



UNITED STATES GOVERNMENT

MEMORANDUM

Date: January 22, 1996

From: Des Lacs NWR Complex  
P.O. Box 578  
Kenmare, ND 58746

To: N. D. Refuge Supervisor, Denver, CO

Subject: Annual Water Use Report/Management Plan

Attached is the subject report for review and forwarding to Engineering for the Des Lacs NWR. If you have any questions please call Dan Severson at 701-385-4046.

  
Dan Severson  
Acting Project Leader

# DES LACS NATIONAL WILDLIFE REFUGE

## WATER MANAGEMENT PLAN

1996

Prepared by: Dan Severson  
Refuge Manager

Date: 22 January, 1996

Concurrence: Dan Severson  
Acting Project Leader

Date: 22 Jan 96

Regional Approval: \_\_\_\_\_

Date: \_\_\_\_\_

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## **1995 WATER MANAGEMENT**

Precipitation for the October 1994-April 1995 winter period was 3.4" above normal. Spring run-off came early in March and was heavy due to a good frost seal in the winter. All units except Units 1 and 2 reached and exceeded objective levels in March. Precipitation during spring and summer was slightly below normal, but enough to keep units at desired levels. Heavy precipitation in June in Burke County caused Units 1 and 2 to increase rather than decrease during the summer. Amounts were recorded from 9-18" adjacent to the refuge. August-October recorded below normal precipitation with soil moistures declining. November's above normal precipitation coupled with freezing rain on several days created an excellent frost seal above fair soil moisture conditions. Snow again began piling up early with approximately 21" total in November and December and all indications are pointing to excellent run-off in spring of 1996. Several minor thaws occurred in December 1995 and January 1996 but little water entered the soil and most is still on the ground in the form of ice sheets.

The "big thaw" came quickly in 1995, and provided the area with good to excellent water conditions. The water started running in early March with peak flow from March 10-25. All wetlands on Des Lacs were at or above spring target levels, with downstream releases occurring. The 1300 acre Unit 2 rose over 2.0' during the month, the 2980 acre Unit 1 rose 2.5', the 700 acre Unit 7 rose almost 4.0', and emergency spillways on Units 3, 4a, 5, 6, 7 and 8 also ran.

The Bureau of Reclamation contracted with Harris Construction, Kenmare, to increase the elevation of the three 0.25 acre islands in Unit 7 that were built at too low an elevation in 1994 by BOR. Dirt was hauled to the islands in March 1995 over the ice and the islands reshaped. No additional rip-rap was placed. Spring run-off filled Unit 7 to 1784.50 which was within 0.5' of the top of the islands. Some erosion occurred on the new material. The islands were seeded in spring but a poor catch resulted. Though most of the seed germinated, it did not last the summer. Reseeding will take place in 1996.

A fair stand of emergent vegetation remained in Unit 2, though less than in 1994. The rising water level in Units 1 and 2 will eventually flood out the emergents and overwater nesting habitat for grebes and waterfowl unless water levels can be kept lower. This is the major challenge in water management on the refuge.

Water levels in Units 4, 5, and 6 were lowered in late summer as planned to attract migrating waterfowl to shallow marsh habitat. Snow geese and ducks responded favorably to lower water levels in Unit 6 and the marsh hosted thousands of geese and ducks from September until migration in early November. Coulee Units 3, 4a and 8 all declined to levels lower than outlet structures due to evaporation. No boards were pulled in 1995 in these units and natural drawdowns occurred. The Unit 3 WCS repair appeared to work in 1995 and no further repairs were required.

The Unit 8 bypass ditch out of Unit 7 was cleaned by Pfeifer Dragline, Minot, in October-November 1995. Cattails and silts were removed from the channel with spoil placed on the west dike. Water flow out of Unit 7 increased immediately and flow continued through mid-January until severe cold weather froze up the structure. The project cost \$1900.00 and was paid for by the Northern Coteau Project NAWCA grant. This ditch impacts water management on the entire 26 mile long refuge and must be kept clean in the future. Annual spraying of cattails may be needed as mechanical control with mowing is not feasible as the ditch cannot be dried out, and hiring a dragline is not fiscally feasible.

The Regional Office Engineering and Water Rights staff continued to prepare for water rights adjudication during 1995 with an attempt to determine new area/capacity tables, and get accurate bottom topography of Units 1 and 2. Work continues on this project.

**TABLE 1. CLIMATIC CONDITIONS ON DES LACS NWR OCTOBER 1994-  
DECEMBER 1995 MEASURED AT KENMARE, ND**

MONTH	TEMPERATURES		PRECIPITATION (inches)		
	HIGH	LOW	SNOW	MOISTURE	AVERAGE MOISTURE
OCTOBER 1994	77	19	2.00	2.66	0.85
NOVEMBER	54	7	4.00	0.83	0.51
DECEMBER	50	-25	16.85	1.96	0.47
JANUARY 1995	42	-18	12.25	2.00	0.47
FEBRUARY	45	-13	3.00	0.37	0.49
MARCH	52	-21	8.75	1.71	0.62
APRIL	63	2	1.50	0.97	1.64
MAY	86	32		2.63	2.44
JUNE	90	32		1.37	3.83
JULY	91	43		2.88	2.32
AUGUST	99	44		0.58	2.02
SEPTEMBER	91	21	0.50	1.37	2.06
OCTOBER	79	17		1.18	0.85
NOVEMBER	45	-9	11.50	1.89	0.51
DECEMBER 1995	44	-18	11.00	1.26	0.47
TOTAL 1995			48.50	18.21	17.72

## **WATER MANAGEMENT PLAN FOR 1996**

Prospects for significant run-off are good in 1996. There is a fair snowpack in the Drift Plain and in the Missouri Coteau as of January 1996. Local soil conditions are only fair to good but with an excellent frost seal caused by several days of freezing rain in November that sealed fair soil moisture and is covered with snow. There is still an ice layer under the snow pack so a more than adequate spring run-off is anticipated. We will enter spring with excellent water conditions in Units 1, 2, 4, 5, 6 and 7. The coulee units 3, 4a and 8 are mostly dry but will fill easily.

Water level objectives for 1996 are the levels specified in the Long Range Water Management Plan which was approved in 1990. Units 1 and 2 are currently above desired water elevation and are expected to reach spillway elevations in spring 1996 if run-off meets current expectations.

### **Unit 1**

The objective levels after spring run-off will be 1782.5. This level is already exceeded in December 1995. Water levels are expected to rise to 1785.0 during spring run-off which will probably flood out much of the emergent vegetation on the perimeter of the unit. Excess water is currently being released into Unit 2 and will continue to be released in 1996 in an attempt to lower water levels. The water level froze in ~~the~~ November 1995 at 1783.10'.

### **Unit 2**

The Des Lacs Long Range Water Management Plan calls for an objective level of 1782.5. The Plan also states that "If this objective is met and exceeded by spring run-off, excess water will be released into Units 4 and 5 and farther downstream in an attempt to meet the objective levels of those pools, and to keep Unit 2 low enough to allow the emergents that have become established to continue to grow". Unit 2 water level froze at 1783.0 in November 1995, but with minimal flow continuing through the stoplog water control structure into Unit 4 during the winter. Water levels in Unit 4 continue to restrict flow downstream out of Unit 2. Unit 4 froze at 1782.70 in December though water continues to flow into Unit 5. This is higher than the spring objective level for Unit 2. Unit 4 is sure to rise to the 1785-1787 spillway level in the spring of 1996. Water level at freeze-up in fall 1995 was 1783.00, up 1.6' from fall 1994 level. We do not have the capability to manage the water in the spring at any lower level than Unit 4, unless low run-off simply does not fill the unit.

### **Unit 3**

The objective level after spring run-off will be the spillway level of 1787.0. Except for temporarily removing stop logs to release excess water if needed during peak run-off periods, the Unit 3 water control structure will not be changed. Water levels below 1787.0 will be obtained by evapotranspiration. This unit is expected to fill to spillway levels in the spring. Cattail appeared to increase in 1995 but does not need to be manipulated yet. The high spring run-off levels may be keeping the vegetation in check with good nesting conditions available in spring.

### **Unit 4**

The objective level after spring run-off will be 1783.5. The Unit 4 water control structure boards and gate will be kept open to help with release of excess water out of Units 1 and 2 as long as necessary. The water level at freeze-up in fall 1995 was 1782.70, 0.1' higher than fall of 1994 freezeup level. Water will be released into Unit 5 immediately in the spring in an attempt to pass water quickly out of Units 1 and 2. Water levels are expected to rise above objective levels in the spring to about 1785-1787, which is emergency spillway level. Fall objective levels are again 1782.50 in order to keep releasing Unit 1 and 2 water.

### **Unit 4A**

The objective level after spring run-off will be the spillway level which is 1788.0. It is anticipated that flash boards will need to be pulled to release excess water during spring run-off. Peak water level is expected to reach 1789-1790 during spring run-off. Water levels below 1788.0 will be determined by precipitation and evapotranspiration.

### **Unit 4B**

This is a new unit that resulted from the ditch cleanout between Unit 4 and Unit 5 water control structures. Beginning at the Unit 4 dike, spoil from the cleanout created an embankment that continued to the Soo Line Railroad bridge. This 15-acre area is surrounded by dikes and elevated railroad track with no water source. No water was pumped in 1995. Adequate run-off is expected in 1996, and if a Crisifulli type pump can be borrowed, water will be pumped into the unit until a two-foot depth is obtained over the majority of the area. If water is available, this level will be maintained until fall.

### **Unit 5**

The objective level after spring run-off is 1783.5. Spring 1995 levels rose to a high of 1786.30 in March. It is expected that the Unit 5 water control structure boards and gate



will remain open all spring to pass water from upstream units. The water level at freeze-up in fall 1995 was at 1782.50, which was the fall objective level. Additional water above 1783.5 will be released into Unit 6. Fall objective level is 1782.5 or lower.

### **Unit 6**

The objective level after spring run-off is 1783.5. The water level at freeze-up in fall 1995 was above target level at 1782.10. Water continued to be released through this unit through December. This unit is expected to rise above objective level in spring 1996 and emergency spillway is expected to run. Peak water elevation in spring 1995 reached 1786.40, over 2.5' above emergency spillway level. Additional spring run-off will be released into Unit 7 and flow is expected to continue during summer to allow release of upstream water. Water levels will be lowered in fall to about 1780.5.

### **Unit 7**

Target level for the unit is 1782.0 after spring run-off. Fall freeze-up level was 1781.7 and it is expected to rise to at least 1784-1785 during spring run-off. The bypass ditch continued to run through December releasing excess water from upstream. The bypass ditch is expected to again run most of the spring through fall of 1996 to release excess water. Water flow down the bypass ditch is expected to be much improved after cleaning in fall 1995 and may help to reduce peak water elevation in Unit 7. Fall 1996 target level is 1780.0.

### **Unit 8**

The objective level after spring run-off will be the spillway level which is 1784.0. Water levels below 1784.0 will be determined by evapotranspiration. Water level at fall 1995 freeze-up was 1781.60. Target level is expected to be reached easily.

## DES LACS NWR IMPOUNDMENT DATA

UNIT 1

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1782.5</u> LOW: <u>1778.5</u>
JANUARY	FROZEN 1779.5	
FEBRUARY	FROZEN 1779.5	
MARCH 31	1783.5	
APRIL 18	1784.0	1785.0
MAY 08	1784.8	
JUNE 28	1784.2	
JULY 12	1784.5	
AUGUST 31	1784.1	
SEPTEMBER 27	1783.5	
OCTOBER 31	1783.2	
NOVEMBER 6	FROZEN AT 1783.10	
DECEMBER	FROZEN AT 1783.0	
HIGH (AFTER SPRING RUN-OFF): <u>1784.8</u>		
LOW: <u>1779.5</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1786.0</u>		
BOTTOM OF OUTLET: <u>1779.0</u>		

## DES LACS NWR IMPOUNDMENT DATA

UNIT 2

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1782.5</u> LOW: <u>1780.0</u>
JANUARY	FROZEN 1781.40	
FEBRUARY	FROZEN 1781.74	
MARCH 21	1783.80	
APRIL 30	1783.74	
MAY 14	1783.90	1784.0
JUNE 28	1784.20	
JULY 12	1784.50	
AUGUST 28	1783.60	
SEPTEMBER 30	1783.40	
OCTOBER 27	1783.00	
NOVEMBER 18	FROZEN AT 1783.00	
DECEMBER	FROZEN AT 1783.00	
HIGH (AFTER SPRING RUN-OFF): <u>1784.74</u>		
LOW: <u>1781.40</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1787.0</u>		
BOTTOM OF OUTLET: <u>1780.0</u>		



## DES LACS NWR IMPOUNDMENT DATA

UNIT 3

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1787.0</u> LOW: <u>1784.0</u>
JANUARY	1783.70 Frozen	
FEBRUARY	1787.20	
MARCH 11	1788.20	
APRIL 22	1787.00	1787.0
MAY 14	1787.20	1787.0
JUNE 30	1787.00	
JULY 7	1786.70	
AUGUST 17	1786.00	
SEPTEMBER 28	1784.00	1784.0
OCTOBER 31	1783.50	
NOVEMBER 6	1783.50 Frozen	
DECEMBER 9	1783.50 Frozen	
HIGH (AFTER SPRING RUN-OFF): <u>1788.20</u>		
LOW: <u>1783.50</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1787.0</u>		
BOTTOM OF OUTLET: <u>1783.5</u>		

## DES LACS NWR IMPOUNDMENT DATA

UNIT 4

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1783.5</u> LOW: <u>1780.5</u>
JANUARY	FROZEN AT 1782.60	
FEBRUARY 28	1783.92	
MARCH 18	1786.30	
APRIL 6	1784.90	1783.5
MAY 26	1784.50	
JUNE 12	1784.50	
JULY 22	1784.50	
AUGUST 4	1784.10	
SEPTEMBER 9	1783.30	1780.5
OCTOBER 23	1782.90	
NOVEMBER 21	FROZEN AT 1782.80	
DECEMBER 9	FROZEN AT 1782.70	
HIGH (AFTER SPRING RUN-OFF): <u>1784.90</u> HIGH FOR YEAR: <u>1786.30</u>		
LOW: <u>1782.60</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1787.0</u>		
BOTTOM OF OUTLET: <u>1780.5</u>		



## DES LACS NWR IMPOUNDMENT DATA

UNIT 4A

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1788.0</u> LOW: <u>1785.5</u>
JANUARY	FROZEN AT 1786.20	
FEBRUARY 28	1789.20	
MARCH 18	1789.74	
APRIL 21	1789.10	1788.0
MAY 1	1788.90	
JUNE 30	1788.00	
JULY 7	1787.90	
AUGUST 4	1787.30	
SEPTEMBER 28	1786.10	1786.0
OCTOBER 24	1786.00	
NOVEMBER 6	FROZEN AT 1785.90	
DECEMBER	FROZEN AT 1785.90	
HIGH (AFTER SPRING RUN-OFF): <u>1789.10</u> HIGH FOR YEAR <u>1789.74</u>		
LOW: <u>1785.90</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1788.0</u>		
BOTTOM OF OUTLET: <u>1779.5</u>		



## DES LACS NWR IMPOUNDMENT DATA

UNIT 5

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1783.5</u> LOW: <u>1781.0</u>
JANUARY	FROZEN AT 1782.80	
FEBRUARY 28	1784.24	
MARCH 18	1786.30	
APRIL 6	1784.94	1783.5
MAY 23	1784.60	
JUNE 9	1784.56	
JULY 7	1784.26	
AUGUST 4	1783.88	
SEPTEMBER 7	1783.20	1780.5
OCTOBER 24	1783.00	
NOVEMBER 18	FROZEN AT 1782.60	
DECEMBER 29	FROZEN AT 1782.50	
HIGH (AFTER SPRING RUN-OFF): <u>1784.94</u> HIGH FOR YEAR <u>1786.30</u>		
LOW: <u>1782.50</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1783.5</u>		
BOTTOM OF OUTLET: <u>1778.0</u>		



DES LACS NWR IMPOUNDMENT DATA

UNIT 6

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1784.0</u> LOW: <u>1780.0</u>
JANUARY	FROZEN AT 1782.88	
FEBRUARY 28	1784.00	
MARCH 18	1786.40	
APRIL 22	1784.66	1783.5
MAY 23	1784.60	
JUNE 9	1784.60	
JULY 7	1784.26	
AUGUST 4	1783.88	
SEPTEMBER 7	1783.00	1780.5
OCTOBER 24	1783.00	
NOVEMBER 6	FROZEN AT 1783.20	
DECEMBER 29	FROZEN AT 1782.10	
HIGH (AFTER SPRING RUN-OFF): <u>1784.66</u> High for the year: <u>1786.40</u> LOW: <u>1782.10</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1784.0</u> BOTTOM OF OUTLET: <u>1777.5</u>		



DES LACS NWR IMPOUNDMENT DATA

UNIT 7

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1780.5</u> LOW: <u>1778.5</u>
JANUARY	FROZEN AT 1780.60	
FEBRUARY 28	FROZEN AT 1780.90	
MARCH 21	1784.50	
APRIL 6	1783.90	1782.0
MAY 1	1782.00	
JUNE 9	1781.56	
JULY 22	1781.20	
AUGUST 29	1781.80	
SEPTEMBER 29	1782.38	1780.0
OCTOBER 11	1782.64	
NOVEMBER 18	FROZEN AT 1781.80	
DECEMBER 29	FROZEN AT 1781.70	
HIGH (AFTER SPRING RUN-OFF): <u>1783.90</u>		HIGH FOR YEAR <u>1784.50</u>
LOW: <u>1780.60</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1784.0</u>		
BOTTOM OF OUTLET: <u>1778.5</u>		

## DES LACS NWR IMPOUNDMENT DATA

UNIT 8

PROGRAM YEAR 1995

WATER SURFACE ELEVATION FOR 1995		PLANNED WATER SURFACE ELEVATION FOR 1996
PLANNED:		HIGH: <u>1784.0</u> LOW: <u>1782.0</u>
JANUARY	FROZEN AT 1782.00	
FEBRUARY 26	FROZEN AT 1784.20	
MARCH 17	1784.66	
APRIL 6	1783.50	1784.0
MAY 1	1783.34	
JUNE 9	1783.30	
JULY 7	1782.90	
AUGUST 4	1782.40	
SEPTEMBER 28	1782.00	1782.0
OCTOBER 24	1781.60	
NOVEMBER 6	FROZEN AT 1781.60	
DECEMBER 9	FROZEN AT 1781.60	
HIGH (AFTER SPRING RUN-OFF): <u>1783.50</u> HIGH FOR YEAR <u>1784.66</u>		
LOW: <u>1781.60</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1784.0</u>		
BOTTOM OF OUTLET: <u>1778.5</u>		