



**U.S. Department of the Interior
Fish and Wildlife Service
Bear River Migratory Bird Refuge**

2155 West Forest St.
Brigham City, Utah 84302
Phone: (435) 723-5887
Fax: (435) 723-8873

**Annual Habitat Management Plan
2009**



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2009
Bear River Migratory Bird Refuge
Brigham City, Utah

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Prepared by:

Bridget E. Hro 5/6/09
Wildlife Biologist, Date
Bear River Migratory Bird Refuge

Recommended by:

B. Danner 5/7/09
Project Leader, Date
Bear River Migratory Bird Refuge

Concurred by:

W. D. Gull 5/11/09
Refuge Field Supervisor, Date
Montana/Wyoming/Utah

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 2008. Following the 2008 review is the management plan for the current year (2009). 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 2009 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).

2008 STRATEGY AND ACTIONS SUMMARY

Water levels in the 26 wetland management units (Figure 1.) are manipulated or influenced to achieve the objectives. In 2008, Refuge staff anticipated and planned for “near average” river flow (90-110 %) based on snowpack conditions in the nearby Wasatch Mountain Range. Flows in the River during July and August were predicted to be around 230-250 cfs. Under those forecast water conditions, staff anticipated maintaining about 10,000 acres in seven units at target levels throughout the summer months (5B, 4C, 1, 1A, 2C, 2B and 5C).

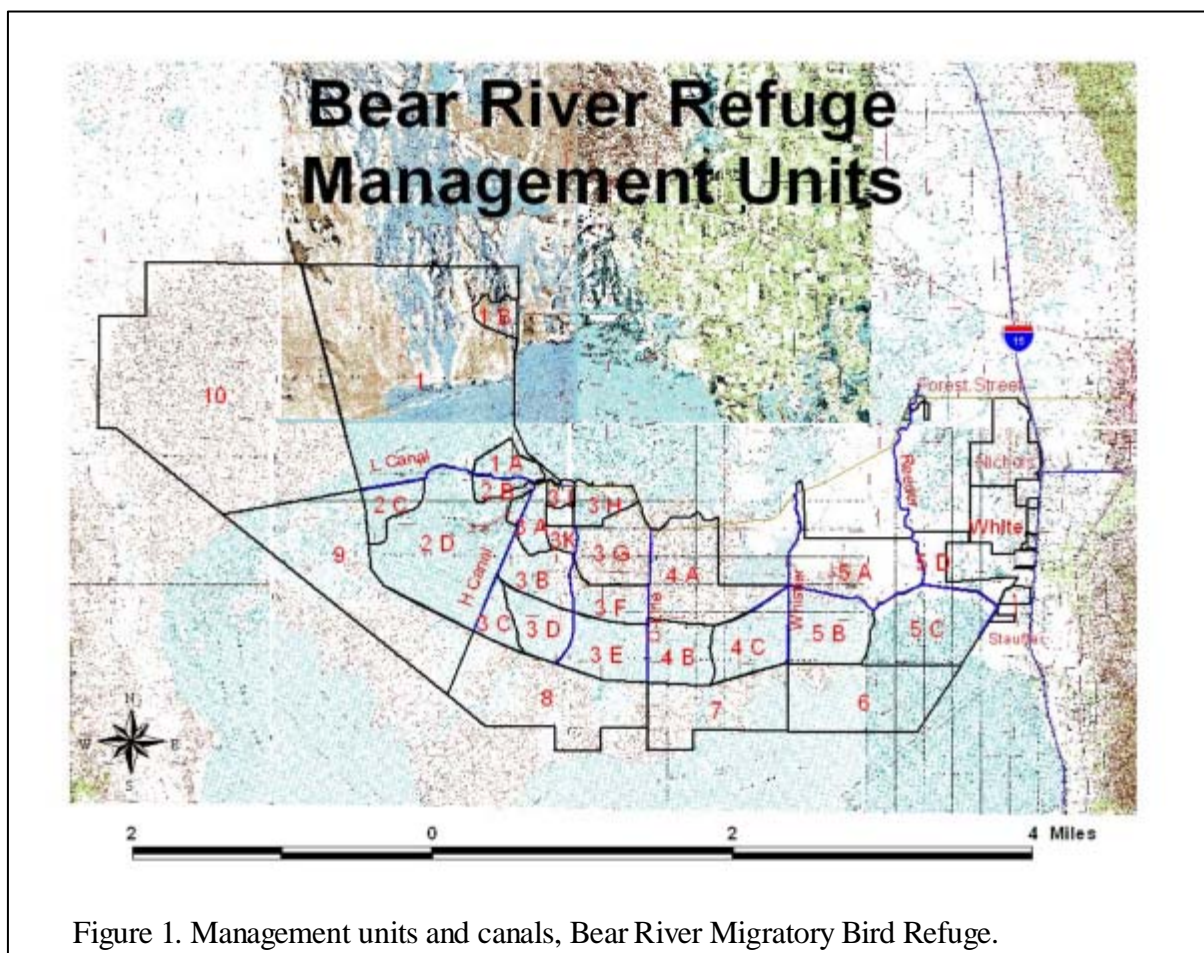


Figure 1. Management units and canals, Bear River Migratory Bird Refuge.

Target water levels (and associated habitat) were actually maintained in five units through the summer months: Unit 1, 2C, 3E, 4B, 4C and part of 6. Unit 5B was initially the refuge's highest priority for 2008 because the emergent vegetation in the unit has supported a large breeding colony of Refuge priority species, white-faced ibis. However, the ibis moved to Unit 1 so 5B was dropped as a priority and was replaced by Unit 1. Other units received water as available from the Bear River. About 11,000 acres of wetlands were maintained through July and August. This compares to about 6,550 in 2007, 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 the last couple days of September (219-373 cfs 09/28-09/30) as irrigation demand remained high through the end of the irrigation season (September 30). Refuge unit refilling was initiated the first week of October. Graphs of the unit water levels for 2008 are found in Appendix A.

2008 WATER SUPPLY SUMMARY

Climate Overview

The months of January thru April 2008 were somewhat colder than normal while May-August temperatures were all above average. National Weather Service personnel examined the number of days during the summer of 2008 when temperatures at the Salt Lake City airport and other locations in Utah, reached 90, 95, and 100 degree benchmarks. They then compared the findings to 2007 (the warmest on record-Salt Lake City), the average, and historical records. What they found is that these locations are experiencing an increasing trend in the number of days reaching the 90 degree benchmark. The warmer temperatures in the summer are particularly significant to water management at the Refuge as increased air temperatures equate to higher than average evaporation rates. Fall temperatures in September-November were near normal, with a slightly cooler December.

Snowpack Conditions

Snow-pack in the Bear River Basin was at 100% of normal on April 1, 2008 which was about 178% of last year (2007). April 1 is the normal peak of snowpacks with melt beginning in the lower elevations, but climatic conditions in April may increase or decrease snowpacks dramatically. Cool, wet conditions will slow melt and lead to greater runoff later in the season whereas warm, dry conditions will accelerate melt. The 2008 accumulation was a return to average snowpack conditions experienced only for the third time between years 2001-2008 (Table 1).

Table 1. Bear River Basin snowpack conditions 2001-2008.

Bear River Basin Snowpack	
April 1	
Year	% of Normal
2001	67
2002	78
2003	67
2004	45
2005	102
2006	131
2007	56
2008	100

Bear Lake reservoir has a usable capacity at 1,302,000 ac-ft. The reservoir started out in 2008 at only 21% usable capacity (277,600 ac-ft.). This is similar to conditions in 2006 (Table 2). 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.

Table 2. Bear Lake usable capacity April 1, 2005-2008.

Bear Lake Usable Capacity-April 1		
	Ac-ft.	%
2005	122,000	9
2006	325,300	25
2007	490,300	38
2008	277,600	21

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 2006-2008 for a full allotment.

Though snow pack conditions were near normal, National Weather Service forecast for April-July stream flow for the Bear River basin in 2008 was for 90% of normal. This was due to the low reservoir storage in Bear Lake. The actual stream flow for April-July was worse than predicted at only 36 % of normal. The annual mean flow rate of the Bear River for the 2008 water year (October 2007-September 2008) was 785 ft³/s. Annual runoff was 570,200 ac-ft. (Table 3). This is below the annual runoff from 2005-07 and only about half of the long-term annual runoff average of 1,218,000 ac-ft.

Table 3. 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	328,016
2008	570,200	785	287,456
long-term	1,218,000	1,681	

Mean Bear River flows were significantly below the long-term mean for every month in the water year (October 2007-September 2008) (Table 4). In particular, the mean monthly flow for July and August was only 13 and 15% of normal, respectively.

Table 4. Mean monthly flows, Bear River 2002-2008.

	Bear River Mean Monthly Flows (ft ³ /s)							
	Long-Term *	2008	2007	2006	2005	2004	2003	2002
January	1760	848	1306	1811	1240	869	756	1168
February	1799	1125	1493	1585	1016	1034	899	970
March	2284	1337	1887	2500	2232	1562	993	1300
April	2794	1340	1442	4968	3114	1097	1094	1556
May	2850	1421	462	3853	5863	405	281	636
June	2114	1190	107	1200	3241	503	81	250
July	669	85.2	77.3	123	244	43	40	82
August	581	85.5	75.6	149	171	47	50	67
September	866	197	150	640	297	132	112	306
October	1294	468	1111	776	540	351	449	233
November	1559	627	1297	871	745	663	702	629
December	1635	730	1414	1189	1056	708	819	1219

* Mean data for water years 1950-57, 1964-2008.

All the inlets to the low priority units were boarded up by mid-June to begin shunting water to only the highest priority units. Due to the extraordinarily low river conditions experienced in July and August, only two units (1 and 4C) continued to receive water during these months. Water elevations began dropping in the non-priority units around the middle of June as they were not receiving any inflow to balance evaporative losses. River flows were not high enough to begin re-filling of units until September 28th. Unit by unit details follow.

2008 MANAGEMENT ACTIONS AND EFFECTS

Unit 1

A. Objective

Manage water levels to achieve 440 acres of deep submergent, 2610 acres of shallow submergent, 1491 acres of mid-depth emergent and 547 acres of shallow emergent wetland habitat, April 1-December 15.

B. Strategy

Re-fill Unit 1 to achieve target water elevation of 4204.5' by April 1. Draw-down unit to winter target elevation of 4204.0' by December 15, to prevent ice-damage.

C. Management Actions

Water level was maintained within 0.5 of the target April-December. Winter target was achieved by December 11. Inlet and outlet structures were re-surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

No habitat surveys conducted.

E. Response of Resources of Concern

Colonial nesting waterbirds including white-faced ibis (WFIB), Franklin's gull (FRGU), snowy egret, and black-crowned night heron apparently moved to this unit and abandoned Unit 5B. On June 3rd a

survey of the colony was conducted and 6,783 white-faced ibis, 201 snowy egret, 27 cattle egret, 2 great blue heron, 4 great egret, 96 black-crowned night heron and 2700 Franklin's gull were estimated breeders. In addition, a nesting success survey was conducted by Weber State University. Mayfield success rates were 92% and 84% for WFIB and FRGU respectively. The unit accounted for 14% of annual use by cinnamon teal, 17% for all waterfowl, 14% for tundra swan, 44% by snowy plover, 70% of long-billed curlew, 12% by redhead, 61% by Wilson's phalarope and 11% by Franklin's gull (Appendix B). A May monthly record high count of 81 snowy plovers was counted in the unit on 5/05/08 during the Great Salt Lake breeding snowy plover survey.

Units 1A , 3A and 3K

A. Objective

Manage water levels to achieve 50% interspersion of open water with 50% emergent vegetation, April 1-December 31.

B. Strategy

Fill units to target water elevations by April 1: Unit 1A-4205.4'; Unit 3A-4206.0'; Unit 3K-4206.0'. Allow to dry as non-priority units.

C. Management Actions

Unit 1A The unit was filled in the spring from Bear River inflows through the drive-through spillway. The unit was then allowed to dry. Re-filling began in late September. Unit 3A and 3K Water was to target through May, dry by July. The culvert from the bladder gate inlet to the units under the road was replaced by two 2400mm X 1800mm X 24.8 m box culverts as part of the road construction process. Re-filling began in early October after culvert installation was complete. Maintenance staff removed the non-functional bladder at the inlet and replaced it with a winch system in November. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

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

E. Response of Resources of Concern

Unit 3A Supported 13% of seasonal use by white-faced ibis in the spring, and 45% of shorebird use and 100% of long-billed dowitcher use in the winter (Appendix C). Units 1A and 3K There was no significant use ($\geq 10\%$ of annual use) of the units by priority species.

Units 2A and 2B

A. Objective

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

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 2A.

C. Management Actions

No water elevation data is available for 2A as the units has no water gauge. The unit was full in the spring dry by late-June. Unit 2B Estimated target for this unit was for boards set at 21.5 inches. Unit was dry by July and re-filled in October. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

The habitat objectives in units 2A and 2B were not met because of the dry conditions. Some spraying for Phragmites from the dike only was completed in 2A.

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 (70% of unit) and 216 acres (30% of unit) 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. Re-fill to target in October as water is available.

C. Management Actions

Though the unit was supposed to dry as a non-priority, it remained full due to floating boards in the inlet structure off L-Canal. The unit remained about 0.5' about target throughout the year until late September. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

A vegetation survey was conducted in 2008. Objectives have been met. Roughly 90% of the unit is occupied by submergent aquatics (sago pondweed). Emergent vegetation (alkali bulrush), also occupies about 30% of the unit ranging from dense to sparse stands chiefly in the south and eastern portion of the unit.

E. Response of Resources of Concern

The unit provided 100% of winter use by white-faced ibis in 2008 (Appendix C).

Unit 2D

A. Objective

Manage water levels to achieve 4,029 acres of deep submergent and 590 acres of deep emergent habitat, during early spring and fall migration.

B. Strategy

Remove boards at outlet structures to dry unit to facilitate bridge-deck replacement in late summer. Re-fill beginning in October or after construction is complete.

C. Management Actions

Boards were pulled at the outlet structures beginning on March 4, 2008. Unit was dry by early June. Bridge decks were replaced on the two nine-bay outlet structures. Began re-filling the unit on September 25th. Inlet and outlet structures were re-surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

No habitat surveys were conducted.

E. Response of Resources of Concern

This unit was important to Refuge priority species in the spring, hosting 58% of all the spring use by tundra swan (Appendix C). The unit also accounted for 11% of annual use by American avocet (AMAV), 17% of white-faced ibis, 31% by tundra swan, and 13% by Wilson's phalarope (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. Set boards at inlet to 17.0". Allow to dry naturally as a non-priority unit.

C. Management Actions

Water was 17" at the outlet structure until mid-May. Unit was dry throughout summer and early fall. Re-filling began in October. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

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 32% of spring use by long-billed dowitcher in 2008 (Appendix C).

Units 3C and 3D

A. Objective

Dry units after spring migration to facilitate dike repair between the units.

B. Strategy

Maintain units at target of 4204.0' through May 1. Allow units to dry out through evaporation to facilitate dike repair. Re-fill in the fall as inflows allow.

C. Management Actions

The boards were pulled from the units in May. Unit 3C went dry by mid-May while 3D didn't dry until late June. No dike repair actions were initiated in 2008. Re-filling began in early October. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

No habitat surveys were conducted in either unit.

E. Response of Resources of Concern

Unit 3C There was no significant use ($\geq 10\%$ of annual use) of this unit by priority species in 2008.

Unit 3D This unit accounted for 12% of the annual use by redhead (Appendix B).

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 through late June. Unit hovered within 0.5 of the target July-September. On September 22nd O-Line Canal gates were shut to facilitate replacement of the three culverts under the road with three box culverts as part of the road project. Three 3600mm X 1800mm X 24.6m precast concrete box culverts with headwalls, wing-walls and riprap were placed September-late November. Re-filling of O-Canal did not begin until early December 2008. 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 mid-June re-filled in early November. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-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 Dr. John Cavitt, Weber State University reported that shorebird nesting success (Mayfield) of the small islands adjacent to D-Line dike in the unit was 0.3 for American avocet and 0.83 for black-necked stilt (BNST). This unit was important to American avocet, cinnamon teal, and shorebirds in the spring, accounting for 26%, 45%, and 21% the seasonal use (Appendix C). The unit also accounted for 50% of the fall use of American avocet. The unit accounted for 24% of annual use for American avocet, 25% for cinnamon teal, and 26% for Wilson's phalarope (Appendix B).

Unit 3F and 3G The units received no significant use by priority species in 2008. An aerial survey of the unit on 6/2/08 by Utah Division of Wildlife Resources staff revealed an estimated 3033 breeding adult CAGU and 125 double-crested cormorant nests. There is some question whether the locations were labeled correctly though there are several nesting islands in the unit. In 2009, the units will be allowed to dry and the small island adjacent to O-Canal will be removed or bull-dozed down to discourage nesting by CAGU.

Unit 3H, 3I, and 3J

A. Objective

Maximize emergent wetland type to encourage colonization of alkali bulrush.

B. Strategy

Fill Units 3H, 3I, 3J and 3K 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 late-June. They were re-flooded starting in late September. The culvert from the screw gate/flap gate inlet off the river that supplies the units with water was replaced by a 3000mm X 1800mm X 21.9 m pre-cast box culvert with headwalls and wing-walls, as part of the county road construction process. In addition the culvert under the road on the east side of 3H was also replaced as part of the road project with a 600mm X 13.8m pipe culvert with flap. Re-filling began in mid-October after culvert installation was complete. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

No habitat monitoring was conducted in these units.

E. Response of Resources of Concern

None of these units received significant use by priority species in 2008.

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 5A Long-billed curlews (LBCU) and snowy plovers nest in the playa and upland area of the northern portion of the unit. Thirteen LBCU nests were found in the unit and monitored by Weber State University. Of those nests, 12 hatched successfully. Unit 5D The single LBCU nest found in 5D was depredated. A small nesting colony of AMAV and BNST monitoring in 5D had extremely poor nest success at .0001 for both species.

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. Allow unit to dry as a non-priority unit.

C. Management Actions

The unit never went dry even though no water was added during the summer months. Unit was about 0.5' below target from mid-May through early October. Unit returned to target by late October and remained near 4205.00' the remainder of the year. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

No habitat surveys were conducted.

E. Response of Resources of Concern

This unit supported large California gull colonies on the islands (1368 nests in 2008). The predatory behavior of these gulls is thought to negatively influence success of priority nesting species of shorebirds and waterfowl in some years. In 2009, a draw-down will be initiated June 1 to facilitate drying of the unit. This will allow heavy equipment to remove the island in the northwest portion of the unit (after nesting season) that supports a large number of nesting California gulls. The unit accounted for 11% of the annual use by tundra swan in 2008 (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. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

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 2008. Phragmites stands have colonized the unit in the southeast

corner that may need spraying in the next one to two years.

E. Response of Resources of Concern

The unit accounted for 28%, 13%, 29% and 100% of annual use by all waterfowl, American white pelican, redhead, and black tern respectively (Appendix B). The unit accounted for 34% of use by American white pelican in the spring, summer use by black tern, 93% of use by redhead in the fall, and 27%, 100% and 99% of use by waterfowl, American white pelican, and redhead respectively in the winter (Appendix C). The unit has three islands which also host large nesting colonies of California gulls, double-crested cormorants, and great blue herons. In addition, CAGU and some great blue heron also nest on the west-dike of the unit 4 drain canal (east dike of Unit 4B). An aerial survey conducted by Utah Division of Wildlife Resources staff estimated 4,414 adults on the breeding areas.

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.



Figure 1. Nesting Caspian tern and California gull in Unit 5B, 2008.

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

The white-faced ibis breeding colony abandoned this unit in favor of Unit 1. In response to this fact, Unit 5B was dropped as a priority. The unit was allowed to dry by early August. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November).

D. Habitat Response

No habitat surveys were conducted.

E. Response of Resources of Concern

Though the unit went dry, the small island in the northwest corner supported nesting California gulls (CAGU) and Caspian terns (CATE). A total of 42 CATE and 48 CAGU nests were located and monitored on the island. Mayfield nest success was 83% and 100% for CATE and CAGU, respectively. The unit accounted for 43% of use by marbled godwit in spring (Appendix C), 21%, 29%, 10%, 18%, and 37% of annual use by American avocet, black-necked stilt, white-faced ibis, and marbled godwit respectively (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 July. Re-filling began in early October and reached the target by early November. Inlet and outlet structures were surveyed by Realty staff to determine flow line elevations (July-November). Spraying for *Phragmites* was conducted along the north dike of the unit in early October.

D. Habitat Response

Habitat objectives were unmet due to dry conditions.

E. Response of Resources of Concern

The unit was important to American avocet, black-necked stilt, white-faced ibis, migratory shorebirds, redhead, marbled godwit, American white-pelican, and Franklin's gull. Unit 5C accounted for 20% of spring use by redhead, 67% of fall use by Franklin's gull, and 100% of winter use by cinnamon teal (Appendix C). The unit accounted for the greatest annual use of American avocet (11%), black-necked stilt (17%), white-faced ibis (16%), shorebirds (15%), marbled godwit (35%), American white-pelican (18%), redhead (12%), and Franklin's gull (36%) (Appendix B).

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 December in the 2008 water year. Water was shut off going into O-Canal in early October for box culvert placement under the county road. As a consequence, no water was available to cover the "dog ear" hunting areas of units 7 and 8 until mid-December, leading to many disgruntled hunters. A ¼ mile long "stub-dike" was created perpendicular to D-Line dike below unit 3E in Unit 8. This dike forces water that would otherwise stay in the borrow area along the south side of D-Line to spread out across Unit 8 playas instead.

D. Habitat Response

Unit 6 (Willard Spur) had an estimated 8" of shallow water until August. 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 November when by-pass waters were channeled to these units. A habitat survey was

conducted on Unit 6. Results are pending.

E. Response of Resources of Concern

Units 6, as usual was especially important to many of the priority species. Unit 6 received significant annual use by 10 out of 16 of the Refuge priority species and species groups including AMAV (13%), cinnamon teal (31%), BNST (24%), shorebirds (40%), waterfowl (17%), tundra swan (18%), American white pelican (32%), redhead (16%), long-billed dowitcher (86%), and Franklin's gull (23%). In the spring, Unit 6 accounted for 24% of the use by black-necked stilt, 18% of use waterfowl, and 59% of the use by Franklin's gull. In the fall, the unit hosted 65% of use by cinnamon teal, 81% black-necked stilt use, 88% of shorebird use, 89% marbled godwit use, and 91% of long-billed dowitcher use. In the winter, 31% of use by tundra swan was on unit 6 (Appendix C). Unit 7-9 None of these units received significant use ($\geq 10\%$) by priority species in 2008. Unit 10 The unit accounted for 56% and 30% of annual use by snowy plover and long-billed curlew (Appendix B).

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 west 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. D-line is usually graded as moisture allows, after August 1 when the majority of waterfowl nesting has occurred.

The chemical Patriot was used to treat 231 acres of white-top (perennial pepperweed) and Canada thistle invasions at an application rate of 17 gallons per acre with a mix of 8 ounces chemical/100 gallon water. A total of about 20 lbs. of active ingredient of Patriot were used. About 640 gallons of Aquaneat was sprayed to treat Phragmites over about 186 acres.

2009 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 2008 summary above. Exceptions are noted below in Table 5.

Units 3C and 3D will be allowed to dry to repair the eroded dike between the units. Rip-rap will be placed on both sides of the 3F/3G and 3F/3E dikes. The large island in the northwest corner of 4B will be removed in late summer after the nesting season. In addition, the small island in the southeast corner of 3F will also be removed or flattened. Very small islands (75'-100' X 20'-30') will be constructed in 3D as nesting islands for American avocet and black-necked stilt.

GENERAL MANAGEMENT STRATEGY

In 2009, 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 decrease, only the priority units will be maintained at target elevations. Non-priority units will be allowed to dry naturally through evaporative losses with re-filling commencing (in priority order) in September or when dependable water supply allows. Fall targets should be achieved 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 8" 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 94% of normal on April 1, 2009 (http://www.ewcd.org/snotel/snow_data.php). The 2009 forecast streamflows in the Bear River basin range from much below to near average (53%-96%) volumes for the spring and summer with an overall forecast of 90% of average (<http://www.cbrfc.noaa.gov/wsup/wsup.cgi>). This will likely equate to flows around 100-130 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 5,000 acres of wetlands may be maintained at target levels in 3-5 of the highest priority units throughout the driest period of the year (Table 5).

In the fall, when the water supply allows, the units will be re-filled in the order indicated in Table 5. 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 5. Management priority order of wetland units, 2009.

Unit	Total Acres	Wet Acres	Spring Target Elevation	Priority Order	Maintenance Needs (July-Aug.)	Cumulative Needs (July-Aug.)	Fall Fill Order	Winter Target Elevation
			2009		cfs	cfs	2009	2009
1	12,204	4638	4204.50	1	80	80	1	4204.00
4C	1,528	1528	4205.00	2	26	106	2	
2D ¹	4,619	4,029	4205.25	3	69	176	3	4204.75
3E	1,448	1,396	4204.60	4	24	200		
3B	1,085	1,066	4205.00	5	18	218	4	
3A	505	505	4206.00	6	9	227	5	
3I	211	211	4205.00		4	231	6	
3J	166	166	4206.00		3	233	7	
3K	230	230	4206.00		4	237	8	
1A	544	514	4205.40		9	246	9	
5C	2,558	2,516	4204.75		43	333		4204.25
6	3,185	3,185	N/A		55	388		
4B ²	1,242	1242	4205.25		21	290		
2C ³	720	699	4204.50		12	400		
2B ³	294	290	4206.00		5	405		
2A	135	33	4205.50		1	406		
3F	903	956	15"		16	422		
3G	1,545	1,047	12.5"		18	440		
3H	655	540	4206.00		9	449		
3C ⁴	549	536	4204.00		9	459		
3D ⁴	1,045	1,034	4205.40		18	476		
5B ⁵	1,783	1,275	4204.60		22	268		
4A	2,698	2,698	4205.50		47	523		
5A	2,405	2,405	4205.50		41	564		
5D	939	939	N/A		16	581		
7	2,581	2,581	N/A		45	625		
8	4,158	4,158	N/A		72	697		
9	5,171	5,171	N/A		89	786		
10	15,262	15,262	N/A		263	1049		
Total	58,164							

2D¹ Allow to dry to 4204.0 by August 1 for shorebird habitat in July-August

4B² Dry below north contour to expose nesting island (by June 1) to facilitate destruction in late summer

2C³ / 2B³ Dry naturally to retreat phragmites

3C³ / 3D³ Pull boards May 15 to allow dry out for dike repair

5B⁵ Burn in spring and refill by May 15. Let dry naturally for late summer phragmites treatment

GRASSLAND POND MANAGEMENT

2008 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 2008.

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.

2009 MANAGEMENT PLAN FOR GRASSLAND PONDS

A. Objective

The 2009 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

2008 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, October-December) grazes were utilized as management tools on the grasslands in 2008. About 1480 acres were grazed in 11

designated areas by cooperator Lane Parker (Table 6).

Table 6. Prescribed grazing of grassland units, 2008.

			DAYS	# OF	AUM'S	AUM'S/	HEAD/
UNIT	ACRES	DATES GRAZED	GRAZED	HEAD	REMOVED	ACRE	ACRE
N3	45	Jan. 1-Jan. 10, 2008	10	243	81	1.8	5.4
N4	188	Jan. 11-Jan. 20, 2008	10	243	81	0.43	1.3
N5	63	Jan. 21-Feb. 14, 2008	25	243	202.5	3.2	3.9
N6	258	Feb. 15-March 1, 2008	16	243	129.6	0.5	0.9
N7	119	March 2-16, 2008	15	243	121.5	1.02	2.1
S1	196	March 17-22, 2008	5	243	40.5	0.21	1.2
1	225.13	Sept. 23-Oct. 7, 2008	15	88	44	0.20	0.4
		Oct. 8-Oct. 14, 2008	7	138	32.2	0.14	0.6
2	110.35	Oct. 15-Oct. 19, 2008	5	138	23	0.21	1.3
		Oct. 20-Oct. 27, 2008	8	148	39.5	0.36	1.3
		Oct. 20-Oct. 27, 2008	8	87 pair	23.2	0.21	0.8
		Oct. 28-Nov. 5, 2008	9	160	48	0.43	1.4
		Oct. 28-Nov. 5, 2008	9	87 pair	26.1	0.24	0.8
3	123.98	Nov. 6-Nov. 28, 2008	23	160	122.7	0.99	1.3
		Nov. 6-Nov. 28, 2008	23	87 pair	66.7	0.54	0.7
4	95.88	Nov. 29-Dec. 18, 2008	20	160	106.7	1.11	1.7
		Nov. 29-Dec. 18, 2008	20	87 pair	58	0.60	0.9
5	56.28	Dec. 19-Dec. 28, 2008	10	160	53.3	0.95	2.8
		Dec. 19-Dec. 28, 2008	10	87 pair	29	0.52	1.5
		Dec. 29-Dec. 31, 2008	3	156	15.6	0.23	2.3
		Dec. 29-Dec. 31, 2008	3	87 pair	8.7	0.15	1.5
Totals	1480.62				1352.8		

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.

2009 UPLAND GRASSLAND MANAGEMENT PLAN

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

B. Strategy Dormant season (January-March and September-December) grazing of the grassland unit will be attempted to reduce the duff layer and invasive plants, and increase native plant diversity. Consultation will be sought with the Natural Resources Conservation Service (NRCS) to initiate a Rangeland Health Evaluation Matrix. It is desired that the NRCS will assist with grassland health and grazing prescriptions to accomplish desired conditions.

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. Nesting success by shorebirds is also used to measure the effectiveness of our predator control program.

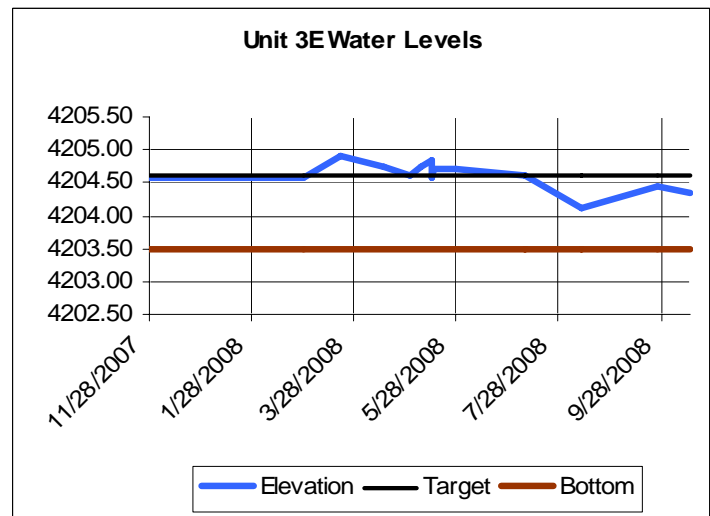
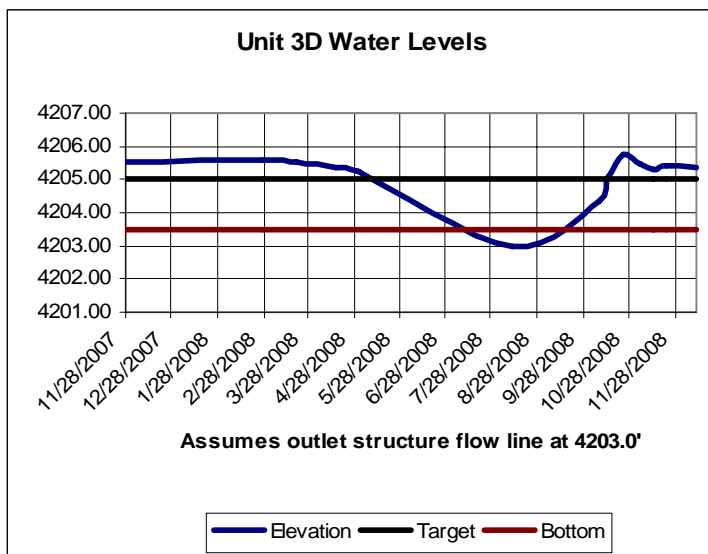
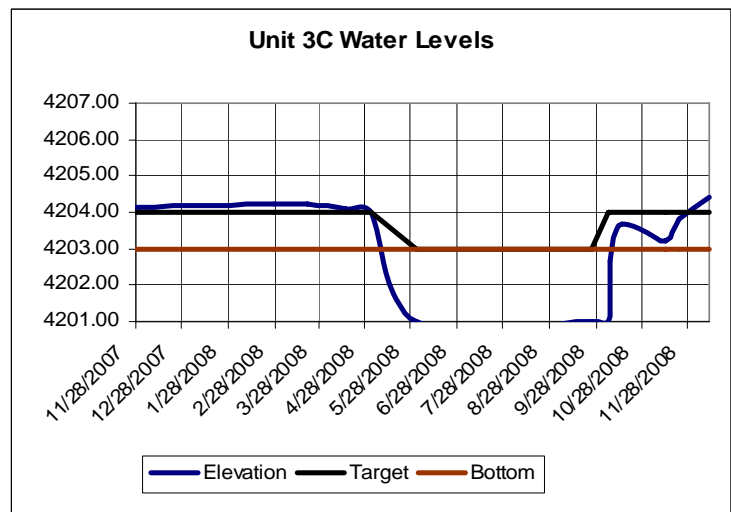
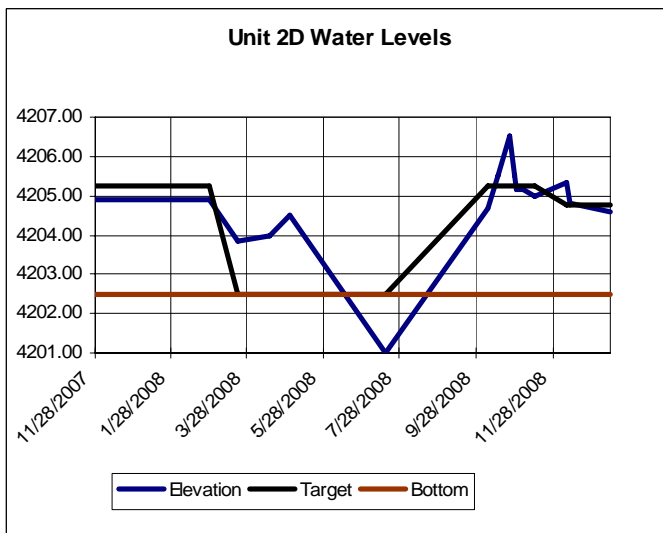
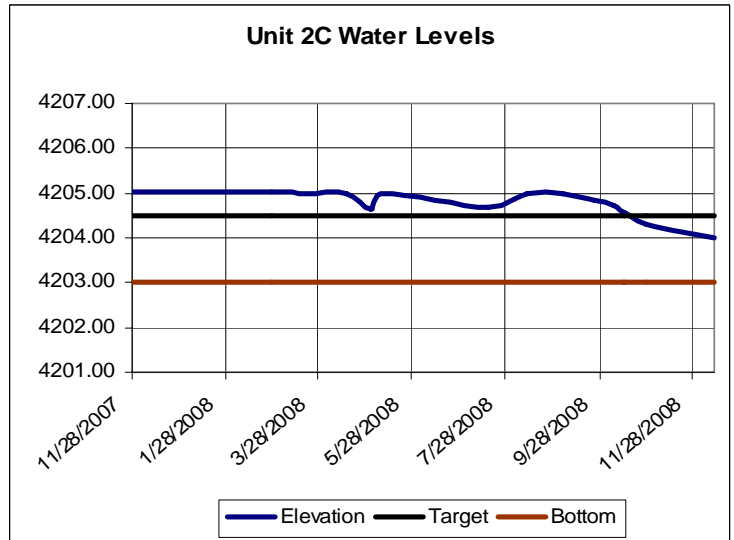
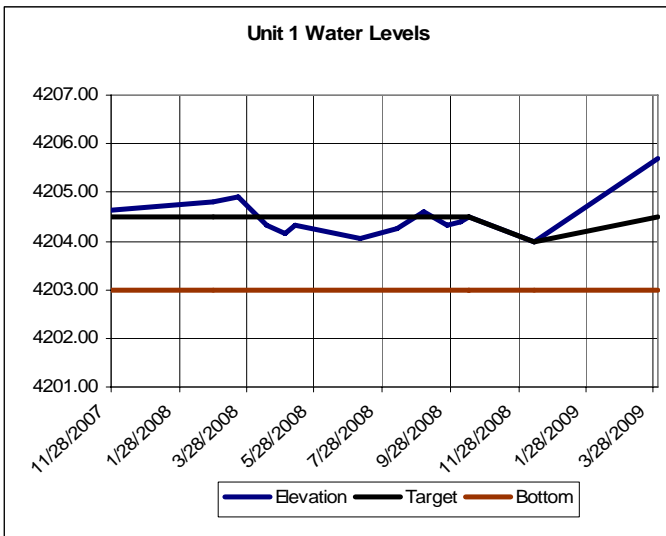
Refuge staff will also conduct mortality surveillance as a partner in Utah's Avian Influenza (AI) Surveillance Plan. The Refuge will also provide the bunkhouse as a check station to Utah Division of Wildlife Resources and USDA Wildlife Services as a location to collect tundra swan AI samples.

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

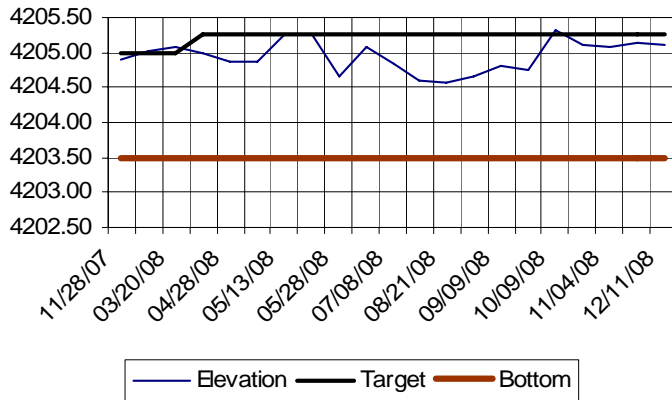
investigated in 2005. It is believed at this time that there are no other users below the point of diversion besides the Refuge. Therefore, the excess will by default reach the Refuge via a culvert under Interstate 15 and inundate wet meadows on the Stauffer Unit. The formal filing on this water is pending.

Appendix A. 2008 Unit Water Levels

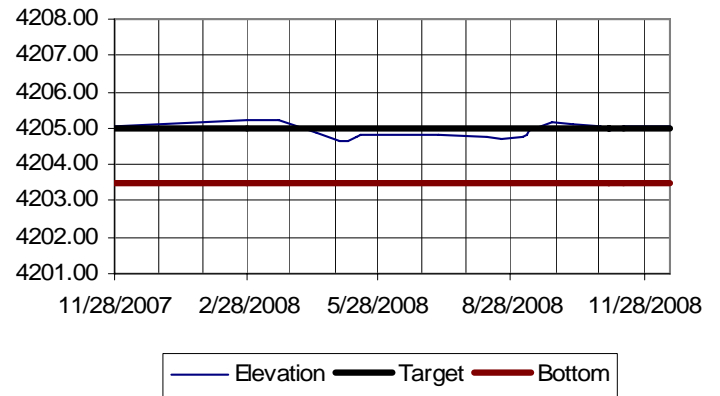


Appendix A. 2008 Unit Water Levels (continued)

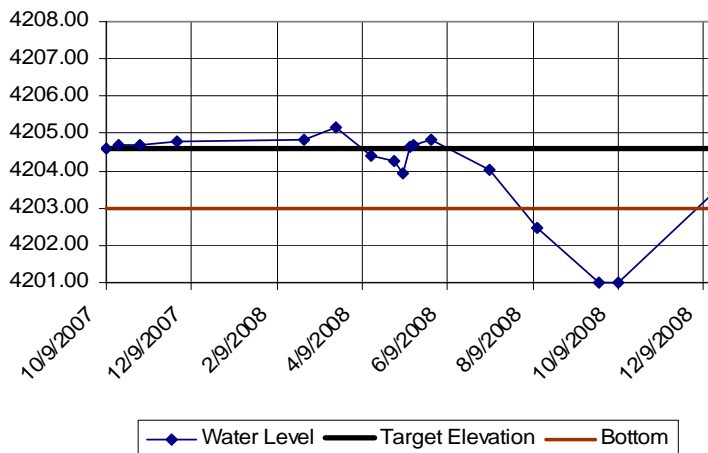
Unit 4B Water Level



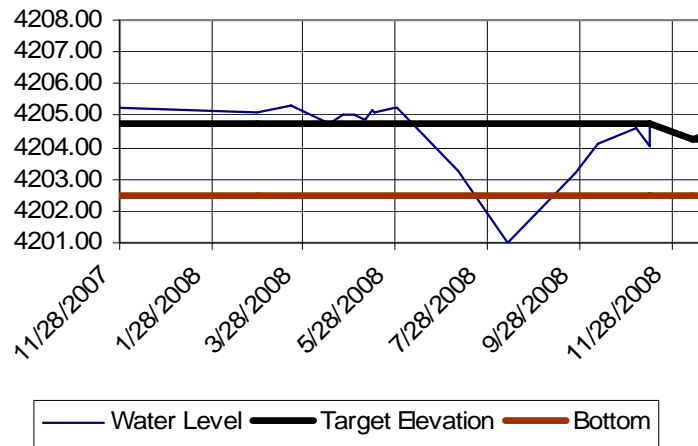
Unit 4C Water Levels



Unit 5B Water Levels



Unit 5C Water Levels



Appendix B. Significant use of management units by priority species as a proportion of total Refuge annual use ($\geq 10\%$ annual use), 2008.

Priority
Rank

1	American Avocet	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	65,458	11
	3E	143,032	24
	5B	125,550	21
	5C	64,219	11
	6	78,990	13
2	Cinnamon Teal	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	59,890	14
	3E	109,451	25
	6	138,956	31
3	Black-necked Stilt	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	5B	134,280	29
	5C	77,324	17
	6	111,255	24
4	White-faced Ibis	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	2D	63,960	17
	5B	37,812	10
	5C	59,636	16
5	Shorebirds	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	5B	423,962	18
	5C	345,182	15
	6	907,980	40
6	Waterfowl	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	4,795,994	17
	4C	7,756,431	28
	6	4,758,420	17
7	Tundra Swan	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	81,021	14
	2D	183,410	31
	4B	65,672	11
	6	109,679	18
8	Snowy Plover	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	294	44
	10	368	56
9	Marbled Godwit	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	5B	157,400	37
	5C	147,000	35
10	Long-billed Curlew	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	170	70
	10	74	30
11	Am. White Pelican	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	4C	35,105	13
	5C	48,078	18
	6	85,122	32
12	Redhead	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	69,762	12
	3D	72,240	12
	4C	169,786	29
	5C	70,628	12
	6	90,722	16
13	Wilson's Phalarope	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	1,396	61
	2D	294	13
	3E	588	26
14	Long-billed Dowitcher	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	6	683,200	86
15	Franklin's Gull	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	1	58,806	11
	5C	188,346	36
	6	117,773	23
16	Black Tern	Annual	Proportion of
	Unit	Unit Use	Annual Use (%)
	4C	5,292	100

Appendix C. Seasonal use of wetland units by priority species, 2008.

2008	Spring (Mar-May)			Use Days on	Seasonal Use	Peak Unit Use/
Species	Peak No.	Peak Date	Peak Unit	Peak Unit	Sum	Seasonal Use %
American Avocet	5,981	1-May	3E	40,715	153,910	26
Cinnamon Teal	4,591	1-May	3E	43,091	95,664	45
Black-necked Stilt	1,896	1-May	6	9,348	38,868	24
White-faced Ibis	3,265	1-May	3A	8,405	66,931	13
Shorebirds	9,434	1-May	3E	46,947	225,194	21
Waterfowl	236,810	21-Mar	6	1,251,534	7,063,802	18
Tundra Swan	11,545	21-Mar	2D	173,090	297,737	58
Snowy Plover	None Observed					
Marbled Godwit	460	1-May	5B	4,100	9,431	43
Long-billed Curlew	None Observed					
Am. White Pelican	225	1-May	4C	1,990	5,789	34
Redhead	10,045	21-Mar	5C	62,686	313,098	20
Wilson's Phalarope	None Observed					
Long-billed Dowitcher	943	1-May	3B	6,150	19,506	32
Franklin's Gull	3,444	1-May	6	42,030	70,732	59
Black Tern	None Observed					

* Only 1 date for this time period so no bird use days calculated

2008	Summer (June-July)			Use Days on	Seasonal use	Peak Unit Use/
Species	Peak No.	Peak Date	Peak Unit	Peak Unit	Sum	Seasonal Use (%)
American Avocet	3,281	3-Jul	5B			
Cinnamon Teal	421	3-Jul	5B			
Black-necked Stilt	4,894	3-Jul	5B			
White-faced Ibis	2,575	3-Jul	5C			
Shorebirds	13,415	3-Jul	5B			
Waterfowl	5,704	3-Jul	5B			
Tundra Swan	Not Present					
Snowy Plover	9	3-Jul	10			
Marbled Godwit	5,190	3-Jul	5B/5C			
Long-billed Curlew	1	3-Jul	10			
Am. White Pelican	3,281	3-Jul	6			
Redhead	661	3-Jul	6			
Wilson's Phalarope	31	3-Jul	1			
Long-billed Dowitcher	Not Observed					
Franklin's Gull	2,020	3-Jul	5C			
Black Tern	72	3-Jul	4C			

Appendix C. Seasonal Use (Continued), 2008.

2008	Fall (Aug-Nov)			Use Days on	Seasonal use	Peak Unit Use/
Species	Peak No.	Peak Date	Peak Unit	Peak Unit	Sum	Seasonal Use %
American Avocet	302	25-Sep	3E	2,494	4,974	50
Cinnamon Teal	3,005	25-Sep	6	28,202	43,572	65
Black-necked Stilt	37	25-Sep	6	435	537	81
White-faced Ibis	281	25-Sep	1	1,000	4,073	25
Shorebirds	13,958	25-Sep	6	179,206	204,684	88
Waterfowl	187,884	25-Sep	1	1,243,854	5,253,337	24
Tundra Swan	530	24-Oct	1	6,525	7,685	85
Snowy Plover	None Observed					
Marbled Godwit	220	25-Sep	6	4,060	4,582	89
Long-billed Curlew	3	25-Sep	1	44	44	100
Am. White Pelican	189	25-Sep	1	1,000	3,756	27
Redhead	1,727	25-Sep	4C	25,042	26,985	93
Wilson's Phalarope	None Observed					
Long-billed Dowitcher	12,970	25-Sep	6	174,000	191,995	91
Franklin's Gull	3,379	25-Sep	5C	32,973	48,996	67
Black Tern	None Observed					

2008	Winter (Jan-Feb, Dec.)			Use Days on	Seasonal use	Peak Unit Use/
Species	Peak No.	Peak Date	Peak Unit	Peak Unit	Sum	Seasonal Use %
American Avocet	Not present					
Cinnamon Teal	1	11-Dec	5C	143	143	100
Black-necked Stilt	Not present					
White-faced Ibis	1	11-Dec	2C	143	143	100
Shorebirds	18	11-Dec	3A	1,287	2,867	45
Waterfowl	55,830	11-Dec	4C	2,958,444	10,793,783	27
Tundra Swan	10,154	11-Dec	6	500,491	1,628,421	31
Snowy Plover	Not present					
Marbled Godwit	Not present					
Long-billed Curlew	Not present					
Am. White Pelican	11	11-Dec	4C	1,573	1,573	100
Redhead	920	11-Dec	4C	131,560	133,318	99
Wilson's Phalarope	Not present					
Long-billed Dowitcher	4	11-Dec	3A	572	572	100
Franklin's Gull	Not present					
Black Tern	Not present					