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Bear River Migratory Bird Refuge**

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**Annual Habitat Management Plan
2006**

April 6, 2006



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Bear River Migratory Bird Refuge
Brigham City, Utah

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4/06/06
Date

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Bear River Migratory Bird Refuge 2006 Annual Habitat Management Plan

HABITAT OBJECTIVE

WETLAND

The overall wetland habitat objective for Bear River Refuge is to manage the 29,259 wetland acres for 9% deep submergent, 28% shallow submergent, 14% deep emergent, 23% mid-depth emergent and 26% shallow emergent marsh (June-October).

- 1) 2,500 acres of deep submergent marsh with 18.1 to 36 inches of water (March-December), 60-80% coverage by sago pondweed and < 15% coverage by emergent vegetation (June-October).
- 2) 8,700 acres of shallow submergent marsh with 4 to 18 inches of water (February-December), 60-80% coverage by sago pondweed and < 15% coverage by emergent vegetation (June-October).
- 3) 2,800 acres of deep emergent marsh with 12.1 to 24 inches of water (February-November), 50-70% coverage by emergent vegetation (predominantly hardstem bulrush and alkali bulrush) interspersed with 40-50% open water with submerged sago pondweed (June-October).
- 4) 6,600 acres of mid-depth emergent marsh with 8.1 to 12 inches of water (February-November), with 50% emergent vegetation (alkali bulrush in shallower areas and hardstem bulrush in deeper zones, phragmites, and cattail) and 50% open water with sago pondweed (June-October).
- 5) 8,659 acres of shallow emergent marsh with 2 to 8 inches of water (February-November) with 50-70% coverage by emergent vegetation (90% alkali bulrush, 10% phragmites and/or cattail) and the remainder open water (June-October).

Water levels in the 26 wetland management units are manipulated or influenced to achieve the objectives (Figure 1). In 2005, these objectives were partially met. Refuge staff anticipated and planned for very low river flows due to the diminished capacity of Bear Lake Reservoir and the subsequent high demand for irrigation waters throughout spring and summer. Under forecast low water conditions we believed we would only be able to maintain the two highest priority units (5B and 4C) throughout the driest period of the year. Instead, late spring precipitation increased Bear Lake Reservoir capacity, diminished irrigation demand, and maintained normal to high river flows throughout May. These conditions, in turn, allowed us to maintain many Refuge units at or near target elevations.

Target water levels (and associated habitat) were maintained in nine units through the summer months; Unit 5B, 5C, 4B, 4C, 3C, 3D, 3E, 1 and 6. Unit 5B was the refuge's highest priority for 2005, as the emergent vegetation in the unit is occupied by a large waterbird colony of several Refuge priority bird species including White-faced Ibis and Franklin's Gull. Other units received water as available from the Bear River. About 27,457 acres of wetlands were maintained through July and August. This compares to a mere 2,803 wetland acres for the same time period in 2004. The nine management units accounted for 17,468 wetland acres while units 2C, 2D, 3F, 3G, 7, 9 and 10 provided additional acres (9,989) though not at target levels. The habitat diminished as the units

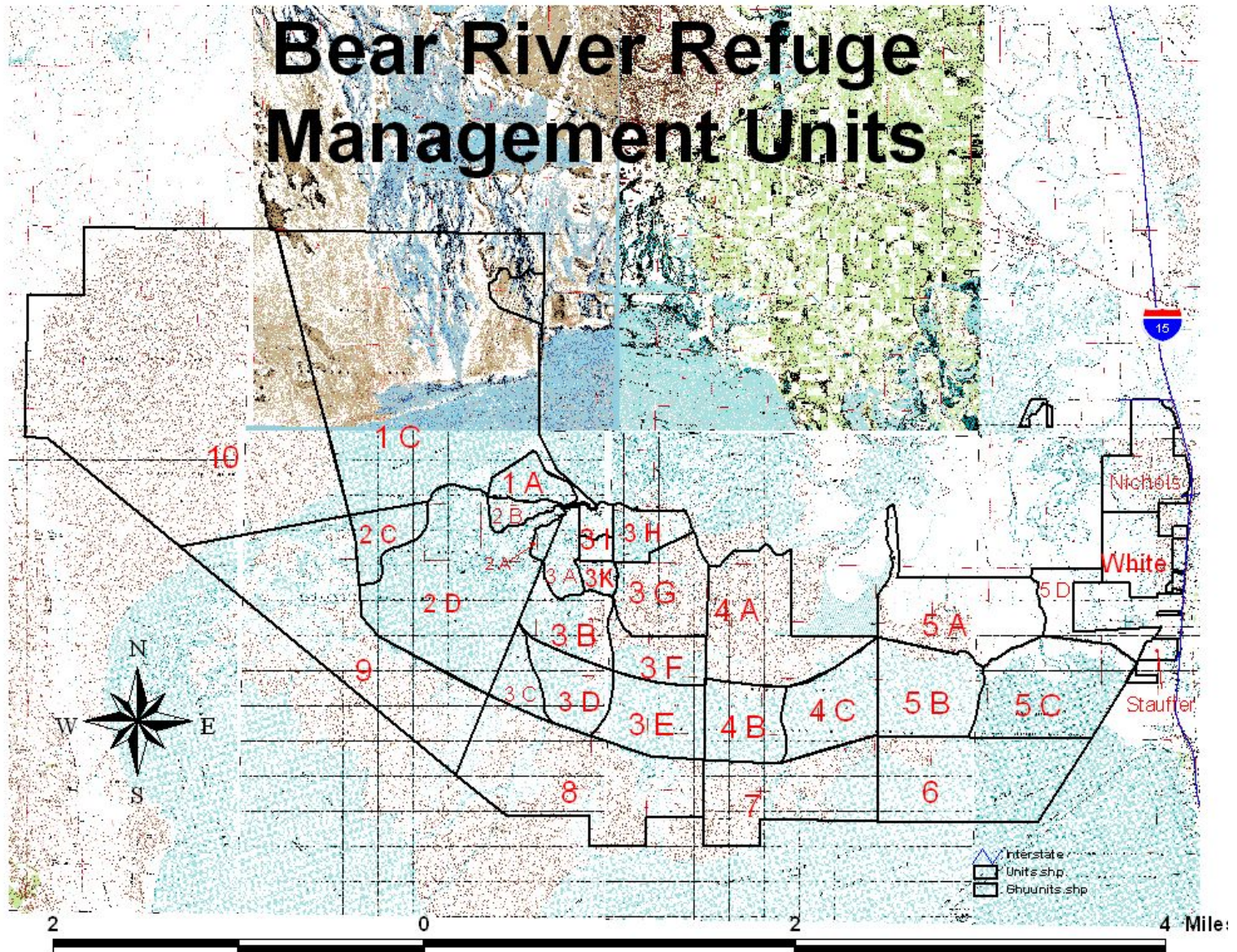


Figure 1. Bear River Migratory Bird Refuge management units.

dried out. Graphs of the unit water levels for 2005 are found in Appendix A.

2005 Water Summary

Air temperatures were about average January-February and cooler than average March-June. In fact, May 11th brought snowfall to the Salt Lake Valley. July brought hot dry weather. The fall was normal to about average. The first part of December brought well below normal temperatures and a solid freeze. Record warmth hit for the latter part of the month which melted the Valley snow pack by Christmas and was enough to swing the average temperature for the month to above normal.

The drought that began in 1997 with below normal snowpack, ended in 2005. The Great Salt Lake Basin snowpack was 125% of normal on April 1. Snowpack in the Bear River Basin was 102% of normal, but 243% of 2004. Record rainfall events in April wrought flooding in Brigham City along Box Elder Creek. The additional precipitation in April increased the usable contents of Bear Lake reservoir from 37,000 ac-ft. or 3% usable capacity to 122,000 ac-ft. or 9% of usable capacity in just one months time.

The National Weather Service forecast for April-July streamflow based on snow-pack was near average amounts (90-110% of normal). The actual streamflow was 96% of normal or within the forecast range. The 2005 (water-year) Bear River annual mean flow rate was 1,650 ft³/s with an annual runoff of 1,194,000 ac-ft. This compares to the 2004 annual mean flow rate of 616 ft³/s with an annual runoff of 446,900 ac-ft. The long-term average annual mean flow rate for the Bear River at the Corrine gauge is 1,716 ft³/s and the mean annual runoff is 1,243,000 ac-ft. The low river flows in July-September resulted in a Refuge water deficit of 73,230 ac-ft. (Table 1).

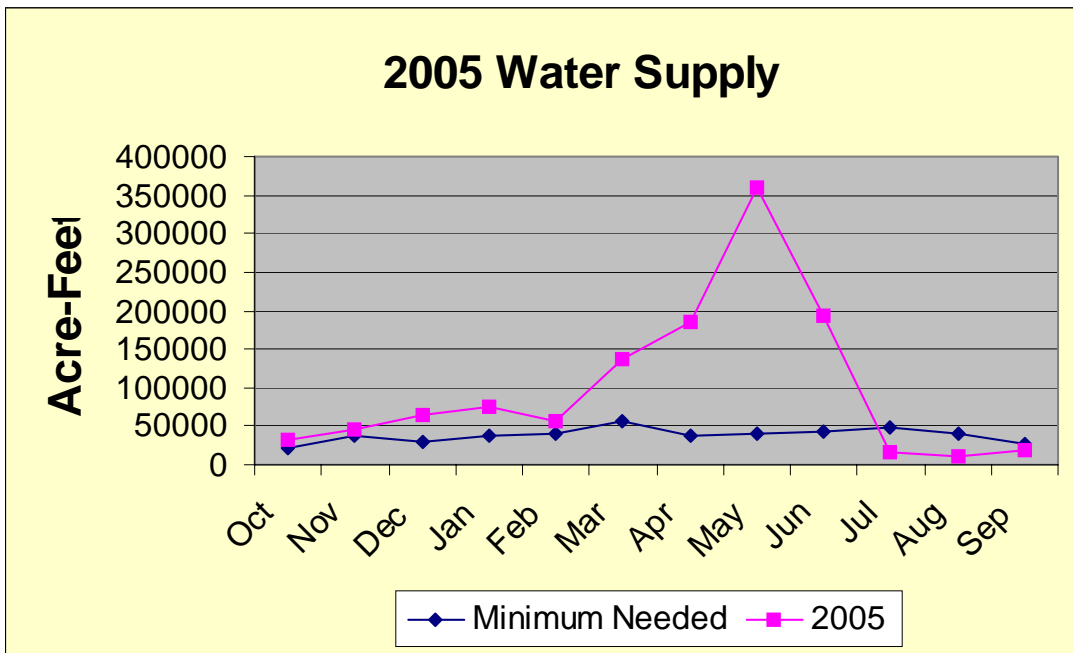


Table1. Water supply scenario, Bear River Migratory Bird Refuge, 2005 water year.

Significant events in the water year (October 2004-September 2005) were normal to high mean

monthly river flows March - June. The mean monthly flow for March was at 97% of normal at 2,306 ft³/s. April-June were 111%, 202% and 148% above average. The high precipitation in the spring months (mainly rain) led to flooding in the Bear River basin from the Hampton Forte crossing below Cutler Reservoir all the way to the Refuge. Water flowed over the county road to the Refuge in several places; just west of the second cattle guard, and immediately west of O-Line canal. A neighboring rancher successfully lobbied Box Elder County to breach the road that was acting as a dam. The resulting hole in the road effectively cut off access to the Refuge for about a 2 week period much to the dismay of visitors and Brigham City officials. The hole was ineffective in providing flood relief to the rancher.

The high spring flows enabled target water level maintenance of many of the Refuge wetland units well into August. The Refuge units were all full to target throughout May and June. December 2004-April 2005 and most of May saw the Refuge in full “by-pass mode” with all canals open and channeling water to units 6-10 that are seamless with the Great Salt Lake. Though levels began to drop below target elevation in the non-priority units (evaporative loss) in July and August, few units went completely dry. The mean monthly discharge for July and August was 244 ft³/s (35% of normal) and 171 ft³/s (33% of normal), respectively. River flows were not high enough to begin re-filling of units until September 22nd. Unit by unit details follow.

Summary of 2005 management effects

Unit 1 Objective

1. Manage water levels to achieve 440 acres of deep submergent, 2160 acres of shallow submergent, 1491 acres of mid-depth emergent and 547 acres of shallow emergent wetland habitat, April 1-December 15.

Strategy: Re-fill unit 1 with clear water (sans silt) to achieve target elevation of 4204.5 by April 1 and maintain target through December 15.

A. Management Strategy Prescriptions. With high spring precipitation, excess flows from the Bear River Club kept this unit within a .5 ft. of target until June. A layer of boards were added to the outlet structure on April 1 as the Club stopped spilling water as they refilled their unit after carp control. A high rain event in early May caused the unit to bounce about 1 foot higher than target. In response, a layer of boards was pulled from the outlet on May 20th and returned on June 1. Bear River water was shunted to this unit on June 24th and 29th by raising the head in L-Canal (adding boards) and pulling 1.5 layers of boards at the L-Canal/Unit 1 WCS. The unit remained within .25 of the target elevation through the critical months of July and August. The inlet structure was boarded up September 8th when the unit once again achieved the target elevation. The Unit 1 dikes were spot treated for invasives; whitetop and thistle, and salt cedar.

B. Habitat Response. When the unit is at the target elevation of 4204.5 there are about 2,981 acres of surface water. A survey of the unit in October 2004, indicated that there are 452 acres of emergent vegetation (mainly alkali bulrush) in the unit. The vegetation community did not change significantly in 2005. An airboat survey of the unit was conducted on July 13th to take salinity readings and estimate sago pondweed productivity. To sample sago productivity, a 26" square fashioned out of PVC was thrown randomly from the airboat. The area within the square that is occupied by sago pondweed is assessed and scored. Six samples yielded an average score of 66 for a grade of “Good” (Appendix B). Soil salinity levels averaged 2,057 ppm with water salinity levels at 2,671 ppm which

is well below objective levels of 5-10,000 ppm.

C. Response of Resources of Concern. The unit hosted a nesting colony of Franklin's gulls, white-faced ibis, black-crowned night heron, great blue heron and snowy egret. The colony consisted of about 1,727 nests of Refuge priority species White-faced Ibis, and 1,585 nests of Franklin's Gulls along with nests of Black-crowned Night Heron (9), Eared Grebe (25), and an unknown number of Pied-billed Grebe. Unit 1 was a high use unit for duck broods accounting for 59% and 15% of all broods counted on 7/7 and 8/2 respectively including the first canvasback broods observed on the Refuge since 1966. The Jameson Unit of Unit 1 was especially important for the broods in the July count before the unit went dry.

This unit was important all year for waterfowl, accounting for 10% of all waterfowl use in the spring (March-May), 12% in the summer (June-July), 15% in the fall (August-November), and 18% in the winter (January-February, December) (Appendix C). Unit 1 accounted for 27% of tundra swan use in the spring and 89% in the fall. Readhead use of the unit was high accounting for 17% in the summer and 32% in the fall. Also in the fall, the unit accounted for 13% of cinnamon teal use.

Priority shorebird use of the unit was also high, accounting for 11% of all shorebird summer seasonal use. Also in the summer, Unit 1 was important for American avocet, marbled godwit, and Wilson's phalarope accounting for 11%, 15%, and 17% of seasonal use respectively. 10% of the total Franklin's gull use of the Refuge in the summer occurred in Unit 1. Fall accounted for 41% of snowy plover use, 16% of long-billed curlew use, and 46% of black tern (Appendix C).

Units 1A, 3A and 3K Objective

1. Manage water levels to achieve 50% interspersion of open water to 50% emergent vegetation, April 1-December 1.

A. Management Strategy Prescriptions. Unit 1A The unit was filled in the spring from Bear River inflows through the drive-through spillway. The unit was drained in the late summer to facilitate a grazing treatment. The stop-logs were removed from the two lowest bays of the drive-through spillway on September 8th to begin refilling. Near target, all but one bay of stop-logs were installed to stop inflows on September 23rd. Units 3A and 3K No water elevation data is available as these units have no water gauges. In general, the units were filled with water in the spring and remained near target through early summer. On July 5th the inlet from the river to 3A was closed to start shunting water to the priority units. In mid-September, about ½ mile of the 3A canal was cleaned out with a back-hoe by Refuge staff starting at the inlet and day lighted to just south of where the water runs from 3A into 3J. Re-filling began in late September via the Bear River inflatable water-control-structure. The inflatable gate was closed on October 13th.

B. Habitat Response. Unit 1A. A survey of the unit in 2003 indicated that 42% or 232 acres of the unit was open water and the remaining 48% (312 acres) was emergent vegetation. It is believed the habitat acreages in 2005 are similar to those from 2003 which are near objective levels. The unit was grazed from August 14-September 7th 230 cow/calf pairs at 0.4 AUMs/acre as an attempt at emergent vegetation control. Habitat conditions were not measured in Units 3A and 3K though water supply was not a problem until late summer.

C. Response of Resources of Concern. There was no significant use ($\geq 10\%$ of annual use) of Unit 1A or 3A by priority species. Unit 3K accounted for about 11% of the summer use by Wilson's phalarope (Appendix C).

Unit 2A and 2B Objectives

1. Manage water levels to achieve 75% cover by alkali bulrush and 25% open water (year-round).

A. Management Strategy Prescriptions. No water elevation data is available as these units have no water gauges. Unit 2A and 2B were full in the spring, dry by mid-August and full in late fall. The Unit 2A inlet screw-gate was not closed until July 5th to begin shunting water to the priority units. Re-filling of units began September 8th.

B. Habitat Response. The habitat objectives in units 2A and 2B were unmet due to dry conditions. Objectives were not met in 2A also because the emergent vegetation community is dominated by cattail. The emergent vegetation community in 2B is near objective levels. Unit 2B was grazed from September 8-16th with 230 cow/calf pairs at .3 AUMs/acre for emergent vegetation control.

C. Response of Resources of Concern. Unit 2B was thought to host a nesting colony of Franklin's full and white-faced ibis. A count from the dike estimated 305 breeding adult FRGU and 33 adult WFIB. 2A was important in the spring, hosting 34% of the seasonal use by black tern, and in the summer accounting for 57% of the seasonal population of long-billed curlew (Appendix C).

Unit 2C Objectives

1. Maintain water-level at 4205.25' msl, year-round.

2. Increase sago pondweed to cover 70% of the unit.

3. Manage water levels to achieve 504 acres of shallow submergent wetland and 216 acres of shallow emergent wetland.

A. Management Strategy Prescriptions. The unit was maintained about target throughout spring and early summer. The unit reached a low of 4204.38 in mid-September. Boards were pulled from the L-line 3 Way WCS on September 22nd to bring water back up. The unit was brought back near target for the late fall and winter months.

B. Habitat Response. An emergent vegetation survey was not conducted in this unit. However, sago pondweed samples averaged 53% coverage for a productivity grade of "good" (Appendix B). Soil salinity levels averaged 1,283 ppm with water salinity levels at 1,900 ppm which is well below objective levels of 5-10,000 ppm.

C. Response of Resources of Concern. The unit received no significant use by priority species in 2005.

Unit 2D Objective

1. Manage water levels to achieve 4,029 acres of deep submergent and 590 acres of deep emergent habitat.

A. Management Strategy Prescriptions. The target elevation was 4205.25. The unit was lowered to winter target of 4204.75 in December, 2004. Spring re-fill began on February 14th. Many adjustments were made to this unit at both the radial gate WCS and outlets to the Great Salt Lake to accommodate the high spring flows and flooding of the Bear River Club dock during hunting season. The unit remained within .5 of the target until late July when the unit began drying. This unit provides phenomenal shorebird and wading bird habitat in late July and August when the unit is

drying between 4204 and 4203. This natural phenomena as the unit is allowed to dry may be adopted as a management strategy. The unit reached a low of 4203.94 on September 16th. High river flows in September over-topped the Headquarters radial gates and began to re-fill the unit. The northern end of the unit was grazed. Winter draw-down was initiated on November 22nd.

B. Habitat Response. The habitat objective was met with the exception of August and September due to evaporative loss. The unit produced a dense stand of sago pondweed covering the entire open water portion of the unit. A sago pondweed productivity survey was conducted on July 15th. The samples yielded an average rank of 93% for a productivity ranking of “excellent” (Appendix B). Soil salinity averaged 1083 ppm with water salinity at 716 ppm. This is below the objective soil salinity level of 2,000 ppm.

C. Response of Resources of Concern. This unit was utilized by all the refuge priority species. In the spring, the unit accounted for 48% of the seasonal use by tundra swan. In the summer 2D accounted for 43% of the use by black tern. In the fall, the unit accounted for 35% of the use of black-necked stilt, 37% of white-faced ibis, and 50% of use by black terns (Appendix C). Over the entire year, the unit accounted for 24% of use by black-necked stilt, 18% of white-faced ibis, 13% of Tundra Swan, 11% of American white pelican, 10% by Redhead, and 39% of use by Black Tern (Appendix D).

Unit 3B Objective

1. Increase amount of alkali bulrush to account for 60% of emergent vegetation.

A. Management Strategy Prescriptions. No water elevation data is available as this unit has no water gauge. In general, the unit was filled with water in the spring, went dry by mid-August, and was re-filled in mid-September.

B. Habitat Response. The habitat objective was unmet due to drying of the unit. No vegetation survey has been conducted in this unit to determine the amount of coverage by alkali bulrush.

C. Response of Resources of Concern. The unit supported a small colony of nesting Franklin’s gull. The nesting population was estimated at 366 adults as determined from a survey from the dike. This unit accounted for 24% of fall use by long-billed curlew and 10% of the total annual use by curlew.

Units 3C and 3D Objective

1. Maximize deep submergent wetland habitat to provide optimum conditions for production of sago pondweed.

A. Management Strategy Prescriptions. Unit 3C The target elevation was 4204.0. The unit was maintained within .5 of the target elevation throughout the year. The unit was filled via the inlet from H-canal where a screen was used to exclude large fish (carp). Water inflows throughout the summer were maintained to just off-set evaporation. Unit 3D The target elevation was 4205.0. The unit was maintained within .2 of the target elevation throughout the year with the exception of a short dip in October. The unit was filled throughout the summer months from the inlet in H-canal beginning on June 15th. Water inflows throughout the summer were maintained to just off-set evaporation.

B. Habitat Response. Though water conditions were optimal in 2005, sago pondweed has been slow to colonize either unit. Sago stands are few and far between in each of the units and can be described as sparse.

C. Response of Resources of Concern. Unit 3C This unit accounted for 10% of the annual use by long-billed curlew. Unit 3D accounted for 10% of the seasonal use by cinnamon teal and 19% of use by Franklin's gull in the fall (Appendix C).

Units 3E, 3F and 3G Objectives

1. Maintain soil salinity levels at 5,000 -10,000 ppm (8-15 m.mhos/cm), April 1- October 15.
2. Maintain water at target elevation of 4204.6 msl. year-round.
3. Increase amount of sago pondweed to cover 60% of unit.

A. Management Strategy Prescription. Unit 3E target elevation of 4204.6 was maintained throughout the year. Due to the shallowness and bottom contours of this unit at the target elevation, it is difficult to maintain water over the entire unit throughout July and August. There were periods when the south-central portion of the unit would be wet mud while water elevation at the inlet would indicate the unit was at target elevation. Many adjustments were made throughout the summer months to maintain the target. Fish screens were periodically used at the inlet to exclude carp. There is no water level data available for Units 3F and 3G as they have no gauges. In general, the units were filled by sheet water and flood waters to maximum capacity in the spring. These shallow units maintained water levels well into the summer months. Unit 3F was maintained by filling through O-Canal. This unit was used heavily by Canada Geese with broods and for molting.

B. Habitat Response. No habitat monitoring was conducted to capture habitat response. However, sago pondweed stands were not apparent.

C. Response of Resources of Concern. Unit 3E This unit was important to American avocet in the spring and fall accounting for 33% and 26% of the seasonal use (Appendix C). In the summer, the unit was important cinnamon teal, waterfowl, snowy plover, and redhead accounting for 15%, 15%, 25%, and 20% of season use, respectively. The unit accounted for 23% of the annual use for American avocet, 11% for all shorebirds, and 13% for snowy plover (Appendix D). An estimated 18 AMAV, and 3 black-necked stilt pairs were estimated to nest on the small islands immediately adjacent to D-line dike in this unit. Unit 3F accounted for 10% of summer use by redhead and 14% and 15% of spring and summer use by snowy plover (O-line canal). Unit 3G accounted for 12% of the annual use by snowy plover along O-canal and 16% of use by long-billed curlew (Appendix D).

Unit 3H, 3I and 3J Objective

1. Maximize emergent wetland type to encourage colonization of alkali bulrush.

A. Management Strategy Prescriptions. There is no water elevation data available as none of these units have water gauges. In general, the units were full in the spring and did not dry until August. They were re-flooded starting in late September.

B. Habitat Response. No habitat monitoring was conducted to capture habitat response. However, Units 3I and 3J are estimated to be about 70% emergent vegetation (cattail) and 30% open water.

C. Response of Resources of Concern. Unit 3I accounted for 10% of the fall use by long-billed curlew as well as 10% of the overall annual use by curlew. Neither units 3H and 3J received significant use by priority species.

Unit 4A, 5A and 5D Objective

1. Maintain mudflat habitat for foraging and loafing waterbirds.

A. Management Strategy Prescriptions. These units have wet mudflats with less than 2 inches of standing water shortly after precipitation events, otherwise they're dry, alkali mudflats. Flooding from the Bear River put several inches of water across these units that remained until late July. Overflow water from Reeder Canal and Black Slough flooded the alkali flats in Unit 5D also until late July. The rock crossing across the 4B/4C canal continues to act as a dike and effectively impounds water across Unit 4A up to the 4204 contour creating about 900 acres of additional shallow water wetland habitat ranging from about 2-10" deep.

B. Habitat Response. Unit 4A had water throughout much of the year at least up to the 4204 contour elevation. Standing water was also present in Unit 5A and 5D throughout much of the summer.

C. Response of Resources of Concern. Unit 4A was important for both long-billed curlew and snowy plover, accounting for 10% of the annual use of curlew and 18% of summer use by plover. Unit 5D provided habitat for white-faced ibis in the spring accounting for 11% of use as well as 16% of use by long-billed curlew. Unit 5A received no significant use by priority species in 2005.

Unit 4B Objectives

1. Manage soil salinity levels at about 5,000-8,000 ppm (8-12 m.mhos/cm), April 1 - October 15.
2. Maintain water at target elevation of 4205.5' msl year-round.
3. Increase amount of alkali bulrush to account for 60% of emergent vegetation with a mix of 50% open water to 50% emergent vegetation over the entire unit.
4. Manage water levels to achieve 784 acres of mid-depth emergent wetland habitat.

A. Management Strategy Prescriptions. The unit was maintained around 4205.5 during March and April. We decided to drop the target to 4205.0 as wave action was causing erosion along D-line. This unit was third highest priority unit as water levels are maintained to try to encourage the growth of a dense alkali bulrush stand. The unit was maintained within .5 of 4205 all year. Water inflows throughout the summer were maintained to just off-set evaporation.

B. Habitat Response. The emergent vegetation component does not yet cover 50% of the unit area. The unit will remain a priority unit in the near future to encourage further colonization and expansion of the fledgling alkali bulrush stand in the unit.

C. Response of Resources of Concern. This unit supported large California gull colonies on the islands with an estimated 3,897 nests. The predatory behavior of these gulls are thought to negatively influence success of both priority nesting species of shorebirds and waterfowl. 4B accounted for 50% of fall use of snowy plover and 24% of the annual use by this species (Appendix D). This unit hosted large numbers of waterfowl broods. A total of 99 broods were counted on this unit during a brood survey on August 2nd. The total represents 41% of all broods counted during the survey.

Unit 4C Objectives

1. Maintain soil salinity levels at 5,000 - 10,000 ppm, April 1-October 15.
2. Maintain water level at 4205.5' msl, throughout the year.
3. Increase amount of sago pondweed to cover 60% of the unit.
4. Manage water levels to achieve 1528 acres of deep submergent wetland habitat and kill salt cedar that was treated in 2003.

A. Management Strategy Prescriptions. The target elevation of 4205.5 was achieved by March and was maintained through May. The water was allowed to drop below target to 4204.5 for July-September for erosion control along D-Line. The lower target apparently was appropriate as the unit received heavy use by waterbirds in 2005. Water inflows throughout the summer were maintained to just off-set evaporation. It is hoped that in time, the bulrush stand in this unit will be used in place of the phragmites stand in Unit 5B by colonial nesting waterbirds. About 300 yd³ of dirt was used to repair the 4C west dike. The dike was also rip-rapped.

B. Habitat Response. Objective 4 was met as the salt cedar is gone. As a priority unit, the water levels were maintained in the unit throughout the year. Habitat objectives were met. An airboat survey of the unit in 2004 indicated sago pondweed covered at least 60% of the unit with a stand of alkali bulrush covering about 238 acres. The bulrush stand created a fairly dense strip along the south border but was sparse in the central part of the unit. Habitat conditions were similar in 2005.

C. Response of Resources of Concern. Unit 4C received heavy use by waterfowl, especially cinnamon teal and redhead. The unit hosted 21% of the fall use of cinnamon teal tallying 595,081 use days (Appendix C). In addition, the unit accounted for 13% of the annual use all waterfowl, 16% of cinnamon teal, and 11% by redhead (Appendix D). The unit has three islands which also host large nesting colonies of California gulls. A survey of the islands on May 31st indicated 2,222 California gull nests, 269 double-crested cormorants, 43 great blue herons and 49 Caspian tern nests. A total of 38 broods were recorded in this unit during a survey on August 2nd. The total represented 16% of all broods counted on the survey.

Unit 5B Objectives

1. Manage soil salinity levels at about 5,000-8,000 ppm.
2. Maintain water at target elevation of 4204.6' msl April 1-December 15.
3. Increase amount of alkali bulrush to account for 60% of emergent vegetation with a mix of 50% open water to 50% emergent vegetation over the entire unit.
4. Manage water levels to achieve 582 acres of mid-depth emergent wetland habitat, 207 acres of shallow emergent and 994 acres of vegetated mudflat.

A. Management Strategy Prescriptions. This unit was the highest priority unit so water in-flows were maintained throughout the summer to just off-set evaporation. The unit was maintained within .2 of the target until high precipitation runoff in late April bumped the unit up about a foot over target for most of May. The unit was allowed to gradually return to the target through evaporative loss. A small botulism outbreak at the end of July-early August began in this unit. All the boards were removed at the outlet structure on August 1 in an attempt to minimize the botulism outbreak and discourage further bird use of the unit.

B. Habitat Response. The objectives were partially met. Salinity readings taken on July 15th indicated the soil around 3,000 ppm while the water was around 3,500 ppm which are below the objective level. A survey in July 2004 showed about 1,000 acres of open water habitat and about 245 acres of emergent vegetation of which about 10% was alkali bulrush. Though no intensive vegetation survey was repeated in 2005, it appears the stand of alkali bulrush continues to diminish and be replaced by *Phragmites*. Though the size of the stand of emergent vegetation doesn't seem to grow, Refuge staff have noticed a gradual change in the species composition. Alkali bulrush used to comprise a much larger percentage of the stand than it does currently. When the alkali bulrush stand in 4C grows large enough and dense enough to support the waterbird colony that current utilizes the unit 5B stand, the unit will be drained for a management action aimed at reducing the size of the *Phragmites* stand. Sago pondweed was sampled on July 15th and was graded as "good" with the samples averaging 65% coverage (Appendix B).

C. Response of Resources of Concern. The emergent vegetation attracted colony nesting birds such as priority species White-faced Ibis and Franklin's Gull. The colony was surveyed on May 26th and the number of nests were counted. The colony supported an estimated 6,294 white-faced ibis nests, 713 Franklin's gull, 106 black-crowned night heron, 260 snowy egret, 204cattle egret, 5 great blue heron and 6 or more great egret. In addition, the islands in the unit hosted 11 California gull nests, 10 nests of double-crested cormorant, 65 Caspian Tern, 40 Forster's tern, and 19 American avocet. The unit hosted 23% of summer use by white-faced ibis, 41% of fall use by Wilson's phalarope, and 92% of winter use by American white pelican. The unit accounted for the majority of annual use by white-faced ibis (13%), Franklin's gull (19%), and long-billed dowitcher (10%) (Appendix D). On August 3, 2005 about 154 dead birds were picked up from the unit. Test results from the Wildlife Health Lab confirmed botulism as cause of death.

Unit 5C Objectives

1. Maintain soil salinity levels at 5,000 - 10,000 ppm (8-15 mmhos/cm) April 1-October 15.
2. Maintain water level at 4205.5' msl, April 1-December 15.
3. Increase amount of sago pondweed to cover 60% of unit.
4. Manage water levels to achieve 1752 acres of deep submergent and 806 acres of shallow submergent wetland habitat.

A. Management Strategy Prescriptions. The water level in the unit bounced around in response to flooding throughout the spring months. Water levels are difficult to maintain under these conditions as Reeder Canal flows directly into the unit. After spring flooding subsided the unit was maintained near 4205.5 through late summer.

B. Habitat Response. The high water killed all small seedling salt cedar that had sprouted in the unit in 2004 while in draw down to access large salt cedar and *Phragmites* stand in the north portion of the unit or the delta of Reeder Canal. Sago pondweed productivity and density was sampled on July 15th and received a "fair" rank with the samples averaging only 42% coverage (Appendix B). Soil salinities averaged 1167 ppm while water salinities average 1150 ppm on July 15th.

C. Response of Resources of Concern. The unit was important to waterfowl, pelican, and redhead accounting for 10%, 13%, and 12% of annual use by these birds (Appendix D).

Units 6-10 Objectives

1. Maintain salinity levels at 5,000 - 10,000 ppm (8 -15 m.mhos/cm) year-round.
2. Manage water levels to achieve 1,836 acres of deep submergent, 3,076 acres of shallow submergent, 6,206 acres of mid-depth emergent, and 4,962 acres of shallow emergent, and 13,967 acres of vegetated mudflat in median or above median precipitation years.

A. Management Strategy Prescriptions. Unit 6-10 Though not impounded, these units are influenced by water releases through the D-line dike from the various units as well as Whistler, O-line, L and H canals. The units, which comprise the south boundary of the Refuge, are seamless with the Great Salt Lake. Once impounded units are full to target levels, river flows are by-passed via unit outlets and various canals, strategically to supply water to these units for beneficial use to migratory bird species. River flows were by-passed to these units from December-May and again in September in the 2005 water year.

A stub dike (about 1/4 mile long) was constructed below H-Line canal to facilitate movement and distribution of water on the eastern boundary of Unit 9.

B. Habitat Response. Unit 6 (Willard Spur) had an estimated 18-24" of shallow water throughout the year. Sago pondweed production was "good" averaging 57% coverage in samples on July 15th. Soil salinity readings averaged 1,583 ppm with water salinity around 1,233 the same day. Units 7-10 maintained a 1-6" sheeting of water through June. Alkali bulrush stands germinated in Unit 7.

C. Response of Resources of Concern. The units were important to many of the priority species, especially unit 6. This unit received significant use by 13 out of 16 of the priority species and species groups (Appendix C). In the spring, the majority of use by cinnamon teal (33%), white-faced ibis (32%), waterfowl (17%), marbled godwit (69%), redhead (19%), Franklin's gull (24%), and black tern (98%) occurred on Unit 6. In the summer, the unit hosted 24% of the seasonal use by marbled godwit, 46% of pelican, 64% of long-billed dowitcher, and 29% of Franklin's gull. In the fall, the unit was once again the most important unit to priority species accounting for the highest use by 6 of the 16 species. The unit hosted 31% of shorebird use, 20% of waterfowl use, 63% of marbled godwit, 32% of pelican, 41% of long-billed dowitcher and 21% of Franklin's gull. In the winter American avocet, shorebirds, waterfowl, and tundra swan use were mainly on unit 6. Unit 7 accounted for 34% of use by long-billed dowitcher in the spring, 23%, 20%, and 20% of use by avocet, stilt, and all shorebirds respectively, in the summer. The unit also hosted 11% of annual use by avocet and 17% of Wilson's phalarope. Unit 8 hosted 54% of use by black-necked stilt, 21% of use by all shorebirds, and 22% of use by Wilson's phalarope in the spring. The unit was again important for Wilson's phalarope in the summer, hosting 51% of the use. The unit accounted for 11% of the annual use by American avocet and 49% of use by Wilson's phalarope. Unit 9 hosted 10% of the spring pelican. Unit 10 accounted for 10% of the annual use of the Refuge by snowy plover.

Dikes

A swath about 3' wide was mowed from the edge of the road all the way around the tour loop, mainly for aesthetics, during the summer months. Only the center line of D-line dike in the closed portion of

the Refuge was mowed were during the spring and summer months. The vegetation on sides of dikes provide critical cover for nesting waterfowl. Refuge staff restrict driving of dikes to just D-line from April 1-August 1 as snowy plover and other shorebirds nest directly in the driving path. D-line dike around Unit 5C was sectioned into two portions and grazed to invigorate salt grass and wheatgrass. The farthest east portion was grazed from December 4-10 at a rate of 1.10 AUMs/acre while the second area was grazed from December 11-19th at 0.27 AUMs/acre.

Slag was placed on Units 4C, 3E/3F, and 2C/D dikes to surface the road and fill scarp areas (about 5.5 miles). Road base was applied to about 8 miles along Unit 4B, tour loop road, 3F/3G, and 3E/3F dikes. About 3,304 gallons of chemical were applied for salt cedar, Canada thistle and white top control along dikes and canals.

2006 Wetland Management Plan

The wetland habitat goal at Bear River Refuge is to provide a diversity of wetland types, a diverse and abundant population of aquatic macro invertebrates, and a range of aquatic plant communities from early to late successional stages.

The following general management strategy applies to all wetlands to achieve the overall Refuge wetland habitat goal and objective. Unit by unit objectives and strategies remain the same as stated in the 2005 summary above with the exception of Unit 2D. The Unit 2D objective is state below. Several changes were made to unit target elevations and are noted below in Table 2.

Unit 2D Objective

1. Maintain target elevation of 4205.25 through May. Allow to slowly decrease (no inflow- evaporative loss) to 4204.0 msl by August 1.

General Management Strategy

In 2006, pools will be filled to target levels according to the availability and turbidity of Bear River water. Pools should be refilled to target levels just prior to the spring peak, to reduce sediment deposits in the pools and turbidity that can inhibit sago pondweed germination, growth, and production. Units should all be brought up to target elevation by April 1 and maintained, when water conditions allow, through December 15. Once at target levels, outflow should be restricted to maintain soil salinity levels appropriate for saline marsh vegetation (hardstem bulrush, alkali bulrush and sago pondweed). Once impounded units are at target elevations, Bear River flows are strategically diverted to Units 6-10 below D-line through the various channels. Non-priority units allowed to dry naturally through evaporation losses and low water supplies, will be filled beginning in September or when dependable water supply allows, and should be at target level by the first week in November. The larger units, (Unit 1, 2D, 4C and 5C) which are subject to ice damage from wind fetch, will be lowered about 18" before ice-up and will remain in draw-down throughout the winter. All other units will be maintained at or near target levels through the winter. Unit objectives are listed only for those units that can be sustained at target levels throughout the driest part of the year. The general management strategy outlined above will be followed for the non-priority units that the water supply is inadequate to maintain at target level through July, August and September.

A reliable water supply outlook forecasting the April-July runoff based on snowpack, is available around April 1 of each year. Wetland unit target elevations are developed and prioritized for filling (spring and fall) and water level maintenance based on the forecast.

Snowpack in the Bear river basin was 131% of normal on April 6, 2006 (http://www.ewcd.org/snotel/snow_data.php). The water supply forecast for 2006 is for “above average” runoff in the Bear River basin which means 111-130% of normal (<http://www.cbrfc.noaa.gov/wsupsup.cgi>). However, due to several drought years (1997-2004), Bear Lake, which acts as a reservoir, is still only at 25% usable irrigation storage capacity. This will likely equate to low flows around 150-200 cfs in the Bear River for July and August when irrigation demand is high and the Bear River Canal Company’s water right is senior to the Refuge’s. The water in the river during these months of high irrigation demand consist only of return flows. Under these expected low water conditions, we would only be able to maintain the five or six highest priority units throughout the driest period of the year (Table 2).

When the water supply allows, the units will be re-filled in the order as indicated in Table 2. The order of fall fill does not need to be applied to every unit. After about the first five units, water supply is ample enough to fill many of the units simultaneously.

Table 2. Management priority order of wetland units with “above average” runoff forecast, Bear River MBR, 2006.

	Wet	Spring	Priority	Maintenance	Cumulative	Fall Fill	Winter
Unit	Acres	Target	Order	Needs	Needs	Order	Target
		Elevation	2006	(July-Aug.)	(July-Aug.)	2006	Elevation
		2006		cfs			2006
5B	1,275	4204.60	1	21.9	21.9	1	
4C	1,528	4205.00	2	26.3	48.2	2	4204.75
4B	1,242	4205.25	3	21.4	69.6	3	4205.00
3E	1,448	4204.60	4	25	94.6	4	
5C	2,558	4204.75	5	44.1	138.7	5	4204.50
1	4,638	4204.50	6	80	218.7		4204.00
3D	1,045	4205.00	7	18	236.7		
3B	1,085	4205.00	8	18.7	255.4		
3C	549	4204.00	9	9.5	264.9		
1A	544	4205.40		9.4	274.3		
2B	237	4206.00		4.1	278.4		
2D	4,619	4205.25		79.6	358		4204.75
3F	903	4205.20		15.6	373.6		
3G	1,047	4205.70		18.1	391.7		
2C	720	4204.50		12.4	404.1		
	Allow to dry to graze in late summer						
2A	135	4205.50		2.3	406.4		
3H	295	4206.00		5.1	411.5		
3I	211	4205.00		3.6	415.1		
3J	166	4206.00		2.8	417.9		
3K	230	4206.00		4	421.9		
3A	505	4206.00		8.7	430.6		
5A	495	4205.50		N/A			
4A	1,523	4205.50		N/A			
5D	0	N/A		N/A			
6	3,185	N/A		54.9			
7	2,581	N/A		44.5			
8	4,158	N/A		71.6			
9	5,142	N/A		88.6			
10	1,014	N/A		17.5			
Total	43,078						

Grassland Ponds

In 2005, the objectives for the grassland ponds were:

1. Manage ponds to achieve mix of 50% open water to 50% emergent vegetation or hemi-marsh conditions, year-round.
2. Maintain water level at 1' below the top of the dike year-round unless otherwise stated.

A. Management Strategy Prescription. All the units were filled in the spring to the objective level. There are no water level data available as there are no staff gauges on the outlet structures. However, water inflow data was collected periodically from March 22 to November 25 from the three flume gauges to each of the Nichols, White and Stauffer tracts. In general, water supply was higher than average throughout the year on all three tracts with the exception of March-May for the White tract (Table 3). Summer inflows kept the units at or near objective levels. As N2-N5 dried in the summer mowing was attempted. The units however, never got dry enough for mowing to be effective.

Table 3. Flume measurements for grassland tracts, 2005.

	Nichols		White		Stauffer	
	Average	2005	Average	2005	Average	2005
2000-2004	0.97		0.81		0.39	
January	4.87		1.16		0.42	
February	1.51	1.79	0.76	0.66	0.58	1.57
March	1.15	1.93	0.75	0.42	0.58	1.09
April	1.54	4.65	0.67	0.49	1.21	2.94
May	0.88	4.38	0.48	0.54	0.87	1.84
June	0.66	1.70	0.44	0.53	0.59	1.13
July	1.17	6.56	0.33	0.80	0.43	1.09
August	2.12		0.34		0.57	
September	12.06		0.25		0.42	
October	3.17	2.33	0.66	0.66	0.93	0.42
November	2.34		0.66		0.33	
December						

B. Habitat Response. No aquatic vegetation monitoring was conducted in 2005 so it is not known if the first habitat objective was met. The second habitat objective was met except for N2-N5. The dikes have been breached on both due to both beaver action and high water levels.

C. Response of Resources of Concern. The grassland ponds are utilized primarily by migratory waterfowl in the spring and fall, cinnamon teal and redhead as pair and brood rearing ponds throughout the spring and summer, as feeding areas for White-faced Ibis, and nesting, resting, feeding and brood rearing areas for black-necked stilts, American avocet, and long-billed curlew.

Waterfowl breeding pair surveys yielded 164 indicated pairs on May 3rd and 134 indicated pairs on May 25th. About 40% of the pairs in both surveys were cinnamon teal, followed by redhead (20%), mallard (12%), and gadwall (9%).

The 2005 total use days by priority species, as tallied from 17 weekly surveys, was 77,964. This compares to the 117,746 use days tallied from 21 surveys in 2004.

Peak count for waterfowl was April 7th at 888. Peak count or highest use date by shorebirds was May 3rd at only 36. Pond N5 was the preferred pond for American avocet, all shorebirds, redhead, and Wilson's phalarope accounting for the highest use by the priority species. Pond W5 had the highest use by cinnamon teal, waterfowl, white-faced ibis, and pelican. Pond N3 accounted for the highest use by black-necked stilt and Franklin's gull. Pond N1 accounted for the highest use by long-billed curlew for the second year in a row.

2006 Wetland Management Plan for Grasslands

The 2006 objectives for the grassland ponds remain the same as last year.

Management Prescription: To meet the first objective, the density of cattail needs to be reduced in several ponds. Ponds N2 - N5, S2, and W5 will be allowed to dry for dike repair. All the other ponds on the Nichols, White, and Stauffer units will be kept as full as the available water supply will allow.

2005 Summary of Management effects for Uplands

GRASSLAND UPLANDS

The overall grassland objective is to: *Manipulate grassland tracts so that native grasses comprise 65-75% of the stand, forbs 5-10%, and woody shrubs 2-5% while decreasing exotic grasses to < 15%, and noxious grass to < 1% by 2015.* Implied, is that the remainder of the area is bare ground (approximately 30-35%).

Nichols, White, Stauffer Unit objectives

Based on the soils, each of the units supports three habitat types and associated plant communities. The objectives describe climax plant communities for each habitat type.

Alkali Bottom Objectives:

- 1) Increase cover of grasses (saltgrass, alkali sacaton, wheatgrass, Basin wildrye) to 60% by 2015.
- 2) Increase forb cover to 5% (silverscale, fireweed, and hollyleaf clover) by 2015.
- 3) Increase shrub cover to 5% (greasewood) by 2015.
- 4) Decrease cheatgrass cover to < 15% by 2015.

Salt Meadow Objectives:

- 1) Increase grass cover (alkali bluegrass and saltgrass) to 65-75% by 2015.
- 2) Increase forb cover (lanceleaf goldenweed, fiddleleaf hawksbeard and sunflower) to 10% by 2015.
- 3) Increase shrub cover (iodinebush, rabbitbrush and greasewood) to 1-3% by 2015.

Wet Meadow Objectives:

- 1) Increase grass cover (*Carex* spp.) to 80% by 2015.

- 2) Increase forb cover (alkali marsh aster and common silverweed) to 5% by 2015.
- 3) Decrease shrub cover (rabbitbrush and greasewood) to 1% by 2015.

Saltair Mudflat Objectives:

Maintain natural saltair mudflat range condition consisting of strongly saline soils where:

- 1) 60-65% of the area is barren alkali flats;
- 2) 30-35% is grasses (saltgrass);
- 3) 1-5% forbs (pickleweed and seepweed);
- 4) \leq 1% fresh water marsh (alkali bulrush, hardstem bulrush, and cattail).

A. Management Strategy Prescriptions. A dormant season graze was initiated in December 2004 and continued until early March and again October-November 2005 on the Refuge grassland units.

The goal of the grazing program is to invigorate perennial native grasses (wheatgrass species, salt grass, alkali sacaton, Great Basin wildrye and alkali cordgrass) while suppressing annual cheatgrass, *Bromus spp.* Grazing is a tool to improve habitat for ground nesting migratory birds and to improve habitat conditions for other non-target grassland community species. Dormant season grazing reduces the litter layer that inhibits new plant growth. The removal of residual vegetation allows more sunlight penetration to raise soil temperatures. The grazing areas and utilization rates for the winter and fall of 2004-05 are found in Table 4.

Table 4. Prescribed grazing of grassland units, 2005.

Graze Unit	Cooperator	Acres	Dates Grazed	Days Grazed	No. of Head	Aum's Removed	Aum's Per Acre	Head Per Acre
N1	Doug George	66	Feb. 10-24, 2005	15	200	100	1.50	3
N2	Doug George	86	Feb. 25-March 7, 2005	11	200	73	0.85	2
N5	Doug George	47	Feb. 12-22, 2005	11	250	92	2.00	5.3
N6	Doug George		March 11, 2005	1	250			
S1	Doug George	149	Oct. 14-Nov. 6, 2005	24	250 pairs	264	1.80	2.2
W4	Doug George	293	Dec. 27, 2004- Jan. 12, 2005	17	265	150	0.51	0.9
W5	Doug George	45	Dec. 30, 2004-Jan. 14, 2005	16	200	106	2.36	4.4
W6	Doug George	299	Jan. 15, 2005 - Feb. 9, 2005	26	200	173	0.58	0.7
C1	Todd Yates	69	Jan. 6-12, 2005	7	90	21	0.30	1.3
J1	Todd Yates	22	Jan. 24-Feb. 5, 2005	13	55	24	1.09	2.5

An estimated 199 acres in four designated areas within the Nichols Unit were grazed (Table 4). Both the Jensen and Christensen tracts were also grazed (J1 and C1). These units are considered part of the Nichols grassland unit. About 637 acres in three areas within the White Unit was grazed while 149 acres in one area was grazed on the Stauffer Unit.

B. Habitat Response. Photo points were photographed in June and July. A vegetation survey initiated in the fall of 2003, was completed the fall of 2004. A total of 22,000 samples were taken at 55 random points. When the samples were pooled across both ecological site and grassland unit, the frequency of occurrence was 67% grass (38% native, 22% non-native, 7% noxious), 2% shrub, 10% forb, 17% bare ground, and 1% classified as "other". Overall habitat conditions are thought to have changed little since the survey was completed.

C. Response of *Resources of Concern*. No specific surveys, outside of the grassland ponds, are conducted to capture use of the habitat by priority species. In 2005, however it was estimated that 3-4 pair, of long-billed curlews nested in the grasslands as pairs were observed regularly.

2006 Grassland Upland Management Plan

The objectives for 2006 in the upland grasslands remain the same as last year.

Management prescription: Dormant season grazing (January-April and September-December) of western portions (marshy areas) of the three grassland units will be attempted for cattail and phragmites control in 2006. Portions of the White and Stauffer units will be dormant season grazed for cheatgrass control and native grass invigoration/enhancement. To set back succession of wetland emergents along the drainages in unit 5D, a September graze is planned.

In areas of the grassland where the wheatgrass community is dominant and considered in good condition (White), the general grazing strategy is to graze every other year for maintenance and invigoration. In areas where wheatgrasses are sparse and colonization/expansion of this community is the goal (Nichols), dormant season and early spring grazing is prescribed every year to hinder growth and production by cheatgrass and other undesirables and perhaps open up ground for wheatgrasses.

MONITORING AND EVALUATION

HABITAT

In July, at the peak of sago pondweed flowering, airboat surveys of the priority units will be conducted with the aid of a GPS unit. The amount of habitat occupied by submergent and emergent vegetation as well as the aquatic plant species diversity will be calculated in order to determine if habitat objectives are being met. Should any of the grassland ponds go dry, the vegetation will be mapped with a GPS unit. The amount of habitat occupied by emergent vegetation in the ponds may also be conducted after winter freeze-up to facilitate surveying.

At least twice monthly, soil salinity readings will be taken at set points within the priority units. During the same sampling trip, sago pondweed coverage and productivity will be monitored.

The water depth at the outlets of priority units will be recorded regularly, to determine amounts and types of habitat associated with the different water depths.

Salt cedar in the main river delta of unit 2D, 5D, 4C, and cleanup along the water courses of L, O, and P-Line will be the focus of saltcedar control efforts in 2006. Whitetop control will focus on a repeat of areas treated in 2005. Treatment methods will include herbicide spraying, disking, mowing and pulling.

The photo points on the Nichols, White, and Stauffer Units should be maintained to monitor any changes in upland habitat.

On the grasslands, the amount of water flowing through the Parshall flumes should be recorded regularly, and note made of the amount of water in unmeasured diversions. The condition of gates (open, closed, partly open) should be noted at the same time. Records of diversions that are shared with other water right holders should be particularly noted. Staff gauges need to be installed on all of the ponds and the water depths recorded regularly.

PRIORITY SPECIES

Weekly waterbird surveys of the 26 wetland management units and the grassland ponds will be conducted to determine use by priority species on a unit by unit basis.

Populations of small mammalian predators increased after the flooding of the 1980s. The striped skunk has always been on the refuge, but large populations of red fox and racoon have inhabited the refuge only since the flood. Wildlife management efforts through predator control activities will be implemented again in 2006 in partnership with USDA Wildlife Services, Salt Lake City, UT. Canada Goose pair counts, waterfowl nest searches and brood counts will be conducted to estimate nesting success as a measure of the effectiveness of the predator control program.

A research investigation into the productivity of high priority shorebirds; American avocet, black-necked stilt, snowy plover and long-billed curlew by Dr. John Cavitt, Weber State University, Ogden, UT will continue for a 4th straight year. The research was supported by a Challenge Cost-Share Grant in 2004 and again in 2006. Nesting success by shorebirds is also used to measure the effectiveness of our predator control program.

A research investigation to determine length-of-stay and migration connectivity for marbled godwits was initiated in April of 2005 and will continue in 2006 with the addition of satellite transmitters to several birds.

A research investigation to determine sago pondweed productivity on eastern marshes of the Great Salt Lake was initiated by Oregon State University in August of 2005 and will continue through 2006. The Refuge is one of several sampling locations.

Point count surveys are tentatively planned for the grassland units during the peak of songbird nesting (first ten days of June).

Transect surveys of appropriate habitat to determine nesting density of snowy plovers (un-vegetated alkali mudflats, 5A, 5D, and Unit 1), and long-billed curlews (vegetated mudflats 5A, 5D, 8, 9 and 10) is tentatively planned.

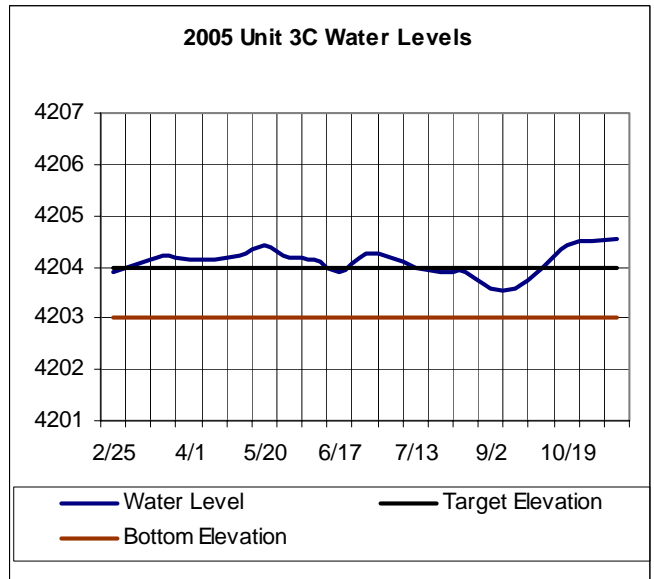
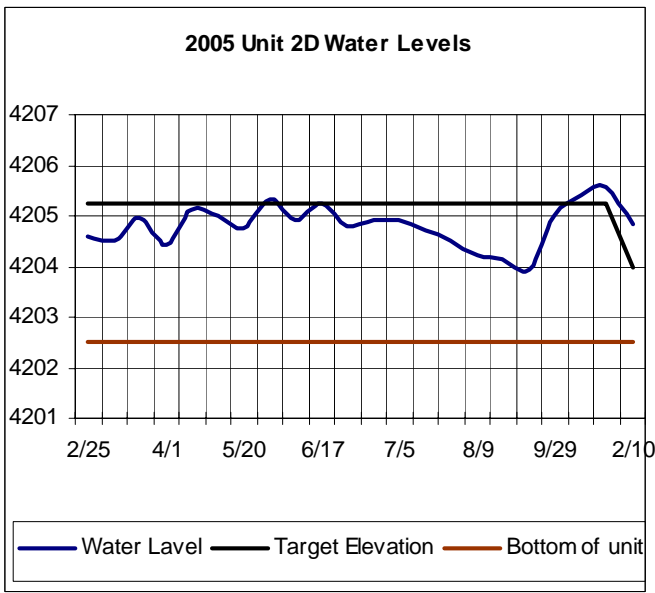
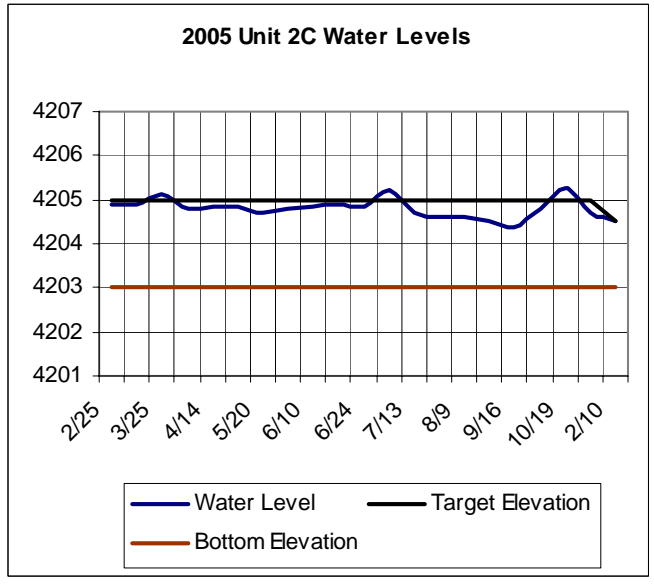
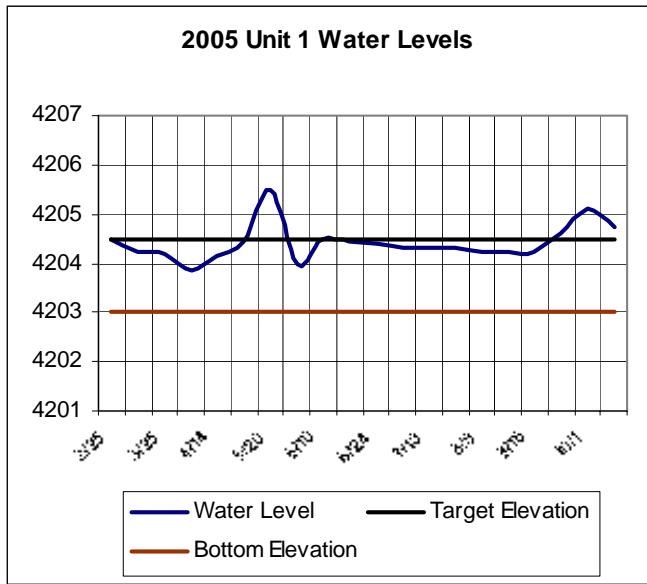
UNMET NEEDS AND STRATEGIES TO ADDRESS THEM

The chief impediment to improved habitat on the Bear River Migratory Bird Refuge is the shortage of water during the summer months, especially July and August. Many strategies have been advanced to remedy this problem, most recently a plan to increase the storage pool at Hyrum Reservoir by 50,000 acre-feet, or a yield of 24,200 acre-feet delivered to the refuge in July and August. This amount of water would allow the refuge to maintain an additional 8-10,000 acres of wetland habitat.

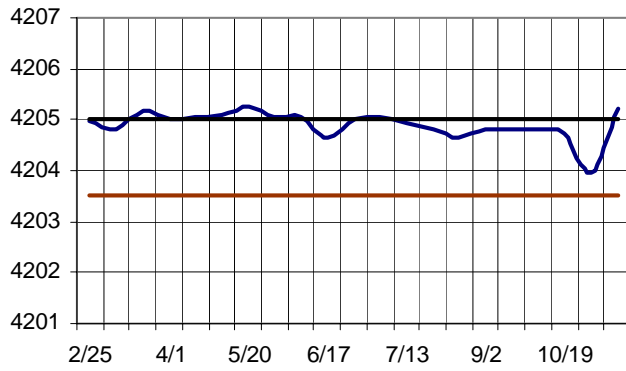
Water is limited on the Nichols, White, and Stauffer Tracts as well. Any opportunity to acquire additional water for those units (such as water under subdivisions in Perry and Brigham City) should be pursued actively. A water right claim for the excess runoff from Three Mile Creek was investigated in 2005. It is believed at this time that there are no other users below the point of diversion besides the Refuge. Therefore, the excess will by default reach the Refuge via a culvert under Interstate 15 and inundate wet meadows on the Stauffer Unit.

Another permanent, year-round staff position is needed at the Biologist or Biological Technician level to accomplish all the necessary monitoring activities. Currently, only portions of needed monitoring activities are completed in a timely manner with little to no inventory work being completed.

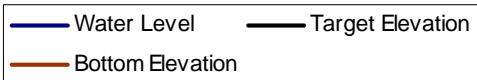
Appendix A. 2005 Unit Water Levels



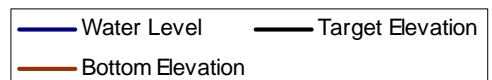
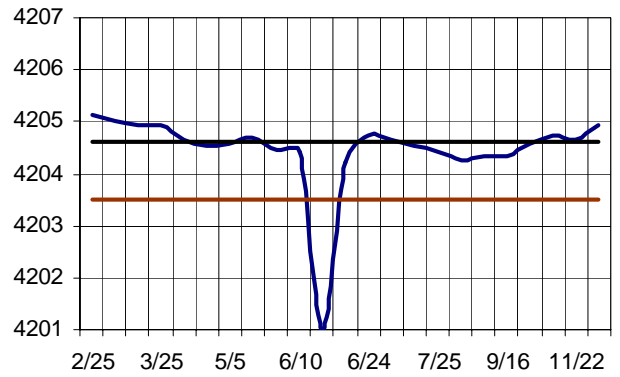
2005 Unit 3D Water Levels



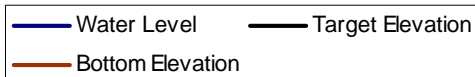
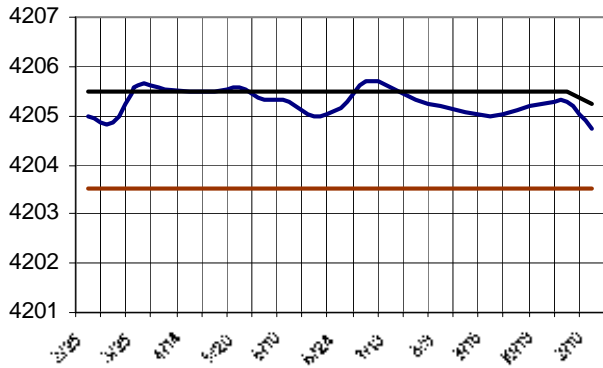
Assumes outlet structure flow line at 4203.0'



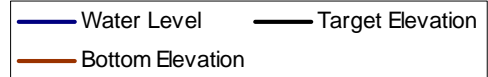
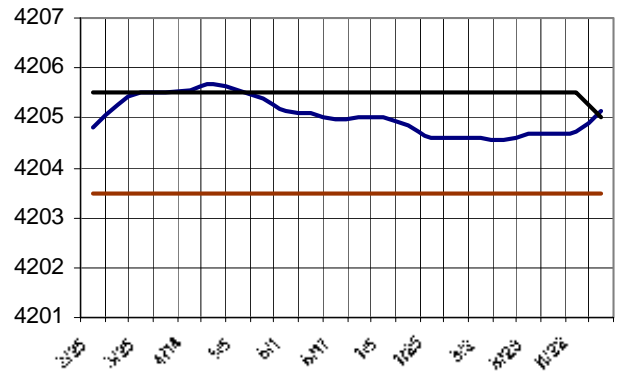
2005 Unit 3E Water Levels



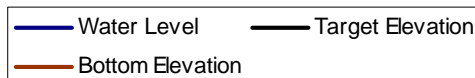
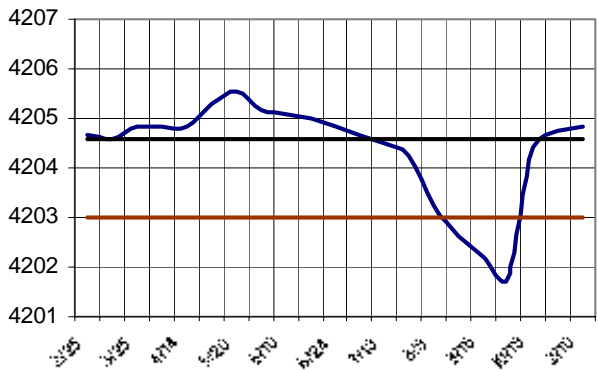
2005 Unit 4B Water Levels



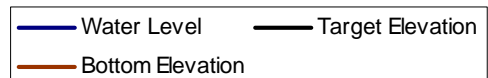
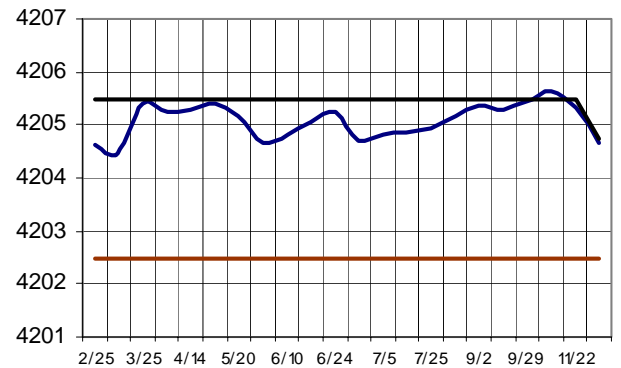
2005 Unit 4C Water Levels



2005 Unit 5B Water Levels



2005 Unit 5C Water Levels



Appendix B. Sago pondweed, *Stuckenia pectinata*, productivity and density, 2005.

2005 Sago Production			
Date	Unit	Avg. %	Grade
13-Jul	1	66	Good
15-Jul	2C	53	Good
15-Jul	2D	93	Excellent
15-Jul	5C	42	Fair
15-Jul	5B	65	Good
15-Jul	6	57	Good

Sago pondweed colonization and productivity scale.

Productivity Key	
Grade	% coverage
Poor	0-25
Fair	26-50
Good	51-75
Excellent	76-100

Appendix C. Seasonal use of wetland units by priority species, 2005.

Species	Spring (March-May)					
	Peak No.	Peak Date	Peak Unit	Peak Unit Use	Seasonal Use Sum	Population Prop (%)
American Avocet	4,844	19-Apr	3E	65,608	196,685	33
Cinnamon Teal	5,227	19-Apr	6	39,581	121,112	33
Black-necked Stilt	2,064	19-Apr	8	26,950	49,910	54
White-faced Ibis	8,721	6-May	6	85,968	266,519	32
Shorebirds	9,614	19-Apr	8	78,341	366,381	21
Waterfowl	108,276	15-Mar	6	875,556	5,039,217	17
Tundra Swan	12,582	8-Mar	2D	108,140	224,518	48
Snowy Plover	23	1-Apr	3G	341	646	53
Marbled Godwit	2,559	19-Apr	6	30,486	43,908	69
Long-billed Curlew	8	6-May	3G	126	258	49
Am. White Pelican	325	6-May	9	1,304	12,961	10
Redhead	5,087	15-Mar	6	43,506	229,772	19
Wilson's Phalarope	56	6-May	8	252	1,164	22
Long-billed Dowitcher	4,705	6-May	7	22,610	66,122	34
Franklin's Gull	5,798	6-May	6	45,024	187,758	24
Black Tern	188	6-May	6	2,632	2,684	98

Species	Summer (June-July)					
	Peak No.	Peak Date	Peak Unit	Peak Unit Use	Seasonal Use Sum	Population Prop (%)
American Avocet	8,918	8-Jul	7	60,523	268,028	23
Cinnamon Teal	3,319	8-Jul	3E	13,435	88,117	15
Black-necked Stilt	6,130	8-Jul	7	37,375	185,054	20
White-faced Ibis	7,024	18-Jul	5B	80,278	344,133	23
Shorebirds	18,623	8-Jul	7	113,063	574,741	20
Waterfowl	23,064	8-Jul	3E	119,157	815,825	15
Tundra Swan	Not Present					
Snowy Plover	42	18-Jul	3E	216	870	25
Marbled Godwit	3,038	8-Jul	6	14,436	59,481	24
Long-billed Curlew	32	8-Jul	2A	310	545	57
Am. White Pelican	3,998	18-Jul	6	44,536	96,769	46
Redhead	3,590	8-Jul	3E	21,592	109,443	20
Wilson's Phalarope	2,831	24-Jun	8	22,110	43,328	51
Long-billed Dowitcher	325	18-Jul	6	3,000	4,667	64
Franklin's Gull	5,640	8-Jul	6	59,576	202,854	29
Black Tern	10	29-Jul	2D	124	290	43

Appendix C. (Continued) Seasonal use of wetland units by priority species, 2005.

Species	Fall (August- November)					
	Peak No.	Peak Date	Peak Unit	Peak Unit Use	Seasonal Use Sum	Population Prop (%)
American Avocet	10,351	5-Aug	3E	95,861	362,790	26
Cinnamon Teal	17,626	2-Sep	4C	125,804	595,081	21
Black-necked Stilt	13,729	5-Aug	2D	173,512	495,587	35
White-faced Ibis	15,630	19-Aug	2D	193,446	528,456	37
Shorebirds	36,814	5-Aug	6	490,307	1,558,737	31
Waterfowl	431,451	25-Nov	6	4,770,155	24,388,749	20
Tundra Swan	28,543	25-Nov	1	633,298	714,588	89
Snowy Plover	183	5-Aug	4B	714	1,418	50
Marbled Godwit	7,518	5-Aug	6	189,279	300,626	63
Long-billed Curlew	19	5-Aug	3B/3I	147	601	24
Am. White Pelican	2,708	2-Sep	6	68,738	216,759	32
Redhead	10,300	20-Oct	1	143,400	445,087	32
Wilson's Phalarope	59	19-Aug	5B	308	749	41
Long-billed Dowitcher	8,311	26-Aug	6	126,291	304,478	41
Franklin's Gull	2,244	5-Aug	6	8,227	38,880	21
Black Tern	652	5-Aug	2D	4,907	9,807	50

Species	Winter (January-February, December)					
	Peak No.	Peak Date	Peak Unit	Peak Unit Use	Seasonal Use Sum	Population Prop (%)
American Avocet	11	5-Dec	6	163	163	100
Cinnamon Teal	1	5-Dec	1	9	9	100
Black-necked Stilt	Not present					
White-faced Ibis	5	5-Dec	5C	59	59	100
Shorebirds	16	28-Feb	6	154	235	66
Waterfowl	86,189	5-Dec	6	584,838	2,480,855	24
Tundra Swan	26,071	5-Dec	6	212,257	570,106	37
Snowy Plover	Not present					
Marbled Godwit	Not present					
Long-billed Curlew	Not present					
Am. White Pelican	24	28-Feb	5B	192	208	92
Redhead	3,853	28-Feb	2D	15,390	33,272	46
Wilson's Phalarope	Not present					
Long-billed Dowitcher	Not present					
Franklin's Gull	Not present					
Black Tern	Not present					

Appendix D. Units with significant use ($\geq 10\%$ annual use) by priority species, 2005.

Priority Rank

1	American Avocet	Annual	Population
	Unit	Use	Prop. (%)
	3E	190,052	23
	6	91,189	11
	7	88,094	11
	8	86,972	11

2	Cinnamon Teal	Annual	Population
	Unit	Use	Prop. (%)
	1	81,638	10
	4C	131,000	16
	6	148,159	18

3	Black-necked Stilt	Annual	Population
	Unit	Use	Prop. (%)
	2D	174,710	24
	6	138,572	19

4	White-faced Ibis	Annual	Population
	Unit	Use	Prop. (%)
	2D	210,395	18
	5B	147,599	13
	6	257,609	23

5	Shorebirds	Annual	Population
	Unit	Use	Prop. (%)
	3E	280,026	11
	6	612,382	24

6	Waterfowl	Annual	Population
	Unit	Use	Prop. (%)
	1	4,798,938	15
	4C	4,181,397	13
	5C	3,367,430	10
	6	6,315,814	19

7	Tundra Swan	Annual	Population
	Unit	Use	Prop. (%)
	1	851,058	56
	2D	201,571	13
	6	256,706	17

8	Snowy Plover	Annual	Population
	Unit	Use	Prop. (%)
	1	581	20
	3E	388	13
	3G	341	12
	4B	714	24
	10	282	10

Priority Rank

9	Marbled Godwit	Annual	Population
	Unit	Use	Prop. (%)
	6	234,201	58

10	Long-billed Curlew	Annual	Population
	Unit	Use	Prop. (%)
	2A	310	22
	3B	147	10
	3G	218	16
	3I	147	10
	4A	140	10

11	Am. White Pelican	Annual	Population
	Unit	Use	Prop. (%)
	2D	36,127	11
	5C	42,518	13
	6	117,587	36

12	Redhead	Annual	Population
	Unit	Use	Prop. (%)
	1	175,369	21
	2D	81,258	10
	4C	87,148	11
	5C	96224	12
	6	148780	18

13	Wilson's Phalarope	Annual	Population
	Unit	Use	Prop. (%)
	1	7,504	17
	7	7,494	17
	8	22,362	49

14	Long-billed Dowitcher	Annual	Population
	Unit	Use	Prop. (%)
	5B	39,241	10
	6	145,531	39

15	Franklin's Gull	Annual	Population
	Unit	Use	Prop. (%)
	5B	79,530	19
	6	89,481	21

16	Black Tern	Annual	Population
	Unit	Use	Prop. (%)
	1	4,515	35
	2D	5,031	39
	6	2730	21