The Trumpeter Swan Society

Centennial Valley Project

October 2011

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(all photos by J. Roscoe unless otherwise noted)

Contents

Introduction

The Centennial Valley in the southwestern corner of Montana contains the uppermost headwaters of the Missouri River in the Red Rock River and Hell Roaring Creek, as well as the largest wetland complex in the Greater Yellowstone Ecosystem (GYE). Due to its high elevation and relative inaccessibility, this large valley has escaped many of the human development pressures that have affected much of the surrounding area. This has sustained many of the wildlife habitat values and populations for which the area is recognized, particularly Trumpeter Swans.

The Centennial Valley supports the anchor population of the Greater Yellowstone Trumpeter Swan population. This largest of North American waterfowl was thought to be near extinction in the early 1930's when Red Rock Lakes National Wildlife Refuge was established. The lakes and wetlands of the area, particularly the warm-spring fed Culver Pond and Elk Springs Creek, provided refuge for the remnant non-migratory population of Trumpeter Swans found in Yellowstone National Park, southeast Idaho and southwest Montana. The swan population increased over the next several decades, in part due to the prolonged winter feeding program and other habitat protection afforded swans with Refuge creation and management. However since the 1990's, Trumpeter Swan production has declined, and habitat and population management priorities have changed sufficiently to raise serious concerns over the continued sustainability of this Trumpeter Swan population.

2011 Program Objectives

The Trumpeter Swan Society initiated and funded an effort in 2011 in partnership with the Centennial Valley Association (CVA) to describe and evaluate Trumpeter Swan habitat conditions in the Centennial Valley outside of Red Rock Lakes NWR. Kyle Cutting (USFWS, Red Rock Lakes NWR) and Adonia Henry (Scaup and Willet LLC) also assisted in gathering data for this effort. The Centennial Valley, downstream from the Refuge, has received relatively little management attention although it is a nesting area of increasing importance for Trumpeter Swans. In several recent years, the Valley has fledged more cygnets than the Refuge. In earlier contrast, total swan numbers were higher in the Tristate Subpopulation in 1949-57, but no nesting was occurring west of Blake Slough, which lies just downstream from the Refuge (W. Banko, pers. comm.). Since then, 32 historical nest sites have been identified west of the Refuge, of which eighteen were active in 1985 (J. Roscoe, pers. comm.). Almost all of these territories occur on or are influenced by lands owned by CVA members. The organization and individual members generally support improving the Trumpeter Swan knowledge base and implementing habitat enhancement on their lands. This provides a unique opportunity to incorporate Trumpeter Swan management into a working ranch community. Work in 2011 focused on the 1985 set of territories to monitor swan production, and identify and describe those territories with the highest Trumpeter Swan productivity and best habitat conditions.

Trumpeter Swan Habitat

Overall, wetland habitats in the Centennial Valley below Red Rock Lakes NWR are quite dynamic and resilient to current conditions and uses. Despite periodic lack of adequate water and vegetative cover, and intermittent impacts from livestock grazing and human disturbance, Trumpeter Swans continue to utilize these historic territories. When conditions are compatible,

these habitats and swan pairs are quite productive. Compared to other regional subpopulations, the Centennial Valley Trumpeter Swans are as productive as any others in the GYE.

Trumpeter Swan nesting habitat in the Centennial Valley, excluding RRL, is characterized by three habitat types- extensive lateral wetlands adjacent to the Red Rock River, permanent wetlands, and seasonal isolated ponds surrounded by rangeland. Half of the historic swan nesting territories occupied since the 1980's are riverine habitats and half occupy isolated pond and permanent wetland habitats. The locations and characteristics of the 16 highest priority nesting territories are described in Appendix 1. Prioritization was based on past production, quality of habitat, and potential for sustained or improved production.

Water availability in off-river swan territories is becoming a critical concern. Many sites rely on stream flows and/or irrigation return to sustain water levels throughout the season. Seasonal snowpack and stream flows have dwindled in recent decades both on the Valley floor and in surrounding mountains, and less water is actually reaching many of these isolated wetlands. Season-long flood irrigation on pastureland is not always providing adequate groundwater recharge or surface flow to sustain many of these wetlands.

A distinctive characteristic of most of the wetlands used by Trumpeter Swans in the Centennial Valley is the complex mosaics and diversity of the vegetation communities, even when they occasionally dry out. Most of the wetlands have well established communities of submerged aquatic vegetation, but one open water area may have milfoil, with another dominated by sago pondweed, and yet another dominated by aquatic buttercup, all within a short distance of each other. Many of these submerged aquatics are also found in areas of emergent vegetation that are still flooded. These vegetation communities are certainly suitable to provide adequate food supplies to breeding Trumpeter Swan when water levels are also adequate season-long.

A unique aspect of Trumpeter Swan habitat outside the Refuge in the Centennial Valley is that virtually all habitats are exposed to livestock grazing. This use has an adverse impact on availability of tall, emergent vegetation, and in some territories, the presence of any vertical cover at all. Along the river, past cattle use and lack of residual cover probably are the reason that most nests are only located in wettest and more extensive wetland areas which are generally inaccessible to cattle early in the season. Current livestock use on the J Bar L Ranch is more compatible with sustaining vegetation cover and residual cover than has been past management, and has resulted in improved habitat quality on six territories along the Red Rock River. On isolated ponds, vegetative buffers around nests and the fringe of the pond are often reduced to only a few feet of short emergent plants and shallow water.

Muskrats in wetlands occupied by Trumpeter Swans play an important role in providing nest platforms and foundations. They are common on the Refuge and in the 7L wetland but currently occupy very few other wetlands in the Centennial Valley. Their absence forces swans to utilize upland hummocks or other elevated locations as nest sites which may not be as secure from nest predators, disturbance or other factors that may influence nesting success. Reintroduction of muskrats may be a consideration to improve some wetland territories for Trumpeter Swans.

Riverine habitats

Wetlands along the river are relatively continuous from the refuge downstream to Lima Reservoir and include numerous temporary ponds and oxbows isolated from the main river channel (Figure 1). These wetlands are seasonally inundated during spring runoff or are filled by high ground water levels, but some dry out during the summer. Several large oxbow ponds provide permanent habitat and range from about one-half acre to approximately 10 acres, but in combination with other ponds and the river, these territories can approach 100 acres in size.

Typically, river bottom wetlands are much different from wetlands on the refuge in that very little tall emergent vegetation (cattails, bulrush) is available. Low *Carex* and *Juncus* types dominate most nesting habitat. In many small ponds and wetlands, this vegetation is expanding to the extent that open water area and depth are reduced, rendering some of the habitat as unsuitable for continued Trumpeter Swan use (Figure 2). Nests are generally located in the more extensive wetland areas associated with permanent open water, and with access to the river channel. Where muskrat houses are available, Trumpeter Swans actively select these for nest foundations. However the muskrat population along the river has dwindled and very few wetlands currently support muskrats and trumpeter nests are constructed on small islands or hummocks. Trumpeter Swan breeding territories appear to be approximately the same size as on the Refuge and are used continuously until fledging of young occurs.

Figure 2. River bottom (riverine) wetland habitat, Forsythe territory, May 2011.


Figure 2. Hack Tower (riverine) territory where sedges have encroached throughout most of the isolated oxbow channels, significantly reducing open water availability.

Upland pond habitats

Pond habitats used by breeding Trumpeter Swans in the Centennial Valley are generally isolated, being one to two miles from other permanent water without any intervening wetland habitat. These ponds vary from 1 to 35 acres in size and provide water throughout the swan breeding season, at least during some years.

Water sources for these wetlands vary greatly. Some are part of large wetland complexes similar to Refuge habitats with a combination of groundwater and surface flows as well as being located in shallow drainages. Many wetlands and ponds are associated with stream channels that are at least partially diverted upstream for irrigation purposes, and often have some old dike or low dam that impounds water. These sites are highly dependent on how much water is passed through irrigation systems to the wetland. Another group of ponds are those that are shallow depressional wetlands that occupy clay pans or other depressions that rely solely on surface runoff. These sites have been most affected by prolonged drought and impending climate change, and may no longer provide suitable habitat for nesting Trumpeter Swans (Figure 3).

Upland pond habitats generally support less vegetative cover than habitats along the river, and swan nests are often totally exposed on a muskrat house or hummock in open water. Again, *Carex* and *Juncus* vegetative types are predominant. Apparently in these areas where taller, dense vegetation is limited, the existing, denser vegetation is avoided for nest site selection to afford maximum visibility for swans. In a few instances, a pond territory will include one or two adjacent ponds when they are very closely associated, but more often the territory includes only the nest pond. These swans are then very dependent on a limited water and food supply for brooding and are quite susceptible to disturbance.

Figure 3. Upland pond/wetland habitats – wetland complex (top), drainage impoundment (middle), dry depressional wetland (bottom).

Lima Reservoir

The first attempt to dam the Red Rock River at the lower end of the Centennial Valley occurred in 1875. A summer flood washed out that dam and it was replaced by Lima Dam in 1902. That dam also washed out in May 1933 and was repaired in 1934. Upgrading of headgates and the spillway occurred in the mid-1990s. The dam is relatively small, and uncontrolled spring flows routinely pass over the spillway for several weeks.

Lima Reservoir is a privately owned and operated water storage facility. The original public land right-of-way was issued to the Water Users Irrigation Company on February 27, 1903, with the current right-of-way granted in March 1934. A reservoir withdrawal was issued in 1911 covering 14,740 acres which affects nearly all public lands in the river corridor below Red Rock Lakes NWR. These withdrawals give priority to water storage and use for irrigation purposes but do not preclude other public land uses such as wildlife habitat management projects, livestock grazing or recreational activities. However any of these activities that utilize groundwater or affect inflows to the reservoir are closely scrutinized by the Company.

Figure 4. Lima Reservoir, Centennial Valley.

Lima Reservoir occupies the lower floodplain of the Red Rock River appearing as a long narrow lake with an irregular shoreline and several large bays at the mouth of tributary drainages (Figure 4). The reservoir is approximately 12 miles long and up to one mile wide with approximately 40 miles of shoreline at normal pool of which about 80% is public land. Due to the relatively flat terrain adjacent to the lake, the amount of actual water surface area varies significantly with water level, averaging about 5500 surface acres. The reservoir is relatively shallow, averaging perhaps 30-40 feet in the lower half and only 10-20 feet in the upper pool. The uppermost area is only 3-4 feet deep at full pool, and as water levels decrease, disproportionately large areas of lake bottom are exposed. The depth of the reservoir has been reduced significantly by

sedimentation from eroding banks up to 30 feet tall as well as from high sediment loads carried by the Red Rock River.

Lima Reservoir is an irrigation reservoir and consequently is subject to significant seasonal drawdown. Prior to the mid-1980s, the Company practice was to use all the water available on an annual basis. After that time, water management shifted to maintain a conservation pool that provided some insurance against years of low snowpack and inflows. Unfortunately, this management usually results in more water in the pool early in the season when spring runoff then spreads flood waters well above Price Lane, adversely affecting several hundred acres of nesting habitat and at least two Trumpeter Swan territories.

Reservoirs that are subject to drastic drawdown often appear to be somewhat barren of aquatic vegetation (Figure 5). However, despite this appearance Lima Reservoir has a rich diversity of aquatic vegetation especially in the uppermost pool within two miles of Price Lane. A cursory inventory conducted in August 2011 (A. Henry, 2011) reported the following conditions:

> The eastern part of Lima Reservoir was dominated by *Hipparis vulgaris* (mare's tail). Discharges from the reservoir resulted in extensive flats of dry, saturated, and shallowly flooded (water depth ≤ 12 in [30 cm]) mare's tail habitats (Figure 5). Almost all the *H. vulgaris* observed in the reservoir had senesced. Stands of flooded mare's tail were generally monotypic with few other species of vegetation observed. Invertebrates observed within mare's tail communities include scuds, chironomids, side swimmers, and orb snails. *Potamogeton richardsonii* (Richardson's pondweed) was also common and abundant in deeper portions of the reservoir (observed water depths 3-7 ft [0.9 – 2.1 m]) often associated with the inundated river channel. Invertebrates observed were similar to those observed in mare's tail habitats. Other species of submerged aquatic vegetation observed within and adjacent to beds of Richardson's pondweed include *Myriophyllum exalbescens* (northern water milfoil), *Callitriche hermaphroditica* (autumnal water-starwort), and *Elodea canadensis* (Canadian waterweed). Stands of what is assumed to be *Elodea nuttallii* (Nuttall's waterweed) were observed in the western portion of the area surveyed that is more persistently inundated. Uprooted shoots of *Alisma* sp. (water plaintain) were also observed in beds of *P. richardsonii*.
>
> Uprooted plants of *Ranunculus* sp. (aquatic buttercup) and *Stuckenia pectinata* (sago pondweed) were observed along the edges of flooded areas (water depths up to 2 ft [0.6 m]) in the reservoir. Patches of rooted *S. pectinata* were also observed in water up to 2 ft [0.6 m] deep, however no rooted patches of *Ranunculus* sp. were observed. Dried and/or senescing stems and leaves of *S. pectinata* were also observed on the underside of dried algal mats on exposed mudflats and saturated soils in *H. vulgaris* communities.

Figure 5. Extensive beds of dry and shallowly flooded *Hipparis vulgaris* (mare's tail) at Lima Reservoir in early August (left, photo Adonia Henry) and 15 days after being exposed (right).

Lima Reservoir supports extensive waterfowl use, primarily as molting and foraging habitat for thousands of ducks, geese and shorebirds. In some years as many as 150 non-breeding Trumpeter Swans have utilized the lake during late summer, along with up to 12-15,000 molting Canada geese. The concentration of non-breeding Trumpeter Swans was not observed on Lima Reservoir or elsewhere in the Centennial Valley in 2011. Trumpeter Swan nesting habitat obviously is limited by drawdown/flooding, but at least two territories are consistently occupied near Price Lane. Based on initial inventories and observations, aquatic vegetation composition and production is adequate to sustain much greater swan use than currently occurs.

Human disturbance on Lima Reservoir is minimal. The lake does not contain a sport fishery and has very little shoreline access by vehicles especially during spring and early summer. Recreational use focuses on waterfowl hunting. Consequently Lima Reservoir represents extensive secure habitat for Trumpeter Swans and other waterfowl use.

Trumpeter Swan Production Monitoring

Monitoring for 2011 swan territories was initiated on May 23, and continued through September 29. Twenty-six territories were checked initially with 11 territories occupied (Table 1). Six active nests were established with two of those successful in hatching cygnets; all cygnets survived to fledging.

Spring conditions were extremely wet with very high water levels and widespread flooding on wetlands. Lima Reservoir expanded to 125% normal capacity (AF) with the pool extending 1.25 miles above Price Lane Bridge.

By June 11 one adult swan was missing from the Forsythe territory and no nesting occurred. Active nests were present on Lima Willows, Cocanougher, Bean Creek Reservoir, Passmore Pond, 7L East and Schoolhouse territories. Both the Lima Willows and Cocanougher nests were later flooded by rising water levels in Lima Reservoir. The

Bean Creek Reservoir nest appeared to have been "mobbed" by cattle during mid-June and was abandoned. The fate of the Schoolhouse territory was undetermined and no production occurred. Cygnets were hatched on Passmore (3) and 7L East (2) territories, and both of these broods fledged. Although late summer was quite dry, water was still present in almost all territories in late September and occupying pairs were still present.

Trumpeter Swan Territory Prioritization

Trumpeter Swan territories in the Centennial Valley outside Red Rock Lakes NWR were prioritized based on past production performance, quality of habitat, and potential for improvement in both habitat conditions and reproductive performance (Table 2). Long-term occupancy was a primary consideration along with the consistent production of cygnets into the population. For example, the 7L East and &West territories have been the most consistently occupied and productive in the Valley. Since 1980, these two adjoining territories together have been occupied for 23 years and produced at least 29 cygnets (production was not documented 1990-1999, and 2000-2010). The wetland sustaining these two territories has high quality vegetation composition and is secure from disturbances and conflicts. Obviously these are the highest priority territories for continued monitoring and protection. Other territories such as Forsythe and Duffner were rated on good existing conditions but with management potential that could improve habitat conditions through on-the-ground projects.

However the greatest knowledge gap appears to be in actual production data for individual territories for 1990-1999 and 2000-2010. Data displayed in Table 2 reflect that individual territories were occupied during individual years but it is unclear which of those successfully produced cygnets.

Table 1. Centennial Valley 2011 Trumpeter Swan Nest Territory and Production Monitoring

Territory	Occupied	Date	Nest	Date	Cygnets Hatched	Date	Cygnets Fledged	Adults Seen Other Dates
Passmore	Yes	5/24	**Y**	5/24	**3**	6/23	**3**	8/19
7L East	Yes	5/24	**Y**	6/10	**2**	6/30	**2**	4A:8/19
Schoolhouse	Yes	5/24	**Y**	6/10	0		0	2A:8/19
Bean Crk Res	Yes	5/24	**Y**	5/24	0-mobbed by cattle		0	2A:6/23,8/19
Lima Willows	Yes	5/24	**Y**	6/4	0 - Flooded		0	2A:8/19
Cocanougher	Yes	6/4	**Y**	6/23	0-Flooded		0	2A: 6/23
Brundage Sandhills	Yes	5/24	N					
Forsythe	Yes	5/24	N					2A:5/24; 1A:6/11,6/23,8/19
Mud Lake	Yes	5/24	N					
Sand Creek	Yes	5/24	N					2A:5/24,6/23 8/4, 8/19
Duffner	Yes		N		N, 2A	6/23	5A	8/19
Brundage Bridge	No							
Hack Tower	No							
Matador Pond N	No							
Mud Crk	No							
Oxbow	No							
Peet Crk	No							
Reese Pond	No							
Rody	No							
7L West	No							1A:8/4
Stibal Pond	No							
Christianson	?							2A:8/19
Matador SGC	?							

Table 2. Centennial Swan Territory Performance, 1980-2011, showing recommended priority for management attention, and minimum number of years territory was occupied, minimum number of cygnets hatched, and minimum number of cygnets fledged. X= data missing.

		Min.Yrs Occupied, Min. Cygnets Hatched, Min. Cygnets fledged				
Territory Name	Priority	1980-1989	1990-1999	2000-2010	2011	1980-2011
7LWest	1	2,11,10	7,X, X	3,X,X	0	12,11,10
7L East	2	4,6,6	2,11, 10	3,X,X	1,2,2	10,19,18
Stibal Pond	3	3,6,6	2,6,6	3,X,X	0	8,12,12
Schoolhouse	4	3,6,6	4,5,5	1,X,X	1,0,0	9,11,11
Bean Creek Res.	5	3,9,6	2,0,0	1,X,X	1,0,0	7,9,6
Passmore	6	2,6,6	2,0,0	1,X,X	1,3,3	7,9,9
Forsythe	7			3,X,X	1,0,0	4,0,0
Duffner	8	5,5,4	0	0	1,0,0	6,5,4
Sand Creek	9	2,0,0	1,2,2	2,X,X	1,0,0	6,2,2
Cocanougher	10	1,0,0	0	0	1/0/0	1,0,0
Hack Tower	11	3,X,X	0	0	0	3,0,0
Oxbow	12	1,2,2	0	0	0	1,2,2
Lima Willows	13	2,0,0	0	1,X,X	1,0,0	4,0,0
Brundage Sandhills	14	0	0	1,0,0	1,0,0	2,0,0
Mud Creek	15	2,5,5	0	0	0	2,5,5
Brundage Bridge	16	1,5,5	0	0	0	1,5,5

Management Recommendations

The following recommendations are "starting points" for potential population monitoring and habitat enhancement. They are not in any priority order.

1. Develop a strategy to continue comprehensive and consistent Trumpeter Swan territory monitoring for the next 3-5 years, and compile data into a readily available database for analysis and display
2. Initiate a habitat enhancement program to restore open water habitat in isolated oxbows along the Red Rock River. Focus on the J Bar L Ranch alone would enhance habitat conditions on seven Trumpeter Swan territories.
3. Identify where irrigation water diversions and practices could be modified to restore surface water flow into priority Trumpeter Swan nesting territories.
4. Coordinate with J Bar L Ranch to better integrate Trumpeter Swan nesting security into their grazing management strategies, specifically regarding timing of grazing and locating temporary fence to avoid possible livestock concentrations on swan nests
5. Design a monitoring plan for Trumpeter Swan use and vegetation development and production on the Brundage Sandhills territory.
6. Design and install floating nesting platforms on the Lima Willows and Cocanougher territories to alleviate nest lost from reservoir flooding.
7. Conduct muskrat inventories in primary Centennial wetlands and investigate potential for muskrat reintroduction.
8. Develop public education materials and an outreach strategy to promote the importance of Centennial Valley swans.
9. Consider fencing needs on isolated ponds and wetlands where chronic livestock concentration are limiting tall emergent vegetation – specifically design a short drift fence to restrict livestock access to the Bean Creek Reservoir nest site.

Appendix 1

Centennial Valley TrumpeterSwan Territory Assessments

ASSESSMENTS:

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: 7L West **Number: S19**
Centennial Valley breeding priority: 1
2011 Nesting Activity: Unoccupied

Location: adjacent to south side county road 6.5 miles west of Lakeview
UTM coordinates: 12T 425893 E 4940706N T14S R3W Section 14 SENW
Wetland type: Permanent wetland **Size** 40+ acres
Ownership/Interest: Huntsman Ranch (supportive), Matador Cattle Co. (neutral), BLM

General site description: Part of extensive wetland complex extending northward to Blake Slough on the Red Rock River although the ponds supporting 7L East and West are the only large open water habitats. 7L West territory is centered on moderate-sized pond on west side of wetland with smaller open water areas tall emergent vegetation (*Typha*) to the east. East portion of complex is 7L East territory. Small ponds and emergent vegetation between the two larger ponds are shared foraging areas for both territories. Both territories have been simultaneously occupied and successful.
Water source/persistence: Annual, yearlong, Doyle Creek, ground water. Although water levels are variable, this wetland complex is rarely dry.
Emergent Vegetation: Widespread tall emergents on north, east, and south sides – *Juncus, Scirpus, Typha* (only area outside of refuge). West side is more open, bounded by shorter *Juncus, Eleocharis, Hordeum*
Aquatic Vegetation: Multiple areas of open water were interspersed among emergent vegetation that was predominantly *J. arcticus* with patches of *Typha latifolia* (broad-leaf cattail). *M. exalbescens* with flowering stalks and seeds above the surface of the water dominated the western-most area of open water. Other areas of open water were dominated by *S. pectinata*, *Ranunculus aquatilis* (white-water buttercup), and *Chara* sp. (musk grass). Some patches of the *R. aquatilis* appeared to have been heavily foraged on; uprooted plant fragments of white-water buttercup and sago pondweed were commonly observed. *Chara* sp., was observed as thick mats underneath patches of filamentous green algae an in mixed species assemblages with *S. pectinata* and *R. aquatilis*. *S. pectinata* and *R. aquatilis*, as well as *Utricularia vulgaris* (common bladderwort), *Zanichellia palustris* (horned pondweed) and *Lemna minor* (lesser duckweed) were also observed in shallowly-flooded Baltic rush vegetation zones. Aquatic invertebrates observed included scuds, damselfly larvae, leeches, and orb snails. Egg masses were often observed on *S. pectinata*.
Nest site: Muskrat houses are abundant on the east side of this pond providing numerous potential nest sites.

Human activity in territory: Pond is readily visible from the county road at a distance of ± 0.5 mile. Infrequent fence maintenance and livestock gathering activities occur. No current conflicts.

Disturbance/conflicts: A fence bisects the west pond and represents a potential collision

hazard. Seasonal livestock grazing can encroach on wetland area particularly on the west side and has reduced tall shoreline vegetation.

Management needs/opportunities: Irrigation diversion from Doyle Creek influences seasonal water levels, but return flows augment ground water to sustain wetland function. Upgrading diversion structures could improve water availability. Fence removal and relocation could reduce collision hazard. Interpretive services and swan viewing opportunities could be developed on public lands adjoining the county road.

7L West, May 23, 2011

August 4, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: 7L East **Number: S20**
Centennial Valley breeding priority: 2
2011 Nesting Activity: Occupied, Active, Successful, 2 cygnets hatched/fledged

Location: adjacent to south side county road 6.5 miles west of Lakeview
UTM coordinates: 12T 426346 E 4940855 N T14S R3W Section 14 SENE
Wetland type: Permanent wetland **Size** 40+ acres
Ownership/Interest: Matador Cattle Company (neutral), BLM

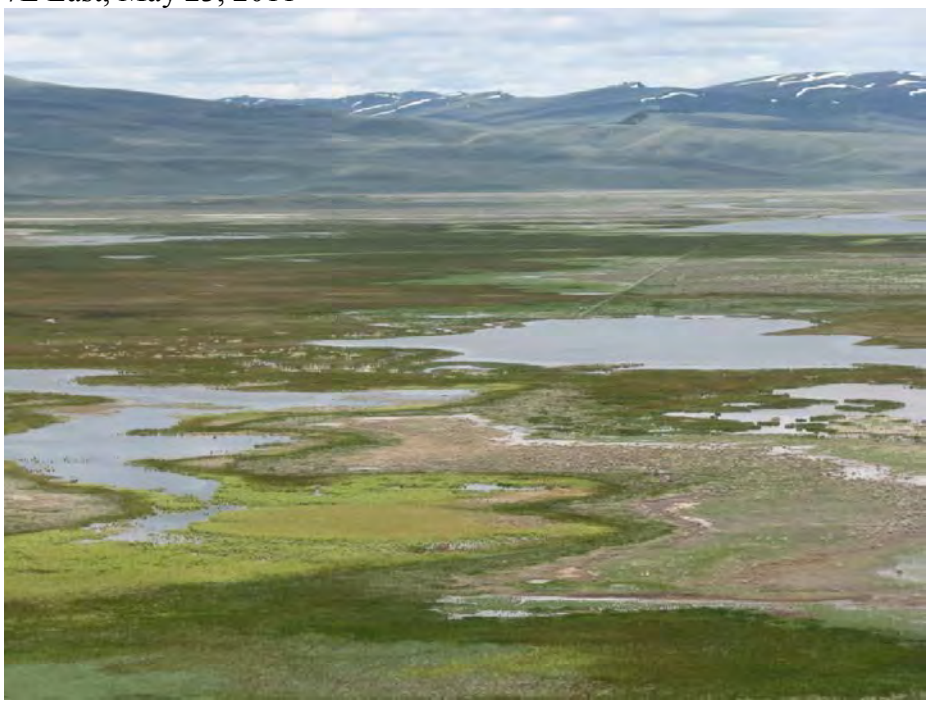
General site description: Part of extensive wetland complex extending northward to Blake Slough on the Red Rock River although the ponds supporting 7L East and West are the only large open water habitats. 7L East territory is centered on moderate-sized pond on east side of wetland surrounded by smaller open water areas and interspersed with tall emergent vegetation (*Typha*). Small ponds and emergent vegetation between the two larger ponds are shared foraging areas for both territories. West portion of complex is 7L West territory. Both territories have been simultaneously occupied and successful.
Water source/persistence: Annual, yearlong, Doyle Creek, ground water. Although water levels are variable, this wetland complex is rarely dry.
Emergent Vegetation: Widespread tall emergents – *Juncus, Scirpus, Typha* (only area outside of refuge), bounded by shorter *Juncus, Eleocharis, Hordeum*
Aquatic Vegetation: Multiple areas of open water were interspersed among emergent vegetation that was predominantly *J. arcticus* with patches of *Typha latifolia* (broad-leaf cattail). *M. exalbescens* with flowering stalks and seeds above the surface of the water dominated the western-most area of open water. Other areas of open water were dominated by *S. pectinata*, *Ranunculus aquatilis* (white-water buttercup), and *Chara* sp. (musk grass). Some patches of the *R. aquatilis* appeared to have been heavily foraged on; uprooted plant fragments of white-water buttercup and sago pondweed were commonly observed. *Chara* sp., was observed as thick mats underneath patches of filamentous green algae an in mixed species assemblages with *S. pectinata* and *R. aquatilis*. *S. pectinata* and *R. aquatilis*, as well as *Utricularia vulgaris* (common bladderwort), *Zanichellia palustris* (horned pondweed) and *Lemna minor* (lesser duckweed) were also observed in shallowly-flooded Baltic rush vegetation zones. Aquatic invertebrates observed included scuds, damselfly larvae, leeches, and orb snails. Egg masses were often observed on *S. pectinata*.
Nest site: Muskrat houses are abundant in this wetland providing numerous potential nest sites. Nests have been documented on both east and west sides of the larger pond.

Human activity in territory: Pond is readily visible from the county road at a distance of ± 0.5 mile. Infrequent fence maintenance and livestock gathering activities occurs. No current conflicts.

Disturbance/conflicts: Fences bisect the west pond and bond the north side of the wetland complex, and represent a potential collision hazard. Seasonal livestock grazing can encroach on wetland area particularly during low water years.

Management needs/opportunities: Irrigation diversion from Doyle Creek influences seasonal water levels, but return flows augment ground water to sustain wetland function. Upgrading diversion structures could improve water availability. Fence removal and relocation could reduce collision hazard. Interpretive services and swan viewing opportunities could be developed on public lands adjoining the county road.

7L East, May 23, 2011



7L East, August 4, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Stibal Pond **Number: S32**
Centennial Valley breeding priority: 3
2011 Nesting Activity: Unoccupied

Location: east of Price Lane, 1.25 miles north of county road and 0.7 miles east, east-southeast of old Zack homestead buildings
UTM coordinates: 12T 411740E 4940623N T14S R4W Section17 NWSE
Wetland type: Seasonal wetland **Size** 16 acres
Ownership/Management support: Stibal Ranch, negative but improving

General site description: Stibal Pond is a small isolated natural wetland south of the Red Rock River. The wetland is part of two small drainages that historically have provided a series of discontinuous ponds and wetlands, and contained much more water than has been available during the past 20 years. The surrounding area is sagebrush upland and irrigated meadow.
Water source/persistence: Surface water and irrigation flows from Price Creek, currently intermittent and insufficient to sustain wetland function. This wetland is typical of most small upland ponds throughout the west half of the Valley.
Emergent Vegetation: Limited to a narrow band of tall rushes (*Juncus* spp.) along the west side
Aquatic Vegetation: Sparse, bottom currently sparsely occupied by facultative wetland and upland species.
Nest site: none identified

Human activity in territory: Minimal limited to infrequent livestock management and irrigation activities. No conflict

Disturbance/conflicts: Livestock encroachment particularly on east side has limited shoreline cover and stability. Cattle concentrations on the pond could disrupt nesting activity. Changes in irrigation practices and reduced natural surface flows are limiting water availability.

Management needs/opportunities: Encourage landowner to divert irrigation flows into wetland area to augment surface water inflows. Small dike in drainage below existing pond could capture additional flow and enlarge wetland area with little or no impact to current landowner uses.

Stibal pond territory

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Schoolhouse/Brundage Lane. There are several small ponds and wetlands within 1.0 miles of this site and production records are not clear regarding the exact location of past Trumpeter Swan nesting in this area.
Number: S30
Centennial Valley breeding priority: 4
2011 nesting activity: Occupied, inactive (no nesting)

Location: adjacent to Brundage Lane, 1.5 miles north of south county road and 0.2 miles east
UTM coordinates: 12T 424630E 4941803N T14S R3W Section 15 NWNE
Wetland type: Permanent wetland **Size** 40 acres
Ownership/interest: Huntsman Ranch, supportive

General site description: The Schoolhouse/Brundage Lane territory occupies a small, impounded wetland pond on a ditch system. The site is similar to many of the other depressional wetlands found in the valley. The dike and outlet for this system was upgraded in about 2008 through the USFWS Partners for Wildlife program and serves to enhance water storage capacity.
Water source/persistence: Annual surface runoff and groundwater. This site is at the lower extent of an extensive but poorly defined drainage pattern consisting of numerous wet meadows, small ponds and interconnecting irrigation ditches that serve to drain some areas but also direct flows into wetlands. Much of this area was historically irrigated to produce hay. This surface flow pattern makes Brundage Lane adjacent to this territory impassable during spring and early summer.
Emergent Vegetation: Dense *Juncus* and *Eleocharis* in the body of the pond with small patches of *Typha* banded by a band of tall *Alopecuris arundinaceus* (creeping meadow foxtail) and Phalaris arundinacea (reed canarygrass)
Aquatic Vegetation: Multiple areas of open water were interspersed among emergent vegetation that was predominantly *J. arcticus* with patches of *M. exalbescens* with flowering stalks and seeds above the surface of the water. Other areas of open water were dominated by *S. pectinata*, *Ranunculus aquatilis* (white-water buttercup). Some patches of the *R. aquatilis* appeared to have been heavily foraged on; uprooted plant fragments of white-water buttercup and sago pondweed were commonly observed.
Nest site: None currently identified. No muskrat houses were observed despite being quite common on the adjacent 7L wetland.

Human activity in territory: infrequent livestock management activities, occasional vehicle traffic on Brundage Lane mid-summer and early fall

Disturbance/conflicts: Little to no disturbance or conflicts identified.

Management needs/opportunities: Project agreement for dike/pond restoration ensures that this site will persist.

Schoolhouse territory, September 29, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Bean Creek Reservoir **Number: S13**
Centennial Valley breeding priority: 5
2011 Nesting Activity: Active, failed (livestock disturbance)

Location: lower Bean Creek drainage, approximately 0.7 miles south of Red Rock River and 1.6 miles southeast of J-L ranch buildings (bridge access)
UTM coordinates: 12T 418912E 4941532N T14S R3W Section18 NWNW
Wetland type: Permanent wetland **Size** 30 acres
Ownership/Interest: Matador Cattle Company, neutral

General site description: Bean Creek Reservoir is a small linear impoundment with two forks. This creates a substantial amount of shoreline edge for the overall dimensions of the pond. Maximum depth at full pool is 5-6 feet. Adjoining habitat is primarily sagebrush.
Water source/persistence: Bean Creek, annual and persistent throughout growing season although volume is dependent on seasonal flows and irrigation return flows
Emergent Vegetation: Taller vegetation is dominated by *Juncus* spp and *Juncus balticus*
Aquatic Vegetation: Bean Creek Reservoir is an impounded wetland on Bean Creek, a tributary of the Red Rock River. Bean Creek Reservoir is dammed downstream of two creek channels. *S. pectinata* was very sparse, covering approximately 1% of the open water area. Water depths increased to greater than 4 ft (1.2) from the edge of the open water to the middle of the creek bed. Invertebrates observed include dragon fly larvae, scuds, chironomids, leeches, side swimmers, and snails. Along the eastern edge of the reservoir M. exalbescens decreases in abundance to less than 50% aerial cover, while *S. pectinata* and *R. aquatilis* increase to approximately 25% cover each. Upstream along the eastern creek channel, open water/submerged aquatic habitats transitions to a mix of emergent vegetation/submerged aquatic vegetation habitats dominated by *J. arcticus*, *Eleocharis* sp., and *S. pectinata*). *H. vulgaris* was also present, but covered less than 1% of the area. Aquatic vegetation is sparse in the main pool (much bare soil) that may be result of occasional exposure. Both forks have adequate density and composition to support foraging.
Nest site: Nest is usually on the upland point between the two forks.

Human activity in territory: Minimal, occasional livestock management activities

Disturbance/conflicts: Minor disturbance from livestock concentrations around perimeter of pond which has reduced some tall emergent vegetation cover and density. Livestock concentration on the point between forks is a major disturbance factor as occurred in 2011.

Management needs/opportunities: Encourage Scheid Ranch and Matador Cattle Company to manage irrigation flows to ensure that adequate flows reach Bean Creek Reservoir to annually support Trumpeter Swan breeding. Consider drift fence between

forks to limit cattle access to nest site.

Bean Creek Reservoir, June 23, 2011

August 19, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Passmore Pond **Number: S23**
Centennial Valley breeding priority: 6
2011 nesting activity: Active, successful, 3 cygnets hatched and fledged

Location: lower Jones Creek drainage approximately 1.6 miles above confluence with Red Rock River, and 1.0 mile above small onstream impoundment**,** 1.0 miles north of south county road
UTM coordinates: 12T 421129E 4940615N T14S R3WSection 17NWSE
Wetland type: Permanent wetland **Size** 13 acres
Ownership/Interest: Matador Cattle Company (neutral), BLM

General site description: Passmore Pond is a small natural pond adjacent to Jones Creek surrounded by wet meadow, black greasewood and sagebrush habitats.
Water source/persistence: The pond lies below several wet meadow/spring areas and receives surface runoff, and ground water connected to Jones Creek and upstream springs, with some irrigation inflows/influence from Bear Creek and Bean Creek. Water presence is annual but generally shallow in depth - <3 feet.
Emergent Vegetation: Dominated by *Juncus* spp. throughout pond area. During some years as in 2011, there is little open water area by mid-summer
Aquatic Vegetation: One of the saturated depressions within the wetland complex was ringed with *J. arcticus* on the south side and *D. spicata* on the north side. These species tolerate different salinities, suggesting that ground and surface water inputs are variable across a relatively short distance. Remnant submerged aquatic vegetation was observed on the underside of dried algal mats on dry and saturated mud flats.The transition zone between *J. arcticus* and *Eleocharis* sp. (robust spikerush) was drier than similar habitats at the 7L wetland. Eleocharis sp. was flooded up to 18 in (46 cm). *R. aquatilis* and *H. vulgaris* were present in some of the flooded *J. arcticus* and *Eleocharis* sp. zones. *R. flabellaris* (yellow water buttercup) was the dominant submerge aquatic species in one of open water depression surrounded by *Eleocharis* sp. Submerged aquatic vegetation in other open water habitats and sparsely vegetated areas of emergent vegetation(e.g., *Eleocharis* sp., *Carex* sp., and *J. arcticus*) included *H. vulgaris*, *R. aquatilis*, *S. pectinata*, *C. hermaphroditica*, and *U. vulgaris*. A pair of Trumpeter Swans was observed foraging in *Eleocharis* sp. flooded up to 2 ft (61 cm) where *S. pectinata* and *R. aquatilis* were the dominant submerged aquatic species. Aquatic invertebrates observed include water striders, dragon fly larvae, side swimmers, beetles, and orb snails.
Nest site: Muskrat house on east side of pond.

Human activity in territory: Minimal, very infrequent livestock management activities

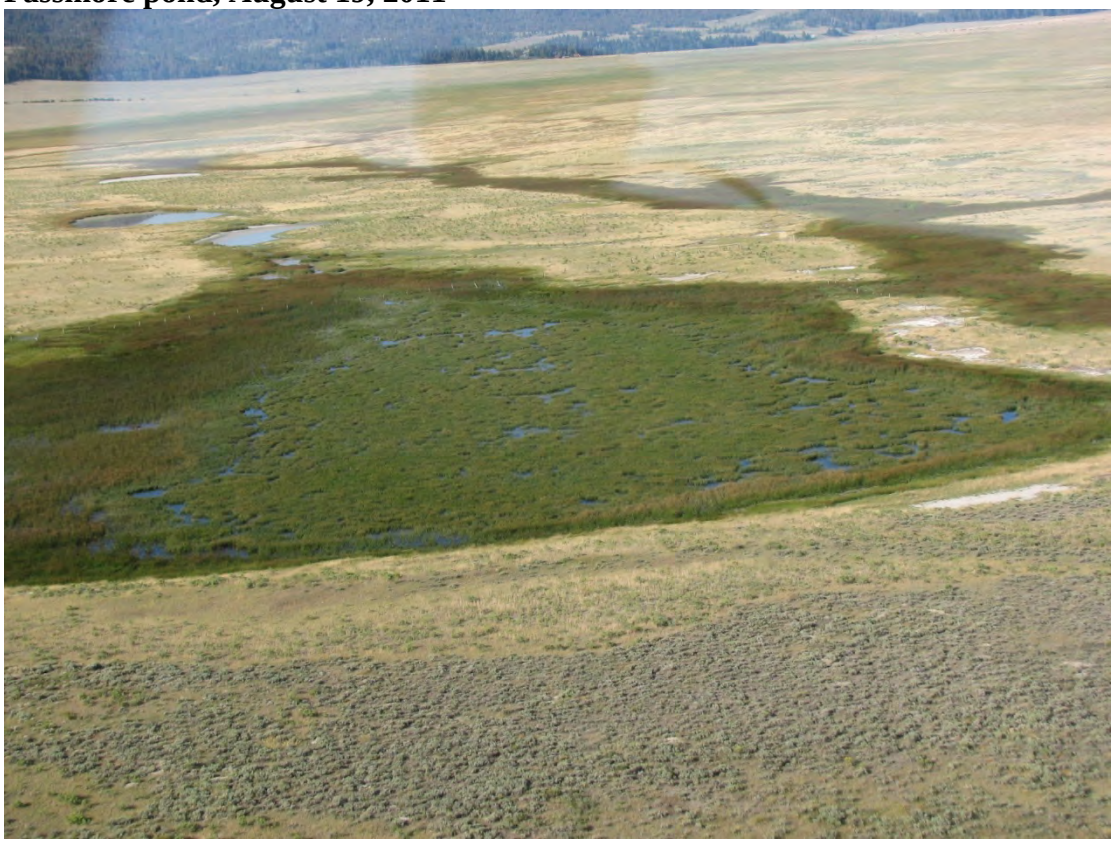
Disturbance/conflicts: Pond was fenced entirely into BLM pasture in about 2007 to control livestock use, and has not been grazed since then. Managed under BLM grazing permit.

Management needs/opportunities: In 2011, this pair and cygnets moved off the

Passmore Pond onto Jones Creek and the impoundment pond downstream possibly since Passmore became so heavily vegetated. Actions to maintain open water may be desirable.

Diverse vegetation habitat types within the Passmore Wetland Complex during September 2011 (photos Adonia Henry).

Passmore pond, August 19, 2011



Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Forsythe **Number: S**
Centennial Valley breeding priority: 7
2011 nesting activity: Occupied, no nest, one adult lost

Location: Red Rock River, 0.5 miles above J Bar L Ranch headquarter buildings
UTM coordinates: 12T 418931E 4942831N T14S R3W Section 7 NWNW
Wetland type: Riverine **Size** 95 acres
Ownership/interest: BLM, J Bar L Ranch (supportive)

General site description: Forsythe territory occupies a series of four isolated oxbow channels on the south side of the river channel, all of which are within 100 yards of the river channel. Three of these oxbows that had become filled with vegetation were excavated in 2007 to restore open water habitat.
Water source/persistence: Red Rock River ground water and surface runoff. Water is present yearlong and annually, but oxbows rarely receive any flood water from spring river flows.
Emergent Vegetation: Abundant water sedge (*Carex aquatilis*), beaked sedge (*C. rostrata*), and Baltic rush (*Juncus balticus*) around fringe of oxbows.
Aquatic Vegetation: Common -water buttercup (*Ranunculus aquatic*). Sago pondweed (*Stuckenia pectinatus*) is present in the river channel
Nest site: None identified

Human activity in territory: The J Bar L ranch headquarters is 0.5 below this territory and a lightly-traveled dirt road parallels the north side of the river within 0.20 miles of oxbows. Intensive but short duration livestock management activities occur during the swan breeding season including installation and maintenance of temporary electric fence.

Disturbance/conflicts: High intensity livestock grazing could concentrate cattle on this set of oxbows and displace swans. A pasture division fence crossing the river at the lower end of the territory has caused collision mortality in the past.

Management needs/opportunities: J Bar L is sensitive and supportive of swan conservation, and the close proximity of this territory to their headquarters buildings is an attraction for their visitors. Fencing that could cause collision mortalities and temporary fencing that could prevent livestock concentrations on the territory need to be discussed.

Forsythe territory, breeding pair of swans on probable nest site, May 23, 2011

Forsythe territory, oxbow on right was excavated in 2007. August 19, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Duffner **Number: S10**
Centennial Valley breeding priority: 8
2011 nesting activity: occupied, no nest

Location: Red Rock River, above Long Creek confluence, 0.5 mile south of J-Bar-L main corrals along the north county road
UTM coordinates: 12T 413540E 4944100N T14S R4W Section 4 NESW
Wetland type: Riverine **Size** 200 acres
Ownership/interest: BLM, J Bar L Ranch (supportive)

General site description: This territory designation combines three historic nest sites in close proximity along the Red Rock River (Duffner South – S10, Duffner North – S11, Duffner Cutoff). All sites occur on isolated oxbow channels immediately adjoining the river channel, and all share common characteristics. Coordinates identified for site location center on the largest oxbow south of the river.
Water source/persistence: Red Rock River ground water and surface runoff. Water is present yearlong and annually, but oxbows rarely receive any flood water from spring river flows.
Emergent Vegetation: Abundant water sedge (*Carex aquatilis*), beaked sedge (*C. rostrata*), and Baltic rush (*Juncus balticus*) around fringe of oxbows. On some oxbows, this sedge vegetation is becoming dense enough to limit open water and suitable habitat for swan use. Small patches of cattail (*Typha latifolia*) are present on the large oxbow south of the river. Cattails have not occurred downstream of Brundage Lane until very recently.
Aquatic Vegetation: Submerged aquatic vegetation in different oxbows on this territory is variable with sparse cover in some areas and up to 100% cover in other areas. The large oxbow south of the river contains dense *S. pectinata* and *Chara* sp. surrounded by *Carex* sp. and *T. latifolia* and *R. flabellaris* (senescing on saturated mud flats). *Chara* sp., *S. pectinata, L. minor* are present in the oxbow north of the river. Both of these sites are primary swan foraging areas. *S. pectinata, P. richardsonii, Chara* sp. are present in the river channel.
Nest site: none identified

Human activity in territory: Intensive but short duration livestock management activities occur during the swan breeding season including installation and maintenance of temporary electric fence.

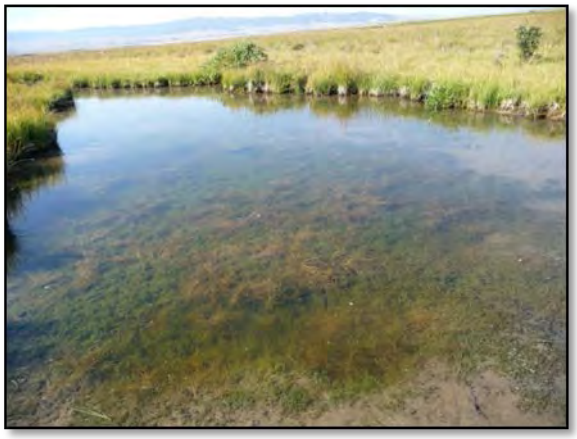
Disturbance/conflicts: High intensity livestock grazing could concentrate cattle on this set of oxbows and displace swans.

Management needs/opportunities: Timing of grazing treatments, herding activities and temporary fencing that could prevent or minimize livestock concentrations on the territory need to be discussed. The close proximity of this territory to J Bar L ranch housing is an attraction for their employees and visitors. Oxbow channels that had

become overgrown with emergent vegetation could be excavated to restore open water areas. Similar work in the adjoining Forsythe territory in 2007 enhanced swan use.

Duffner territory, August 19, 2011

Aquatic vegetation on the Duffner Territory, August, 2011(photos Adonia Henry)



Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Sand Creek **Number: S6, 24, 25**
Centennial Valley breeding priority: 9
2011 nesting activity: Occupied, no nest

Location: lower Sand Creek drainage, approximately 1.0 mile north of Mud Lake and 1.5 north of the Lakeview county road
UTM coordinates: 12T 406301E 4941900N T14SR5W Section 11 SW
Wetland type: Permanent wetland **Size** 150 acres
Ownership/interest: BLM

General site description: The lower Sand Creek drainage is a large wet meadow area with two natural ponds and an intermittent stream channel. Potholes were blasted in this area in the 1980's to provide small open water areas in otherwise continuous vegetative cover (*Carex rostrata*). In 1987, BLM and Ducks Unlimited cooperatively constructed a dike on the lower end of this wetland area to impound up to 160 surface acres of water. Inflows to the area are inconsistent and have yet to completely fill the basin. A small pond has always been present at the dike, and since 2008 the pool has extended sufficiently to encompass the two natural ponds. Sand Creek DU and Mud Lake are the largest water bodies away from Lima Reservoir in the lower part of the Centennial Valley.
Water source/persistence: Sand Creek ground water and inflows, surface runoff. At least three small pond areas are available annually in the spring, at least one of which persists throughout the swan breeding season.
Emergent Vegetation: Tall rushes (*Juncus* spp.) dominate the larger of the two natural ponds with patches pioneering around the impounded pond. Beaked sedge (*Carex rostrata*) and spikerush (*Eleocharis* sp.) dominate the wetter portions of the surrounding wetland.
Aquatic Vegetation: Sparse in the shallow natural ponds. Aquatic vegetation is developing in the impounded pond.
Nest site: A nest has been located on the southwestern corner of the larger natural pond.

Human activity in territory: Minor. The pond project is not grazed. A rough two-track road extends around the west and north part of the project, but receives light vehicle traffic.
Disturbance/conflicts: Vehicles on the road are in full view within 0.25 mile of past nest sites but when swans have nested, adequate screening security cover is present.
Management needs/opportunities: The Sand Creek DU wetland project was developed to provide season-long open water brooding habitat for swans and other waterfowl. It is currently managed under an agreement with the Lima Water Users Association to impound water depending on area-wide snowpack, stream flows and Lima Reservoir storage capacity. Inflows can be held yearlong in the project when projected watershed stream flows are greater than 75%. Otherwise, impounded water is to be released after July 1. In recent years with high stream flows, this policy has not been rigidly enforced and the Sand Creek pool has increased. Renegotiating this agreement to allow

impoundment of all inflows annually at least through the end of August would significantly enhance further wetland development and Trumpeter Swan habitat. Planting of taller emergent vegetation could enhance cover values.

Sand Creek territory, August 19, 2011

Sand Creek territory, Sept. 29, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Cocanougher **Number: S4**
Centennial Valley breeding priority: 10
2011 nesting activity: Occupied, unsuccessful, nest flooded

Location: Red Rock River, 0.5 mile above Price Lane Bridge, 0.25 miles west of old Cocanougher buildings
UTM coordinates: 12T 410465E 4943407N T14S R4W Section 6 SESE
Wetland type: Riverine **Size** 110 acres
Ownership/interest: Raffety Ranch, moderately supportive

General site description: This territory is centered on a large isolated oxbow channel adjacent to the Red Rock river channel. There are other oxbows in the area but most are much older, provide little or no open water area during the swan breeding season, and are marginal as swan habitat. This territory is at the uppermost extent of the Lima Reservoir flood pool and the nest site is periodically inundated at high water as occurred in 2011.
Water source/persistence: Red Rock River ground water and surface flow. Water is available annually and persistent throughout swan breeding season.
Emergent Vegetation: A broad mix of tall sedges and rushes are present along with wetland facultative forbs and grasses. This varies depending on annual and previous year water levels. Sandbar willow (*Salix exigua*) and cattails (*Typha latifolia*) have recently become established in this area.
Aquatic Vegetation: Dense *Chara* sp., *S. pectinata, L. minor* in largest oxbow channel with *S. pectinata, P. richardsonii, Chara* sp. in the river channel.
Nest site: East side of oxbow nearest the river channel and 100 yards north of patch of willows. Some muskrat houses are available in this territory.

Human activity in territory: Minimal, mid-late summer livestock management activities

Disturbance/conflicts: Nest flooding from high Lima Reservoir water levels.

Management needs/opportunities: Flooding from Lima Reservoir cannot be controlled. When this area is inundated, water is already going over the reservoir spillway. Possible site for installing a floating nest platform.

Cocanougher territory, August 19, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Hack Tower **Number: S33**
Centennial Valley breeding priority: 11
2011 nesting activity: Unoccupied

Location: Red Rock River, 0.5 miles below old gauging station flume, 1.3 miles below J Bar L ranch headquarters, at BLM peregrine hack tower
UTM coordinates: 12T 415740E 4944722N T14S R4W Section2 SENW
Wetland type: Riverine **Size** 75 acres
Ownership/interest: BLM, J Bar L Ranch (supportive)

General site description: The Hack Tower territory includes two large, old isolated oxbow channel and several others that adjoining the river channel. All oxbows are filling in with vegetation and open water is becoming limited.
Water source/persistence: Red Rock River ground water and surface runoff. Water is present yearlong and annually, but oxbows rarely receive any flood water from spring river flows.
Emergent Vegetation: Beaked sedge (*Carex rostrata*) and water sedge (*C. aquatilis*) are becoming dense enough in oxbows to limit open water area and depth, and suitability as swan habitat. Baltic rush (*Juncus balticus*) bounds the fringes of oxbows.
Aquatic Vegetation: *L. minor*, *Alisma* sp., and *Sagitaria* sp. were observed along edge where the open water/ submerged aquatic vegetation transitioned into robust emergent vegetation. *S. pectinata*, *E. canadensis*, and *P. richardsonii* had patchy distributions in the Red Rock River channel upstream and downstream of the Hack Tower territory. *Chara* sp. was often observed under patches of submerged aquatic vegetation as well as in open water areas.
Nest site: The historic nest site is on the oxbow north of the river channel and just east of the hack tower. It is bounded on the north and east by a tall vertical bank which shields the nest site from the county road.

Human activity in territory: Intensive but short duration livestock management activities occur during the swan breeding season including installation and maintenance of temporary electric fence.

Disturbance/conflicts: High intensity livestock grazing could concentrate cattle on this set of oxbows and displace swans.

Management needs/opportunities: Timing of grazing treatments, herding activities and temporary fencing that could prevent or minimize livestock concentrations on the territory need to be discussed. Oxbow channels that had become overgrown with emergent vegetation on the upstream Forsythe territory were excavated to restore open water areas. Similar work in the Hack Tower territory would enhance swan use.

Submerged aquatic vegetation habitat at the Hack Tower Oxbow, Red Rock River during September 2011(right photo Adonia Henry).

Hack tower territory, September 29, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Oxbow **Number: S12**
Centennial Valley breeding priority: 12
2011 nesting activity: unoccupied

Location: Red Rock River from just below the J Bar L Ranch headquarters buildings (Dulany) extending downstream for 0.8 miles
UTM coordinates: 12T 417267E 4943965N T14S R4W Section 1 SWNW
Wetland type: Riverine **Size** 50 acres
Ownership/interest: J Bar L Ranch (supportive), BLM

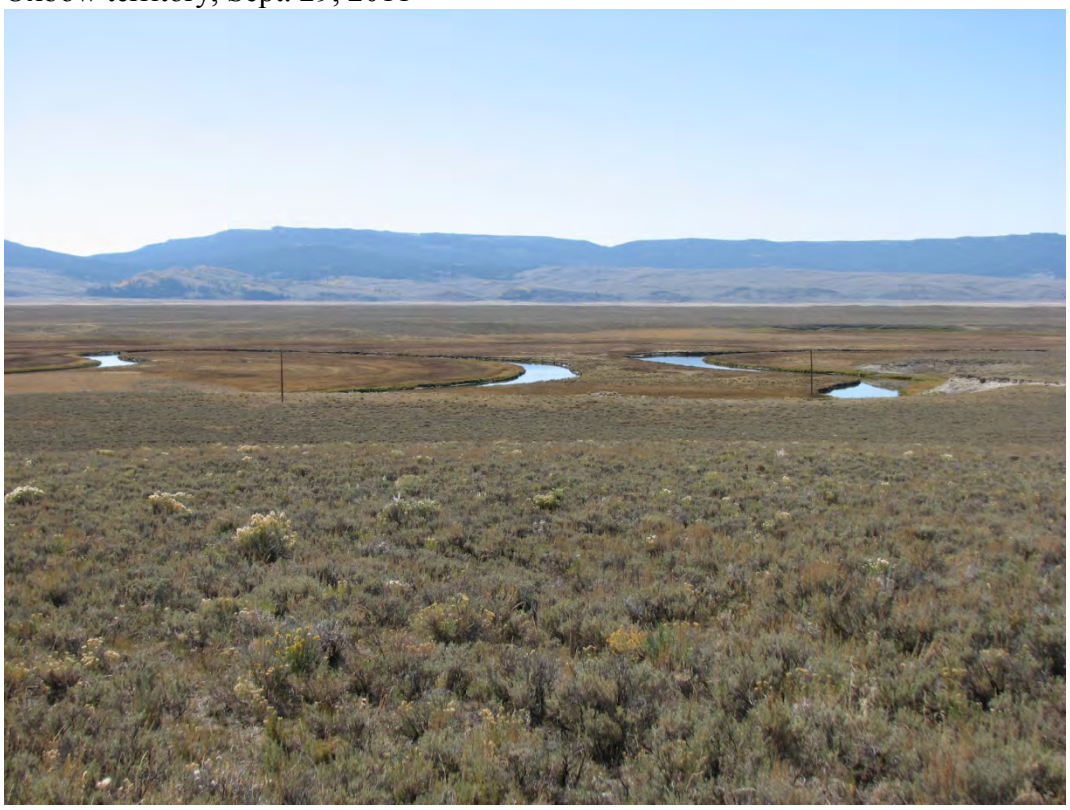
General site description: The Oxbow territory occupies a heavily meandered section of river including two larger isolated oxbow channels. There are fewer off-channel wetlands in this section of river (several older oxbows) than in other reaches, and swans are more dependent on the main river channel than on other adjacent territories
Water source/persistence: Red Rock River ground water and surface runoff. Water is present yearlong and annually, but oxbows rarely receive any flood water from spring river flows.
Emergent Vegetation: Abundant water sedge (*Carex aquatilis*), beaked sedge (*C. rostrata*), and Baltic rush (*Juncus balticus*) around fringe of the largest oxbow. On most other oxbows, this sedge vegetation has become dense enough to limit open water and suitable habitat for swan use.
Aquatic Vegetation: Submerged aquatic vegetation in the Red Rock River along the oxbow area includes *S. pectinata*, *P. richardsonii*, *E. canadensis*, *M. exalbescens*, and *Chara* sp. Sparse areas of *H. vulgaris* also occurred along the edge of the Red Rock River. Scuds were abundant mixed beds of aquatic vegetation and egg masses were commonly observed on *S. pectinata*.
Nest site: None identified

Human activity in territory: Intensive but short duration livestock management activities occur during the swan breeding season including installation and maintenance of temporary electric fence.

Disturbance/conflicts: High intensity livestock grazing could concentrate cattle on this set of oxbows and displace swans.

Management needs/opportunities: Timing of grazing treatments, herding activities and temporary fencing that could prevent or minimize livestock concentrations on the territory need to be discussed. The close proximity of this territory to J Bar L headquarters is an attraction for their employees and visitors. Oxbow channels that had become overgrown with emergent vegetation could be excavated to restore open water areas.

Oxbow territory, Sept. 29, 2011



Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Lima Willows **Number: S5**
Centennial Valley breeding priority: 13
2011 nesting activity: Occupied, unsuccessful, nest flooded

Location: Lima Reservoir about 0.75 mile west of Price Lane bridge at the mouth of Wolverine Creek (first drainage entering the reservoir from the north), and directly across from the mouth of Price Creek entering from the south.
UTM coordinates: 12T 408330E 4943407N T14S R5W Section 1 NWSE
Wetland type: Riverine, Permanent wetland **Size** 95 acres
Ownership/interest: Matador Cattle Company (neutral), BLM

General site description: Lima Willows territory occupies the upper end of Lima Reservoir where the Red Rock River channel is highly meandered but regularly inundated. When the reservoir pool extends into the territory water depths are generally less than four feet. When not inundated numerous small ponds and isolated oxbows are present along with inflows from Wolverine Creek.
Water source/persistence: Lima Reservoir, Red Rock River. Water levels in the reservoir pool dictate swan breeding activity on this territory, often flooding the nest in the spring. When not flooded, the isolated oxbows and river channel sustain swan use throughout the breeding season.
Emergent Vegetation: Limited. Tall rushes (*Juncus* spp.) are present annually. When not flooded there is a mix of tall forbs dominated by (*Senecio triangularis*) and grasses present. A small patch of sandbar willow (*Salix exigua*) has persisted near the nest site.
Aquatic Vegetation: Abundant. Extensive monotypic beds of mares tail (*Hipparis vulgaris*) are present on shallow flats between meandered channels and are persistent despite being regularly exposed. Invertebrates observed within mare's tail communities include scuds, chironomids, side swimmers, and orb snails. Richardson's pondweed (*Potamogeton richardsoni*) occurs in scattered beds extending into the main reservoir pool and along the deeper fringe on the river channel. Other species of submerged aquatic vegetation observed within and adjacent to beds of Richardson's pondweed include *Myriophyllum exalbescens* (northern water milfoil), *Callitriche hermaphroditica* (autumnal water-starwort), and *Elodea canadensis* (Canadian waterweed). Uprooted shoots of *Alisma* sp. (water plaintain) were also observed in beds of *P. richardsonii*.
Nest site: The nest site is at the mouth of Wolverine Creek west of a small patch of willows. Swans typically try to nest on small upland islands rather than denser vegetation in response to rising reservoir water levels.

Human activity in territory: Minimal

Disturbance/conflicts: Livestock are generally present by mid-summer and concentrate on the reservoir shoreline. High reservoir water levels inundate this territory routinely but when available, this territory is very productive.

Management needs/opportunities: Location for installing floating nest platform.

Lima willows territory, Sept. 29, 2011

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Brundage Sandhills. **Number: S31**
Centennial Valley breeding priority: 14
2011 nesting activity: Occupied, no nest

Location: Adjacent to Brundage Lane 1.0 miles southeast of Brundage Bridge
UTM coordinates: 12T 42301E 4944058N T14S R3W Section 3NWSE
Wetland type: Permanent wetland **Size** 105 acres
Ownership/interest: Stibal Ranch, negative but improving

General site description: This territory is a large shallow pond located in the Centennial sandhills. The western half has several small islands and channels depending on water level that provide significant shoreline diversity. Islands are fringed with vegetation but have very little other vegetation. The eastern half of the pond is open water.
Water source/persistence: Ground water and surface runoff. Some pool is available annually but is only persistent during high runoff years. During good water years, the pond is less than three feet deep.
Emergent Vegetation: Tall rushes (*Juncus* spp.) bound to perimeter of the pond and small islands.
Aquatic Vegetation: Very sparse. Foraging craters are present throughout the pond which may indicate a higher abundance of some aquatics in the past. Water clarity and a high sand content in bottom sediments may be a factor influencing vegetation composition. During September 2011 water had receded to the lower elevation edge of the *J. arcticus* and open water habitats. *S. pectinata* covered less than 10% of the shallowly flooded habitats and mudflats along the edge of the water. Deeper water habitats (up to 3 ft [0.9 m]) had very sparse submerged aquatic vegetation, with an estimated 1% cover of sago pondweed. No other species of submerged aquatic plants were observed. Most *S. pectinata* plants that were present were spreading from rhizomes/tubers, and had developed turions.
Nest site: None identified

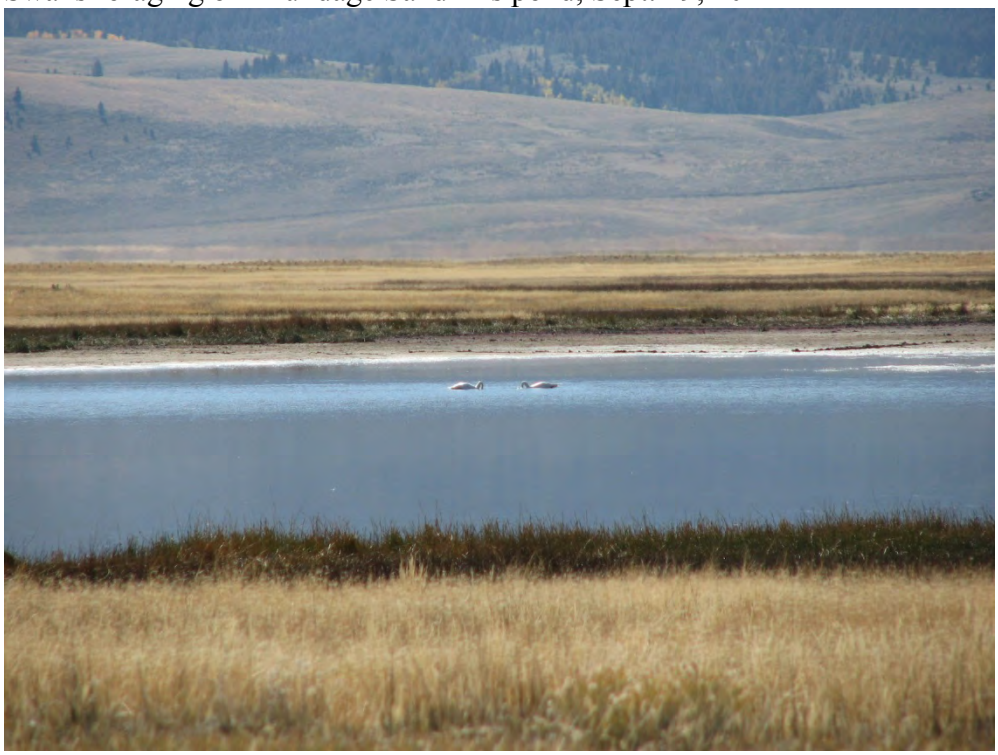
Human activity in territory: Minor. Infrequent livestock management activities. Brundage Lane is with 0.25 miles of the pond and sustains light vehicle traffic during mid-to late summer.

Disturbance/conflicts: Livestock are present on the pond season-long and utilize or trample all taller cover by the end of the growing season.

Management needs/opportunities: This territory has always attracted swans but production has not been clearly documented. Large numbers of swans have been seen on this pond during August but current vegetation abundance would not sustain that level of foraging. A pair of swans was observed foraging on this pond throughout the 2011 season. Monitoring aquatic vegetation production and use throughout the growing season may indicate higher potential than currently assumed. Controlling livestock utilization and/or planting taller emergent vegetation (*Typha* sp.) could enhance cover values.

Brundage Sandhills territory, August 19, 2011

Swans foraging on Brundage Sandhills pond, Sept. 29, 2011



Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Mud Creek **Number: S22**
Centennial Valley breeding priority: 15
2011 nesting activity: Unoccupied

Location: Isolated oxbow channel in Red Rock River corridor just below confluence with Mud Creek, 1.5 miles below Brundage Bridge, and 0.25 mile across the river from J Bar L cabins (Brundage homestead)
UTM coordinates: 12T 420944E 4943338N T14S R3W Section 5 SESW
Wetland type: Riverine **Size** 80 acres
Ownership/interest: J Bar L Ranch (supportive)

General site description: This site occupies a large isolated oxbow adjacent to the Red Rock River. The meandered river channel provides additional foraging and brooding habitat in addition to the oxbow. A high eroded bank bounds the oxbow to the south which provides wind protection.
Water source/persistence: Red Rock River ground water. Water is present annually and is persistent throughout the breeding season. Actual surface flows into the oxbow are rare.
Emergent Vegetation: This site is becoming densely vegetated with water sedge (*Carex aquatilis*) and beaked sedge (*Carex rostrata*), and is limiting open water area. Baltic rush (*Juncus balticus*) dominates the fringe of oxbows and adjoining wet meadow areas.
Aquatic Vegetation: none identified in the oxbow. Sego pondweed (*Potamogeton pectinatus*) is present in the river channel.
Nest site: None identified

Human activity in territory: The Brundage homestead was abandoned until about 2005 when the J Bar L Ranch began renovating the buildings for guest cabins which are occupied intermittently during the summer. A dirt road paralleling the river across from the swan territory provides vehicle access to the cabins. Intensive but short duration livestock management activities occur including installation and maintenance of temporary electric fence.

Disturbance/conflicts: Human activity at the cabins could be detrimental to site occupancy. High intensity livestock grazing could concentrate cattle on this oxbow and displace swans.

Management needs/opportunities: J Bar L is sensitive and supportive of swan conservation, and occupancy of the Brundage cabins usually occurs after swan nests are already established. The close proximity of this territory to these cabins is an attraction for their guests and visitors. Electric fence could be located to exclude cattle from the immediate area of the oxbow to prevent displacement. Oxbow channels that had become overgrown with emergent vegetation on the adjoining Forsythe territory were excavated to restore open water areas. Similar work in the Mud Creek territory would enhance swan use.

Mud Creek territory

Centennial Valley Trumpeter Swan Territory Assessment

Territory Name: Brundage Bridge **Number: S14**
Centennial Valley breeding priority: 16
2011 nesting activity: Unoccupied

Location: Multiple isolated oxbow channels adjoining the Red Rock River approximately 0.5 miles below Brundage Bridge
UTM coordinates: 12T 422003E 4944421N T14S R3W Section 4NWNW
Wetland type: Riverine **Size** 110 acres
Ownership/interest: J Bar L Ranch (supportive), BLM

General site description:
Water source/persistence: Red Rock River groundwater. Water is present annually and is persistent throughout the swan breeding season. Actual surface flows from the river into the oxbow are rare.
Emergent Vegetation: Oxbows on this site have become densely vegetated with water sedge (*Carex aquatilis*) and beaked sedge (*Carex rostrata*) which is limiting open water area. Baltic rush (*Juncus balticus*) dominates the fringe of oxbows and adjoining wet meadow areas.
Aquatic Vegetation: Sago pondweed (*Stuckenia pectinata*) is present in the river channel
Nest site: None identified.

Human activity in territory: Intensive but short duration livestock management activities occur including installation and maintenance of temporary electric fence.

Disturbance/conflicts: High intensity livestock grazing could concentrate cattle throughout this territory and displace swans.

Management needs/opportunities: A portion of this territory wetland was recently acquired by BLM from J Bar L. J Bar L is sensitive and supportive of swan conservation. Timing of grazing treatments and locating temporary fencing that could prevent livestock concentrations on the territory need to be discussed. Oxbow channels that have become overgrown with emergent vegetation could be excavated to restore open water areas. Similar work in the Forsythe territory enhanced swan use.

Brundage Bridge territory, August 19, 2011

September 29, 2011