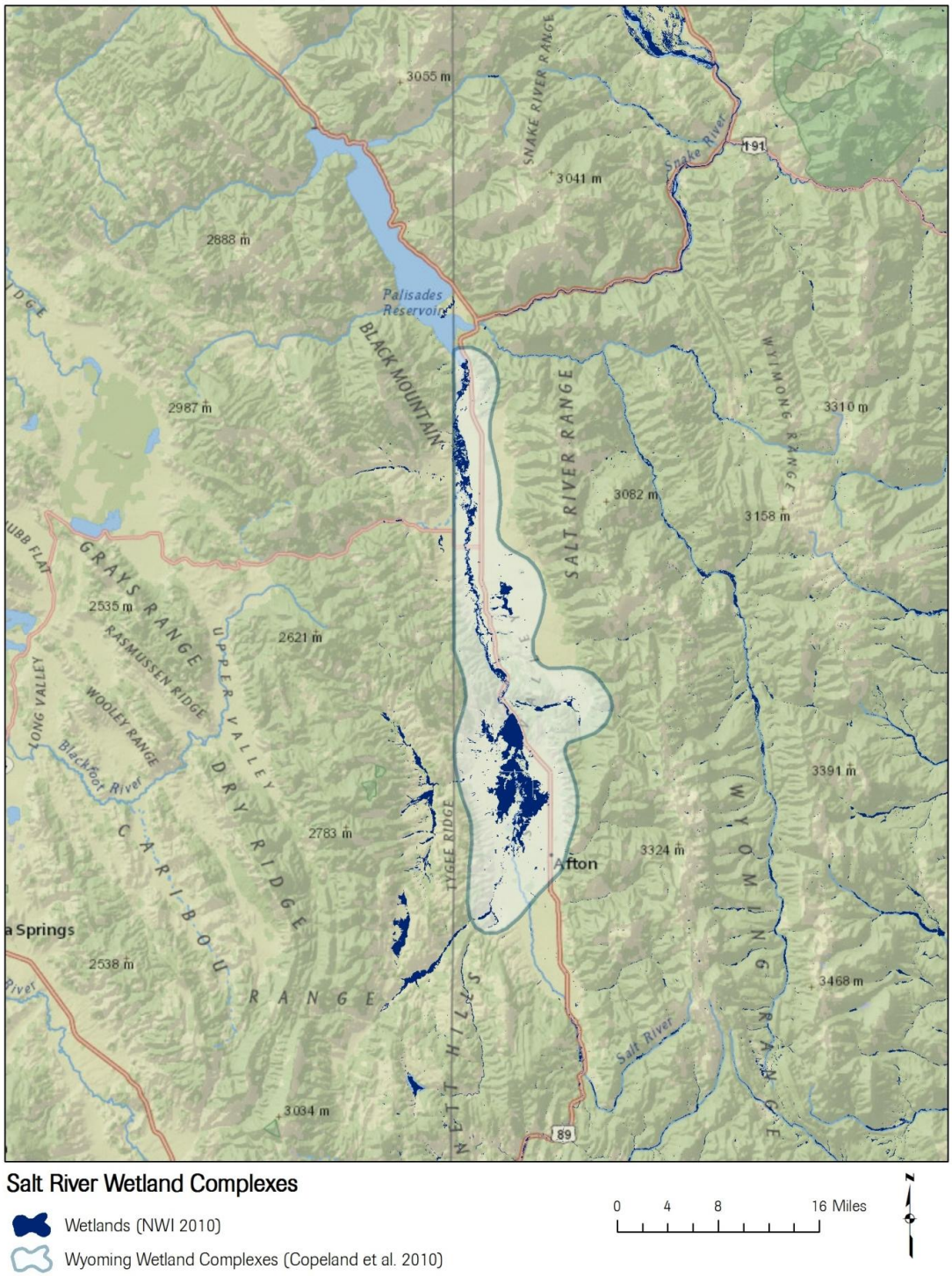



Fig. 2. Delineation of Salt River Wetland Complex from Copeland et al. (2010).

Table 1. Composition of wetlands within the Salt River Complex (from Copeland et al. 2010).

| Wetland Type | Number | Total area |
|---|---|---|
| Freshwater emergent wetland | 1,006 | 8,3335 acres |
| Freshwater forested/shrub wetland | 550 | 1,640 acres |
| Freshwater pond | 111 | 66 acres |
| Lake | 8 | 15,147 acres |
| Other | 5 | 6 acres |
| Riverine | 64 | 662 acres |
| TOTALS | 2,239 | 25,856 acres |

Copeland et al. (2010) ranked wetland attributes in the Wyoming portion of the SRWC as follow:

- Low-medium density of wetlands
- Condition of wetlands ranked as "medium"
- High biological diversity (Shannon Diversity Index)
- Medium to high on wetland species rarity
- Medium vulnerability (risk of change)
- High vulnerability to exurban development (27% chance of development)
- Low vulnerability to oil and gas development
- Medium vulnerability to climatic impacts
- High proportion of irrigated lands
- Medium duck density (6.6-17.5/mi$^2$) based on breeding duck survey
- Medium duck harvest ranking based on 2002-2005 harvest data.

## Hydrology

The Salt River is a major tributary of the upper Snake River. The Salt River watershed (Hydrologic Unit Code 17040105), subdivided by the Idaho and Wyoming state lines, is 592,538 acres. Headwaters are located at the southern end of the watershed and the river flows northward to its confluence with the Snake at the upper end of Palisades Reservoir near Alpine, Wyoming. The average annual flow of the Salt River near Etna is over 800 cfs with maximum flows of over 3,700 cfs and minimum flows of 180 cfs. The average width of the watershed is ten to twenty miles over much of its length, but the valley floor constricts at the "Narrows," which geographically divides the southern "Upper Valley" from the northern "Lower Valley." Elevations in the watershed range from 5,570 ft. at the Salt/Snake River confluence to around 10,750 feet atop mountain peaks on the eastern and southern boundaries of the watershed. The average elevation of the valley floor is around 6,000 feet.

The average annual precipitation in the Salt River watershed ranges from 18–21 inches/year. Most of the precipitation is deposited as winter snowpack. The principal tributaries are Cottonwood Creek, Dry Creek, Swift Creek, Willow Creek, Strawberry Creek and Cedar Creek originating from the Salt River Range on the east, and Spring Creek, Crow Creek, Stump Creek, Flat Creek,

Tincup Creek, and Jackknife Creek originating from the Gannet Hills on the west. The tributaries flowing from the Salt River Range are characteristically short, steep gradient streams that have deposited broad alluvial fans extending from the canyon mouths to mid portions of the valley. The tributaries on the west have a moderate gradient until they reach the valley floor where they transition to low gradient, meandering streams with alluvial flats and marshy areas. Numerous springs and sloughs are also interspersed throughout the watershed (Star Valley Conservation District 2005).

A section of the river in the southern end of the valley near Smoot to Afton is dewatered by irrigation withdrawals each summer. Flows diminish then re-emerge downstream from Afton as a series of spring creeks in the Burton Springs area. The springs rise out of the valley floor along the river channel and some tributaries where they are fed by flood irrigation and elevated sub-surface water levels. The most intact wetland complex lies along the river channel from the Grover-Auburn Lane upstream to Crow Creek. A more modified wetland complex is present between the Grover-Auburn Lane and the south end of the Narrows. The river channel and valley constricts at the Narrows where the riparian habitat is relatively intact until the river emerges from the Narrows near Thayne. The lower Salt River is heavily modified by past and ongoing agricultural practices, and much of the willow riparian habitat has been removed between Wyoming Highway 239 and Etna Lane downstream from Thayne.

The Wyoming Game and Fish Department worked with the Soil Conservation Service (SCS) and the Star Valley Conservation District to develop a hydrologic restoration plan for the Salt River in 1978. The SCS developed a Resource Conservation and Development Critical Area Treatment Plan in the lower valley (28 mile stretch from the Highway 89 Bridge south of Thayne to Palisades Reservoir). Work was carried out from 1978-1984 on 112 sites and included construction of 33,868 feet of tree revetments designed to deepen the channel and prevent lateral erosion. Willow communities were reestablished from plantings to stabilize the river banks from further erosion at 9 sites, and 4,892 feet of fence was built to protect riparian habitat from cattle. Fifteen junked cars were also removed from the river. The revetments seemed to function well until the record high flows of 1983 and 1984, which damaged many of the structures and caused accelerated bank erosion (Gelwicks et al. 2002).

Most irrigators had converted to sprinkler irrigation by 1971. Elimination of flood irrigation reduced water demand during high flows in spring and early summer, but also decreased the amount of irrigation return flow later in summer. The result was higher spring flows (increase of 47%) and lower fall flows (decrease of 13%) (Sando et al. 1985). Apparently, the stabilized hydrology of the Salt River had been a reflection of historic flood irrigation withdrawals and return flows. The sudden change to sprinkler irrigation led to extensive spring flooding as the river hydrology readjusted to a more natural flow regime (Erickson 1986).

Record spring flows in 1986 took out some tree revetments and caused additional bank erosion. In response, SCS proposed an extension of the Critical Area Treatment project to assist landowners with bank stabilization measures including: fencing, levee and diversion construction, rock riprap, tree revetments, grass seeding, and tree planting. The WGFD was concerned some of proposed work could damage fisheries habitat and possibly lead to additional problems. The WGFD proposed use of tree revetments rather than levees and riprap. Nonetheless, rock riprap was

applied to 1,500 ft of stream bank at 5 sites between Afton and Auburn-Grover Lane. The landowners did not want to use tree revetments to stabilize the stream banks but did agree to fence and revegetate the sites. Further work on the project lapsed due to lack of funding, disagreement over some stabilization practices, and the inability of many landowners to pay their cost share of proposed work. By 1990 vegetation survival was fair on revegetated sites, but some treatment areas were damaged by ungulate grazing. The overall project demonstrated mixed success and alternate funding was made available in 1990 for another bank stabilization project in the upper valley. Funds were contributed through a cooperative partnership that included Wyoming DEQ, EPA, Star Valley Conservation District, Orvis Company, DU, TU, and the WGFD. A work plan was developed for 23 sites downstream from the Auburn - Grover Lane Fishing Access site. Tree revetments were constructed on 5 sites in 1991-1992 and a channel plug and revetments were placed at another site to prevent further channel shift. A rock drop structure and rock barb structure were also placed in another site. Banks along Christensen Creek on the Orvis property were protected by installing fencing with a 50-ft setback distance. Bank fencing and additional rock work were installed on some other sites from 1991-1993. However, flooding in spring of 1993 raised concern that some structures actually resulted in more damage than they prevented. Consequently, the program lost credibility and died from lack of interest and funding (WGFD Annual Fisheries Reports 1990-1993 *in* Gelwicks et al 2002).

## River Classification

The upper watershed of the Salt River is a natural free flowing system above Highway 89. Tributaries are small ranging from perennial to intermittent with high gradients and canyon-type valleys. These tributary streams have fairly stable banks with straight channel development. Large cobble/boulder substrates in the headwaters become exceedingly mobile during high run-off events. Beaver ponds are common but often breached during these run-off events. The steep tributary gradients, beaver dam breaches, and size of substrates all contribute to a high bedload deposit on the upper Star Valley floor. The Salt River proper does not have the water quantity, velocity or gradient to move the large substrates that have been deposited. As a result, the channel is naturally unstable throughout the entire valley floor and the stream confluences (Gertsch pers. com.).

As the river passes through the upper and lower valleys, its physical characteristics change dramatically. In the area west of Smoot surface flow generally ceases during summer due to natural geology (porous bed materials) and irrigation withdrawals below Smoot. The river then resurfaces at the Burton springs area west of Afton. The Salt River Watershed Management Plan asserts the river's varied uses and characteristics such as dry river sections make it appropriate to recognize variable classifications along segments of the watershed (Star Valley Conservation District 2005). However, the Salt River is currently designated a class 2AB waterbody and is protected for designated uses defined in Chapter 1 of the Wyoming Surface Water Quality Standards:

> "*Class 2AB waters are those known to support game fish populations and are designated as coldwater game fisheries unless identified as a warm water game fishery. Unless it is shown otherwise, these waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected*

*for that use. Class 2AB waters are also protected for nongame fisheries, fish consumption, and aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value uses."*

The beneficial uses assigned through Stream Classification establish the chemical, biological and physical standards against which conditions in that waterbody will be evaluated [Section 4(b)(i), Chapter 1, Wyoming Surface Water Quality Standards].

In 2002, the Salt River was designated on the Wyoming DEQ's Section 303(d) List of Impaired Waterbodies. Specifically, the river segment from above to below the Etna Gauging Station was listed as threatened for recreational contact due to fecal coliform, and was considered a high priority for remediation under the Total Maximum Daily Load (TDML) development process (Star Valley Conservation District 2005). To avoid imposition of a TMDL remediation process the conservation district developed the Salt River Watershed Management Plan, completed in 2015.

## Potential Issues Adversely Affecting Water Quality in the Salt River Drainage

Sources of water quality impairment including fecal coliform concentrations, and recommended management actions are described in the following sections (Star Valley Conservation District 2005). Water quality management actions may benefit wetland and riparian habitats in addition to addressing impairment issues.

### *Agriculture*

The agricultural community has been an economic and cultural mainstay of the Salt River watershed for generations. Specific agriculture-based issues and recommended actions include:

- *Waste Management* – Control commercial and private agricultural waste disposal and its proximity to surface waters. Seasonal livestock feeding areas should be managed to minimize impacts to area streams.
- *Grazing Management* – Opportunities exist to address potential fecal coliform loads, and enhance streambank stability and riparian area conditions through grazing management practices.
- *Irrigation Management* – Appropriate irrigation management practices will minimize the possibility for contamination of nearby surface waters.

### *Economics*

Additional resources are needed to ensure the Salt River Watershed Plan is implemented effectively.

- *Economic Impacts of Remediation* – Remediation should not place an undue economic burden on those who implement Best Management Practices.
- *Resources*– Sufficient human and fiscal resources to implement this watershed plan are currently unavailable. However the District is committed to actively pursue the necessary fiscal resources.

***Industry***

The influence of industry on fecal coliform and nutrient loading in the Salt River watershed appears to be negligible at present, but the potential for future impacts exists.

> *NOTE: Significant pollution was historically caused by waste discharge from the cheese factory in Thayne. The problem was eventually corrected through litigation and regulatory oversight, and the factory was recently demolished.*

- *Processing Facilities* – Facilities must comply with existing water quality rules and regulations.
- *Aquaculture* - Facilities must comply with existing water quality rules and regulations.

***Recreation***

Outdoor recreation interests can be an important advocate for compatible development planning and a high quality environment. Some recreational activities can also have an adverse impact on water resources. Specific issues and concerns include:

- *Waste Discharge from RV's* – Discharge directly into or near surface waters adversely affects water quality.
- *Camping* – Repeated use of camping sites too close to surface waters has potential to adversely affect water quality and riparian areas through inappropriate waste disposal and excessive disturbance of soil and vegetation.
- *Pet Walking* – Pet waste can pose a threat to water quality if proper disposal is not practiced.
- *Boating and other Water Related Activity* – Discharge of waste and contaminants directly into or near surface waters adversely affects water quality.
- *Off-Road Vehicle Use* – Excessive vehicle use too close to surface waters can adversely affect water quality and riparian areas by disturbing soil and vegetation, thereby accelerating erosion.
- *Other Outdoor Recreation* – Activities such as hiking, biking, fishing, trail riding etc. have some potential to adversely affect water quality within locations of intensive use. Such activities can result in trailing and bank erosion, or litter and waste accumulation near surface water. In general, however, dispersed recreation activities pose little threat to habitat or water quality.

***Rural Subdivisions***

Rural subdivisions are generally considered to be lots or parcels of 35 acres or less. Subdivision development is happening at a fast pace within the Salt River watershed, and has potential to impact water resources.

- *Surface Runoff* – As non-point source pollution accumulates on land surfaces, storm water runoff flushes those pollutants directly into surface waters.
- *Irrigation Management* – Watering of lawns, gardens, yards, and especially excessive irrigation in conjunction with pesticide and fertilizer use contributes to contamination of surface and subsurface flow.
- *Small Acreage Land-Use Management* – Concentrated land use activities such as hobby farming, concentrated livestock grazing, vehicle storage, fuels and hazardous materials storage all have potential to impact the Salt River Watershed.
- *Setbacks* – Inadequate setbacks or buffers between surface waters and subdivision land uses have the potential to adversely affect surface water quality.
- *Sewage Treatment (aging systems or untreated discharge)* – Proper installation and periodic maintenance of septic systems and leach fields are very important to minimize the potential impact of waste management practices.
- *Hydrologic Modifications* – Landowners have built private in-stream pools, off-channel ponds, spring developments and other channel modifications for their personal use. These can have a cumulative adverse impact on water quality and stream hydrology and stability. If built, these types of modifications should be properly planned. Activities involving excavation or deposition of fill into waters of the U.S. or connected waters must be permitted under Section 404 of the Clean Water Act or must comply with a nationwide permit if applicable.

***Urban Growth***

The urban and suburban population continues to increase in Star Valley. Developers and planning officials need relevant technical and environmental information readily available to make informed decisions.

- *Surface Runoff* – As pollutants such as fertilizers, herbicides, and pesticides accumulate on the land surface from a variety of point and nonpoint sources, these pollutants wash directly into surface waters.
- *Irrigation Management* – Watering of lawns, gardens, yards and especially excessive irrigation in conjunction with heavy use of chemicals in yards and gardens contributes to contamination of surface and subsurface flow.
- *Sewage Treatment (inadequate facilities and/or untreated discharge)* – Community wastewater treatment capacity should be addressed by municipal and county planners based upon projected population growth. Individual on-site treatment systems for properties not on community systems will require proper installation and periodic maintenance to minimize potential for surface water contamination.
- *Solid Waste Management* – Municipal and county planning efforts should consider projected population growth when addressing landfill locations and capacity to avoid adverse water quality impacts.

## LINKAGES TO OTHER CONSERVATION PLANS AND PROGRAMS

- *Coordinated Implementation Plan for Bird Conservation in Central and Western Wyoming (BCRs 10, 16, 18)* – The Star Valley is within the Snake River Riparian Corridor Bird Conservation Area (BCA), as identified in WY Steering Committee (2005). The Valley is also situated just north of the Commissary Ridge Raptor Migration BCA (encompassing raptor migration routes). Conservation actions within the Star Valley would contribute directly to statewide objectives within the Coordinated Implementation Plan.
- *Partners in Flight* – The Star Valley and adjacent areas encompass 6 of the 14 priority habitats designated by the *Wyoming Partners in Flight Bird Conservation Plan* (montane riparian, wetlands, riparian meadows, aquatic, and aspen).
- *Waterbird Conservation for the Americas Plan* – Franklin's gulls (a species of moderate concern at the western hemispheric scale) occur in Star Valley.
- *Ecosystem Plan for the Upper Missouri, Yellowstone, and Upper Columbia River Project* – The USFWS designated the Salt River as a river needing protection.
- *Pacific Flyway Management Plan for the Rocky Mountain Population of Trumpeter Swans (Pacific Flyway 2008)* – Acquisition of conservation easements and restoration and creation of shallow water wetland habitats within the Salt River drainage area could address the following objectives in this plan:
    - Work with partners to protect, enhance and increase trumpeter swan winter habitat.
    - Develop a landscape-level planning strategy to facilitate prioritization and implementation of actions that will provide adequate nesting, brood rearing, spring transitional habitat, and summer habitat for breeding pairs and subadults. Salt River is identified as a priority area for this work in Wyoming.
    - Identify and work with partners to fund high priority wetland development, restoration and enhancement projects capable of providing nesting and brood-rearing habitat and summer habitat for nonbreeding swans.

## POTENTIAL CONTRIBUTIONS TO THE CONSERVATION OF WATERFOWL HABITAT

The Rocky Mountains (BCR 10) contribute substantively to waterfowl production and maintenance of populations due to the large size of the region and numerous areas of suitable habitat (breeding, migration, and wintering habitat).

Due to the Star Valley's proximity and migration links to the Bear River drainage and the Great Salt Lake, efforts to conserve wetland habitat within the Star Valley will contribute to regional migratory bird conservation efforts. Those efforts will also complement the conservation goals associated with establishment of the Cokeville Meadows National Wildlife Refuge on the Bear River some 40-50 miles to the south, and with the USFWS's ongoing efforts to conserve wetland habitats from the headwaters of the Bear River to the Great Salt Lake (e.g., the Bear River Watershed Conservation Initiative).

Several high priority species identified in the 2004 Implementation Framework for the North American Waterfowl Management Plan (NAWMP ref? ) occur in western Wyoming (Table 2). These are also designated species of greatest conservation need in the Department's State Wildlife Action Plan (WGFD 2010). While all of these species occur in the Salt River watershed, the area is particularly important for Barrow's Goldeneye and Trumpeter Swans. Two of the 4 focal species identified in the 2012 NAWMP Revision (Northern Pintails and Lesser Scaup) nest in the project area (USFWS 2012).

## Bird Conservation Regions and Priority Bird Species

The project area is located in BCR 10 – Northern Rockies. Table 2 lists priority waterfowl species and season of use in the Star Valley and the Greys River Ranger District. Table 3 lists priority non-waterfowl bird species and season of use. The Greys River Ranger District includes the higher elevation wetlands along major tributaries within the Bridger –Teton National Forest on the east and south side of the Star Valley.

Table 2. Priority waterfowl species and season of use.

| Species | Season of Use[A] | |
|---|---|---|
| | Star Valley | Greys River District |
| Northern Pintail [B] | B, M | ? |
| Lesser Scaup [B] | B, M | B, M |
| Greater Scaup | M-rare | n |
| Redhead[B] | B, M | M(?) |
| Canvasback[B] | B, M, W | M (?) |
| Trumpeter Swan[D,E,G,H] | B, S, M, W | S |
| Harlequin Duck[D,F,G] | M | B, M |
| Barrow's Goldeneye[G] | M, W | B, M, W |
| Cinnamon Teal | | |
| Bufflehead[G] | B, M | B, M |

**[A] – Season of Use: B = Breeding, S = Non-breeding Summer Use, M = Migration/Staging, W = Winter, n = non-use**
**[B] – Also listed as a priority species in the North American Waterfowl Management Plan (NAWMP) and Intermountain West Joint Venture (IWJV) occur in Wyoming**
**(Table One of the *Coordinated Implementation Plan for Bird Conservation in Central and Western Wyoming*)**
**[C] – Also listed by the U.S. Fish and Wildlife Service as a Species of Conservation Concern**
**[D] – Also listed by the U.S. Forest Service as a Species of Special Concern (Sensitive Species)**
**[E] – Also listed as a priority species (I) in the Wyoming Partners in Flight Bird Conservation Plan (WPIF)**
**[F] – Also listed as an important species (II) in the Wyoming Partners in Flight Bird Conservation Plan (WPIF)**
**[G] – Also listed by the Nature Conservancy in ecoregional plans**
**[H] – Also listed by the Audubon Society on their Watch List**

Table 3. Priority non-waterfowl bird species and season of use.

| Species | Season of Use[A] | |
|---|---|---|
| | Star Valley | Greys River District |
| Priority NAWCA Species | | |
| Swainson's Hawk[D,F] | B, M | S, M |
| Sandhill Crane[B,F] | B, M | B |
| American Avocet[C,F] | B, M | B, M |
| Whimbrel [F] | M-rare | |
| Long-billed Curlew[C,D,F] | B, M | |
| Marbled Godwit [F] | M | |
| Sanderling [F] | M | |
| Wilson's Phalarope[C,D, F] | M | |
| Short-eared Owl[C,F] | B,M | n |
| Calliope Hummingbird[E,F] | B, M | B, M |
| Lewis's Woodpecker[E,F] | B, M | n |
| Red-naped Sapsucker[E,F] | B, M | B, M |
| Hammond's Flycatcher[E] | B, M | B, M |
| N. Rough-winged Swallow | B, M | B, M |
| American Dipper[E,F] | B, M, W | B, M, W |
| MacGillivray's Warbler[E,F] | B, M | B, M |
| Bobolink[E] | B, M | n |
| Other Priority NAWCP Species | | |
| American White Pelican[E,F] | S, M | S,M |
| Black-crowned Night Heron | M | n |
| Snowy Egret | M-rare | n |
| Great Blue Heron | B, M | S |
| Virginia Rail[D] ---- ? | B,M | |
| Sora | B, M | B, M |
| Franklin's Gull[D] | , M | n |
| California Gull | B, M | M |
| Other USSCP Species | | |
| Killdeer | B, M | B,M |
| Willet | B, M | |

| | | |
|---|---|---|
| Spotted Sandpiper | B, M | B, M |
| Wilson's Snipe | B, M | B, M |
| Other WPIF Priority Species | | |
| Bald Eagle (I) | B, S, M, W | B,S, M, W |
| Willow Flycatcher (II)[F] | B, M | B, M |
| Wilson's Warbler (II)[F] | B, M | B, M |

**[A] – Season of Use: B = Breeding, S = Non-breeding Summer Use, M = Migration/Staging, W = Winter, n = non-use**
**[B] – Also listed as a priority species in the North American Waterbird Conservation Plan (NAWCP)**
**[C] – Also listed as a priority species in the U.S. Shorebird Conservation Plan (USSCP)**
**[D] – Also listed as a priority species (I) in the Wyoming Partners in Flight Bird Conservation Plan (WPIF)**
**[E] – Also listed as an important species (II) in the Wyoming Partners in Flight Bird Conservation Plan (WPIF). Not all species rated as 'II' in the WPIF Plan are listed.**
**[F] – Also listed as a priority species in BCR 9 (Great Basin) and BCR 16 (Southern Rockies/Colorado Plateau), which are near the project area.**

## WILDLIFE IN THE SALT RIVER DRAINAGE

The Wyoming State Wildlife Action Plan (WGFD 2010) identifies 4 fish, 2 amphibian, 3 reptile, 1 mollusk, 29 avian, and 14 mammal species of greatest conservation need (SGCN) that utilize habitats in the Salt River drainage area (Table 4). The Salt River Wetland Complex contains critical riparian and wetland habitat for nesting Bald Eagle, forging Peregrine Falcon, and wintering Trumpeter Swan.

### Migratory Game Birds

#### *Ducks*

The Wyoming Game and Fish Department conducted duck breeding pair surveys from the early 1950s through 1999 based on a stratified random sample of 58 count blocks throughout the state. The Afton count block (12 $mi^2$) is located in the upper valley between Grover and Afton. Based on surveys conducted from 1970-1999, the average density of duck breeding pairs in the Afton count block ranked 6th in the state when tallied for dabbling duck species (9.15 indicated pairs per $mi^2$), and 24$^{th}$ when tallied for diving ducks (0.17 indicated pairs per $mi^2$). Fourteen species of ducks have been documented breeding in the area. The most common dabbling ducks are teal (blue-winged, green-winged, and cinnamon combined), mallard, gadwall, widgeon, and northern pintail, in decreasing order of abundance. The most common diving ducks are lesser scaup and common goldeneye. The Department suspended breeding pair counts after 1999 due to budget constraints and because Wyoming is not within the traditional survey area delineated by the USFWS to monitor status of continental breeding duck populations and habitat conditions.

Table 4. SGCN that use wetlands and riparian habitats in the Salt River drainage.

| ***Bird Species*** | ***Mammal Species*** |
|---|---|
| American Bittern<br>American White Pelican<br>Bald Eagle<br>Barrow's Goldeneye<br>Black-crowned Night-heron<br>Black Tern<br>Bobolink- rare<br>Canvasback<br>Common Loon<br>Franklin's Gull<br>Great Blue Heron<br>Greater Sage-grouse<br>Harlequin Duck rare<br>Lesser Scaup<br>Lewis's Woodpecker<br>Long-billed Curlew<br>Northern Goshawk<br>Northern Pintail<br>Peregrine Falcon<br>Redhead<br>Sandhill Crane<br>Short-eared Owl<br>Snowy egret-rare<br>Swainson's Hawk<br>Trumpeter Swan<br>Virginia Rail<br>White-faced Ibis<br>Willow Flycatcher<br>Yellow-billed Cuckoo-rare | American Marten<br>American pika<br>American water shrew<br>big brown bat<br>Canada lynx<br>dwarf shrew<br>little brown myotis<br>long eared myotis<br>long legged myotis<br>moose<br>northern river otter<br>silver-haired bat<br>vagrant shrew<br>water vole<br><br>***Amphibian Species***<br>boreal toad<br>Columbia Spotted Frog<br><br>***Reptile Species***<br>great basin gophers<br>northern rubber boa<br>wandering garter snake<br><br>***Fish Species***<br>bluehead sucker<br>mountain whitefish<br>snake river cutthroat<br>Yellowstone cutthroat<br><br>***Mollusk Species***<br>western pearalshell |

***Canada Geese***

Star Valley is a locally important nesting habitat for Canada geese from the Rocky Mountain Population (RMP). The breeding population estimate is 395 pairs based on projections from annual surveys conducted during 2002-2011. The Salt River drainage is a high elevation mountain valley and comparatively few geese and ducks winter there.
September crane and goose hunts were begun in the valley during the early 1980s to address agricultural depredation. Drewien et al. (2009) reported, "Canada Goose numbers during early years (1982-84) of hunts included 4,000-5,000 in Star Valley and 400-600 in the Bear River Valley (Lockman et al. 1987). During recent September aerial surveys, which occur after the early goose

and crane hunt, we have seldom seen groups larger than several dozen geese in either valley. We conclude that the hunts have been extremely successful at greatly reducing numbers of both species due to harvest and harassment of birds out of the valleys."

***Trumpeter Swans***

In 1988, the Wyoming Game and Fish Department (WGFD) initiated a Trumpeter Swan range expansion project in conjunction with the Pacific Flyway's Tri-state Range Expansion Program (WGFD records). The main goal for the Salt River drainage to was to establish a new wintering area outside traditional use areas in the core Snake River drainage. Prior to releasing Trumpeter Swans, WGFD personnel conducted extensive habitat suitability evaluations. Lockman (1990) estimated that the Salt River could support up to 133 swans in winter and a limited number (up to 10 swans) in the summer.

WGFD released 14 captive-raised and salvaged cygnets (67-80 days old) during 1987-1990. The purpose of these releases was to establish decoy groups to attract migrating wild swans into new wintering habitat (Lockman 1990, Shea and Drewien 1999, Patla and Oakleaf 2004). In winter 1990, the U.S. Fish and Wildlife Service (FWS) translocated 30 wild Trumpeter Swans from Harriman State Park (HSP), ID and Red Rock Lakes NWR, MT (RRLNWR) to the Salt River (Shea and Drewien 1999). An additional 67 swans were translocated from RRLNWR to Grays Lake NWR in Idaho (38 km west of the Salt River release sites) during summer months from 1988-1991. Decoy groups were immediately successful in attracting wild swans and the number of wintering swans began to increase. Between 2004 and 2013 an average of 152 Trumpeter Swans (range 97-217) were documented in the Salt River area during the annual Tri-state midwinter aerial surveys. Based on sightings of neck-collared swan, wintering swans included a majority of the summer flock that was established at Gray's Lake NWR as well as some Canadian migrants (Shea and Drewien 1999; WGFD records).

Much of the river remains open even in extremely cold winters. Currently greatest concentrations of swans are found from the Clark's Barn area just north of Afton north to the Narrows, and in the Etna area. Smaller groups can be found scattered throughout the river drainage. Wintering swans leave the valley by the end of March and return to breeding areas. The Alpine Wetland provides good late winter and spring foraging habitat for trumpeter swans (Patla and Oakleaf 2004).

To date, nesting attempts by trumpeter swans have been limited in the Salt River drainage. A collared pair originating from the from the 1991 Gray's Lake NWR releases nested at the north end of the valley just south of the Alpine wetland in 1997 and 1998. The male hit a power line and was killed in 1999. A new unmarked pair took over the territory the following year. The territory was abandoned after 2006, likely due to subdivision development (Salt River Cove) south of the McCoy Creek Road. A pair established a new territory on the Alpine wetlands in 2009. Two cygnets were hatched and one fledged in 2011 but pair has failed to produce cygnets in other years, most likely due to nest flooding. Other subadult swans have summered adjacent to established nest sites at the Alpine wetland ponds, in the Etna area, and recently at a newly constructed wetland near the Clark's Barn area. Swans also attempted to nest in 2015 on a small pond south of the Auburn-Grover Lane recently (Patla 2015, Patla, pers. com). Construction of shallow water

ponds on private lands could increase the number of nesting pairs if properly designed (Patla and Lockman 2004).

### *Rocky Mountain Population of Sandhill Cranes*

September counts of Sandhill Cranes have declined in the Salt River valley since the early 1980s. In part, the declines are the intentional outcome of hunts begun in 1982 to reduce depredations on barley and other grain crops. The 3-year mean count was 793 in 1982-1984 and had declined to 169 by 2010-2012 (Drewin et al 2010, Thorpe and Benning 2011, and Thorpe, Benning, and Donnelly 2012). Fluctuations in Canada goose and crane numbers just prior to the early season hunts reflect both population changes from year to year and annual variation in time of staging by both species in the valley. There is no doubt the early goose and crane hunts are displacing both species out of the valley. In addition, considerable crane and waterfowl habitat has also been lost in Star Valley during the 1990s and since due to rapid subdivision development, associated roads, urban sprawl, and large increases in human uses of these areas. In addition, declining production of barley on agricultural lands has been unfavorable to cranes and geese since the 1980s (Drewin et al 2009).

### *Aquatic Species*

Nineteen fish, five amphibian, one mollusk, and six reptile species have been documented within the Salt River basin (Table 5).

Table 5. Aquatic species documented in the Salt River drainage, including native species Status (WGFD 2010).

| **Common Name** | **Scientific Name** | **SGCN Rank** |
|---|---|---|
| boreal chorus frog | *Pseudacris maculata* | |
| bluehead sucker | *Catostomus discobolus* | **NSS1** |
| brook trout | *Salvelinus fontinalis* | |
| brown trout | *Salmo trutta* | |
| boreal toad | *Bufo boreas boreas* | **NSS1** |
| bullsnake | *Pituophis catenifer sayi* | |
| fathead minnow | *Pimephales promelas* | |
| Great Basin gophersnake | *Pituophis melanoleucas deserticola* | **NSS2** |
| intermountain wandering garter snake | *Thamnophis elegans vagrans* | |
| kokanee | *Oncorhynchus nerka* | |
| lake trout | *Salvelinus namaycush* | |
| longnose dace | *Rhinichthys cataractae* | |
| mottled sculpin | *Cottus bairdi* | |
| mountain sucker | *Catostomus platyrhynchus* | |
| mountain whitefish | *Prosopium williamsoni* | **NSS4** |
| northern leopard frog | *Rana pipiens* | |
| northern rubber boa | *Charina bottae bottae* | **NSS3** |
| northern sagebrush lizard | *Sceloporus graciosus graciosus* | |

| | | |
|---|---|---|
| Paiute sculpin | *Cottus beldingi* | |
| rainbow trout | *Oncorhynchus mykiss* | |
| redside shiner | *Richardsonius balteatus* | |
| rainbow trout x cutthroat trout | | |
| tiger salamander | *Ambystoma tigrinum* | |
| | | |
| speckled dace | *Rhinichthys osculus* | |
| Columbia spotted frog | *Rana luteiventris* | **NSS3** |
| Snake River cutthroat trout | *Oncorhynchus clarkii ssp.* | **NSS4** |
| Utah chub | *Gila atraria* | |
| Utah sucker | *Catostomus ardens* | |
| valley garter snake | *Thamnophis sirtalis fitchi* | **NSSU** |
| Yellowstone cutthroat trout | *Oncorhynchus clarkii bouvieri* | **NSS2** |
| western pearlshell | *Margaritifera falcate* | **NSSU** |

The principle objective for fish management within this drainage is to enhance the wild trout fishery and integrity of the indigenous Snake River cutthroat trout population while maintaining sport fishing opportunities (WGFD 2009). Current enhancements include removal of fish passage barriers and installation of habitat improvements that increase spawning habitats. Projects are designed to reduce sediments. Excessive sediments blanket spawning gravels and create conditions that proliferate whirling disease. The parasite that causes whirling disease, *Myxobolus cerebralis*, was first documented in the Salt River in 1995. Brown trout, Snake River cutthroat trout, rainbow trout, rainbow-cutthroat hybrids, and mountain whitefish have all tested positive. The river is a popular blue-ribbon trout fishery with 17 fishing access areas and boat launch points that have been acquired by the WGFD (Figs. 3 and 4).

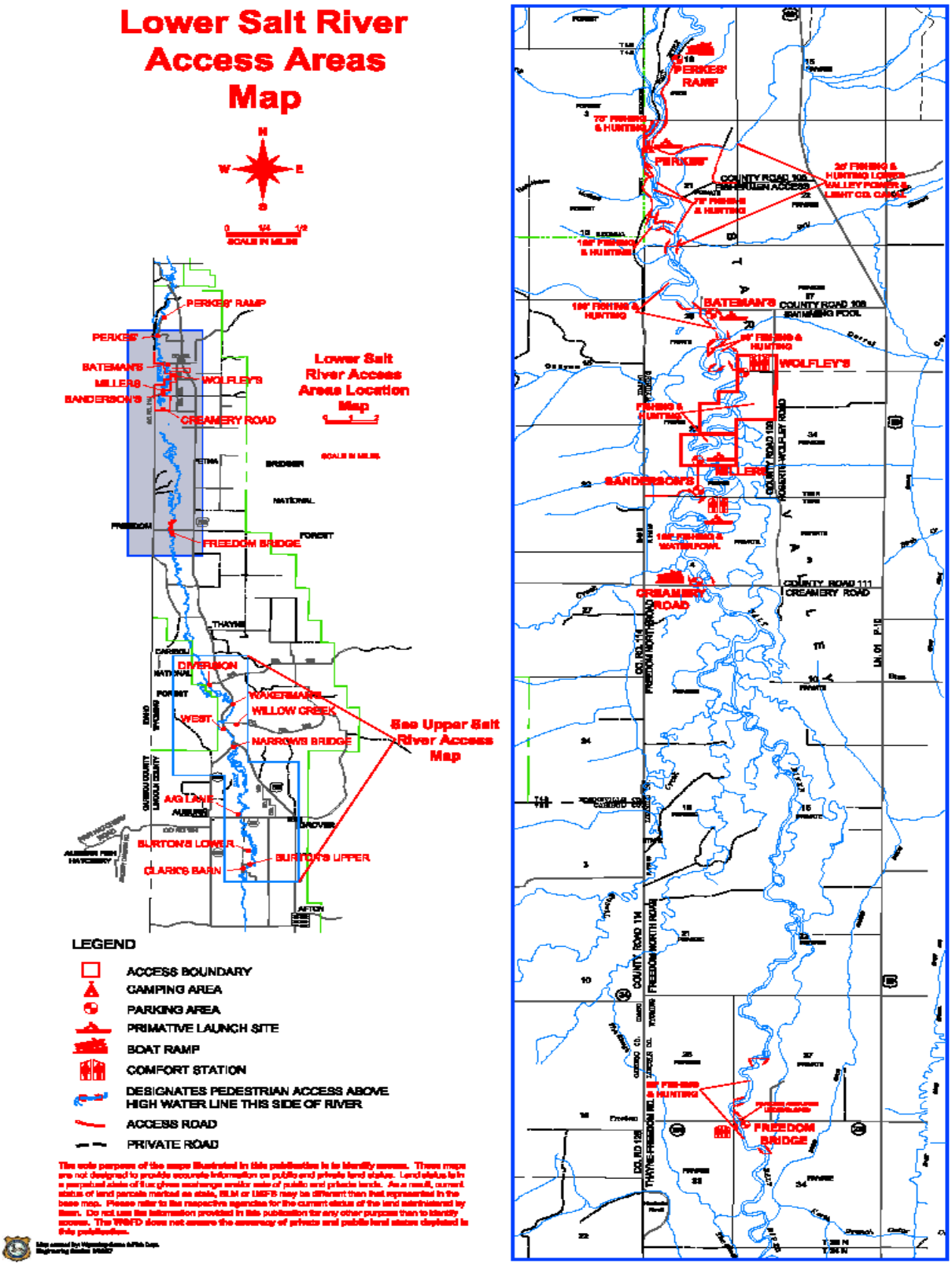



Fig. 3. WGFD Public Access Areas in the lower SRWC.

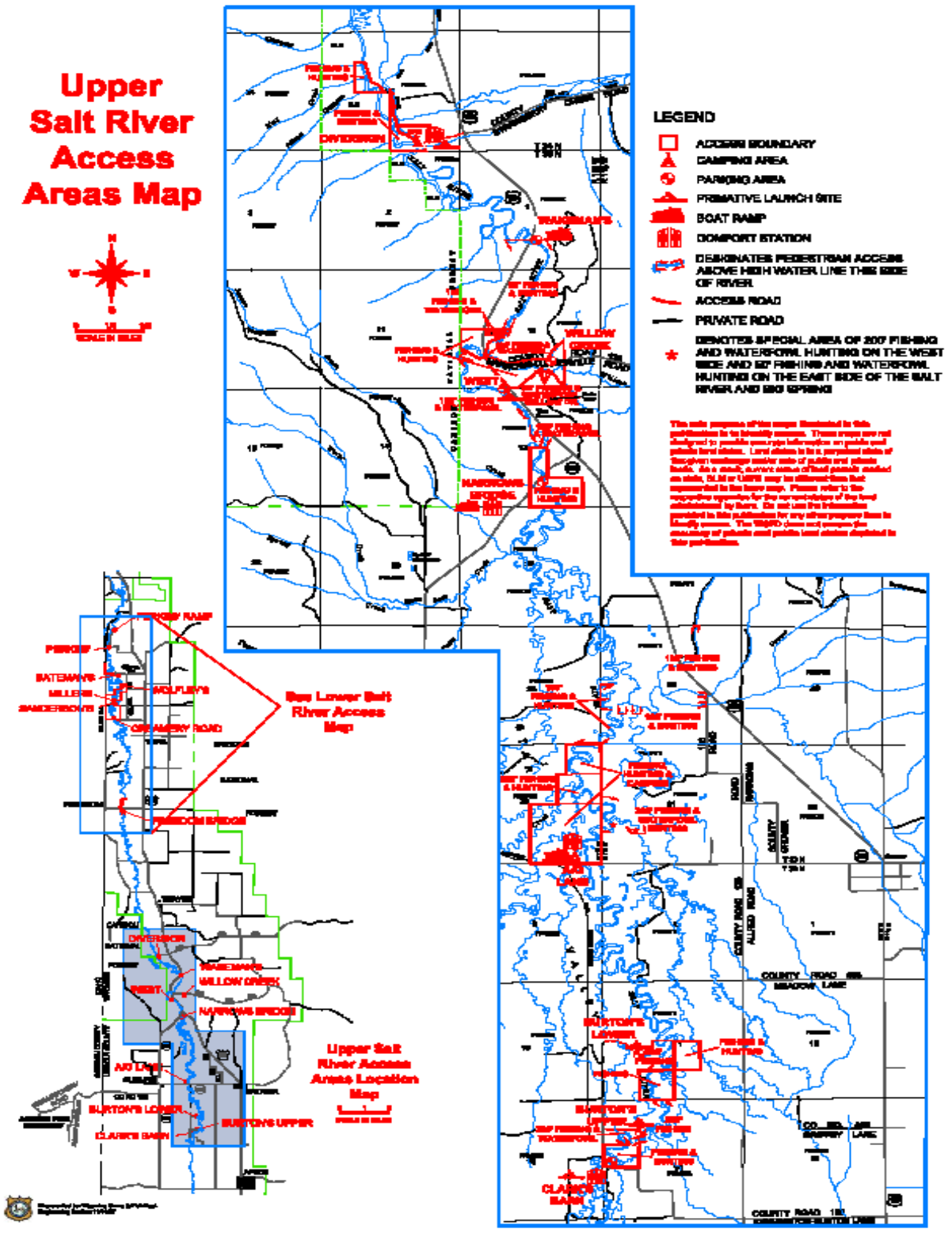



Fig. 4. WGFD Public Access Areas in the upper SRWC.

## PRIORITIZATION OF WETLAND AREAS IN THE SALT RIVER DRAINAGE

Five wetland complexes of the Salt River drainage are characterized in decreasing priority. The most important complex is located between the bridge on Wyoming Highway 238 west of Afton and the bridge on Wyoming Highway 238 at the start of the Narrows (Fig. 2). This area includes the Burton Springs area where the water table associated with the Salt River rises to the surface sustaining many springs, spring creeks, and wet meadows. The area is dominated by pastures with wet meadows and willow patches. Grazing and native hay meadows are the dominant land use. Flood irrigation augments water supplies to several of the springs. Lower Crow Creek takes on the appearance of a spring creek in this section but is also dewatered in summer for a reach upstream from Highway 239. Swift Creek is also dewatered in its lower reaches. Numerous fish ponds and other water features have been constructed in this area. Most of the spring creeks are owned by Orvis Company.

The area described above corresponds with the Afton duck count block and is a significant staging area for RMP Sandhill Cranes in the fall. Prior to the September crane and early goose hunting season, it is possible to count 300-500 cranes and up to 1000 geese leaving the roosts on the Salt River and nearby ponds at dawn to feed in grain fields. The area is also winter habitat used by trumpeter swans and other waterfowl. This wetland complex is the highest priority for conservation because of its value for migratory game birds. It includes several WGFD fishing access easements; however none of it is protected with conservation easements. This area has much potential for wetland/waterfowl habitat development and riparian habitat improvements.

The stretch of river below the Auburn-Grover Lane has moderate fisheries value and is characterized by low gradient habitat with a high degree of sinuosity. About 20% is secondary channel habitats with eroding banks and limited willow habitat. Some of the pastures are heavily grazed and the unfenced stream banks in some areas are degraded with little residual riparian vegetation. Willow cover declined from 41% in 1939 to 5% in 1970 and has recovered to only 15% in 2000 (Gelwicks et al. 2002).

The second most important wetland complex is the stretch of the Salt River from Creamery Lane downstream to Palisades Reservoir. The Double L Ranch within this reach of the river is a high end subdivision that includes a fishing and waterfowl hunting easement. Houses and support structures are situated immediately adjacent to the easement rendering its value questionable in some locations, and numerous ponds and water features have been constructed in what were once wet meadows and pastures. Large numbers of geese use the ponds and lawns, leading to complaints from some landowners. However, segments of the river downstream from Creamery Lane still retain good stream bank habitat and some old river channel/oxbows and spring creeks are present. The Perkes access provides good riverine habitat and an excellent slough formed by 2 old river channels remains on the west side of the river at the downstream boundary of the Double L property. This area also includes the Alpine Wetland complex, which is located at the upper end of Palisades Reservoir, and jointly managed by Bureau of Reclamation, Caribou-Targhee NF and the WGFD. The Alpine Wetland complex was created to offset losses incurred from prolonged drought on Bureau of Reclamation projects. The project also functions as a dust abatement measure for the nearby town of Alpine. The wetland complex consists of 6 ponds and associated supply ditches, dense willow patches, open marshes, and grass uplands encompassing 254 acres.

The area is actively managed for waterfowl and closed to waterfowl hunting to provide a secure roost, loafing and feeding area. The wetland provides nesting habitat for many Canada geese and ducks, primarily Mallards, Cinnamon Teal and Greenwing Teal, and has also provided nesting habitat for a pair of Trumpeter Swans. Great Blue Herons, White-faced Ibis, a variety of migrant shorebirds, American White Pelicans and cormorants loaf on the dikes and forage in the ponds and on the exposed shoreline. The wetland was designated an Audubon Important bird Area (IBA) in 2004. The ponds freeze during the coldest portion of the winter, but open up to provide spring foraging habitat for swans and other waterfowl when adequate flows are maintained through the system.

Water supply issues have impacted management of the Alpine wetland complex. Beaver management has been a significant problem further complicated by inadequate and aging water control structures. Changes to the river channel have limited the utility of the intake structure on the Salt River and adversely affected efforts by the WGFD to control water levels in the ponds on the wetland. The water control structures were replaced in 2011 and work was completed on the intake structure and ditch on the Salt River. However, the river channel shifted in the spring of 2012 and the modifications were not effective when the river flows dropped in mid-summer. Further work was planned during the low flow period in 2012-2013. Additional work is needed to correct engineering flaws, in addition to fixing the water control issues, to make the wetlands more productive. Management concerns include nest site flooding and human activity in the wetlands. Although the area is closed to motorized use until July 1, enforcement is not strict.

The private land portions along this stretch of the Salt River are being subdivided with large homes being built in areas that were formerly pastures. Much of the willow habitat along the river and adjacent to the wet meadows is still present. An old flooded gravel pit in this area once supported a Trumpeter Swan nest territory until the subdivision encroached on the pond. Trout habitat remains in good condition with intact willow riparian habitat, stable banks, high gradient flows, and good pool and riffle structure (Gelwicks et al. 2002).

The third most important wetland complex is located from Wyoming Highway 239 (Thayne-Freedom Lane) downstream to Wyoming Highway 239 (Freedom Lane). This stretch includes lower Flat Creek, which is spring-fed and provides some of the best winter habitat for swans and other waterfowl. The wetlands associated with the river and Flat Creek are constricted by adjacent land uses. Pastures and farmland impinge on the natural wetland corridor and private land uses are fairly intensive. There is no public access for fishing/hunting, except a short stretch upstream from the bridge on Freedom Lane. According to Rod Drewin (pers comm.) this area had much greater value for cranes 20-30 years ago but the conversion of farmland to rural subdivisions and loss of grain croplands in the Etna-Thayne area appear to have reduced fall crane use of this stretch of river. Conservation easements to protect lower Flat Creek and the river corridor adjacent to Flat Creek are desirable. Trout habitat is diverse with high gradient flows in a single channel and somewhat stable stream banks with intact riparian willow cover upstream from the confluence of Flat Creek. Below the confluence of Flat Creek the channel becomes braided with eroding stream banks and 45% willow cover on the banks. Trout populations are healthy, however, fishing access is limited (Gelwicks et al. 2002).

The fourth most important wetland complex is the riverine habitat from the bridge where Wyoming Highway 238 crosses the Salt River at the start of the Narrows downstream to Wyoming Highway 239 ( Freedom lane). This area includes 5 fishing access points and the most intact riparian habitat. The stretch is excellent habitat for native cutthroat trout and supports high trout densities. The stream has a high gradient, stable banks, and good willow cover along with some cottonwoods on the banks. The private land is managed as pasture and hay meadows. Recent subdivisions including several large homes and small ranchettes comprise most of the landownership but the wetlands and riparian habitats remain relatively intact. The greatest threats to the fishery are potential subdivision development, loss of channel sinuosity, and entrapment of fish in the East Side Diversion Canal. This is the most important stretch from a fisheries perspective based on habitat quality and public access (Gelwicks et al. 2002).

The fifth most important wetland complex lies along the stretch of the Salt River from the Highway 239 (Freedom Lane) crossing downstream to Creamery Lane (CR 111). This area was intensively farmed and willow removal along the riparian corridor has resulted in degraded habitat and unstable banks. In recent years much of the adjacent land has been subdivided with development encroaching on the river in several places. Ducks Unlimited proposed to do some habitat enhancement work near Jackknife Creek, but negotiations fell through. Wetlands provide both summer nesting and winter habitat for Trumpeter Swans and numerous other waterfowl. This stretch of river has 6 fishing/hunting easements including two (Wolfley and Miller easements) with sizeable upland acreage. Trout habitat quality is poor and supports lower fish densities. However the stretch is still an important fishery due to the good access, and some important spawning tributaries flowing into this reach. Considerable potential exists to improve riparian habitat conditions. Grazing management is needed in the riparian zone and willows should be re-established on the stream banks. Once stream banks are stabilized, in-stream structures could be installed to improve pool and riffle habitat. Wetland enhancement is also possible in some of the low-lying pastureland along the river (Gelwicks et al. 2002). The area is prone to flooding and additional subdivision development should be discouraged.

## RELATIONSHIP OF THE SALT RIVER PLAN TO OTHER CONSERVATION INITIATIVES

### Ducks Unlimited

The Salt River Wetland Complex lies within the Northern and Southern Rockies/Colorado Plateau – a Level III conservation priority area identified by Ducks Unlimited. Although one of DU's lower ranking priority areas, the conservation area has very productive waterfowl breeding habitat in several intermountain valleys, including the Salt River. Threats to habitat include rapid development impacting wetlands and upland nesting cover; diversions of ground and surface water to support a growing human population; manmade alterations of riverine systems, including dams and flood control levees; and modification or elimination of agricultural practices such as ranching and irrigated cropland that have helped to sustain wetlands. DU has been involved in two projects within the Salt River Drainage.

## USFWS Partners for Fish and Wildlife Program

The 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 at: https://www.fws.gov/mountain-prairie/refuges/wyomingpfw.php

PFW Focal areas include the Laramie Plains, Goshen Hole, Little Snake/Upper North Platte, Wind River Reservation, Upper Sweetwater/Red Desert, Bear River, Upper Green River, Powder/Tongue Rivers, and Black Hills Mixed Grass. . The program has increased efforts to protect wetlands within the Bear River drainage though conservation easements and wetland improvement projects. Conservation issues in the Salt River drainage are similar to those in the Bear River drainage, and the two drainages are linked by waterfowl and Sandhill Crane migrations. It may be feasible to extend the Bear River effort into the Star Valley if sufficient resources become available and if there is landowner interest.

## 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 Salt River Wetland Complex is one of 48 priority bird habitat conservation areas identified in the plan The IWJV Wyoming Implementation Plan can be downloaded from: http://iwjv.org/sites/default/files/wy_coord_imp_plan.pdf

## 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 Salt River Wetland Complex is within Bird Conservation Region 10 (Northern Rockies). A number of wetland best management practices recommended in the plan could improve watershed function and wetland conditions for priority species if they were implemented within the Complex. 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

The Salt River watershed encompasses 5 of 14 priority habitats designated by the *Wyoming Bird Conservation Plan* – wetlands, riparian, meadows, aquatic, and aspen. Conservation actions identified in the Salt River Plan would contribute to resolving the principal threats to these habitats (Table 6). Although the plan does not identify specific habitat conservation objectives for the priority habitats, it identifies problems and other issues that need to be resolved or mitigated and it identifies best management practice (Nicholoff 2003).

## Wyoming 2010 State Wildlife Action Plan (SWAP)

The Wyoming's 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 federally 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) for ecological systems (Comer et al. 2003) within Wyoming. The Salt River Wetland Complex received a mid-range habitat quality 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 complex. The SWAP does not provide specific objectives or conservation actions for the SRWC.

The Wyoming 2010 State Wildlife Action Plan can be downloaded from:
https://wgfd.wyo.gov/WGFD/media/content/PDF/Habitat/SWAP/SWAP.pdf

Table 6. Problems and best management practices identified in the Wyoming Bird Conservation Plan, and how conservation actions in this Salt River Plan would address them.

| **Problems resulting in habitat degradation or loss and reduced habitat effectiveness** | **How conservation actions in the Salt River Plan would address the problems** |
|---|---|
| Sub-division and development of riparian areas, wetlands, and agricultural land | Protect key areas from development with conservation easements or acquisitions. |
| Reduced water quality and disruption of hydrologic functioning (e.g., due to changes in land use) | Implement grazing and agricultural BMPS to reduce impacts to water quality and degradation of wetlands and riparian habitat. |
| Disturbance due to human activity (e.g., proximity of housing developments) | Conservation easements or acquisitions would reduce housing developments near riparian and wetlands and minimize the human footprint. |
| Predation by pets (e.g., cats and dogs) | Reduce human footprint and pets running at large. |
| **General best management practices outlined by the PIF plan** | **How conservation actions in the Salt River Plan would address BMP implementation** |
| Manage wetlands and riparian areas from a watershed perspective. Ensure that riparian areas are continuous along the entire drainage and are as wide as the soil and water table will allow riparian vegetation to exist. | Major emphasis of the plan if implemented. |
| Strive for no net loss of wetland habitat on a landscape scale. Limit activities that degrade or remove wetland habitats (e.g., conversion to other land uses). | Objective of the plan. |

| | | |
|---|---|---|
| | Develop conservation partnerships between landowners, land agencies, and private organizations to conserve and restore riparian habitat. | Plan requires a collaborative approach with willing landowners. |
| | Maintain "open" (undeveloped) areas and clump housing developments, through the use of conservation easements and zoning to reduce habitat fragmentation. | Objective of the plan. |
| | Protect relatively pristine wetlands and maintain and enhance the habitat of remaining wetlands. | Objective of the plan. |
| | Where possible, restore and rehabilitate the hydrology, water quality, and native plant communities in degraded wetlands. | Wetland restoration is an important component of the plan. |

## The Nature Conservancy (TNC)

TNC developed a statewide wetland evaluation and risk assessment that provided baseline data for a wetland chapter in the State Wildlife Action Plan (WGFD 2010). The main purpose of TNC's wetland database is to determine where conservation actions should focus. Functional wetland complexes are identified based on several evaluation criteria including mean wetland patch size, mean wetland densities, and distance between wetlands. Copeland et al (2010) provides a geospatial assessment of the distribution condition and vulnerability of Wyoming's wetlands. It provides a decision support tool for evaluating and prioritizing wetland conservation potential. Based on the assessment in Copeland et al. (2010), the following ranks were assigned to wetland attributes within the Salt River Wetland Complex:

- Number of wetlands = low-medium
- Condition of wetlands = medium
- Biological diversity of wetlands = high
- Rarity of wetland types = medium
- Overall vulnerability of wetlands = medium
- Vulnerability to exurban development = high
- Vulnerability to oil and gas development = low
- Vulnerability to climatic impacts = medium
- Proportion of irrigated lands = high
- Duck survey density = medium (6.6-17.5/$mi^2$)
- 2002-2005 duck harvest ranking = medium

## Wyoming Wildlife and Natural Resources Trust

The Wyoming Legislature created the Wyoming Wildlife and Natural Resource Trust (WWNRT) in 2005The Trust's 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 [State] funds can be used to meet the non-federal match requirements of other funding programs including NAWCA grants, WHIP, and SWG. 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.wyo.gov/

No wetland related projects have received WWNRT funding in the SRWC, although there is some interest to see such work in the area.

## Wyoming Statewide Comprehensive Outdoor Recreation Plan

The Wyoming Division of Parks, Historic Sites and Trails prepared the Statewide Comprehensive Outdoor Recreation Plan (SCORP) and is required to update the plan 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 potential utilization of LWCF funds for wetland acquisition and improvements that support wetland-based recreation needs to be investigated further.

## Other Plans and Initiatives

- *Management Plan for the Rocky Mountain Population (RMP) of Greater Sandhill Cranes* (Pacific Flyway 2007) – Conservation strategies describe in this wetland plan would contribute to the state-specific habitat objectives outlined in the RMP crane plan. In particular, the acquisition of conservation easements in Star Valley is an important task addressing the RMP plan objective of protecting sufficient habitat on primary fall premigration staging areas. Wetland conservation strategies directly address the RMP Plan objective of protecting and enhancing wetland habitats for crane production and staging.

*Ecosystem Plan for the Upper Missouri, Yellowstone, and Upper Columbia River Project* (USFWS 2000) – The Salt River was designated by the U.S. Fish and Wildlife Service as a river needing protection. The Salt River Plan would contribute to achieving several of the goals for conserving and restoring river and associated riparian habitat, as well as several of the goals for mountain habitats.

## THREATS TO WETLANDS

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

### Climate Change/Drought

Periodic drought is a natural climatic event and an important driver of wetland hydrology and ecology in the Intermountain West. Drying cycles restore productivity of wetlands by oxidizing organic matter and releasing organically-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 and long-term loss of functional wetlands in several regions. Climatologists predict frequency and severity of drought will increase as global warming continues.

Under normal conditions, 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, though they 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 can remain dry for extended periods when there are water shortages, especially permitted wetland impoundments with junior appropriation dates (WJVSC 2010).

### Water Supplies

A substantial proportion of wetlands in the Salt River Drainage depend directly or indirectly on irrigation. The conversion to more efficient sprinkler irrigation has reduced the amount of flood irrigation in late spring and early summer and reduced return flows back to the river in the fall. Reduction in wet meadow habitat likely has reduced available foraging areas for waterfowl and waterbirds such as Long-billed Curlew and White-faced Ibis.

Other important water supply issues include dewatering of the Salt River near the confluence of Crow Creek, dewatering of the lower reaches of a number of major tributaries, the loss of trout into the East Side diversion canal, and loss of some lateral channels due to in-stream alterations to improve effectiveness of irrigation head gates.

### Compromised Regulatory Protections

Two U.S. Supreme Court decisions, Solid Waste Agency of Northern Crook County (SWANCC) (2001) and Rapanos and Carabell (2006) 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 isolated, playa-type wetlands in several regions of Wyoming. 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 activities that impact isolated wetlands. The SWANCC and Rapanos decisions have significant implications elsewhere, but their impact on wetlands in the SRWC is expected to be low in the foreseeable future (GWWG 2014).

**Table 7. Threats to wetlands in the Salt River 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 | | | | L |
| Agricultural Operations not meeting BMPs | | | X | | H |
| Livestock Grazing not meeting BMPs | | | X | | H |
| Invasive Plant Species | | | X | | M |
| Management/Maintenance at Existing Wetland Projects | | X | | | M |
| Disturbances Associated with Recreational Use | | | X | | M |
| Irrigation Conveyance Improvements | | X | | | M |
| Conversions to Center Pivot Irrigation | | X | | | M |
| Public Awareness and Support | | | X | | H |
| Available Funding for Monitoring, Protection, Mitigation | | | X | | H |

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

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

Working ranches contribute to the maintenance of habitats used by wildlife species in Star Valley. Changes in irrigation practices or diversion of water for rural residential or urban developments

could reduce or eliminate wetlands and riparian areas associated with the Salt River downstream to Palisades Reservoir (Gelwicks et al. 2002).

## Rural Residential Development

Rural residential construction had been rapidly ongoing for over 20 years in Star Valley, but slowed during the 2008 recession. This type of development is currently a high threat level and expected to increase in the foreseeable future. Isolated wetlands lacking a significant nexus to navigable waters can be drained or filled without a permit at construction sites. In addition riparian corridors are appealing locations and often desirable private land available for rural residential development in Wyoming. Additional wetlands are lost when fields are no longer irrigated or agricultural water rights are converted to domestic use. Infrastructure such as roads, buildings, power lines, and fences, along with associated disturbance, can lessen the suitability of wetlands and riparian habitats used by sensitive wildlife. Loose pets, especially domestic cats, also pose a serious threat to wildlife near subdivisions (GWWG 2014, WJVSC 2010). These developments lead to habitat fragmentation and degradation.

## Water Development Projects

Water developments include publicly-funded projects such as dams and stream diversions that alter the hydrology of existing watershed systems. Project supporters and developers commonly fail to recognize or acknowledge the downstream impacts these projects cause 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

The Salt River has been impacted over the years by numerous efforts to increase forage and crop production through conversions of riparian and wetland habitat. Developments in floodplains alter natural ecological and geomorphic processes and functions. Structures that change flow dynamics include riprap, car bodies, bridges, bridge approaches, culverts, irrigation diversions, dikes, levees, retaining walls, elevated roadways and railroad grades, sand/gravel operations, and other barriers. Physical alterations that prevent point bar creation can significantly reduce cottonwood and willow regeneration. Perhaps the greatest future threats will come from actions taken to reduce flooding of low lying pastures and farmland or subdivisions, and from bank stabilization projects such as riprap intended to prevent property loss from bank erosion during high flows (Gelwicks et al. 2002).

Levees, grades, and other elevated structures constrain flow from spreading onto the floodplain during high runoff periods. This disrupts the natural tendency of the channel to shift and form meanders and braids, which are essential for maintenance and formation of floodplain wetlands. Smaller braided channels are also critical spawning and nursery habitat for trout and other species. Fish access is blocked when levee systems sever braided channels from the main channel. Flow energy also becomes concentrated within the main channel, leading to channel downcutting,

destabilization and more frequent flooding downstream, and the need for additional stabilization projects that in turn impact even more wetland and riparian area (WJVSC 2010).

## Transportation Infrastructure

Road construction projects involving stream and floodplain crossings can impact wetlands if not properly designed. Road improvements can also affect "isolated" wetlands that have formed in drainage ditches, borrow pits, gravel quarries, and where surface drainage may have been impounded by the original roadbed. Road construction and culvert installation can intercept and channel surface and groundwater flow thereby desiccating substantial areas of wetland on the down gradient side of the culvert. Reconstruction of U.S highway 89 from Afton to Alpine will affect some wetlands associated with the Salt River, particularly within the Alpine Wetland Complex and possibly the portion of the Salt River drainage through the Narrows south of Thayne.

Other impacts associated with road improvements may include disturbance effects from increased traffic, which can displace sensitive species from nearby wetlands. Roadways also become a barrier to less mobile wildlife such as amphibians andsnakes, resulting in additional habitat fragmentation for those species. Heavy traffic near wetlands can become a significant source of wildlife mortality. Salt, oil, and other pollutants washing from roads can impair water quality in small streams and wetlands (WJVSC 2010).

## Wind Energy Development

Wind energy developments include turbines, roads, transmission lines, and disturbances that result in wildlife habitat fragmentation and other cumulative impacts (e.g., increased access for recreation and increased prevalence of invasive species) (Pocewicz and Lathrop 2008).

Wyoming ranks 7$^{th}$ nationally in wind power generating potential, factoring in land status and environmental constraints. Interest in Wyoming's wind resources is sharply escalating. Projections indicate 4,000 megawatts of power generating capacity may be added to the existing 800 megawatts within the next several 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 pose a collision mortality risk to wetland-associated birds. These structures and associated disturbance can also cause waterfowl, waterbirds, and shorebirds to displace from otherwise suitable habitat. Significant wind energy development is not anticipated in the SRWC but the construction of new power lines or transmission lines could increase collision mortalities. Lower Valley Power and Light has been working with the WGFD to mark power lines with reflectors to reduce collisions by swans and other birds.

To reduce impacts on wetlands, the U.S. Fish and Wildlife Service recommends that turbines never be constructed in or near wetlands including lakes, ponds, marshes, sloughs, swales, swamps, or potholes. Turbine locations should 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 that turbines should 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 corridors 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.

## Mining

Sand and gravel operations are often sited in floodplains and 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 widths 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 some of the wetlands that exist in the SRWC today. However, intensive farming and grazing operations adversely affect the quality and function of wetlands and riparian habitats in some locations. Sediment and manure washing into wetlands from tilled fields and heavily grazed pastures can decrease wetland 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.

Willow removal has been extensive in some portions of the Salt River to expand grazing or farmland. In some regions, isolated wetlands continue to be drained and converted into additional grazing or farming area. However, some manmade wetlands within the SRWC also exist as a direct result of agriculture and irrigation infrastructure. Best management practices that improve wetland quality and function, especially the retention of grassy buffers and intact wetland plant communities by fencing, should be encouraged. Retention of willow and cottonwood riparian habitats should also be encouraged. Efforts to address water quality issues have had limited success in the past due to lack of landowner interest and lack of resources to complete the work (Star Valley Conservation District 2005, GWWG 2014). However, funding for conservation practices is available through various Farm Bill programs.

## 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. (Ohmart 1996). 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, overload 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 properly regulating distribution of cattle (WJVSC 2010).

Grazing practices have historically impacted riparian areas and throughout the SRWC. Willow removal to increase grazing and farmland has also eliminated wildlife habitat and destabilized stream banks. The WGFD Fish Division, working with the old Soil Conservation Service and the Star Valley Conservation District, attempted installing tree revetments and other in-stream structures to stabilize banks and provide cover for trout. The Fish Division also promoted willow plantings and riparian fencing to manage livestock grazing, although those efforts realized mixed success. Many of the problems associated with riparian habitat management still persist on the private lands and along the Salt River and important tributaries (Miller 1971, Gelwicks et al 2002).

**Invasive Plant Species**

Habitat functions 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 out-compete 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 of benefit to some wildlife, but can also increase predator densities, which adversely affect ground-nesting birds and small mammals adapted to open grassland ecosystems. Nonnative and invasive plants should be eradicated where possible, and their further spread should be vigorously controlled (GWWG 2014).

**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. Issues with the Alpine wetlands have been described in previous sections. For many years, resources to manage and maintain constructed wetlands on WGFD wildlife habitat and public access areas were limited due to competing priorities. In some cases, water control structures and fences lapsed into disrepair, dikes were damaged by erosion and rodent activity, and personnel were not available to monitor livestock distribution and use, or attend to water management. Funding and other resource limitations continue to be a challenge (WJVSC 2010).

## Recreational Use of Wetlands

Human activity associated with recreation in and near wetlands can be a significant disturbance issue in densely populated or heavily used areas. Star Valley remains a predominantly rural landscape, however exurban development is expanding and along with it, the human population is increasing. For much of the year, disturbances associated with farming and recreational fishing are at comparatively high levels. Moderate to heavy hunting pressure on some private wetland areas 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. This has been documented in Star Valley (Lockman et al. 1987). Currently the Alpine Wetland WHMA is managed as a waterfowl sanctuary and closed to hunting migratory game birds. However, no sanctuary areas have been located in the upper valley in recent years. The former hunting closure on the stretch of river upstream from the Auburn-Grover Lane should be reinstated. As the human population continues to increase in western Wyoming, disturbance will become an increasingly significant factor. However, allowing access for wildlife-dependent recreation is also critical to the conservation of wetlands, because this instills a public value in wetlands and maintains a base of support for wetland conservation programs **(**WJVSC 2010). An appropriate balance of use and protection is needed.

## Irrigation Conveyance Improvements

Efforts to improve water delivery (e.g., by installing canal and ditch linings or buried pipelines) will potentially eliminate wetlands currently sustained by seepage adjacent to ditches and canals. Impacts to seepage dependent wetlands can be mitigated by constructing or enhancing other wetlands, and this approach should be advocated where public funds are used for irrigation improvement or rehabilitation projects. Much of the valley below the ditches has been converted from flood irrigation to a variety of sprinkler systems to improve efficiency. Gravity flow sprinkler systems are more economical where feasible and the conversions seem to have reduced water withdrawal from the river, but also reduced return flows to the river (Sando et al.1985).

## Public Awareness and Support

Wetlands conservation has received a great deal of national attention since the 1960s as 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 in-stream 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 capacity to secure existing sources of funding. 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 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). In addition, many sources of federal funding require substantial amounts of nonfederal match funding, which has been, and continues to be a challenge in Wyoming.

## WETLAND CONSERVATION OBJECTIVES

The following objectives are recommended to conserve and manage wetlands within the Salt River Wetland Complex:

- Identify and prioritize important stretches of the Salt River and associated riparian habitat or wetlands for conservation actions (goal of this document).
- .
- Secure adequate funding to implement wetland conservation efforts including expanded agency or NGO staffing, assistance and outreach programs, and public education regarding ecological services of wetlands and their benefit to working ranches.
- Negotiate conservation easements or other instruments to protect important wetlands and riparian areas potentially threatened by development. This should be the highest priority for the Salt River Wetland Complex.

- Plan and manage future residential and agricultural development t to conserve and protect sufficient wetland and riparian habitat and associated uplands needed to sustain ecological function, and regional populations of species of conservation concern and other wetland and wet meadow/grassland birds and mammals.
- Restore and enhance wetlands and wet meadow/grassland habitat. Restoration and enhancement efforts should focus on high wildlife use areas including staging and nesting areas for cranes and swans and other migrant waterfowl.
- Plan and locate developments such that a properly functioning floodplain is maintained, allowing for periodic channel shifts, overbank flooding in spring, and formation of oxbows.

  Protect water quality to sustain wetland-dependent wildlife and an important trout fishery.
  - Build partnerships within the local community to support wetland conservation efforts while maintaining traditional agricultural uses of the land and water.
  - Maintain or enhance water supplies for wetlands.
  - Minimize floodplain development to avoid the need for future stabilization projects that constrict natural river flows

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

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

- Implement wetland and watershed "best management practices" to sustain and enhance wetland functions throughout the Salt River Wetland Complex.
  http://www.fs.fed.us/biology/resources/pubs/watershed/FS_National_Core_BMPs_April2012.pdf
  http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849
  http://deq.wyoming.gov/media/attachments/Water%20Quality/Nonpoint%20Source/Reports%20%26%20Documents/2013_wqd-wpp-Nonpoint-Source_Livestock-Wildlife-Best-Mangement-Practice-Manual.pdf

- Improve habitat quality of the Alpine wetland. This would include expansion of the wetland on the periphery of Palisades Reservoir and modifications to the configuration and slopes of nesting islands and possibly the slopes of the dikes. Modify the head gate and water intake structure on the river to improve water intake during low river flows. Possibly modify/upgrade the ditch and canal supplying water to the wetland.

- Promote and seek opportunities for riparian corridor restoration (e.g., cottonwood and willow regeneration, fencing, and grazing management)

- Promote and establish fish passage and screening solutions at problem irrigation diversions.

- Work with willing landowners to identify and develop additional nesting habitat for swans and other avian species.

## WETLAND CONSERVATION STRATEGIES

The following strategies are recommended to achieve the objectives listed above:

### General

- Secure permanent conservation easements 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 Salt River is vulnerable to ongoing subdivision development. Although the Department's extensive fishing and hunting easements currently offer some protection, most of these do not qualify as conservation easements. It may be desirable to negotiate long-term management agreements to retain upland buffers

surrounding some of the larger and more important easements, to assure wetlands remain in proper functioning condition.

- Negotiate conservation easements to protect riparian and adjacent upland habitats along segments of the Salt River, Crow Creek, Stump Creek, and Spring Creek.

- .

- Work with industry, land managers, and government agencies to minimize the biological impacts of water diversions, agriculture practices that fail to meet BMP's and subdivision development.

- Participate in county and state planning and zoning to discourage additional rural subdivisions (maintain agricultural zoning) and restrict development along the Salt River to a set distance from the high water line to deter fragmentation and disturbance.

**Local Partnerships and Traditional Uses**

- Keep water rights in the hands of ranchers/irrigators through strategies to reduce ranch subdivision.

- Communicate the importance of wetlands and water conservation to the general public and municipalities.

- Establish a Salt River Management and Wetlands Working Group comprised of a part or full time coordinator and members from the landowner community, agencies, Star Valley Conservation District, and NGOs such as sportsman groups, DU and TU chapters.

- Investigate a range of potential funding sources to maintain or enhance conservation practices in the Salt River drainage, including North American Wetland Conservation Act, Ducks Unlimited, Agricultural Conservation Easement Program, Partners for Fish and Wildlife, Landowner Incentive Program, State Wildlife Grants, Wyoming Wildlife and Natural Resources Trust, Wyoming Mineral Trust Fund, Water Development Account, energy mitigation funds, and others.

- Drought and depleted water supplies are a significant threat to wetlands in the Salt River Complex. The quantity of water delivered to flood 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 that sustain healthy stream and riparian habitat function. A healthy riparian system will store a great deal of water that maintains stream base flows through the year.

- Support irrigation system rehabilitation and improvement projects that benefit wetlands and other wildlife habitats.

- Develop groundwater wells to augment surface water supplies to constructed wetlands if needed.

- Lease or acquire property on which water rights can be managed to enhance wildlife habitats.

- Establish "in-stream" flows to maintain native fish populations and sustain wetland habitats in smaller streams.

- Obtain formal recognition of "wildlife habitat" as a beneficial use, in addition to the legislatively recognized use of "fisheries maintenance."

- Network 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 quality, reduce run-off from winter pastures, restore wetlands and old river oxbows, improve trout habitat, stabilize stream banks, protect spring creeks, and create new wetlands.

- Implement riparian best management principles and practices.
http://www.srs.fs.usda.gov/pubs/ja/uncaptured/ja_phillips007.pdf
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_010137.pdf

- Use conservation easements and cooperative efforts to address development and related impacts.

- Support management practices that maintain riparian vegetation and stream channels in excellent condition.

- Deploy alternative stabilization methods that reduce the amount of riprap and restore existing rip-rap areas to natural condition.

- Use sloughing conservation easements to allow the steam channel to meander (MFWP 2005).

**Invasive Plant Species and Grazing Management**

- Prevent introduction and spread of noxious weeds.

- Mechanically, chemically, and biologically treat invasive species that compete with native vegetation (WGFD 2009).

- Increase financial support for coordinated resource management (CRM) and Weed and Pest control, educational activities, and mapping efforts. Identify and pursue potential sources of funding (Pocewicz and Lathrop 2008).

- Participate in partnerships implementing efforts to eradicate or reduce the abundance of invasive or exotic species.

- Promote and facilitate exclosure fencing of riparian and channel habitats (e.g., corridor and tract fencing), or reduce frequency, duration, and intensity grazing to disperse herbivory and passively restore upland, riparian, and channel function.

- Riparian grazing should be closely monitored to provide desirable levels of grazing during the proper season for best vegetation management and protection of cottonwood and willow communities.

**Funding to support conservation and restoration efforts**

- Secure funding to support efforts. Human resources will be needed to accomplish wetland conservation and should include participation from the local community area.

- Use WGFD personnel to support, or develop applications for available wetland related funding.

- Support the involvement of conservation groups in the conservation of wetlands in the SRWC.

- Support the use of Farm Bill conservation programs administered by the NRCS/FSA.

- Increase project delivery capacity by advocating an NGO or government position responsible for administering grants and/or Farm Bill conservation programs.

- Support Congressional appropriations to adequately 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.

**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 adequate 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), 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/index.asp#Grants:
  - 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 (Tessmann 2008).
  - Riparian corridor restoration.

- Reconnect floodplain habitats. Oxbows, side channels, and backwaters should be reconnected to the river, thus raising the water table and supporting 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 USFWS Partners for Fish and Wildlife Program to identify and promote additional wetland projects on private lands.

- Encourage wetland projects that increase public access for wetland-based recreation. Such projects can be constructed on accessible public lands, Department lands, or private lands under agreement, such as lands enrolled in the Department's Access Yes Program.

- Work cooperatively with interests managing and/or restoring beaver populations to maintain riparian and stream habitat conditions.

- Through extension and outreach programs of the WGFD, USFWS, NRCS, DEQ/WQD, and Star Valley Conservation District, 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.

- Use compatible fencing to protect riparian and wetland vegetation from uncontrolled grazing and improve grazing management options. Fencing is often the only thing needed to dramatically change riparian conditions. If management changes are not adequate to

restore riparian vegetation, then plant grasses, shrubs, and trees appropriate for the location's elevation.

- Leave riparian buffers undisturbed whenever possible. Healthy riparian zones can absorb and store large quantities of water, providing healthy vegetation, which in turn protects riparian soil and stream system. Disturbed riparian zones can lose this sensitive balance and take a long time to replace. Work with the City and Lincoln County Planning and Zoning to recognize the importance of riparian zones and limit actions/developments within them that harm the valuable habitat type.

- Riparian habitat should be protected from fires used to clear irrigation ditches and remove residual crop residue. Frequent burning can result in invasive species replacing the more desirable native vegetation.

- Modify barriers such as culverts, dams, irrigation diversions, and other instream structures that impede fish movement and reduce habitat connectivity. Restore fish passage for fluvial native fish.

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

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