LAZY K MARSH: FOUR YEARS OF HABITAT ENHANCMENT FOR WETLAND-DEPENDENT WILDLIFE AT A CONSTRUCTED MARSH IN TETON VALLEY[1]

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Abstract: Lazy K Marsh was constructed in 1999 to enhance habitat for wetland dependent wildlife in Teton Valley Idaho. The project received broad financial support because of the unique, sensitive and threatened wildlife resources being targeted. Teton Valley's 27,000 acres of wetlands are home to fall staging sandhill cranes (*Grus canadensis*), breeding long-billed curlew (*Numenius americanus*), wintering trumpeter swans (*Cygnus buccinator*), short-eared owls (*Asio flammeus*) and large concentrations of migrating waterfowl including pintails (*Anas acuta*). Our primary goal was to create waterfowl brood-rearing and shorebird habitat. Secondary goals included establishing dense nesting cover for resident waterfowl and food plots for spring migrating sandhill cranes. Revegetating the project area was daunting with nearly 30 ac. of constructed marsh. We developed cost-effective techniques for establishing emergent marsh, sub-merged aquatic and upland grass communities in areas historically used for livestock grazing. Alkali soils, aggressive introduced pasture grasses and noxious weeds compounded the problem. Initial revegetation efforts consisted of planting almost 10,000 native wetland plugs. We drill-seeded disturbed uplands (including the dike) with a mix of native grasses and forbs. Wildlife herbivory mostly by Canada geese was the major impediment to establishing vegetation. A constructed peninsula was particularly difficult to revegetate in this regard. Waterfowl concentrated on the peninsula and grazed vegetation to bare soil, increasing soil erosion and weed invasion by Canada thistle *(Cirsium arvense)*. After many failed plantings we enclosed the peninsula with snow fencing in 2002 and replanted. Pre-vegetated coconut matting was used to stabilize soils on the windward side and proved extremely effective. Plant species selection, planting techniques, weed control and herbivory control were critical for vegetation establishment. Lazy K Marsh has become an important habitat in Teton Basin.

Additional Key Words: waterfowl, revegetation, Canada geese, herbivory

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Introduction

Wetlands cover an estimated 27,000 ac. of Teton Valley Idaho (USFWS Nat. Wetlands Inventory 1991), a large extent by western intermountain standards. Most wetlands occur in flat bottomlands along the Teton River. Since settlement in the late 1880's farmers have extensively flood irrigated Teton Valley for crop and forage production, which is thought to have played a significant role in wetland development. Recent changes in irrigation (e.g. flood to sprinkler, farming to subdivisions) may be reversing this trend as less water is being applied to recharge the shallow groundwater aquifer and sustain some wetland areas.

Sub-irrigated, sedge-dominated wetmeadows and willow dominated scrub-shrub wetlands are the prevailing wetland types. In concert with grain production, wetlands support a diverse assemblage of wildlife including unique concentrations of resident and migratory waterfowl and shorebirds. Teton Valley is an important staging ground for Rocky Mountain Population sandhill cranes but populations are declining due to habitat losses from development and changes in agriculture. September staging counts between 1984-87 averaged 4,830 cranes, similar counts during 1995-97 averaged 1,517 cranes, a 68.6% decline over 10 years (Drewien et al. 1999). Teton Valley is also part of the Core Tri-State Area for Rocky Mountain Population Trumpeter Swans, providing historically important wintering ground (Pacific Flyway Study Subcommittee 2002). There has never been documented swan nesting in Teton Basin; suitable habitats may be limiting. A major management objective is to increase the swan population size and productivity by providing adequate nesting and brood rearing habitats. Lazy K Marsh was designed to provide suitable swan nesting and brooding habitat. Developing restoration techniques that improve the quality and quantity of emergent and submerged aquatic macrophytes is critical in this regard. Other wildlife that could potentially benefit from enhancement efforts includes sensitive shorebird species like long-billed curlews and willets (*Catoptrophorus semipalmatus)* that nest in relatively high numbers in Teton Valley and large numbers of spring migrating waterfowl, including northern pintails.

Habitat loss and degradation due to changes in irrigation practices and increased land development has stimulated interest in construction and establishment of wetlands and uplands for wildlife. In 1999 Intermountain Aquatics Inc., working with a willing landowner and state,

federal and non-profit funding partners designed and constructed Lazy K Marsh a 30+ ac. shallow impoundment near the Teton River.

The primary project goals were to create waterfowl brood-rearing and shorebird foraging habitat. In North Dakota (Weller and Spatcher 1965) found maximum bird numbers and diversity when a well-interspersed cover-water ratio of 50:50(hemi-marsh) occurred. Because the dominant introduced pasture grasses would die when inundated, we needed to rapidly establish emergent vegetation to achieve this condition. Secondary goals were to improve upland nesting conditions and establish barley food plots for migrating sandhill cranes. Waterfowl use of dense nesting cover (DNC) has been widely documented in the prairie pothole region but little has been reported for the intermountain western U.S. Average nest initiation for Teton Valley ducks is May 20 (Cavallaro 2002), which means most birds are nesting in residual cover from the previous year. Snow pack has a significant affect on vegetative structure; many plants stand-up poorly to the snow and are matted come spring. Matted vegetation provides little structure for nesting birds. Robel (1971) described the ideal condition when residual cover (in Spring) provides 100% effective screening up to a height of 20 cm or more. We decided to plant a mix dominated by native cool season grasses and selected species of primarily wheat grasses and wild ryes based on observations at reference sites.

Study Area

Teton Valley lies in southeast Idaho at approximately 6200 ft. elevation and is encircled on three sides by mountain ranges including the Tetons to the west. Short dry summers and long cold winters characterize the climate; the average annual temperature is 40°F and average precipitation is almost 16". Lazy K Ranch is located near Driggs, approximately 0.25 miles from the Teton River. Historically the property was a mix of low wetland swales and flood irrigated pastures used for livestock grazing. Soils consist mainly of silty clay loams with pH ranging from 8.0-9.0. Upland vegetation generally consists of introduced pasture grasses (*Agrostis stolonifera*, *Lolium arundinaceum*) and shrubby cinquefoil (*Dasiphora floribunda*). Wetlands consist primarily of sedges (*Carex nebrascensis, C. utriculata, C. pellita*), rushes *(Juncus balticus)* and hydric grasses (*Deschampsia caespitosa, Calamagrostis stricta, Alopecurus*

arundinaceus). Canada thistle (*Cirsium arvense*) also occurs in patches and along irrigation ditches across most of the property.

Methods

Planning

Before a decision was made about wetland size we calculated a water budget, which was largely motivated by water availability and soil seepage rates. We had roughly 2.2 $ft.^3$/sec. (cfs) of surface irrigation water and needed to determine how much surface we could inundate and still maintain the desired habitat types. Because the ground was flat, inundation was more cost effective than excavation. To control costs we planned on lining with native soils rather than geosynthetics or bentonite. We completed a geotechnical analysis of substrates and monitored water levels in a series of shallow groundwater wells for roughly 14 months in advance of construction. Based on test results the final project was designed for a maximum pool of roughly 30 ac. We decided to ignore potential groundwater inputs and instructed the excavation contractor to avoid areas of underlying gravel. Constructing the dike across natural drainage ways and diverting surface irrigation water would maintain wetland hydrology.

Construction

Approximately 4000 ft of dike was built to construct the marsh. In addition we constructed a peninsula to increase habitat edge and provide areas for waterfowl loafing. A large excavator, articulated dump trucks and a LGP dozer were used to build the dike and grade habitat areas. We stripped and stockpiled the organics from the dike footprint and built the dike core with native sub-soils borrowed from several small excavations inside the normal high water line. Most of the dike consisted of "track-packed" silty clay loams constructed with 6" lifts because conditions were too wet to operate a sheepsfoot compactor. The dike front and back slopes were built to 4:1 to maximize open-water but also allow seeding equipment to operate on contour. Clay collected from a small wetland was used to face the dike in the deepest areas and line excavations that intercepted permeable gravels. The dike was fitted with a flashboard riser type

water control structure designed to pass expected high flows and allow for periodic basin draw down. The peninsula was constructed with subsoils and capped with 2-4" of salvaged upland coversoil. Careful construction monitoring ensured that a seal was maintained.

Salvaged topsoil was distributed over the dike and all borrow areas and re-graded to provide a seedbed. The disturbance area outside the dike was minimized to avoid excessive revegetation efforts and limit the potential for new weed invasions. Equipment mobilization was limited to the dike or below the high water mark. The impoundment covers roughly 30 ac at full pool; 10-15 ac. are less than 2 ft. deep. By late summer the pool drops to approximately 20 ac. but the relative proportion of shallow to deep water does not change significantly.

Fig. 1 Lazy K Marsh at full pool - July 1999 (just after construction).

Revegetation

Uplands. A Truax habitat seeder was used to drill the DNC mix on all disturbed upland surfaces including the dike. We applied 180-lbs/ac. of elemental sulfur and worked it into the soil with a disk plow and harrow to amend pH and prepare the seedbed. Soils were drill-seeded immediately after construction in July 1999 and again in September the same year (dormant seeding). We applied a low rate of mineral fertilizer (N-P-K) immediately prior to the initial seeding. Revegetated upland surfaces were sprayed at the end of the growing season with Curtail ™ herbicide to control Canada thistle. Bare soils were periodically re-drilled between 1999 and 2001. In spring of 2001 we applied Biosol plus ™ organic fertilizer on the dike at a rate of 1000 lbs/ac. No fertilizers were applied in 2002.

Approximately 5 ac. of moist pasture was tilled in 2000 to grow barley for sandhill cranes. The soil was disk plowed, amended with elemental sulfur, drill seeded with Harrington barley at a rate of 100 lbs/ac. and fertilized. Weeds were sprayed with 2,4-D herbicide each year after the barley reached the 5-leaf stage. We planted barley each year from 2000-2002.

Wetlands. Herbaceous wetlands were seeded and/or planted with nursery-propagated 3.5 in^3 and 10 in^3 tublings and bareroot propagules depending on the species and hydrologic regime. We hand-broadcast seeded a mix of native species between the normal and high water marks along the dike, disturbed shoreline reaches and the entire peninsula. The seedbed was scarified prior to seeding and then rolled with a Schmeiser packer following seed application. Isolated areas incidentally disturbed during construction were also seeded. The peninsula was re-seeded annually in an effort to establish cover on bare areas.

Certain herbaceous wetland reaches were also plugged with tublings at high density to rapidly establish emergent vegetation stands along the wetland fringe and in shallows. Over 10,000 tublings, mostly consisting of hardstem bulrush (*Schoenoplectus acutus)* and sedges were planted in 1999. We planted another 5000 tublings each year in 2000 and 2001. All emergent plantings were initially protected from waterfowl (i.e. Canada geese (*Branta canadensis*)) with wood lath, metal fenceposts and cotton twine. The entire peninsula fringe was plugged with emergent vegetation and the windward shore was planted with pre-vegetated coir mats (aka Wetland Sod) consisting of hardstem and alkali bulrush (*Schoenoplectus maritimus*). Wetland Sod was not protected. In 2002 we fenced the entire peninsula with metal posts and snow fence to exclude waterfowl.

In 2000 we transplanted approximately 100 duck potato (*Sagittaria latifolia*) tubers from the Henrys Fork Snake River near St. Anthony, ID to a shallow-water 1 ac. test plot at the north end of the marsh. In 2002 we planted 1000 commercially supplied duck potato tubers and 1000 commercially supplied Sago pondweed (*Stuckenia pectinatus*) tubers. All submerged aquatic propagules were gently pushed into the mud to a depth of 1" below the soil surface. We protected some plantings with metal mesh fencing to prohibit muskrat (*Ondatra zibethicus*) damage.

Native willows were generally left in place and flooded. A few isolated shrubs were relocated with an excavator to shallow areas if the designed high water level would overtop them.

Wildlife Monitoring We compiled an avian life-list (Appendix 1) for species observed at Lazy K Marsh from 1999 – 2002. In June 2002 large areas were also nest dragged to locate and identify duck nesting use of enhanced habitats.

Results

Revegetation:

Uplands. Seed germination and seedling emergence was ≥ 75% on salvaged wetland coversoils and ≤ 30% on salvaged upland coversoils. Salvaged wetland coversoils were much higher in soil organic matter (SOM) in the form of peat. In one location at the north end of the dike we encountered a layer of peat almost 4 feet thick. Salvaged upland coversoils were very silty, structurally poor, low in SOM and high in pH. Lack of moisture and Canada geese hampered plant establishment and growth on the dike. Dike areas with upland coversoil had less than 25% canopy cover by the end of the first growing season. In contrast wetland coversoils had greater than 50% canopy coverage. Canada goose damage was most severe on the central, open dike areas. Western wheatgrass (*Pascopyrum smithii*), Slender wheatgrass (*Elymus trachycaulus*), Canada wildrye (*Elymus canadensis*), Green needlegrass (*Nassella viridula*) and Lewis blue flax (*Linum lewisii*) accounted for approx. 90% of the cover after two growing seasons.

The barley food plot did poorly the first year but produced good crops in 2001 and 2002. High soil pH, Canada thistle and insufficient moisture may have contributed to poor initial seed production.

2000

2002

Figure 2. Vegetation establishment on constructed peninsula before and after exclusion of Canada geese.

Wetlands. Seed germination and seedling survival was about 25 % but cover was ≤ 10 % for seeded species following one growing season. Some plants (e.g. tufted hairgrass) had established well from propagules within the salvaged wetland cover soil and grew well. Despite continual re-seeding efforts seedling establishment on the peninsula was severely limited by Canada geese the first three years. Another factor may have been invasion by Canada thistle, which was annually controlled. In 2002 we completely enclosed the peninsula with plastic snow fence and vegetation responded very well. Most of the new growth was clonally from the emergent fringes inward.

Plugged emergent plants were slow to establish and survival of stands was highly variable. Overall survival for Hardstem bulrush was estimated at < 50% for all years. Waterfowl caused much of the damage; Canada geese regularly pulled up plants to eat tender rhizomes. Emergent wetland stands that established the year they were planted over-wintered and began to spread slowly by the second growing season. Nebraska sedge, beaked sedge *(Carex rostrata)*, creeping spikerush *(Eleocharis fallax)* and baltic rush all established and survived well. Nebraska sedge and Baltic rush also established well from propagules (i.e. rhizomes) in the salvaged wetland cover soils. Hardstem bulrush was more difficult to establish but generally bareroot plants or larger tublings did best. Wetland Sod planted to control erosion on the windward side of the peninsula survived and grew well despite waterfowl herbivory. Expansion outside the initial sod footprint was > 100% after 3 years for Alkali bulrush; Hardstem bulrush mats also spread but at a slower rate. Wetland Sod may provide the most cost-effective revegetation in areas susceptible to extreme waterfowl herbivory.

Duck potato transplanted from the Henrys Fork Snake River survived well but spread has been very slow. Overall, spread has been about 100% after 4 years. Muskrats heavily damaged commercially sourced duck potato immediately following planting. After we replanted and protected the plots with wire mesh on all sides the plants established and grew well.

Sago pondweed has naturally invaded and slowly spread in some areas, however total coverage after 4 years was < 10%. Competition with other submerged plants (e.g. Chara) seems to be a significant factor impeding the spread of this species; wave damage may also play a role. Sago may be limited by wave activity at Lazy K Marsh. Carter et al. (1985) found that sago plants can be washed out of fine textured bottoms by wave activity. Transplanted commercially supplied sago pondweed tubers did very poorly and mortality was estimated at greater than 90% across the test plots.

Except for the deepest areas of the marsh willows that were left in place and inundated are still alive after 4 years. Willows that died are still standing and provide excellent cover for passerine birds. Natural basin draw down and subsequent soil oxidation in late summer and through winter may be sufficient to sustain willows inundated for much of the growing season. It is unclear how long willows will tolerate and grow under the current season-long flooded conditions.

Wildlife Use From 1999-2002 we recorded 76 bird species most of which are wetland dependent. Species of special management concern included whooping crane (*Grus americana*), trumpeter swan, bald eagle (*Haliaeetus leucocephalus)*, long-billed curlew and short-eared owl.

Sandhill cranes and trumpeter swans. Lazy K Marsh has become a major roost for fall-staging sandhill cranes. In 2002 we estimated the September roosting flock at 200 –500 cranes. Sandhills would congregate at the marsh every evening at sundown to roost in the shallows and wetmeadows until daybreak when they would depart to feed in nearby grain fields. More cranes were seen at this roost location than any other location we monitored in Teton Valley in 2002. Marsh size, proximity to grain fields and relative isolation are likely factors contributing to the attractiveness of Lazy K Marsh for roosting cranes. In 2001 and 2002 at least one pair of cranes nested and reared young at Lazy K Ranch. Cranes used barley food plots extensively in both fall

and spring in 2001 and 2002. Poor seed production in 2000 likely contributed to low use the first year.

Trumpeter swans typically arrive in Teton Valley in mid - late autumn and spend the winter on the Teton River, spring creek tributaries and isolated spring-fed ponds. The Idaho Fish and Game Department has closed hunting of "light geese" in Teton Valley to protect trumpeter swans from accidental shooting, however, normal waterfowl hunting pressure and human disturbance may force swans to relocate more in search for secure habitats. In all years since construction, trumpeters used Lazy K Marsh in late autumn and early spring when open water was available. In November 2001 we counted almost 90 swans on the marsh at one time. After freeze up in 2002 swans continued to use the pond as a roost into December and on one visit we counted 40-50 swans roosting on the ice. Like sandhill cranes we predict that swans are attracted to the marsh for security and relative freedom from human disturbance.

In spring 2002 swans used the marsh for several weeks prior to their dispersal to summer ranges; however a pair of swans remained throughout the summer. According to IDF&G historic records trumpeters have never nested in Teton Basin. Trumpeter nesting could be limited by a paucity of suitable and secure habitat. Although the swans did not initiate a nest at Lazy K Marsh in 2002 we are hopeful that they will attempt to nest in 2003.

Waterfowl, shore birds and wetland dependent birds. In 2001 and 2002 Lazy K Marsh was included as a study area for the Teton Regional Land Trust's waterfowl brood survey. Brood production ranked high compared to other test sites in both 2001 and 2002 (Table 1). Based on an estimate of broods/ac. Lazy K Marsh was the most productive waterfowl brooding habitat surveyed in 2001(Cavallaro 2002).

We located 2 duck nests in unimproved habitat and 1 gadwall nest in seeded DNC in 2002. In addition we located a short-eared owl and long-billed curlew nest.

Table 1. Summary of Brood Counts 2001 - 02, Lazy K Marsh (main pool) Teton Valley, Idaho

Species /Year	Mallard	Cinn. Teal	G.W. Teal	Wigeon	Gadwall	N. Shovler	N. Pintail	Total Broods (Ducklings)
2001	15,1	1		4,1	--	4	1,*	7 (27)
2002			9	7,5,7,*	7			6 (35)

* = Unclassified broods

Although systematic surveys were not conducted we believe that shorebirds and wetland dependent birds are well represented at Lazy K Marsh. Commonly occurring species include wilson's phalarope (Phalaropus tricolor), spotted sandpiper (*Actitis macularia*), least sand piper *(Calidris minutilla)*, willet, snipe *(Gallinago gallinago)*, American avocet *(Recurvirostra Americana)*, white-face ibis *(Plegadis chihi)*, pied-billed grebe *(Podilymbus podiceps)*, western grebe *(Aechmophorus occidentalis)*, American coot *(Fulica Americana)*, red-wing black bird *(Agelaius phoeniceus)*, yellow-headed blackbird *(Xanthocephalus xanthocephalus)*, sora *(Porzana Carolina)*, marsh wren *(Cistothorus palustris)* and common yellowthroat *(Geothlypis trichas.* Marsh wren and common yellowthroat are useful habitat indicators. Marsh wrens require sizable marshes with well-developed emergent vegetation to breed (USDA Forest Service 1981). The Bureau of Land Management (BLM) considers the common yellowthroat an excellent indicator of high quality riparian habitat. Two common yellowthroat territories were identified in 2002.

Discussion

Wetlands at Lazy K Marsh provide habitat for a variety of wetland-dependent birds and waterfowl. Most notable has been the development of a large, fall-staging roost for sandhill cranes and nesting season use by a pair of trumpeter swans. We think increased wildlife use is attributed in large part to active establishment of wetland vegetation, associated upland nesting cover and foodplots. Vegetation establishment was not without challenges. Herbivory, primarily by Canada geese but also by muskrats was a major impediment to achieving revegetation success. We recommend complete goose exclusion with fencing to control damage

during plant establishment. We achieved best results with metal "t" posts and snow fencing. Muskrats consumed commercially supplied sago pondweed tubers, which limited establishment. We failed to establish sago pondweed after one growing season even after muskrats were excluded. Sago is establishing naturally but at a very slow rate.

Plant material type was an important variable for wetland plant establishment. For emergent species like sedges, bulrushes and creeping spikerush we had the best success with vegetative propagules (whole plants, rhizomes) and poor results from seed. Seed was effective at establishing some hydric grasses (e.g. tufted hairgrass). Hardstem bulrush established best from bareroot stock, which may be related to relatively well developed below ground biomass (i.e. rhizomes) inherent with bareroot material. Wetland sod was very effective at establishing emergent wetland plants in erosion prone areas and was not protected from geese. We attribute wetland sod success to starting with a well developed plant community and protection afforded by the coconut fiber pillow.

Canada goose herbivory also affected upland revegetation, we recommend excluding geese from newly seeded uplands adjacent to wetlands if possible. Barley foodplots were initially slow to establish because of weed competition from Canada thistle and relatively poorly seedbed preparation the first year. After the second year we saw increased wildlife use of the foodplot. Foodplot grain production was best in year three; sandhill cranes and Canada geese regularly foraged there throughout the autumn.

We plan to continue our wildlife monitoring efforts at Lazy K Marsh in the coming years and efforts are currently underway to learn more about enhancement and restoration of submerged aquatic wetland plant communities.

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Appendix 1. Lazy K Marsh avian life-list 1999 – 2002.

Common name	Spring	Sum.	Fall	Winter	Notes
American avocet		x			Spring migrant
American coot	x	x	x		Nester
American crow	x	x	x	x	Occasional
American kestrel	x	x			Common
American Robin	x	x	x		Common /Nester
American white pelican		x			Occasional
American wigeon	x	x	x		Nester
Bald Eagle	x		x	x	Occasional all seasons
Barrow's goldeneye	x	x	x		Occasional all seasons
Black-billed magpie	x	x	x	x	Common/Nester
Black-necked stilt		x			Uncommon/Spring migrant
Blue-wing teal	x	x	x		Possible Nester
Brewer's blackbird	x	x	x		Nester
Brown-headed cowbird		x			Nester
Bufflehead	x		x		Spring migrant, occasional fall
California Gull	x	x			Occasional
Canada goose	x	x	x		Nester, fall staging
Canvasback	x				Spring migrant, occasional fall
Chipping sparrow		x			Nester
Cinnamon teal	x	x	x		Nester
Clark's Grebe	x	x			Occasional
Common goldeneye	x				Occasional
Common merganser	x				Uncommon
Common snipe	x	x	x		Very common/Nester
Common yellowthroat		x			Nester
Cooper's hawk					Occasional/Possible Nester
Double-Crested Cormorant	x	x			Occasional
Eared Grebe	x	x			Occasional
European Starling	x	x	x	x	Nester/Common
Forster's Tern	x	x			Occasional
Franklin's Gull	x	x			Occasional
Gadwall	x	x	x		Nester
Great blue heron	x	x	x		Common
Great egret		x			Uncommon, observed one time
Great-horned owl	x	x	x		Common
Green-winged teal	x	x	x		Nester
Hooded Merganser	x	x			Occasional
Lesser scaup	x	x	x		Common
Killdeer	x	x	x	x	Common/Likely nester
Long-billed curlew	x	x			Nester
Mallard	x	x	x		Nester
Marsh wren	x	x			Nester
Northern flicker	x	x	x		Nester
Northern harrier	x	x	x		Nester
Northern pintail	x	x	x		Nester
Northern shoveler	x	x	x		Nester
Osprey	x	x	x		Common
Pied-billed grebe	x	x			Nester
Redhead duck	x	x	x		Common
Red-tailed hawk	x	x	x		Common
Red-wing blackbird	x	x	x		Nesting colony
Ring-necked duck	x	x	x		Common
Ruddy duck	x		x		Occasional

Sand hill crane	x	x	x		Common, large roosting colony
Savannah sparrow	x	x			Nester
Sharp-tailed grouse	x	x	x	x	Occasional
Short-eared owl	x	x	x	x	Nester
Song sparrow	x	x			Nester
Sora	x	x	x		Potential Nester/Occasional
Spotted sandpiper	x	x			Common
Swainson's hawk		x	x		Occasional
Tree swallow					Nester
Trumpeter Swan	x	x	x		Occasionally large flocks late fall-winter; 1 pair season long 2002
Tundra Swan			x		Occasional
Violet-green swallow		x			Common
Western Grebe	x	x			Occasional
Western meadowlark	x	x	x		Nester
Western tanager		x			Nester
White-crowned sparrow	x	x			Nester
White-faced ibis		x			Occasional
Whooping crane			x		Seen one time w/ sandhill cranes
Willet		x	x		Common, prob. nesting
Wilson's phalarope	x	x	x		Common, nester
Yellow warbler	x	x	x		Common, Nester
Yellow-headed blackbird	x	x	x		Nesting colony
Yellow-rumped warbler		x			Nester