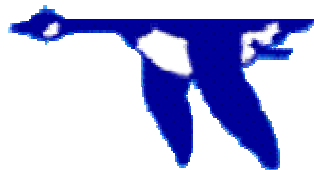




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**Annual Habitat Management Plan
2008**



Annual Habitat Management Plan
2008
Bear River Migratory Bird Refuge
Brigham City, Utah

April 3, 2008

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INTRODUCTION

At Bear River Migratory Bird Refuge (Refuge), we use an adaptive management approach to achieve habitat goals and objectives. These goals and objectives are based on the habitat requirements of priority bird species identified in the Refuge's long-term habitat management plan (HMP; Olson et al 2004). The long-term HMP provides consistency in long-term management while the annual HMP sets a course of action at the beginning of each year.

Refuge staff derived habitat objectives by linking the ecological and physical aspects of Refuge lands with priority species habitat requirements. The objectives concisely state the habitat conditions needed for the priority species. Finally, Refuge staff use ecological data, scientific literature, expert opinion, key historical Refuge data, and staff expertise to generate a list of potential management strategies for each habitat type. The most appropriate management strategy from this list is selected each year in the spring during the annual habitat management process. Our strategy selection is based on the effects of management on the habitat and the species of concern from the previous year, as captured through monitoring, as well as on the predicted water supply for the Bear River.

The first three sections of this plan are organized by broad habitat type: wetlands, grassland ponds, and grassland uplands. These sections include a review of habitat goals and objectives, management actions, and the associated response to habitat manipulation by vegetation and priority bird species from 2007. Following the 2007 review is the management plan for the current year (2008). Within sections, individual management units are described separately or grouped based on the similarity of objectives and strategies. The final two sections of this plan describe the monitoring and evaluation plans for the Refuge for 2008 and propose strategies for addressing unmet needs for more fully implementing adaptive management on the Refuge.

WETLAND HABITAT MANAGEMENT

WETLAND HABITAT OBJECTIVE

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).

2007 STRATEGY AND ACTIONS SUMMARY

Water levels in the 26 wetland management units (Figure 1.) are manipulated or influenced to achieve the objectives. In 2007, these objectives were partially met. Refuge staff anticipated and planned for “much below average” river flow (< 70 %) based on below normal snowpack in the nearby Wasatch Mountain Range. Under these predicted water conditions we planned to maintain the five highest priority units (5B, 4C, 4B, 3E and 3C) at their target water levels throughout the driest period of the year.

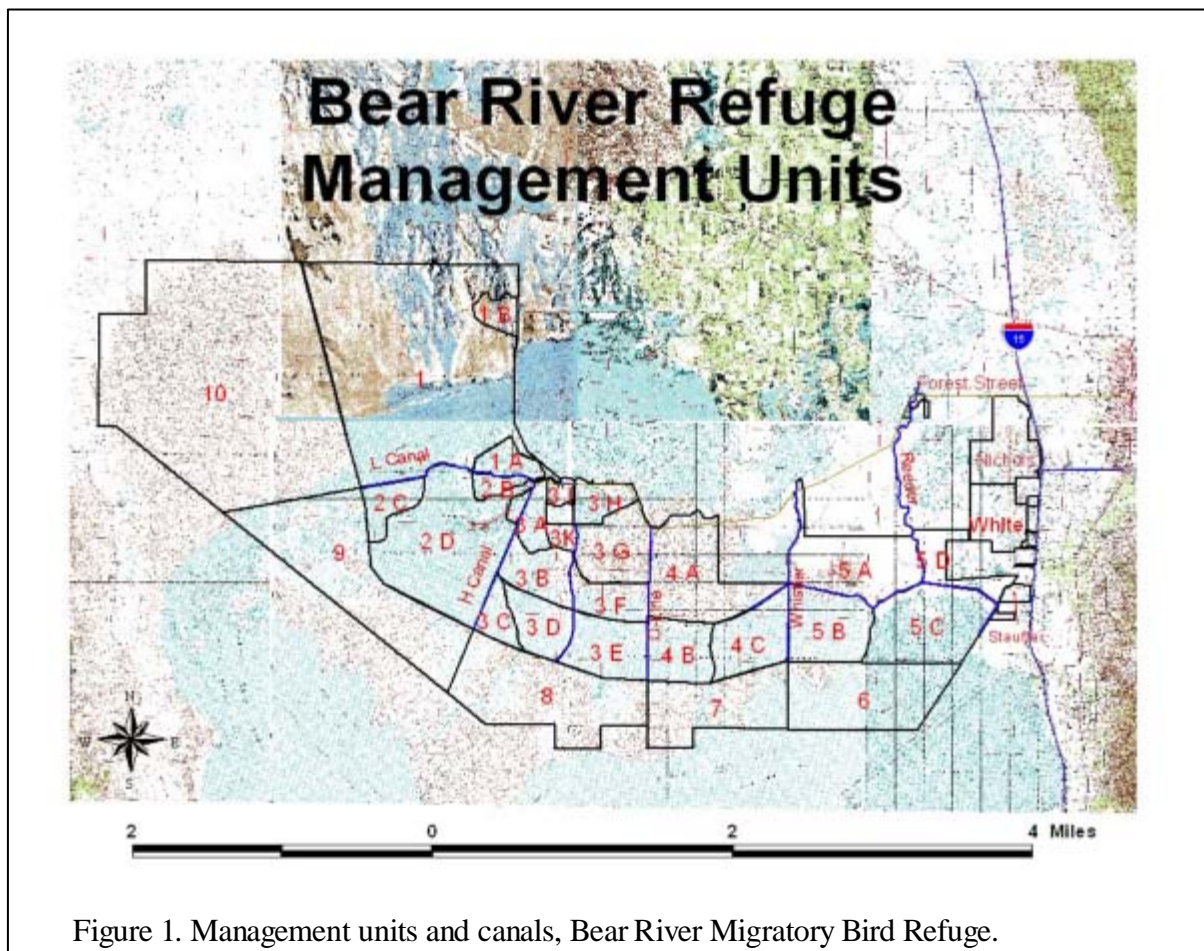


Figure 1. Management units and canals, Bear River Migratory Bird Refuge.

Target water levels (and associated habitat) were actually maintained in five units through the summer months: Unit 3C, 3E, 4B, 4C, and 5B. Unit 5B was the refuge's highest priority for 2007 because the emergent vegetation in the unit is occupied by a large waterbird colony of Refuge priority species, white-faced ibis. Other units received water as available from the Bear River. About 6,550 acres of wetlands were maintained through July and August. This compares to about 15,500 in 2006, 27,500 acres in 2005 and a mere 2,803 wetland acres for the same time period in 2004. Bear River flows did not significantly increase until about September 28th (323 cfs). Due to the dry summer, irrigation demand remained high through the end of the irrigation season (September 30). Consequently, Refuge unit refilling was delayed until the first week of October. Graphs of the unit water levels for 2007 are found in Appendix A.

2007 WATER SUPPLY SUMMARY

Climate Overview

January 2007 was 8 degrees colder while February-May temperatures were all above average (2.5 to 4.4 °F). The 2007 summer (June through August) was the warmest on record (Salt Lake City) with an average temperature of 73.9 °F. June was the 6th hottest ever recorded (average 73.2°F), with July the warmest (84°F) month ever recorded. August was the second warmest August on record (80.7 °F). The warmer temperatures in the summer are particularly significant to water management as increased air temperatures equate to higher than average evaporation rates. Fall temperatures in September and October were near normal, with a warmer than normal November (6-7°F) and slightly cooler December (1-3 °F).

Snowpack Conditions

Snow-pack in the Bear River Basin was only 56% of normal on April 1, 2007. The Bear River percent of average March accumulation was -29%, which was the worst April 1 since 2001. At a time when Utah normally gets a substantial amount of snow (about 17% of our total snowpack accumulates in March), snowpacks were in full retreat. Snowpack was “virtually gone below 8500 feet” by April 1 (National Weather Service Eastern Great Basin Water Supply Outlook, April 1, 2007). The 2007 accumulation was a return to well below average snowpack conditions experienced 2001-2004 and about only 1/3 the snowpack of 2006 (Table 1).

Table 1. Bear River Basin snowpack conditions 2001-2007.

Bear River Basin Snowpack	
April 1	
Year	% of Normal
2001	67
2002	78
2003	67
2004	45
2005	102
2006	131
2007	56

Bear Lake reservoir started out in 2007 at 38% usable capacity or 490,300 ac-ft. compared to 25% or 325,300 ac-ft. in 2006 and only 9% usable capacity or 122,000 ac-ft. in 2005. Water from

snow melt in the Bear River watershed (7500 mi²) above Bear Lake is diverted to Bear Lake which acts as a reservoir. The watershed area above Bear Lake accounts for about 17% (1266 mi²) of the total Bear River watershed area. When natural river flow drops below a certain level, this water is then pumped into the Bear River throughout the irrigation season for users of the Bear River Canal Company under an agreement outlined in the Bear River Compact. Therefore, during the irrigation season (May 1-September 30), the water in the Bear River that flows into the Refuge consists mainly of irrigation return flows.

If the amount of usable water in Bear Lake is not adequate for a full irrigation allotment (51% of usable capacity per conversation with Dan Davidson, BR Canal Co.) the amount of water in the Bear River that reaches the Refuge will be even lower than the forecast amount. A partial irrigation allotment scenario occurred in 2004 and 2005. Water supply was adequate in 2006-2007 for a full allotment. In 2004 the Refuge exercised it's right to "call the river" whereby the state of Utah strictly enforces priority of water rights.

The National Weather Service forecast for April-July stream flow for the Bear River basin based on snow-pack was for "much below average" runoff (< 70 % of normal) or about 45% in 2007. The actual stream flow for April-July was worse than predicted at only 25 % of normal. The annual mean flow rate of the Bear River for the 2007 water year (October 2006-September 2007) was 899 ft³/s. Annual runoff was 650,600 ac-ft. (Table 2). This is well below the annual runoff from 2005-06 and only about half of the long-term annual runoff average of 1,230,000 ac-ft. (Table 2). The long-term average annual mean flow rate for the Bear River at the Corinne gauge is 1,714 ft³/s and the mean annual runoff is 1,242,000 ac-ft.

Table 2. Bear River Basin, water year data 2001-2007.

Bear River Basin			
Water Year Data			
	Annual Runoff	Annual Mean	Annual Total
Year	ac-ft	ft ³ /second	ft ³ /second
2001	450,000	622	226,888
2002	506,300	699	255,235
2003	376,000	520	189,868
2004	446,900	616	225,334
2005	1,194,000	1,650	602,089
2006	1,185,000	1,636	597,184
2007	650,600	899	320,016
long-term	1,230,000	1,698	

Bear River flows were significantly below the long-term average for every month in the water year (October 2006-September 2007) (Table 3). In particular, the mean monthly flow for May and June were only 16 and 5% of normal, respectively. This was due to the low snow pack conditions and early snowmelt in March and April. This lead to an equivalent, early peak river flow from snowmelt in April instead of May.

Table 3. Mean monthly flows, Bear River 2002-2007.

	Bear River Mean Monthly Flows (ft ³ /s)						
	Long-Term *	2007	2006	2005	2004	2003	2002
January	1777	1306	1811	1240	869	756	1168
February	1812	1493	1585	1016	1034	899	970
March	2302	1887	2500	2232	1562	993	1300
April	2822	1442	4968	3114	1097	1094	1556
May	2878	462	3853	5863	405	281	636
June	2132	107	1200	3241	503	81	250
July	681	77.3	123	244	43	40	82
August	591	75.6	149	171	47	50	67
September	879	150	640	297	132	112	306
October	1310	1111	776	540	351	449	233
November	1577	1297	871	745	663	702	629
December	1652	1414	1189	1056	708	819	1219

* Mean data for water years 1950-57, 1964-2007.

All the inlets to the low priority units were boarded up by mid-May to begin shunting water to only the highest priority units. This action usually isn't necessary until early June. Normally, the peak flow in late April or early May allows for one last filling of wetland units to target levels before Bear River flows became minimal and the period of high evaporation began. The Refuge units were all full to target levels only until early May. Water elevations began dropping in the non-priority units around the second week of May as they were not receiving any inflow to balance evaporative losses. The mean monthly flow rates of the Bear River for July and August were 77.3 ft³/s (11% of normal) and 75.6 ft³/s (13% of normal), respectively. River flows were not high enough to begin re-filling of units until September 28th. Unit by unit details follow.

2007 MANAGEMENT ACTIONS AND EFFECTS

Unit 1

A. Objective

Dry out unit by July 1, 2007.

B. Strategy

Allow unit to dry to facilitate bridge deck replacement on south 9-bay water control structure in west dike.

C. Management Actions

Water level was maintained near 4204 through April. Unit was essential dry by July 5. The Unit 1 water control structure/bridge deck project was completed by September. The final four deck sections were set after the concrete in the south intermediate wall had cured for about a month. The guard rails were installed and concrete approaches were cast in place. Re-filling of unit was initiated in late September. The bridge deck on the L-canal three-way was also replaced on May 24, 2007. Re-filling of unit began on September 29th through the Bear River Club dike. Unit reached a target of 4204.5 by November 1 and was maintained throughout the winter months.

D. Habitat Response

No habitat surveys conducted.

E. Response of Resources of Concern

Though water was below optimal target, the unit was still important for snowy plover, tundra swan, and redhead. Unit 1 accounted for 12% of all snowy plover use, 30% of use by tundra swan, and 10% of annual use by redhead (Appendix B).

Unit 1A

A. Objective

Manage water levels to achieve 50% interspersion of open water with 50% emergent vegetation, April 1-June 1. Allow to dry in summer. Return to objectives by October 1-December 1.

B. Strategy

Fill unit to target water elevations of 4205.4 by April 1. Allow to dry to facilitate placement of water-control structure.

C. Management Actions

The unit was filled in the spring from Bear River inflows through the drive-through spillway. The unit was then allowed to dry. A two-bay precast water control structure was installed in the dike connecting the Unit 1A dike and the Bear River Club dike. This replaced an old, worn out culvert type structure. Re-filling of unit began on September 28th.

D. Habitat Response

No habitat survey has been conducted in the unit since 2004.

E. Response of Resources of Concern

There was no significant use ($\geq 10\%$ of annual use) of the unit by priority species.

Units 2A and 2B

A. Objective

Manage water levels to achieve 75% cover by alkali bulrush and 25% open water through spring migration.

B. Strategy

Fill units to target water elevations of 4205.5' and 4206.0' respectively by April 1. Allow units to dry as non-priority units and to facilitate Phragmites control in Unit 2B.

C. Management Actions

No water elevation data is available as these units have no water gauges. Unit 2A and 2B were full in the spring and dry by mid-June. Unit 2A All of Unit 2A and a portion of 2D were fenced and grazed for 27 days (August 14-September 9) at a rate of 0.49 AUMs/Acre (Appendix D). Unit 2B The Phragmites stands were mapped in September (Figure 2). The stands were sprayed with glyphosate (GlyproTM) at a rate of 2 gallons of active ingredient to 100 gallons of water. Spraying was done from the fire water-pumper after Phragmites seed development in late August and September. Management objectives and strategies are outlined in the *Phragmites Control Plan* (Olson 2007). A prescribed burn was conducted in 2B on October 3rd. About half of the unit contained burnable vegetation or an estimated 150 acres. Re-filling of Unit 2B began in mid-October.

D. Habitat Response

The habitat objectives in units 2A and 2B were not met because of the dry conditions. In addition, objectives were not met in 2A because the emergent vegetation community is dominated by cattail rather than alkali bulrush. The Phragmites stands in Unit 2B were mapped in September. Phragmites occupies about 24 acres in this unit or about 11% of the emergent vegetation community. The objective level of Phragmites is $\leq 10\%$.

E. Response of Resources of Concern

There was no significant use ($\geq 10\%$ of annual use) of Unit 2A or 2B by priority species.

Unit 2C

A. Objectives

Manage water levels to achieve 504 acres of shallow submergent wetland and 216 acres of shallow emergent wetland through spring migration and fall-winter period (October-December).

B. Strategy

Fill unit to target water elevation of 4204.5' by mid-April and allow to dry as a non-priority unit and to facilitate *Phragmites* control. Re-fill to target in October as water is available.

C. Management Actions

The water level in the unit was maintained about 0.5 foot above the target elevation through mid-June. The unit was allowed to go dry by mid-August. *Phragmites* stands were mapped in September (Figure 3). These stands were sprayed with glyphosate (Glypro™) at a rate of 2 gallons of active ingredient to 100 gallons of water. Spraying was done from the water-pumper truck after *Phragmites* seed development in late August and September. Management objectives and strategies are outlined in the *Phragmites Control Plan* (Olson 2007). A prescribed burn was conducted in 2C on October 3rd. On October 11th, re-filling of the unit began via L-Canal, and the target water elevation was surpassed on November 1st.

D. Habitat Response

The *Phragmites* stands were mapped in September. *Phragmites* occupies about 15 acres in Unit 2C. The total area of emergent vegetation has not been surveyed.

E. Response of Resources of Concern

There was no significant use ($\geq 10\%$ of annual use) of this unit by priority species in 2007.

Unit 2D

A. Objective

Manage water levels to achieve 4,029 acres of deep submergent and 590 acres of deep emergent habitat, October-May. Provide mudflat habitat June-September for shorebirds and waterbirds.

B. Strategy

Maintain target water elevation of 4205.25' through May. Allow to slowly decrease (no inflow, evaporative loss) to 4204.0' by August 1 to increase shorebird habitat and facilitate grazing in the north end of the unit. Re-fill beginning in October or as water becomes available.

C. Management Actions

The water level in the unit was near target elevation of 4205.25' throughout May. The unit went dry except in the "borrow pit" area along the southwest portion of D-Line, by mid-August. On September 9th water was added to the unit as river inflows increased due to PacifiCorp generating power upstream. Unit reached target level around mid-October. An estimated 575 acres in the northern end of the unit were grazed from September 10-26 at a rate of 0.36 AUMs/acre (Appendix D).

D. Habitat Response

No habitat surveys were conducted.

E. Response of Resources of Concern

This unit was especially important to the Refuge priority species in the spring, summer and fall. In the spring, the unit accounted for 43% of the seasonal use by tundra swan. In the summer, Unit 2D accounted for 28% of the use by American avocet, 39% of use by white-faced ibis, 27% of use by all shorebirds, and 92% of use by long-billed dowitchers. In the fall, the unit accounted for 38% of the seasonal use by black-necked stilt, 43% of use by white-faced ibis, 26% of use by all shorebirds, 44% of use by long-billed curlew, and 94% of use by Wilson's phalarope (Appendix C). Over the entire year, the unit accounted for 19% of use by American avocet, 32% of use by black-necked stilt, 39% of use by white-faced ibis, 23% of use by all shorebirds, 21% of use by tundra swan, 32% of use by

long-billed curlew, 28% of use by American white pelican, 77% of use by Wilson's phalarope, 20% of use by long-billed dowitcher, 15% of use by Franklin's gull, and 24% of use by black tern (Appendix B).

Units 3A and 3K

A. Objective

Drain units after March 15th.

B. Strategy

Pull all boards from outlet structures into the drain canal to dry out units to facilitate water control structure replacement and dike building.

C. Management Actions

No water elevation data is available as these units have no water gauges. A two bay, precast water control structure/bridge was installed between Units 3A and 3K in July. The dike was also extended to the top of 3B to completely separate these two units. The units had reached about 10 inches in depth by mid-October. Unit 3A was grazed by Todd Yates from July 13-26 at a rate of 0.57 AUM/acre and again from July 27-August 13 at a reduced rate of 0.14 AUM/acre.

D. Habitat Response

Units 3A and 3K. Proportions of open water and emergent vegetation were not monitored because of insufficient staff time to monitor lower priority units.

E. Response of Resources of Concern

Unit 3K. There was no significant use ($\geq 10\%$ of annual use) of the unit by priority species. Unit 3A The unit accounted for 17% of the annual use by long-billed curlew (Appendix B).

Unit 3B

A. Objective

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

B. Strategy

Fill unit to target water elevation of 4205.0' by April 1. Allow to dry naturally as a non-priority unit.

C. Management Actions

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-June, and was re-filled in mid-October.

D. 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.

E. Response of Resources of Concern

This unit accounted for 17% of annual use by long-billed curlew which is similar to use by this species in both 2005 and 2006 (Appendix B).

Units 3C and 3D

A. Objective

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

B. Strategy

Unit 3C. Fill unit to target water elevation of 4204.0' by April 1. Maintain throughout the summer months as a priority unit. Unit 3D. Fill unit to target water elevation of 4204.0' by April 1. Maintain target throughout the summer months as a priority unit.

C. Management Actions

These two shallow units, were maintained within 0.5' of their target elevations throughout the year

with the exception of a drying period in late August-mid-September. Target elevations were again achieved by late September and maintained throughout the winter months. Water inflows throughout the summer were maintained to just off-set evaporation. The southwest dike on 3C/H-Canal, eroded by high waters in previous years, was repaired in August.

D. Habitat Response

No habitat surveys were conducted in either unit.

E. Response of Resources of Concern

Unit 3C This unit accounted for 34% of the annual use by black tern (Appendix B). Unit 3D This unit accounted for 24% of the use by waterfowl and 77% of use by Wilson's phalarope (WIPH) in the summer season (Appendix C.) as well as 13% of the annual total use by WIPH.

Units 3E, 3F and 3G

A. Objectives

Increase amount of sago pondweed to cover 60% of unit.

B. Strategy

Fill units to target water elevation of 4204.6' in Unit 3E, 15 inches deep Unit 3F, and 12.5 inches deep in Unit 3G by April 1. Maintain the water level in Unit 3E at target elevation throughout the summer as a priority unit. Allow Units 3F and 3G to go dry as non-priority units.

C. Management Actions.

Unit 3E The target water elevation of 4204.6' was maintained throughout the year. At the target water elevation, the tops of the small islands along D-line are exposed. Avocets and black-necked stilts nest on these islands with a high rate of success (0.80 Mayfield; Cavitt 2006). However, because of the shallowness and bottom contours of this unit, it is difficult to maintain water over the entire unit throughout July and August, particularly during wind events. Units 3F and 3G. There is no water level data available for these units as they have no gauges. In general, the units were filled in the spring with some inflows from O-Canal. These shallow units were dry by late May and re-filled in early November.

D. Habitat Response. No habitat monitoring was conducted in these units. However, sago pondweed stands were not apparent.

E. Response of Resources of Concern

Unit 3E. This unit was important to Wilson's phalarope in the spring, accounting for 80% of the seasonal use (Appendix C). The unit accounted for 100% of the fall use of long-billed curlew. The unit accounted for 11% of annual use for American avocet, 12% for all waterfowl, and 11% for marbled godwit (Appendix B). Unit 3F This unit accounted for 13% of the annual use by redhead (Appendix B). Unit 3G. This unit received no significant use by priority species in 2007.

Unit 3H, 3I and 3J

A. Objective

Maximize emergent wetland type to encourage colonization of alkali bulrush.

B. Strategy

Fill Units 3H, 3I, and 3J to target water elevations of 4206.0', 4205.0', and 4206.0', respectively, by April 1. Allow units to go dry naturally as non-priority units.

C. Management Actions

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 dry by early-June. They were re-flooded starting in late September. The canals from the Bear River into Units 3H and 3I were cleaned out with an excavator in September. About 307 acres in units 3I and 3J were grazed by Todd Yates from June 23-July 12 at a rate of 0.67 AUM/acre.

D. Habitat Response

No habitat monitoring was conducted in these units. However, Units 3I and 3J are estimated to be about 70% emergent vegetation (cattail and Phragmites) and 30% open water.

E. Response of Resources of Concern

None of these units received significant use by priority species in 2007.

Unit 4A, 5A and 5D

A. Objective

Maintain mudflat habitat for foraging and loafing waterbirds year-round.

B. Strategy

These units have wet mudflats with less than 2 inches of standing water shortly after precipitation events or sheet water from snow melt, otherwise they're dry, alkali mudflats.

C. Management Actions

No active management.

D. Habitat Response

Overflow water from Reeder Canal, Black Slough, and Three-Mile Creek flooded the alkali flats in Unit 5D through May. The rock crossing across the 4B/4C canal impounded water in Unit 4A up to the 4204 contour creating about 900 acres of shallow water wetland habitat ranging from about 2-10" deep through late May. No habitat surveys were conducted.

E. Response of Resources of Concern

Unit 4A accounted for 55% of use by shorebirds in the winter (Appendix C).

Unit 4B

A. Objectives

- 1) 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
- 2) Manage water levels to achieve 784 acres of mid-depth emergent wetland habitat.

B. Strategy

Fill unit to target water elevation of 4205.25' by April 1. Maintain water levels in the unit at target elevation throughout summer months as a priority unit.

C. Management Actions

The unit inadvertently remained about 0.5' below target from mid-May through late July. Unit returned to target by early August and remained near 4025.00' the remainder of the year.

D. 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 expansion of the fledgling alkali bulrush stand in the unit. No habitat surveys were conducted.

E. Response of Resources of Concern

This unit supported large California gull colonies on the islands (3,912 nests in 2006). The predatory behavior of these gulls is thought to negatively influence success of priority nesting species of shorebirds and waterfowl in some years. Unit 4B accounted for 50% of spring use by long-billed curlew and 16% of annual use by American avocet (Appendix B).

Unit 4C

A. Objectives

- 1) Manage water levels to achieve 1528 acres of deep submergent wetland habitat

2) Increase amount of sago pondweed to cover 60% of the unit.

B. Strategy

Fill unit to target water elevation of 4205.0' by April 1 and maintain throughout the summer months as a priority unit. Maintain soil salinity levels in the range of 5,000 - 10,000 ppm, April 1-October 15, by only adding enough water in the summer months to offset evaporative loss rather than operating the unit with constant flows at inlet and outlet.

C. Management Actions

The water level in the unit was maintained near the target elevation throughout the year. It is hoped that, in time, the bulrush stand in this unit will be used by colonial nesting waterbirds in place of the *Phragmites* stand in Unit 5B. About 1105 tons of gravel salvaged about 15 years ago from O-Line, and stacked to dry last winter, was hauled and spread on the Unit 4C north dike.

D. Habitat Response

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 2007. *Phragmites* stands have begun to colonize the unit in the southeast corner.

E. Response of Resources of Concern

The unit accounted for 18%, 16%, 15% and 11% of annual use by cinnamon teal, all waterfowl, tundra swan, and redhead respectively (Appendix B). The unit accounted for 34%, 91%, and 21% of cinnamon teal, redhead, and all waterfowl use in the fall (Appendix C). The unit has three islands which also host large nesting colonies of California gulls. A survey of the islands on June 6th, 2006 indicated 1,455 California gull nests, 261 double-crested cormorant nests, 40 great blue heron nests and 28 Caspian tern nests. Number of nesting birds was believed to be similar in 2007 though no survey was conducted.

Unit 5B

A. Objectives

- 1) Manage water levels to achieve 582 acres of mid-depth emergent wetland habitat, 207 acres of shallow emergent and 994 acres of vegetated mudflat
- 2) 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.

B. Strategy

Maintain water at target elevation of 4204.6' April 1-December 15 as a priority unit and manage soil salinity levels in the range of 5,000-8,000 ppm by adding only enough water in the summer months to offset evaporative loss.

C. Management Actions

This unit was the highest priority unit so water in-flows were maintained throughout the summer to just off-set evaporation. The water level in the unit was maintained within 0.5' of target elevation throughout the year.

D. Habitat Response

No habitat surveys were conducted.

E. Response of Resources of Concern

The emergent vegetation attracted colony nesting birds such as Refuge priority species white-faced ibis. The waterbird colony in Unit 5B was thought to suffer a complete failure. A trip to the colony in early June by Jeff Hogan to film nesting bird activity for the Refuge film was the first report of possible failure. Staff surveyed the colony June 25th and found no active nests by any species. An unusual cold snap

around June 6th and 7th accompanied by heavy rains may be the cause of the failure. The white-faced ibis colony at Cutler Reservoir also failed. Further, it was reported that ibis colonies in Idaho also failed due to unknown causes. The unit accounted for 36% of use by black tern in fall and 33% of use by cinnamon teal in summer (Appendix C). The unit accounted for the greatest use overall by waterfowl (11%), long-billed dowitcher (19%), and black tern (36%) (Appendix B).

Unit 5C

A. Objectives 1) Manage water levels to achieve 1752 acres of deep submergent and 806 acres of shallow submergent wetland habitat,
2) Increase amount of sago pondweed to cover 60% of unit.

B. Strategy

Maintain water level at a target elevation of 4204.75', as long as possible into the year. Allow to dry as a non-priority unit.

C. Management Actions

The unit began drying in early June and went completely dry by mid-August. Re-filling began in late September and reached the target by November 1.

D. Habitat Response

Habitat objectives were unmet due to dry conditions.

E. Response of Resources of Concern

The unit was important to American avocet, cinnamon teal, black-necked stilt, white-faced ibis, migratory shorebirds, snowy plover, redhead, long-billed dowitcher, and Franklin's gull. Unit 5C accounted for 40%, 62%, and 26% of summer use by snowy plover, redhead, and Franklin's gull respectively. The unit also accounted for 28% of use by American avocet and 25% of use by long-billed dowitcher in the fall (Appendix C). The unit accounted for the greatest use of American avocet (20%), cinnamon teal (22%), redhead (13%), and long-billed dowitcher (25%) (Appendix B). The annual use by black-necked stilt (15%), white-faced ibis (15%), migratory shorebirds (18%), snowy plover (19%), and Franklin's gull (17%) was also significant.

Units 6 through 10

A. Objective

Manage water levels to achieve 1,836 acres of deep submergent, 3,076 acres of shallow submergent, 6,206 acres of mid-depth emergent, 4,962 acres of shallow emergent, and 13,967 acres of vegetated mudflat in median or above median precipitation years.

B. Strategy

When conditions allow in the spring and fall, water is released to these units as follows.

Unit 6 By-pass water to the unit via Whistler and Unit 5C outlet. Units 7 and 8 By-pass water to the unit via O and H Canals. Unit 9 By-pass water to the unit via L-Canal. Unit 10 By-pass water to the unit via Unit 1 outlet.

C. Management Actions

Though not impounded, these units are influenced by water releases through the D-line dike from the various units as well as from the 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 by migratory birds. River flows were by-passed to these units from December through April and again in October in the 2007 water year.

D. Habitat Response

Unit 6 (Willard Spur) had an estimated 8" of shallow water until late July. Units 7 and 8 had a 1-6"

sheeting of water through May. Units 9-10 had a 1-6" sheeting of water on them until late May and again in October when by-pass waters were channeled to these units. No habitat surveys were conducted.

E. Response of Resources of Concern

Units 6 and 7 were especially important to many of the priority species. A new Franklin's gull colony has been initiated in the alkali bulrush stand immediately west of the Unit 5C/6 outlet structure. Unit 6 received significant use by 12 out of 16 of the Refuge priority species and species groups (Appendix B). In the spring, Unit 6 accounted for 23% of the use by cinnamon teal, 50% of use by white-faced ibis, 34% of the use by shorebirds, 26% of the use by waterfowl, 29% of the use by American white pelican, 72% of the use by long-billed dowitcher, and 67% of the use by Franklin's gull. In the summer, the unit hosted 100% of the seasonal use by snowy plover, 61% of marbled godwit and 21% of pelican. In the fall, the unit hosted 50% of black-necked stilt use, 38% of marbled godwit and 48% of pelican use. In the winter, use by waterfowl, tundra swan, and pelican were mainly on Unit 6. Unit 7. In the spring, the unit accounted for 25% of use by American avocet, 40% of use by black-necked stilt and 67% of marbled godwit. Unit 8-10 None of these units received significant use ($\geq 10\%$) by priority species in 2007.

MAINTENANCE ACTIVITIES

The vegetation on side slopes of dikes provide critical cover for nesting waterfowl, so mowing is minimized. 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. In the closed portion of the Refuge, only the center line of D-line dike and about 1' on either side (16' mower blade) was mowed during the spring and summer months. Staff restrict driving of dikes to D-line and the east side of O-Canal from April 1-August 1 as snowy plover and other shorebirds nest directly in the driving path.

The tour loop road was graded several times throughout the year as was O-Line canal. D-line is usually graded as moisture allows, after August 1 when the majority of waterfowl nesting has occurred. The electric motor on the radial gate at Whistler canal was rebuilt and replaced in July.

About 1,745 lbs. of active ingredient of the chemical Glypro™ was sprayed for phragmites control on an estimated 179 acres. About 14 lbs. of active ingredient of the chemical Patriot was sprayed on about 143 acres to treat white-top or perennial pepperweed. About four acres of Dyer's woad were pulled by hand.

2008 WETLAND HABITAT 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 2007 summary above with the exception of several changes to target water elevations, noted below in Table 4.

Bridge decks on both the southwest 9-bay water control structures of Unit 2D will be replaced in the summer of 2008. Units 3C and 3D will be allowed to dry to repair the eroded dike between the units. The inflatable gate that acts as the inlet to 3A and 3I will be replaced. In mid-summer no water shall be passed down the Unit 3 drain and O-Line canal as stub dikes will be constructed in Unit 7/8 below Units 3E and 4B. Rip-rap will be placed on both sides of the 3F/3G and 3F/3E dikes.

GENERAL MANAGEMENT STRATEGY

In 2008, 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. As Bear River flows drop, only the priority units will be maintained at target elevations. Non-priority units will be allowed to dry naturally through evaporation losses with re-filling (in priority order) 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 12" before ice-up and will remain in draw-down throughout the winter. All units will be maintained at or near target levels through the winter.

A reliable water supply outlook that forecasts 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 90% of normal on April 1, 2008 (http://www.ewcd.org/snotel/snow_data.php). The water supply forecast for 2008 is for "near average" runoff in the Bear River basin which means 90-110% of normal (<http://www.cbrfc.noaa.gov/wsups/wsups.cgi>). This will likely equate to flows around 230-250 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 consists only of return flows (water that has been used for irrigation). Under these expected water conditions, about 10,000 acres of wetlands may be maintained at target levels in 7 or 8 of the highest priority units throughout the driest period of the year (Table 4).

In the fall, when the water supply allows, the units will be re-filled in the order indicated in Table 4. 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.

The focus of saltcedar control efforts in 2007 will be in the main river delta of unit 2D, 5D, 4C, and cleanup along the water courses of L, O, and P canals (Figure 1). Whitetop control will focus on a repeat of areas treated in 2006. Treatment methods will include herbicide spraying, discing, mowing and pulling.

Table 4. Management priority order of wetland units with “near average (90-110%)” runoff forecast, Bear River MBR, 2008.

Unit	Total Acres	Spring Target Elevation 2008	Priority Order 2008	Maintenance Needs (July-Aug.) cfs	Cumulative Needs (July-Aug.)	Fall Fill Order 2008	Winter Target Elevation 2008
5B	1,783	4204.60	1	13.6	13.6	1	
4C	1,528	4205.00	2	26.3	39.9	2	4205.00
1	12,204	4203.50	3	59.7	99.6	3	4204.00
1A	544	4205.40	4	9.4	109	4	
2C	720	4204.50	5	12.4	121.4	5	
2B	294	4206.00	6	4.1	125.5	6	
5C	2,558	4204.75	7	24.4	149.9	7	4205.00
3E	1,448	4204.60	8	25	174.9		
6	3,185	N/A	9	54.9	229.8		
4B	1,242	4205.25	10	21.4	251.2		4205.00
3F	903	15"	11	15.6	266.8		
3A	505	4206.00	12	8.7	275.5		
3K	230	4206.00	13	4	279.5		
3B	1,085	4205.00	14	18.7	298.2		
3H	655	4206.00	15	5.1	303.3		
3C ¹	549	4204.00		9.5	312.8		
3D ¹	1,045	4204.00		18	330.8		4204.50
2D ²	4,619	4205.25		79.6	410.4		4204.75
3I	211	4205.00		3.6	416.3		
2A ³	135	4205.50		2.3	412.7		
3J	166	4206.00		3.6	419.9		
3G	1,545	12.5"		18.1	438		
4A	2,698	4205.50		N/A			
5A	2,405	4205.50		N/A			
5D	939	N/A		N/A			
7	2,581	N/A		44.5	482.5		
8	4,158	N/A		71.6	554.1		
9	5,171	N/A		88.6	642.7		
10	15,262	N/A		17.5	660.2		
Total	70,368						

3C¹ 3D¹ Let dry out for dike repair

2D² Dry as soon as possible to facilitate bridge deck replacement on both 9-Bay structures
And for September Phragmites spraying and October burning

2A³ Dry in June/July for September Phragmites spraying and October burning

GRASSLAND POND MANAGEMENT

2007 MANAGEMENT ACTIONS AND EFFECTS

A. Objective

Manage 16 ponds on the Nichols, White, and Stauffer grassland units to achieve a mix of 50% open water to 50% emergent vegetation, or hemi-marsh conditions, year-round.

B. Strategy

Maintain water level at 1' below the top of the dike year-round unless otherwise stated.

C. Management Actions

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 were periodically collected from the flume gauges on the Nichols, White, and Stauffer tracts.

D. Habitat Response

No habitat monitoring was conducted in 2007.

E. Response of Resources of Concern

The grassland ponds are utilized primarily by migratory waterfowl in the spring and fall. Cinnamon teal and redhead use them as pair and brood rearing ponds throughout the spring and summer. White-faced ibis use them as feeding areas in spring, summer and fall. Black-necked stilts, American avocet, and long-billed curlew use them as nesting, resting, feeding and brood rearing areas.

2008 MANAGEMENT PLAN FOR GRASSLAND PONDS

A. Objective

The 2008 objectives for the grassland ponds remain the same as last year.

B. Strategy

To meet the first objective, the density of cattail needs to be reduced in several ponds. All ponds on the Nichols, White, and Stauffer units will be kept as full as the available water supply will allow.

GRASSLAND UPLANDS MANAGEMENT

2007 MANAGEMENT ACTIONS AND EFFECTS

The overall grassland objective is to manage the 2,877 acres of the Nichols, White, and Stauffer 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. The remainder of the area is bare ground (approximately 30-35%).

A. Objectives

Based on the soils, each of the units supports four habitat types and associated plant communities. The objectives below 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).

B. General strategy

A dormant season graze through a prescribed grazing program is used 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 and creates growing conditions favorable for invasive plants (*Brassica sp.*).

The White and Stauffer unit litter layer becomes very dense after two seasons of rest, effectively shading the ground. In areas of the grassland where the wheatgrass community is dominant and considered in good condition, like White and Stauffer, the general grazing strategy is to graze every two years, (maximum of three years) 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 *Bromus spp.*, bulbous bluegrass, *Poa bulbosa*, and other undesirables. The grazing prescription may create unoccupied niches for wheatgrasses to expand in to. Though the spring grazing appears to be the most effective in hindering growth of cheatgrass and bluegrass, local cattle operators often move their herds to pasture lands at higher elevations during this time. Due to unavailability of cattle for spring grazing, dormant season grazing is often prescribed instead.

C. Management Actions

Both dormant season and early growing season (February-March) grazes were utilized as

management tools on the grasslands in 2007. About 7,400 acres were grazed in 15 designated areas (Table 5).

Table 5. Prescribed grazing of grassland units, 2007.

UNIT	COOPERATOR	ACRES	DATES GRAZED	DAYS GRAZED	# OF HEAD	AUM'S REMOVED	AUMS/ ACRE	HEAD/ ACRE
W2	Lane Parker	217	Dec. 23-Jan. 26, 2007	35	355	415	1.91	1.6
W3	Lane Parker	160	Jan. 27-Feb. 22, 2007	27	360	324	2.03	2.3
W4	Lane Parker	57	Feb. 23-Mar.2, 2007	8	360	97	3.05	6.6
			Mar.3-4, 2007	2	378	26		
			Mar.5-8, 2007	4	395	51		
W5	Lane Parker	51	Mar.9-16, 2007	8	352	95	1.86	6.9
Stauffer	Lane Parker	146	Mar. 17-29, 2007	13	352	151		
Whistler 1	Todd Yates		Dec.29, 2006-Jan. 5, 2007	8	35	9	0.20	0.5
Christensen	Todd Yates	64	Jan. 12-Feb. 9, 2007	29	84	81	1.27	1.3
Jensen	Todd Yates	22	Feb. 19- Mar. 4, 2007	14	84	39	1.77	3.8
Three Bar	Todd Yates	48	Mar. 5-24, 2007	20	84	56	1.17	1.8
TOTALS		6288				2663		

UNIT	COOPERATOR	ACRES	DATES GRAZED	DAYS GRAZED	# OF HEAD	AUM'S REMOVED	AUMS/ ACRE	HEAD/ ACRE
W1	Lane Parker	151	Sept. 10-Oct. 4, 2007	25	104	86	0.60	0.7
W2	Lane Parker	154	Oct. 5-18, 2007	14	135	63	0.60	0.9
			Oct. 19-23, 2007	5	191	32		1.2
W3	Lane Parker	34	Oct. 24-Nov.6	14	191	90	2.70	5.6
W4	Lane Parker	448	Nov.7-18,2007	12	191	76	0.30	0.4
	Lane Parker		Nov. 19-23, 2007	5	243	41		0.5
N1	Lane Parker	137	Nov. 24-Dec.7, 2007	14	243	114	0.80	1.8
N2	Lane Parker	228	Dec. 8-Dec. 24, 2007	16	243			
TOTALS		1152						

D. Habitat Response A vegetation survey conducted in 2003-2004 indicated that the frequency of occurrence of vegetation types in the grassland units was 67% grass (38% native, 22% non-native, 7% noxious), 2% shrub, 10% forb, 17% bare ground, and 1% classified as "other"(see 2005 AHMP for details). Overall habitat conditions are thought to have changed little since the survey was completed.

E. Response of Resources of Concern No surveys of resources of concern were conducted.

2008 UPLAND GRASSLAND MANAGEMENT PLAN

A. Objective The objectives for 2008 in the upland grasslands remain the same as last year.

B. Strategy With a recent in change in staffing, it is likely no grazing in summer and winter will occur.

MONITORING AND EVALUATION

HABITAT

Throughout the summer (June-September) wetland habitat surveys will be conducted via airboat and GPS to determine amount of open water to emergent vegetation.

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.

The water depth at the outlets of wetland units will be recorded at least once a month to determine how closely water elevation targets are being met and to associate different water depths with the amounts and types of habitat observed.

Photos will be taken at established photo points on the Nichols, White, and Stauffer Units to monitor any changes in upland habitat.

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

PRIORITY SPECIES

Bi-weekly waterbird surveys of the 26 wetland management units will be conducted to determine use by priority species on a unit by unit basis. If staff time allows, waterbird use of the grassland ponds will also be surveyed.

Canada goose and duck brood counts will be conducted as an index of the effectiveness of the predator control program.

Waterfowl breeding pair surveys will be conducted on the grassland ponds.

A research investigation into the productivity and identification of predators 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 sixth consecutive 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 Biogeography of Marbled Godwit in North American will continue in 2008. A minimum of five godwits will be equipped with satellite transmitters.

Refuge staff will participate in Great Salt Lake snowy plover breeding bird estimation survey.

Areas around the GSL will be surveyed via two visits along a randomly selected transect survey.

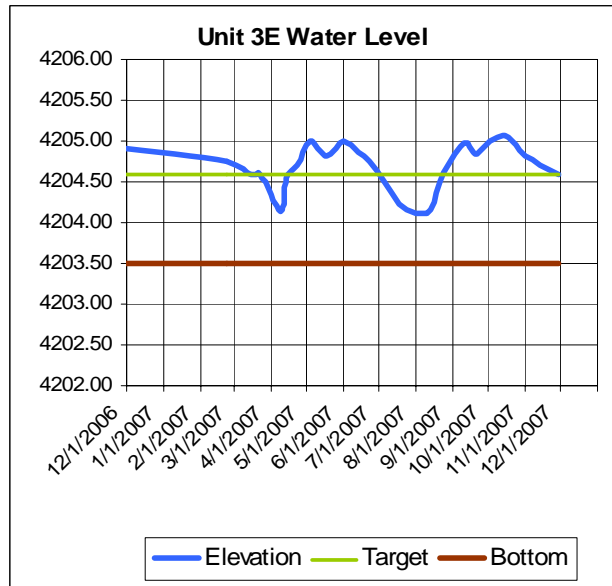
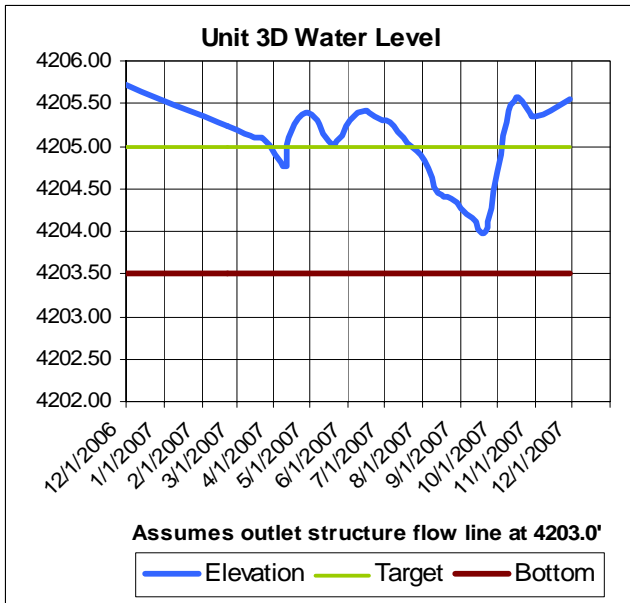
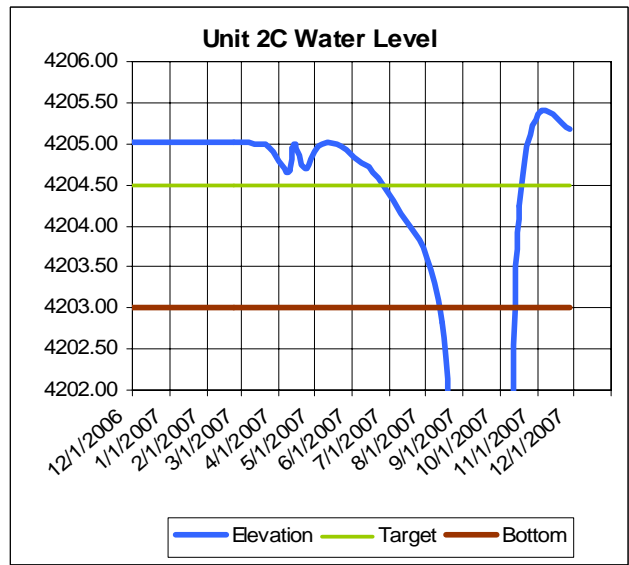
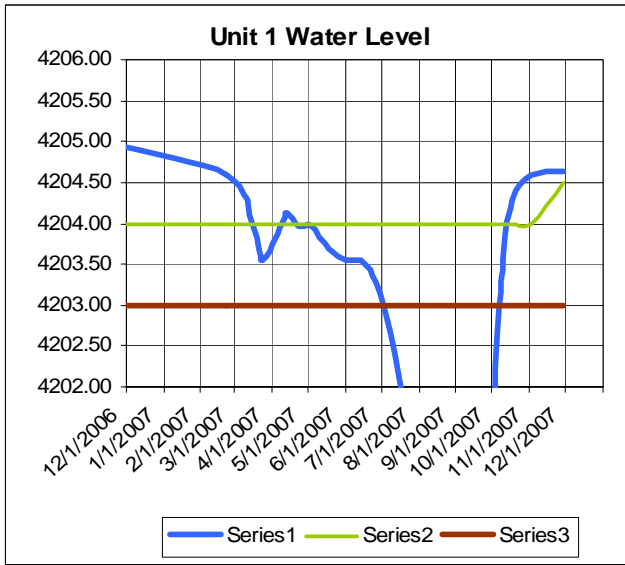
Refuge staff will also conduct mortality surveillance as a partner in Utah's Avian Influenza (AI) Surveillance Plan. The Refuge will also provide the bunkhouse as a check station to Utah Division of Wildlife Resources and USDA Wildlife Services as a location to collect tundra swan AI samples.

REFUGE UNMET NEEDS

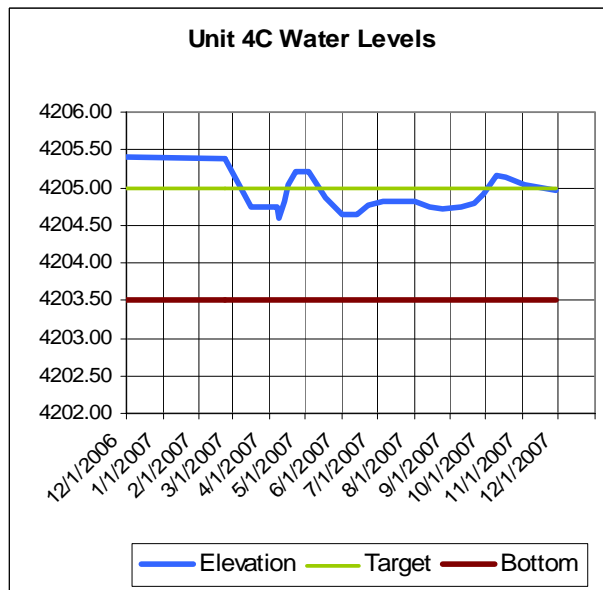
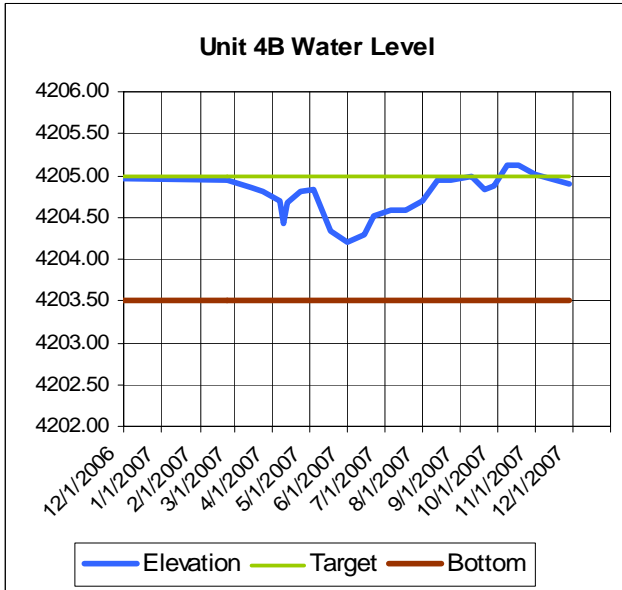
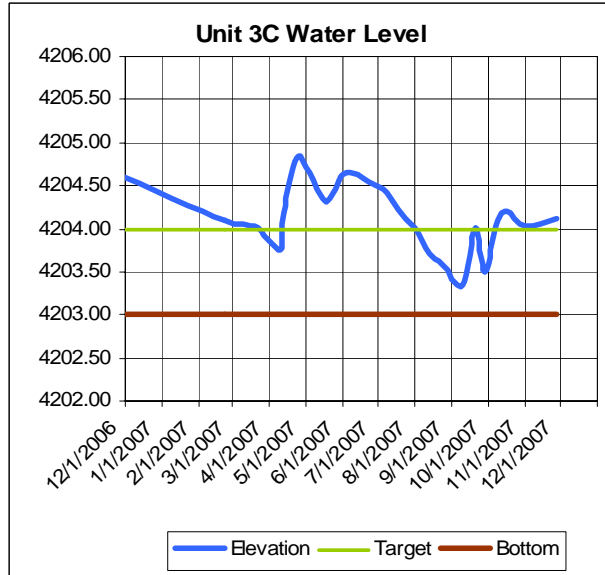
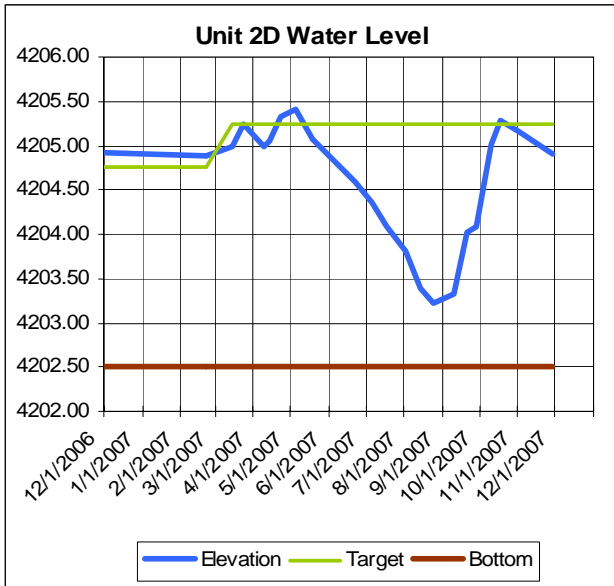
Water is limited on the Nichols, White, and Stauffer Tracts. Any opportunity to acquire additional water for those units (such as water under subdivisions in Perry and Brigham City) should be pursued actively. A water right claim for the excess runoff from Three Mile Creek was investigated in 2005. It 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.

Staff gauges are needed in many units in order to more accurately monitor water (surface acres, and depths). As noted in each of the unit summary details, the wetland units needing staff gauges are Jameson (sometimes denoted on maps as Unit 1B), Units 3A, 3B, 3D, 3F, 3G, 3H, 3I, 3J, 2A and 2B. In addition, the main bypass canals at the outlet to Great Salt Lake also need invert elevations surveyed (L, H, O, and Whistler Canals and the Unit 3 and 4 "Drains") (Figure 1). Staff gauges are also needed in all sixteen of the grassland ponds.

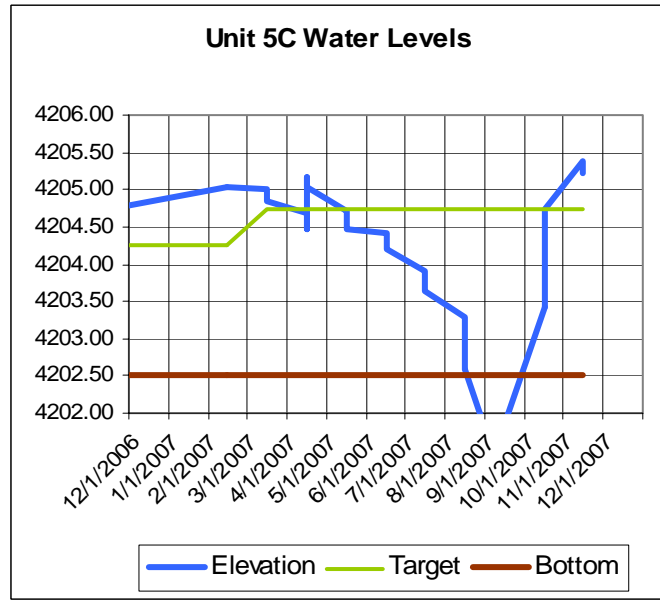
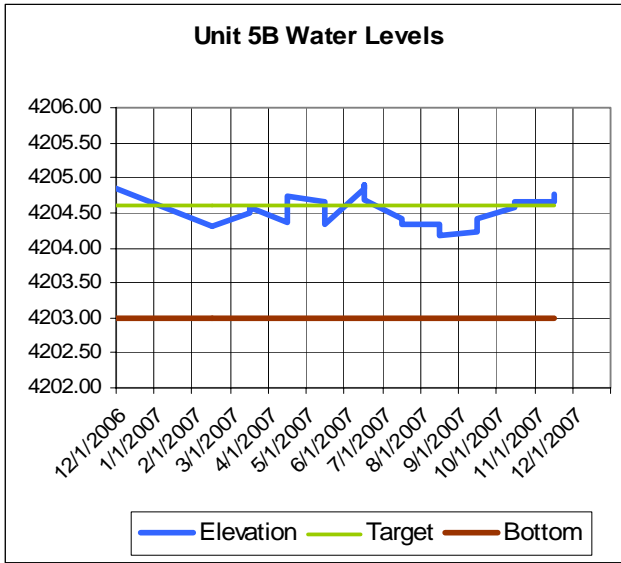
Appendix A. 2007 Unit Water Levels



Appendix A. 2007 Unit Water Levels (continued)



Appendix A. 2007 Unit Water Levels (continued)



Appendix B. Significant use of management units by priority species as a proportion of total Refuge annual use ($\geq 10\%$ annual use), 2007.

Priority Rank

1	American Avocet	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	547,800	19
	3E	320,867	11
	4B	466,666	16
	6	468,697	16
2	Cinnamon Teal	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	4C	84,725	18
	5C	103,167	22
	6	103,084	22
3	Black-necked Stilt	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	415,980	32
	5C	203,010	15
	6	418,867	32
4	White-faced Ibis	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	695,771	39
	5C	270,409	15
	6	353,880	20
5	Shorebirds	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	1,327,443	23
	5C	1,039,937	18
	6	1,393,456	24
6	Waterfowl	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	3E	2,721,765	12
	4C	3,607,812	16
	6	3,230,243	14
7	Tundra Swan	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	323,096	30
	2D	220,722	21
	6	124,996	12
8	Snowy Plover	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	27	12
	6	132	59
9	Marbled Godwit	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	3E	65,927	11
	6	343,478	55
10	Long-billed Curlew	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	175	32
	3A	96	17
	7	83	15
11	Am. White Pelican	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	6	134,687	40
12	Redhead	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	24,000	10
	3F	30,348	13
	5C	30,002	13
13	Wilson's Phalarope	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	87,546	77
14	Long-billed Dowitcher	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	164,981	20
	5B	156,188	19
	6	159,454	25
15	Franklin's Gull	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	116,531	15
	5C	133,056	17
	7	117,010	15
16	Black Tern	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	5,236	24
	5B	7,982	36

Appendix C. Seasonal use of wetland units by priority species, 2007.

2007	Spring (Mar-May)			Use Days on	Seasonal Use	Peak Unit/Seasonal Use
Species	Peak No.	Peak Date	Peak Unit	Peak Unit	Sum	Proportion %
American Avocet	7,567	20-Apr	7	115,117	455,335	25
Cinnamon Teal	3,862	30-Mar	6	36,916	160,223	23
Black-necked Stilt	2,882	20-Apr	7	41,934	104,856	40
White-faced Ibis	2,179	2-May	6	58,902	118,989	50
Shorebirds	13,560	20-Apr	6	256,110	758,953	34
Waterfowl	233,412	14-Mar	6	1,798,625	7,004,223	26
Tundra Swan	20,320	14-Mar	2D	156,000	327,787	48
Snowy Plover	0				0	
Marbled Godwit	2,066	20-Apr	7	21,531	32,319	67
Long-billed Curlew	2	2-May	4B,7	51	102	50
Am. White Pelican	300	2-May	6	5,440	19,072	29
Redhead	4,820	14-Mar	1	24,000	208,076	12
Wilson's Phalarope	25	2-May	3E	1,020	1,275	80
Long-billed Dowitcher	2,849	2-May	6	104,754	146,102	72
Franklin's Gull	3,384	2-May	6	127,010	189,908	67
Black Tern	0				0	

2007	Summer (June-July)			Use Days on	Seasonal use	Peak Unit/Seasonal Use
Species	Peak No.	Peak Date	Peak Unit	Peak Unit	Sum	Proportion %
American Avocet	23,985	19-Jul	2D	149,100	529,497	28
Cinnamon Teal	1,917	19-Jul	5B	30,018	90,045	33
Black-necked Stilt	11,126	19-Jul	6	181,014	364,488	50
White-faced Ibis	23,488	19-Jul	2D	241,293	614,397	39
Shorebirds	41,739	19-Jul	2D	283,329	1,066,059	27
Waterfowl	19,474	19-Jul	3D	196,803	815,601	24
Tundra Swan	Not Present					
Snowy Plover	3	19-Jul	5C	42	90	47
Marbled Godwit	3,612	19-Jul	6	34,248	91,080	38
Long-billed Curlew	2	22-Jun	3E	54	54	100
Am. White Pelican	8,966	19-Jul	6	112,164	235,347	48
Redhead	237	19-Jul	5C	3,228	5,193	62
Wilson's Phalarope	632	22-Jun	3D	14,850	19,332	77
Long-billed Dowitcher	394	19-Jul	2D	7,581	8,274	92
Franklin's Gull	6,445	19-Jul	5C	57,669	222,771	26
Black Tern	0			0	0	0

Appendix C. Seasonal Use (Continued), 2007.

2007	Fall (Aug-Nov)			Use Days on	Seasonal use	Peak Unit/Seasonal Use
Species	Peak No.	Peak Date	Peak Unit	Peak Unit	Sum	Proportion %
American Avocet	57,639	9-Aug	5C	534,320	1,886,053	28
Cinnamon Teal	5,974	9-Aug	4C	73,820	218,827	34
Black-necked Stilt	32,374	9-Aug	2D	322,524	848,032	38
White-faced Ibis	46,141	9-Aug	2D	454,124	1,065,454	43
Shorebirds	131,397	9-Aug	2D	1,042,002	4,056,789	26
Waterfowl	161,605	31-Aug	4C	2,741,181	13,167,535	21
Tundra Swan	15,917	20-Nov	1	306,776	447,751	69
Snowy Plover	6	9-Aug	6	132	132	100
Marbled Godwit	14,280	9-Aug	6	300,338	496,354	61
Long-billed Curlew	25	18-Oct	2D	175	399	44
Am. White Pelican	1,929	9-Aug	6	17,023	79,503	21
Redhead	555	6-Nov	4C	19,224	21,056	91
Wilson's Phalarope	4,210	9-Aug	2D	86,790	92,620	94
Long-billed Dowitcher	20,174	9-Aug	5C	166,440	661,072	25
Franklin's Gull	14,626	9-Aug	7	88,000	349,964	25
Black Tern	665	9-Aug	5B	7,982	22,278	36

2007	Winter (Jan-Feb, Dec.)			Use Days on	Seasonal use	Peak Unit/Seasonal Use
Species	Peak No.	Peak Date	Peak Unit	Peak Unit	Sum	Proportion %
American Avocet	Not present					
Cinnamon Teal	Not present					
Black-necked Stilt	Not present					
White-faced Ibis	Not present					
Shorebirds	8	10-Dec	4A	72	132	55
Waterfowl	81,328	3-Jan	6	509,533	1,653,927	31
Tundra Swan	11,600	3-Jan	6	93,914	292,430	32
Snowy Plover	Not present					
Marbled Godwit	Not present					
Long-billed Curlew	Not present					
Am. White Pelican	2	19-Dec	6	60	60	100
Redhead	Not present					
Wilson's Phalarope	Not present					
Long-billed Dowitcher	Not present					
Franklin's Gull	Not present					
Black Tern	Not present					

Appendix D. Wetland units grazed and grazing intensity for summer, 2007.

UNIT	COOPERATOR	ACRES	DATES GRAZED	DAYS GRAZED	# OF HEAD	AUM'S REMOVED	AUMS/ ACRE	HEAD/ ACRE
Unit 3I/J	Todd Yates	307	June 23-June 26, 2007	4	100 pairs ¹	16	0.67	0.39
			June 27-July 12, 2007	16	300 pairs	191		1.17
Unit 3A	Todd Yates	294	July 13 -26, 2007	14	300 pairs	169	0.57	1.22
Unit 3A (2)	Todd Yates	1547	July 27-August 13, 2007	18	300 pairs	216	0.14	0.23
Unit 2A	Todd Yates	667	Aug. 14-Sept.9, 2007	27	300 pairs	324	0.49	0.54
Unit 2D	Todd Yates	575	Sept. 10-26, 2007	17	300 pairs	205	0.36	0.63
TOTALS		3390				1,121		

¹ "Pairs" indicates cow/calf pair.