

DES LACS NATIONAL WILDLIFE REFUGE

WATER MANAGEMENT PLAN

2013



4/11/12 AJJ

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2012 WATER MANAGEMENT

Overview

Units 1 and 2 went into 2012 freeze-up above average fall levels. Units 3, 4A, and 8 went into 2012 freeze-up below fall levels. Units 4 and below were left open to allow water levels to drop in Units 2 and 1. Outflows continued into January out of Unit 7. Unit 4 level never dropped below Unit 2 level. By mid-April all units were at or below spillway levels. These levels continued to drop and the units dewatered for the repair of Unit 6 and channel clean out.

Spring runoff started on March 12th, in the small coulee of Unit 3. By March 28th, major local runoff had begun. Unit 3 and 6 reached spillway crest levels by March 28th as well. In most years, runoff entering the units flows south out of the unit. In years with heavy runoff, it is possible to divert runoff entering Unit 4 to the north. This was accomplished by opening Unit 2, and moving water into Units 1 and 2 for storage. Once repair on Unit 6 and channel clean out is completed, water from Units 1 and 2 will be used to fill up Units 5 and 6.

Spring was followed by a dry, hot summer with evaporation taking place in the pools.

All units reached or were below objective levels. Units 1, 2, 3, and 4 were all equalized in elevation by mid April and Unit 4 structure was the main structure used to dewater these impoundments. Units 5, 6, and 7 continue to remain open for the dewatering on those impoundments.

All units went into freeze up below objectives except Units 1, and 2. Units 1 went into freeze up 2 feet higher than objective levels. All other units went into freeze up below unit objectives. These levels can only be met on a year with a dry/hot summer to allow for evaporation.

Weather

Precipitation for the October 2011-March 2012 winter period was 5.48" (+1.37"). Total snowfall for the same period was 28.09". Additional measurable snowfall fell in April and May with a total of 5.00", and 4.56" of moisture, for a total snowfall of 33.9".

The high temperature in March was 74°F on March 16. Temperatures continued to remain above average with highs in the upper forties and fifties with lows in the twenties. The month of April continued with this trend with a high temperature of 87°F on April 24. March and April precipitation was slightly lower than normal with 2.82" (-0.93") combined. May started with a high temperature of 89°F on May 5. Temperatures continued in the seventies and eighties with lows in the forties. There were 12 days with measurable precipitation adding up to the average of 2.37". June gave us another 3.59" (+0.12") of precipitation.

July, August, and September were drier than normal, with -2.63" below average precipitation during those months.

October, November, and December, brought us above average moisture, with 3.88" (+1.53"), but the mild November and December temperatures helped melt snow, evaporate moisture in the soil, and should leave us with less runoff come spring, barring weather conditions the rest of the winter.



Figure 1, Picture on left is Unit 3 water control structure (WCS) on 3-12-12; middle is Unit 7 WCS on 3-12-12. Right picture is Unit 8 WCS from 3-12-12, all showing the start of the spring run-off. Pictures taken facing to the W, SE, and NE respectively. AJJ



Figure 2, Unit 4 WCS, upper left taken 4-4-12, upper right taken 4-4-12, showing Unit 4 already at the objective level of 1783.5'. Bottom picture looking downstream of the Unit 4 WCS on 4-4-12. Pictures were taken facing NW, W, and S respectively. AJJ



Figure 3, Unit 5 by Brickyard Bridge photo taken on 4-4-12. Picture taken facing NW respectively. AJJ



Figure 4, Left photo was taken 4-4-12 looking SE, showing upper end of Unit 5. Right photo was taken 4-4-12 looking SW, showing Unit 5 WCS.



Figure 5, Upper end of Unit 5 photo taken on 8-29-12, showing results of the dewatering of Unit 5 in preparation for the channel clean out. AJJ



Figure 6, Both photos showing another view of the channel running through the upper end of Unit 5 photos taken on 8-29-12. Notice the high points and sediment buildup within the channel making it difficult to move water downstream. AJJ

TABLE 1. Climatic Conditions on Des Lacs NWR October 2011-December 2012 measured at Kenmare, ND

MONTH	TEMPERATURES (°F)		PRECIPITATION (inches)		
	HIGH	LOW	SNOW	MOISTURE	AVERAGE MOISTURE
OCTOBER 2011	87	21	t	2.37	1.19
NOVEMBER 2011	55	-7	6.1	0.66	0.69
DECEMBER 2011	45	-13	7.3	0.84	0.53
JANUARY 2012	57	-21	5	0.53	0.48
FEBRUARY 2012	48	-20	7.5	0.45	0.46
MARCH 2012	74	6	3	0.63	0.76
APRIL 2012	87	15	t	2.19	1.38
MAY 2012	87	36	5	2.37	2.37
JUNE 2012	89	44	0	3.59	3.47
JULY 2012	98	49	0	3.40	2.59
AUGUST 2012	102	45	0	0.15	2.10
SEPTEMBER 2012	96	21	0	0.15	1.64
OCTOBER 2012	70	14	.75	2.11	1.13
NOVEMBER 2012	53	-3	15.5	1.25	0.69
DECEMBER 2012	45	-25	7.5	0.52	0.53
TOTAL 2012			57.65	21.21	17.6

The NOAA Climate Reference Network weather station was operational all of 2012. The station is located 20 miles north of Kenmare on the west side of the lake in Unit HB-4.

WATER MANAGEMENT PLAN FOR 2013

As was planned in 2012, unit primary objective levels after spring runoff may deviate from those stated in the Long Range Management Plan. If compatible with Refuge objectives, the Refuge may hold spring runoff for as long as possible, to alleviate flooding downstream, by allowing uncontrollable runoff south of the refuge in the Des Lacs River valley to pass.

After the spring runoff period, Units 5, 6, and 7 will be dewatered to facilitate the cleanout of channel from Unit 4 to water control structure 6. This will allow Units 1, 2, and 4 to be dewatered to objective levels, which has not been accomplished in the past few years. This water will be used to restore Units 5, 6, and 7 to their objective levels after work is complete.

At current unit freeze-up levels, the Refuge is capable of holding 14,861 acre feet of water (spillway crest level on all units). Fifty-three percent (53%) of this storage, 7,958 acre feet, is in Units 1 and 2, and thirty-one percent (31%), 4,657 acre feet, in Unit 4.

Unit 1

The Unit 1 water level froze at an estimated 1785.52 ft., this is 5.52 ft. higher than fall objective levels of 1780.0. The primary objective level after spring runoff will be 1782.0 to 1782.5, as stated in the long range management plan. Realistically it will be similar to its fall freeze up level, until dewatering can occur later in the summer. The water control structure is currently set to allow excess water to be released south into Unit 2. The water levels in Unit 1 and Unit 2 will be managed at the same levels and be controlled by the Unit 2 water control structure.

Unit 2

The Unit 2 water level froze at 1782.60 ft., 2.60 ft. higher than desired. The water control structure is currently still releasing water slowly to the south through Unit 4. The primary objective level after spring runoff will be 1782.5, but same restrictions as Unit 1 will most likely make the level be close to its freeze up level. Water will be released as soon as conditions allow following spring runoff, and to keep Unit 2 low enough to allow emergent vegetation that have become established to continue to grow.

If compatible with Refuge objectives, the Refuge may hold spring runoff for as long as possible, to alleviate flooding downstream. This is accomplished by opening the structures at Unit 2 and 4 and allowing water to move north into Units 1, 2, and 4 for storage. Most of this runoff is coming from Ankenbauer and Tasker's coulees. This will make it difficult to achieve the primary objective level stated above, because the drawdown capability is limited by the highpoint in the channel south of Unit 4.

Unit 3

The objective level after spring runoff will be the spillway level of 1787.0. Current level at October 2012 freeze-up was 1784.0. Except for temporary removal of stop logs to release excess water during peak run-off periods, the structure will not be changed. The Unit 3 water control structure will remain closed all year.

Unit 4

The objective level after spring runoff will be 1783.5. The water level at freeze-up was 1782.68. Currently, the structure is set to allow water to move south, hoping that post freeze up drawn down might occur. If the decision is made not to move water north, Unit 4 will be closed to divert the runoff from Tasker's Coulee to the south. Spring levels are expected to stay below the emergency spillway level of 1788.5. The fall objective level is 1781.0.

The Unit 4 structure was replaced in 2009. The new outlet invert elevation is 3 feet lower than the previous structure.

Based on a survey completed for the Ward County Water Resources Board in 2003, the high point that controls the lowest level that Unit 4 can be drawn down is about 500' south of the structure (1783.75').

Unit 4A

The objective level after spring runoff will be 1788.4. The water level at freeze-up was unknown due to an ice jam in the spring of 2010 breaking the gauge, and the flooding of 2011 making it difficult to repair the gauge. Currently, the elevation is set at 1788.0. The water level is expected to reach the spillway elevation quickly during spring runoff. Water levels will be kept at 1787.0 into the fall, if possible.

Unit 4B

No water was pumped in 2012. Low water levels (6-12 inches) from April to July, which made for good waterfowl habitat in June and July when the water started to recede. No pumping is planned in 2013, and the unit is expected to be mostly dry with water only in some of the ditches. Marginal habitat will be provided.

Unit 5

The water level at freeze-up was 1780.80. It is expected the unit will fill quickly from spring runoff. The objective level after spring runoff is normally 1783.5, but this year the unit will be dewatered for the repair of Unit 6, and channel clean out in August.

The Unit 5 structure was replaced in 2010. The new outlet invert elevation is 1.4 feet lower than the previous structure.

Unit 6

The water level at freeze-up was 1778.90. The objective level after spring runoff is normally 1783.4 (spillway crest level), but the unit will be dewatered this year for channel clean out in August.

In 2010, the water elevation was held high to show a leak near the water control structure until it could get inspected. This water control structure was monitored closely in 2011 and 2012, but with the high water levels on both sides of the dike showed no leaks. We will continue to monitor it in 2013.

The Unit 6 structure was replaced in 2009. The new outlet invert elevation is 1 foot lower than the previous structure.

Unit 7

The water level at freeze-up was 1778.98, with the water control structure and bypass channel still flowing at 20-25 cubic feet per second. All boards have been removed from the structure to allow water to flow from Units 1 and 2. Normally, the primary objective level after spring runoff is 1780.0, but this year, the unit may need to be dewatered to facilitate drawdown of Units 5 and 6.

Unit 8

The water level at freeze-up was 1780.53. The objective level after spring runoff will be the spillway level of 1783.9. Target level is expected to be reached because it is a small unit. The spillway is expected to run. Water levels below 1783.9 will be determined by evaporation in the fall, at which time water levels will be lowered to approximately 1782.0, if necessary.

DES LACS NWR IMPOUNDMENT DATA

UNIT 1

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED: HIGH: <u>1783.5</u> LOW: <u>1780.5</u>		
JANUARY 05	Frozen at 1783.74	
FEBRUARY 14	Frozen at 1783.74	
MARCH 28	1783.50	
APRIL 11	1783.60	1783.5(flood 1783.0-1784.0)
MAY 17	1783.60	1783.5 (objective level)
JUNE 19	1783.60	
JULY 20	1783.60	
AUGUST 07	1783.60	1780.0
SEPTEMBER 26	1784.00	
OCTOBER 26	Frozen at 1785.52	1780.0
NOVEMBER 11	Frozen at 1785.52	
DECEMBER 20	Frozen at 1785.52	
HIGH (AFTER SPRING RUNOFF): <u>1785.52</u> HIGH FOR YEAR: <u>1785.52</u>		
LOW: <u>1783.50</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1785.6</u>		
BOTTOM OF OUTLET: <u>1779.5</u>		
Acre-feet stored as of December 31 <u>26,948.0 AF</u>		
Maximum Acre-feet stored at spillway elevation 1786.0 <u>28,237.0 AF</u>		

DES LACS NWR IMPOUNDMENT DATA

UNIT 2

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED:		HIGH: <u>1783.5</u> LOW: <u>1780.0</u>
JANUARY 05	Frozen at 1783.66	
FEBRUARY 14	Frozen at 1783.50	
MARCH 28	1783.80	
APRIL 11	1783.66	1783.5 (flood 1784.0-1786.2)
MAY 17	1783.94	
JUNE 19	1784.00	1782.0 to 1782.5 (Objective level)
JULY 20	1783.60	
AUGUST 07	1783.20	
SEPTEMBER 26	1782.40	
OCTOBER 26	Frozen at 1782.60	1780.0
NOVEMBER 11	Frozen at 1782.60	
DECEMBER 20	Frozen at 1782.60	
HIGH (AFTER SPRING RUNOFF): <u>1784.00</u> HIGH FOR YEAR: <u>1784.00</u>		
LOW: <u>1782.40</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1789.4</u>		
BOTTOM OF OUTLET: <u>1778.33</u>		
Acre-feet stored as of December 31 <u>10,302.0 AF</u>		
Maximum Acre-feet stored at spillway elevation 1786.2 <u>16,614.0 AF</u>		

DES LACS NWR IMPOUNDMENT DATA

UNIT 3

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED: HIGH: <u>1787.0</u> LOW: <u>1784.0</u>		
JANUARY 05	Frozen at 1787.04	
FEBRUARY 14	Frozen at 1787.10	
MARCH 28	1787.16	
APRIL 11	1787.08	1788.3
MAY 17	1787.20	1787.0 (objective level)
JUNE 19	1784.14	
JULY 20	1786.70	
AUGUST 07	1786.10	
SEPTEMBER 26	1784.60	
OCTOBER 26	Frozen at 1784.0	1784.5
NOVEMBER 11	Frozen at 1784.0	
DECEMBER 20	Frozen at 1784.0	
HIGH (AFTER SPRING RUNOFF): <u>1787.54</u> HIGH FOR YEAR: <u>1787.54</u> LOW: <u>1784.0</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1787.0</u> BOTTOM OF OUTLET: <u>1782.0</u> Acre-feet stored as of December 31 <u>?estimate 30.0 AF</u> Maximum Acre-feet stored at spillway elevation 1787.0 <u>107.0 AF</u> ? Estimate-Area capacity table doesn't go below 1788.0'		

DES LACS NWR IMPOUNDMENT DATA

UNIT 4

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED: HIGH: <u>1783.5</u> LOW: <u>1780.5</u>		
JANUARY 05	Frozen at 1783.58	
FEBRUARY 14	Frozen at 1783.40	
MARCH 28	1783.74	
APRIL 11	1783.40	1783.5 (flood 1788.5)
MAY 17	1783.74	
JUNE 19	1783.60	1783.5 (objective level)
JULY 20	1783.30	
AUGUST 07	1783.20	
SEPTEMBER 26	1782.40	1781.0
OCTOBER 26	Frozen at 1782.68	
NOVEMBER 11	Frozen at 1782.68	
DECEMBER 20	Frozen at 1782.68	
HIGH (AFTER SPRING RUNOFF): <u>1783.74</u> HIGH FOR YEAR: <u>1783.74</u> LOW: <u>1782.40</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1788.5</u> BOTTOM OF OUTLET: <u>1777.62</u> Acre-feet stored as of December <u>1082.0 AF</u> Maximum Acre-feet stored at spillway elevation 1788.5 <u>5739.0 AF</u>		

DES LACS NWR IMPOUNDMENT DATA

UNIT 4A

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED: HIGH: <u>1788.4</u> LOW: <u>1785.0</u>		
JANUARY	Frozen at gauge missing	
FEBRUARY	Frozen at gauge missing	
MARCH	Frozen at gauge missing	
APRIL	gauge missing	1788.4 (flood 1789.5)
MAY	gauge missing	
JUNE	gauge missing	1788.4 (objective level)
JULY	gauge missing	
AUGUST	gauge missing	
SEPTEMBER	gauge missing	1785.5
OCTOBER	gauge missing	
NOVEMBER	gauge missing	
DECEMBER	holding water gauge missing	
HIGH (AFTER SPRING RUNOFF): ? HIGH FOR YEAR ? LOW: ? Gauge missing from ice jam, still holding water into freeze up		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1788.4</u> BOTTOM OF OUTLET: <u>1786.6</u> Acre-feet stored as of December 31 <u>?20.0 AF</u> Maximum Acre-feet stored at spillway elevation 1788.6 <u>54.0 AF</u> ? Estimate-Area capacity table doesn't go below 1788.0 **Estimate-gauge does not go that low.		

DES LACS NWR IMPOUNDMENT DATA

UNIT 5

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED:		HIGH: <u>1783.5</u> LOW: <u>DRAWDOWN</u>
JANUARY 05	Frozen at 1782.10	
FEBRUARY 14	Frozen at 1781.90	
MARCH 28	1783.72	
APRIL 11	1783.50	1783.5 (flood 1784.6)
MAY 17	1783.54	DRAWDOWN
JUNE 19	1783.50	
JULY 20	1781.90	
AUGUST 07	1782.00	(1780.5 to 1781 recommended)
SEPTEMBER 26	1780.60	
OCTOBER 26	Frozen at 1780.80	
NOVEMBER 11	Frozen at 1780.80	
DECEMBER 20	Frozen at 1780.80	
HIGH (AFTER SPRING RUNOFF): <u>1783.7</u> HIGH FOR YEAR <u>1783.7</u> LOW: <u>1780.6</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1784.6</u> BOTTOM OF OUTLET: <u>1777.62</u> Acre-feet stored as of December 31 <u>2.0 AF</u> Maximum Acre-feet stored at spillway elevation 1784.6 <u>90.0 AF</u>		

DES LACS NWR IMPOUNDMENT DATA

UNIT 6

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED:		HIGH: <u>1783.4</u> LOW: <u>DRAWDOWN</u>
JANUARY 05	Frozen at 1780.60	
FEBRUARY 14	Frozen at 1781.0	
MARCH 28	1783.72	
APRIL 11	1783.44	1783.4
MAY 17	1783.60	DRAWDOWN
JUNE 19	1783.30	
JULY 20	1781.70	
AUGUST 07	1781.70	(1780.5 to 1781 recommended)
SEPTEMBER 26	1778.90	
OCTOBER 26	Frozen at 1778.90	
NOVEMBER 11	Frozen at 1778.90	
DECEMBER 20	Frozen at 1778.90	
HIGH (AFTER SPRING RUNOFF): <u>1783.72</u> High for the year: <u>1783.72</u> LOW: <u>1778.90</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1783.4</u> BOTTOM OF OUTLET: <u>1776.6</u> Acre-feet stored as of December 31 <u>1.0 AF</u> Maximum Acre-feet stored at spillway elevation 1783.5 <u>282.0 AF</u>		

DES LACS NWR IMPOUNDMENT DATA

UNIT 7

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED: HIGH: <u>1780.5</u> LOW: <u>1780.0</u>		
JANUARY 05	Frozen at 1779.44	
FEBRUARY 14	Frozen at 1778.34	
MARCH 28	1779.90	
APRIL 11	1780.44	1780.5 (flood 1783.9)
MAY 17	1781.00	1780.5 objective level (or drawdown if needed)
JUNE 19	1780.60	
JULY 20	1780.00	1779.0
AUGUST 07	1779.60	
SEPTEMBER 26	1778.60	1778.5
OCTOBER 26	Frozen at 1778.98	1778.0
NOVEMBER 11	Frozen at 1778.98	
DECEMBER 20	Frozen at 1778.98	
HIGH (AFTER SPRING RUNOFF): <u>1781.00</u> HIGH FOR YEAR <u>1781.00</u> LOW: <u>1778.34</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1784.0</u> BOTTOM OF OUTLET: <u>1778.5</u> Acre-feet stored as of December 31 <u>602.0 AF</u> Maximum Acre-feet stored at spillway elevation 1784.0 <u>2599.0 AF</u>		

DES LACS NWR IMPOUNDMENT DATA

UNIT 8

PROGRAM YEAR 2013

WATER SURFACE ELEVATION FOR 2012		PLANNED WATER SURFACE ELEVATION FOR 2013
PLANNED: HIGH: <u>1783.9</u> LOW: <u>1782.0</u>		
JANUARY 05	Frozen at 1781.84	
FEBRUARY 14	Frozen at 1781.8	
MARCH 28	Frozen at 1782.54	
APRIL 11	1782.4	1783.90
MAY 17	1782.6	
JUNE 19	1782.52	
JULY 20	1781.94	
AUGUST 07	1781.58	
SEPTEMBER 26	1780.64	1781.50
OCTOBER 26	Frozen at 1780.53	
NOVEMBER 11	Frozen at 1780.53	
DECEMBER 20	Frozen at 1780.53	
HIGH (AFTER SPRING RUNOFF): <u>1782.60</u> HIGH FOR YEAR <u>1782.60</u>		
LOW: <u>1780.53</u>		
MAXIMUM ELEVATION PERMISSIBLE (CREST OF SPILLWAY): <u>1783.9</u>		
BOTTOM OF OUTLET: <u>1780.0</u>		
Acre-feet stored as of December 31 <u>2.0 AF</u>		
Maximum Acre-feet stored at spillway elevation 1783.9 <u>138.0 AF</u>		

DES LACS NATIONAL WILDLIFE REFUGE
POTENTIAL WATER STORAGE
2013

Unit	Current Elevation	Spillway Elevation	Max Acre-feet Storage at Spillway Elevation	Surface Acres at Spillway Elevation	Current Surface Acres	Current Acre-feet Stored	Acre-feet Storage Available
1	1785.52	1786.0	28,237	2,692	2,678	26,948	1,289
2	1782.6	1786.4	16,614	1,789	1,704	10,302	6,312
3	1784.0	1787.0	107	57	45*	30*	77*
4	1782.68	1788.6	5,739	847	713	1,082	4,657
4a	?	1788.6	54	38	20*	30*	24*
5	1780.80	1784.6	90	70	3	2	88
6	1778.90	1783.36	282	183	3	1	281
7	1778.98	1784.0	2,599	430	327	602	1,997
8	1780.53	1784.0	138	116	4	2	136
Total							14,861

*estimate

DES LACS NATIONAL WILDLIFE REFUGE
POTENTIAL WATER STORAGE
2013

New chart due to change in gauge readings on Unit 1

Unit	Current Elevation	Spillway Elevation	Max Acre-feet Storage at Spillway Elevation	Surface Acres at Spillway Elevation	Current Surface Acres	Current Acre-feet Stored	Acre-feet Storage Available
1	1782.62	1786.0	28,237	2,692	2,583	19,258	8,979
2	1782.6	1786.4	16,614	1,789	1,704	10,302	6,312
3	1784.0	1787.0	107	57	45*	30*	77*
4	1782.68	1788.6	5,739	847	713	1,082	4,657
4a	?	1788.6	54	38	20*	30*	24*
5	1780.80	1784.6	90	70	3	2	88
6	1778.90	1783.36	282	183	3	1	281
7	1778.98	1784.0	2,599	430	327	602	1,997
8	1780.53	1784.0	138	116	4	2	136
Total							22,551

*estimate

DES LACS NATIONAL WILDLIFE REFUGE

WATER MANAGEMENT PLAN

2013



4/11/12 AJJ

Prepared by: Jason Melin Date: 2/19/13
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