Finalized by: Sharon

Originated by: Lisa

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MAR 7 1994

Memorandum

To: Refuge Manager, Necedah National Wildlife Refuge

From: Wildlife Associate Manager 1

Subject: Annual Water Management Program for 1994

Your Annual Water Management Program for 1994 is approved as written. The Division Biologist has provided comments on some minor editorial changes which are attached for your information.

This plan is well-written and provides the guidance needed for a successful water management program this year. Keep up the good work!

Edward S. Crozier

Attachments

WAM1:LLMandell:sharon:3/3/94:x3701 (G:\WAM1\NCD\AWP.MEM)

COPY

ANNUAL WATER MANAGEMENT PROGRAM - 1994

NECEDAH NATIONAL WILDLIFE REFUGE
Necedah, Wisconsin

Submitted by: _____ Date: 1/31/94

Concurrence: _____ Date: 2-23-94

_____ Date: _____

Approved by: _____ Date: 3/7/94

United States Department of the Interior

Fish and Wildlife Service

Division of Migratory Birds and Refuge Biology

425 State Street

P. O. Box 2484

LaCrosse, Wisconsin 54602-2484

TAKE PRIDE IN AMERICA

In Reply Refer to:

February 23, 1994

Memorandum:

Steve Wilds 2/28/94

To: Chief, Division of Migratory Birds and Refuge Biology, Region 3, Twin Cities, MN

From: Assistant Regional Refuge Management Biologist, P.O. Box 2484, La Crosse, WI 54650

Subject: Review of Necedah Annual Water Management Program 1994

I'm happy to concur with the subject plan. Water management has become highly developed at Necedah. A few errors should be corrected on the computer copy of the plan, so that these will not be perpetuated in succeeding plans:

Page 14 under B.2., par. 1, line 3 -- add either "inhibit" or "suppress" to woolgrass.

Page 20, line 5 of first par. -- "spewing" should be "spring."

Page 24, line 2 of second par. -- Delete either "was" or "went."

I commend the use of the schedule at the back of the plan. This should be a valuable tool for the water manager to take in the field. I think every annual plan should include a map of pools simply because the reviewers are not usually as familiar with the pools.

Robert B. Dahlgren

ANNUAL WATER MANAGEMENT PROGRAM

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Pool 1

Maximum elevation permissible: 924.0'

Flowline elevation of lowest drain structure: 910.00 (New Dam)

Elevation of general pool bottom (not borrow pit bottom): 920.0'

Emergency spillway flow level: 924.5'

Level of dike top: 929.0' +/-

Level of dam top: 929.0' +/-

5 Bays each with 6.0'

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations	Water Surface Elevations	
Jan. 1	922.1	922.5	
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	922.3	924.5	Raised and stabilized to maximum
15	"	"	elevation for maximum spring
			waterfowl use and willow and
Apr. 1	923.3		wool grass suppression.
15	924.5		
May 1	924.7	"	
15	924.5	"	
Jun 1	924.8	"	
15	924.8	"	
Jul. 1	924.5	"	
15	924.3	"	
Aug. 1	923.6	"	
15	923.3	"	
Sep. 1	922.7	"	
15	923.2	924.5	Gradually lower the pool for
			invertebrate exposure to
Oct. 1	922.6	924.0	feeding waterfowl on the
15	922.5	923.5	marsh bottom.
Nov. 1	922.5	923.0	"
15	"	922.5	Allow to freeze at relatively low
			level to prevent ice heaving of the
Dec. 1	922.5	"	dike slopes.
15	922.6	"	
31	"	"	

A. 2. Effects of Past Year's (1993) Water Management Program - Pool 1

1) Water Supply. Water supply was adequate throughout the year. Surplus water was released through the outlet control all year.

2) Water level effects on habitat conditions. The pool was maintained at a level near 924.0' through August 1 when the pool was lowered to expose more ground at the duck banding site. The fall drawdown went as planned with water levels reaching 922.5' on October 15.

B. 2. Objectives for Proposed Levels (1994) Pool 1

The pool will be raised from the winter level of 922.2' to 924.5' by April 1. This is 6" below the spillway elevation and will provide maximum spring waterfowl habitat with minimal threat of erosion on the dike.

Water levels will be maintained at 924.5' through September 15 to suppress Woolgrass and Willow regrowth. Water levels will be lowered to 924.5' on September 15 to provide waterfowl feeding access to moist soil seed residues and invertebrates on the bottom of the pool. Water levels will be lowered gradually through mid-November to make the bottom in the deeper portions of the pool accessible to waterfowl as well as to provide perimeter loafing sites. The pool will be allowed to freeze to the bottom for rough fish control.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Pool 2

Maximum elevation permissible: 924.5'

Flowline elevation of lowest drain structure: 912.0'

Elevation of general pool bottom (not borrow pit bottom): 921.0'

Emergency spillway flow level: 925.0'

Level of dike top: 929.0'

Level of dam top: 929.0'

2 - 8' bays, 16' radial gate

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations	Water Surface Elevations	
Jan. 1	923.7'	923.0	Stabilize water levels
15	"	"	"
Feb. 1	"	"	"
15	"	"	"
Mar. 1	"	"	"
15	"	"	"
Apr. 1	923.3'	924.5	Raise after ice-out for maximum spring
15	924.5'	"	waterfowl use and to suppress woolgr and canary grass growth
May 1	924.7'	"	"
15	924.5'	"	"
Jun. 1	924.8'	918.0'	Drained for moist soil plant
15	924.8'	"	seed production
Jul. 1	924.5'	"	"
15	924.3'	"	"
Aug. 1	923.6'	"	"
15	923.3	"	"
Sep. 1	922.6'	"	"
15	923.2'	921.0'	Raised to partially reflood moist soil plants.
Oct. 1	922.6'	921.5'	"
15	922.5'	922.0'	"
Nov. 1	922.5'	923.0'	"
15	922.5'	"	"
Dec. 1	922.5'	922.0	Stabilize water levels to relatively
15	922.6"		low levels for winter ice damage
31	"		protection on dike.

A. 2. Effects of Past Year's (1993) Water Management Program - Pool 2

1) Water supply. Surplus water was released through the outlet control all year.

2) Water level effects on 1993 habitat conditions. Plans to keep the pool stabilized at full pool levels during the growing season to suppress woolgrass were successful in 1993.

The October drawdown went as planned and provided for more invertebrate exposure in the deeper portions of the pool. Exposed mud flats provided loafing sites for over 1,500 sandhill cranes during the peak of the migration in late October.

B. 2. Objectives for Proposed Levels (1994) Pool 2

Water levels will be brought up to near full pool as soon as possible after ice-out in March and maintained there through May 20 to suppress early woolgrass and reed canary grass growth around the marsh perimeter and to delay germination of moist soil plants until danger of frost is likely to be over. All necessary water, in the meantime, may be diverted into Suk Cerney Pool to bring it up to full pool. Then Pool 2 will be drained by June 1 through September for moist soil plant production. Then the pool will be gradually reflooded starting on September 15 through October 30 to make the seed crop available to fall migrant waterflowl.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Suk Cerney Pool

Maximum elevation permissible: 923.4'

Flowline elevation of lowest drain structure: 916.7'

Elevation of general pool bottom (not borrow pit bottom): 920.5'

Emergency spillway flow level: 923.4'

Level of dike top: 925.1' Side walls: 924.1'

Level of dam top: 925.1' Side Walls: 924.1'
(One Bay 8 ft. Stoplog)

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations	Water Surface Elevations	
Jan. 1	922.7'	921.5'	
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	"	"	
15	922.1'	"	
Apr. 1	922.6'	923.4'	Raise to highest possible level immediately after ice-out for maximum spring waterfowl use and water stora
15	923.0'	"	
May 1	923.5'	"	Use water diverted from Pool 2 if necessary.
15	923.5'	"	
Jun. 1	922.8'	"	"
15	923.8'	"	"
Jul. 1	922.9'	"	"
15	923.0'	"	"
Aug. 1	923.0'	"	"
15	"	"	"
Sep. 1	922.8'	"	"
15	922.9'	"	"
Oct. 1	"	"	"
15	922.7'	"	"
Nov. 1	922.7'	"	"
15	921.6'	"	"
Dec. 1	921.4'	921.0	Lowered for winter to prevent ice
15	"	"	heaving on foot of dike.
31	"	"	"

A. 2. Effects of Past Year's (1993) Water Management Program - Suk Cerney Pool

1) Water Supply. Water supplies were adequate enough in 1993 to keep the pool full through November as planned. The Pool was filled by mid-April with the help of water diverted from Pool 2. Diverted water flowed into Suk Cerney from March 25 through April 15. Surplus water was not released during any part of the year. Water was diverted from Pool 2 to Suk Cerney Pool from September 15 through mid-October. As a result Suk Cerney water levels were kept at full pool level throughout most of the growing season.

Spring waterfowl use continued to be higher than that occurring prior to the 1987 draw-down but was noticeably lower than that occurring on other pools. Hunter disturbance prevented most waterfowl use in the fall.

B. 2. Objectives for Proposed Levels (1994) Suk Cerney Pool

As soon as possible after ice-out in the spring, this pool will be raised to the highest permissible level of 923.4' (emergency spillway level). Water diverted from Pool 2 may be required to do this. Full pool is to be maintained as long as possible. Suk Cerney Pool will probably recede gradually by fall which is acceptable. No artificial drawdown is planned. All possible water is to be retained through the waterfowl hunting season, then lowered one foot for the winter if the pool is still full by the end of November.

This pool should be considered for a moist soil plant drawdown. This would benefit the pool by eliminating rough fish and by developing some vegetative structure on the pool bottom.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name:No. East Sprague Pool 29

Maximum elevation permissible: 940.0'

Flowline elevation of lowest drain structure: 929.72'

Elevation of general pool bottom (not borrow pit bottom): 937.2'

Emergency spillway flow level: 940.0' - Into Sprague Pool 30
943.0' - On East Dike

Level of dike top: 945.0'

Level of dam top: 945.0'

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevation		Water Surface Elevation
Jan. 1	938.0'	937.7'	Dry
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	"	940.0	Raised for best goose use of nesting
15	938.1'	"	islands and woolgrass suppression.
Apr. 1	940.0'	"	"
15	940.6'	"	"
May 1	940.4'	"	"
15	"	"	"
Jun. 1	949.6'	"	"
15	939.7'	"	"
Jul. 1	940.2'	"	"
15	940.0'	"	"
Aug. 1	937.5'	936.6	Drained for spike rush development
15	937.0'	"	for goose browse.
Sep. 1	936.9'	"	"
15	936.6'	"	"
Oct. 1	936.5'	"	"
15	"	"	"
Nov. 1	937.5'	"	"
15	"	"	"
Dec. 1	938.0'	938.0	Raised to prevent winter freeze-
15	938.1'	"	drying of bare mudflats.
31	"	"	"

A. 2. Effects of Past Year's (1993) Water Management Program - East Sprague Pool 29

Generally, water management went as planned in 1993. Water supplies and timing were adequate.

This pool was kept near full pool through August. The pool was then drained during the first week of August for spike rush production. Spike rush started to developed on the ten-acre mudflat west of the banding site and on the mudflat near the control structure. In mid-August high amounts of rainfall caused the mudflats to be reflooded. Water was immediately released through the outlet structure as fast as possible without the risk of washing out culverts downstream. The mudflats remained flooded for two weeks. Spike rush began to develop again on the mudflats at this time but with little time left in the growing season not much development took place. As a result, the pool received very little use from migrating Canada geese.

Because this pool has a relatively small watershed, it is most likely that reflooding in the fall after a summer drawdown will be unsuccessful. Therefore, the every third year drawdown cycle for moist soil plant seed production has not been implemented on this pool. Instead, it has been managed successfully most years since 1979 strictly for goose production and Spike rush green browse production.

B. 2. Objectives of Proposed Levels (1994) East Sprague Pool 29

Water levels will be about 2.0' below normal full pool from January 1 through February. At this level, ice damage to the toe of the dike and nesting islands will be prevented. The Spike rush mudflats are protected from freeze drying by the ice.

As soon as possible after March 1, the pool will be raised to the highest permissible level of 940.0'. Stoplogs will be set on Dam 29 so that the normal stream flow will be forced to trickle over the low-level spillway into the main Sprague Pool rather than over Dam 29. In this way, maximum obtainable pool levels are to be achieved. These levels are to be maintained through July 25 for best isolation of artificial nesting islands for goose production and brood habitat, as well as Woolgrass and Willow encroachment control on Spike rush mudflats.

Commencing in the last week of September, the pool will be lowered just enough to remove the surface water on the mudflat west of the banding site on the east dike. Water will be kept only two or so inches above the marsh bottom level. In this manner, the marsh bottom soils will remain saturated but expose enough mudflats for goose loafing sites. Levels will be maintained at this level through mid-November.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Sprague Pool 30

Maximum elevation permissible: 939.0'- Long term; 940.0'- Short term, i.e., once every 3-4 years for 3 months +/-.

Flowline elevation of lowest drain structure: 935.0'

Elevation of general pool bottom (not borrow pit bottom): 936.5'

Emergency spillway flow level: 943.0' +/-

Level of dike top: 945.0'

Level of dam top: 945.0 +/-

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994
Date	Water Surface Elevations	Water Surface Elevations
Jan. 1	938.0'	938.7'
15	"	"
Feb. 1	"	"
15	"	"
Mar. 1	"	939.0' Raise to enhance spring waterfowl
15	"	" use and to suppress woolgrass
Apr. 1	940.6'	" "
15	940.8'	" "
May 1	940.9'	" "
15	940.6'	" "
Jun. 1	939.4'	Drained for moist soil seed production
15	938.4'	"
Jul. 1	940.6'	" "
15	940.3'	" "
Aug. 1	939.1'	" "
15	938.7'	" "
Sep. 1	938.7'	" "
15	938.5'	" "
Oct. 1	938.6'	937.5' Gradually raise to reflood moist soil
15	938.6'	938.0' plants.
Nov. 1	938.7'	938.5'
15	939.0'	939.0'
Dec. 1	939.0'	938.0' Stabilize to prevent ice heaving
15	938.8'	937.5' on dikes.
31	938.8'	"

A. 2. Effects of Past Year's (1993) Water Management Program - Sprague Pool 30

1) Water Supply. Adequate water was available throughout 1993. Water was released from the Sprague Pool throughout the year. The June drawdown did not go as planned because water released from this pool could not flow downstream through the Upper Rice Pool structure fast enough to keep up. Therefore, the plans for the June drawdown were abandoned.

2) Water Level Effects on 1993 Habitat Conditions. Water levels were held lower in 1993 than usual on this pool during the attempted June drawdown. None of the mudflats on this pool were ever exposed so no moist soil plant were able to grow. The lower pool levels surely will increase the vigor of the hundreds of acres of willow on this pool.

B. 2. Objectives of Proposed Levels (1994) Sprague Pool 30

Water levels in the Main Sprague Pool, above Dam 30, will be at about 939.0', or at the maximum permissible level from January 1 through February.

The Pool will be maintained at the maximum permissible level of 939.0' and kept at this level through mid-May. This level will provide maximum habitat for spring migrant waterfowl, duck and goose breeding pairs, and brood habitat. Also, this level is as high as we dare go to inhibit encroachment of woolgrass and willows on islands and margins of the pool and still prevent wave action damage to the dike.

Commencing about May 15, the Main Sprague Pool will be drained as low as possible to provide the best possible drainage of exposed mudflats for moist soil plant production. The addition of second water control structure on Upper Rice Pool should allow the water released from this pool to pass downstream quickly.

Gradual reflooding of moist soil plants will commence about September 25, with water taken from Pools 13, 28, and 27. Pools 13, 28, and 27 will be held in high water management cycles in 1993 and should provide plenty of water to reflood Main Sprague Pool in the fall.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. West Sprague Pool 31

Maximum elevation permissible: 939.0'- Long term; 940.0' - Short term, i.e., once every 3-4 years for 3 months

Flowline elevation of lowest drain structure: 929.0'

Elevation of general pool bottom (not borrow pit bottom): 936.5'

Emergency spillway flow level: 945.0'

Level of dike top: 945.0'

Level of dam top: 946.0 +/-

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations		Water Surface Elevations
Jan. 1	938.5'	938.7'	
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	"	"	
15	938.8'	939.0'	Raised and stabilized for maximum spring waterfowl use and to suppress woolgrass.
Apr. 1	940.6'	"	"
15	940.8'	"	"
May 1	940.1'	"	"
15	940.2'	"	"
Jun. 1	939.4'	938.5'	Lowered to encourage submerged aquatics and to facilitate drawdown in adjacent Pool 30.
15	939.0'		
Jul. 1	940.6'		"
15	940.2'		"
Aug. 1	939.1'		"
15	938.7'		"
Sep. 1	938.7'		"
15	938.8'		"
Oct. 1	938.8'		
15	938.6'	937.5'	Lowered to provide loafing sites on exposed bars and feeding access to
Nov. 1	938.8'	937.0'	invertebrates on bottom.
15	939.0'	"	
Dec. 1	938.0'	"	Stabilize to prevent ice heaving on
15	937.5'	"	dikes.
31	"	"	"

A. 2. Effects of Past Year's (1993) Water Management Program - West Sprague Pool 31

1) Water supply. Water levels in this pool above 938.5' fluctuate with and are controlled with the adjacent Main Sprague Pool to the east. Below this level the pools are separated by a natural mud flat. Surplus water was released through the outlet control throughout the year.

2) Water level effects on 1993 habitat conditions. The pool was full throughout the 1993 growing season. The planned fall drawdown went as planned and provided some of the largest waterfowl concentrations on the Refuge.

B. 2. Objectives of Proposed Levels (1994) West Sprague Pool 31

Water levels of West Sprague Pool will be held at the maximum permissible level until mid-May. This level will provide maximum habitat for spring migrant waterfowl, duck and goose breeding pairs, and encroachment of woolgrass and willows on islands and margins of pool.

Commencing about May 20, West Sprague Pool will be lowered to 938.5' to facilitate the drainage of the adjacent Main Sprague Pool for moist soil plant seed production on June 1.

Commencing on October 1, West Sprague Pool will be lowered at 6 inch intervals through November 15 to provide loafing sites on exposed bars and feeding access to invertebrates on the pool bottom.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Goose Pool 33

Maximum elevation permissible: 942.0'

Flowline elevation of lowest drain structure: 936.0

Elevation of general pool bottom (not borrow pit bottom): 938.1'

Emergency spillway flow level: 943.0'

Level of dike top: 945.0'

Level of dam top: 943.0'

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations	Water Surface Elevations	
Jan. 1	940.5'	939.7'	
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	940.2'	"	
15	940.6'	942.0'	Raised for spring migration, to maximum elevation for woolgrass suppression.
Apr. 1	940.6'	"	"
15	942.0'	"	"
May 1	942.2'	"	"
15	941.9'	"	"
Jun. 1	942.0'	"	"
15	942.3'	"	"
Jul. 1	942.3'	"	"
15	942.0'	"	"
Aug. 1	940.8'	940.0'	Lowered to expose mudflats for spike rush
15	940.2'	"	production and loafing sites.
Sep. 1	940.2'	"	"
15	940.0'	"	"
Oct. 1	939.6'	939.0'	Lowered further to expose invertebrates
15	939.3'	"	in the deepest portions of the pool to feeding dabbler ducks.
Nov. 1	939.5'	"	"
15	935.5'	"	"
Dec. 1	939.7'	"	"
15	"	"	"
31	939.4'	"	"

A. 2. Effects of Past Year's (1993) Water Management Program - Goose Pool 33

This pool was kept full through July. In August a drawdown commenced for Spike rush production on exposed mudflats. Surplus water was released through Dam 33 and Dam 32 through West Sprague Pool.

Heavy rains in late August caused the mudflats to be prematurely reflooded. Water was immediately released through the outlet structure as fast as possible without the risk of washing out any culverts downstream. The mudflats remained flooded until mid-September. With very little time left in the growing season the Spike rush developed very little. As a result the pool received very little waterfowl use during 1993.

B. 2. Objectives for Proposed Levels (1994) Goose Pool

Following the spring thaw, this pool will be raised again to the maximum permissible pool level of 942.0' by April 1.

Water levels will be maintained at this high level through July. Then water levels will be reduced to 940.0' by the first week of August. This will expose 100+ acres of mudflats containing dead willows in the western portion of this pool. Water levels will be maintained at this level through September for Spike rush production and goose utilization of the exposed flats. The pool is to be lowered another foot in October.

Reduced levels during the fall migration will expose flats for loafing sites as well as expose invertebrates to bottom feeding waterfowl in the deeper portions of the pool. After November 20, water levels will be allowed to rise to cover the Spike rush mudflats for the winter to prevent freeze-drying of the bottom soils.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Pool 9

Maximum elevation permissible: 946.6'

Flowline elevation of lowest drain structure: 940.0'

Elevation of general pool bottom (not borrow pit bottom): 944.5'

Emergency spillway flow level: 946.6'

Level of dike top: 948.0' +/-

Level of dam top: 948.0' +/-

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations		Water Surface Elevations
Jan. 1	945.6'	946.1'	
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	945.7'	"	
15	946.0'	"	
Apr. 1	946.5'	946.2	Stabilized for maximum spring waterfowl
15	946.7'	"	use, to suppress woolgrass, and water
			retention for reflooding moist soil
May 1	947.0'	"	plants in West Sprague Pool in fall.
15	946.2	"	"
Jun. 1	946.0'	Drained to as low as possible for moist soil	
15	947.0'	plant production.	
Jul. 1	946.8'	"	"
15	946.5'	"	"
Aug. 1	946.2'	"	"
15	946.0'	"	"
Sep. 1	945.9'	"	"
15	945.9'	"	"
Oct. 1	945.4'	945.5'	Reflood moist soil plants
15	945.2'	946.0	"
Nov. 1	944.7'	946.0'	"
15	944.9'	"	"
Dec. 1	944.7'	945.5'	"
15	"	"	"
31	"	"	"

A. 2. Effects of Past Year's (1993) Water Management Program - Pool 9

1) Water supply. Surplus water was released through the outlet control all year. Water supply was adequate and water levels were generally managed as planned throughout the year. The pool was allowed to raise to full pool with the spring thaw through mid-May. No unmanageable floods occurred.

2) Water level effects on habitat conditions. The pool was maintained at a level near 946.0' through September. Willows and woolgrass were successfully inundated throughout the 1993 growing season. The fall drawdown went as planned. This pool only received moderate waterfowl use probably because there was plenty of flooded areas in Central Wisconsin from higher than normal amounts of precipitation.

B. 2. Objectives for Proposed Levels (1994) Pool 9

After ice-out in the spring the pool will be raised to near full pool (946.6') as soon as possible. This level will be maintained until May 25. Then the pool will be drained as low as possible for the rest of the growing season or until September 15 for moist soil plant seed production. Reflooding is to commence then and be completed by early October.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Pool 13

Maximum elevation permissible: 944.0'

Flowline elevation of lowest drain structure: 935.8'

Elevation of general pool bottom (not borrow pit bottom): 940.8'

Emergency spillway flow level: 943.5'

Level of dike top: 946.0' +/-

Level of dam top: 943.8'

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations		Water Surface Elevations
Jan. 1	943.0'	943.6'	
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	943.2'	"	
15	943.4'	944.0'	Levels held high and stable for spring migration, waterfowl production; and
Apr. 1	943.5'	"	woolgrass, reed canary grass-
15	944.0'	"	willow suppression.
May 1	944.0'	"	"
15	943.4'	"	"
Jun. 1	943.5'		"
15	944.5'		"
Jul. 1	944.0'		"
15	943.6'		"
Aug. 1	943.6'		"
15	943.3'		"
Sep. 1	943.0'		"
15	943.4'		"
Oct. 1	943.4'	942.5'	Gradually lower levels commencing on
15	943.0'	"	9/20 to provide loafing sites on exposed bars and feeding access to
Nov. 1	942.7'	"	invertebrates on bottom - using water
15	943.0'	"	to reflood moist soil plants in Main Sprague Pool.
Dec. 1	942.9'	942.0'	Lowered for winter to prevent ice
15	942.4'	"	heaving of dikes.
31	"	"	"

A. 2. Effects of Past Year's (1993) Water Management Program - Pool 13

As soon as it was possible after ice-out, the pool was raised to full pool level and it was kept at this level until mid-September. The pool was kept high enough to force some water over the emergency spillway throughout the growing season. This provided maximum habitat for the spewing migration and flooded perennials such as woolgrass, willow, and reed-canary grass. After mid-September water levels were successfully lowered about 1.0' causing invertebrates to become available to feeding waterfowl from the bottom of the deeper portions of the pool.

B. 2. Objectives for the Proposed Levels (1994) Pool 13

Following the spring thaw water levels will be allowed to rise to the maximum elevation permissible at 944.0'.

Water levels will be maintained at this high level through September 15 to kill any perennial vegetation that might have become established during the 1992 drawdown. Then water levels will be lowered to 943.0' to provide loafing sites on bars and provide access to invertebrates in the deeper portions of the pool.

Water levels will be lowered and stabilized at 942.0' on December 1 to prevent ice heaving on the dike.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Coaver Road (Carter-Woggon)

Maximum elevation permissible: 926.0'

Flowline elevation of lowest drain structure: 921.' (Est.)

Elevation of general pool bottom (not borrow pit bottom): 924.0'

Emergency spillway flow level: 926.0'

Level of dike top: 928.0' +/-

Level of dam top: 930.0'

One bay, 5' stoplog

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations	Water Surface Elevations	
Jan. 1	924.3'	924.2'	
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	"	"	
15	926.0'	"	
Apr. 1	926.6'	926.0'	Raised for spring migration, waterfowl
15	926.0'	"	production, and Bur-reed and Woolgra
			suppression, and to force water ove
May 1	926.2'	"	emergency outlet to fill new Coaver
15	926.0'	"	Road Pool South.
Jun. 1	927.0'	"	"
15	925.8'	"	"
Jul. 1	926.3'	"	"
15	924.8'	"	"
Aug. 1	923.0'	923.0'	Lowered to expose mudflats for
15	923.0'	"	spike rush development.
Sep. 1	923.0'	"	"
15	923.2'	"	"
Oct. 1	923.6'	"	"
15	924.0'	"	"
Nov. 1	924.2'	"	"
15	924.0'	924.0	Raised to flood spike rush flats for winter.
Dec. 1	924.0'	"	"
15	"	"	"
31	"	"	"

A. 2. Effects of Past Year's (1993) Water Management Program - Coaver Road Pool
(Note this pool is also known as Carter-Woggon Pool)

This pool began the year with water levels 2.0' below full pool levels. It was filled by mid-March. Surplus water was released through mid-May. The pool was drawn down as planned in August for Spike rush production. High amounts of rainfall in late August and early September caused the exposed mudflats to be reflooded with 6 inches of water. The remainder of the stoplogs in the outlet structure were removed in an effort to drain the water off of the mudflats. Even with the outlet structure fully open, the water wasn't drained off of the mudflats until September 15. Spike rush then developed on the exposed mudflats. With only a few weeks left in the growing season, very little development took place.

B. 2. Objectives for Proposed Levels (1994) Coaver Road Pool

Since this pool has a history of good spike rush production, another attempt will be implemented in 1994 to produce another crop as long as Bur-reed is suppressed. Therefore, the pool will be raised to full pool levels immediately after ice-out in the spring. Water levels will be maintained stable through July. After ice-out through July, all surplus water from this pool will be forced over its emergency spillway (if it's needed) to fill the Coaver Road South Pool downstream.

Beginning the first week of August, levels will be reduced just enough to expose spike rush producing mudflats. These flats should remain soggy, but just above water levels in the borrow ditches through mid-November. Levels will be raised in December and held through the winter to cover the Spike rush flats to prevent freeze-drying of the bottom soils.

If Bur-reed should become apparent again on the mudflats by August 1, the option to keep the pool high enough through September should be kept open to suppress this competitive plant.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Pools 19E & 19W

Maximum elevation permissible: 951.0'

Flowline elevation of lowest drain structure: 944.0'

Elevation of general pool bottom (not borrow pit bottom): 948.2'

Emergency spillway flow level: Unknown

Level of dike top:

Level of dam top: Bench Mark 952.13'

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations	Water Surface Elevations	
Jan. 1	950.5'	950.9'	
15	"	"	
Feb. 1	"	"	
15	"	"	
Mar. 1	"	951.0	Maintained stable for optimum spring
15	"	"	waterfowl use and to suppress or delay woolgrass encroachment.
Apr. 1	949.7'	"	"
15	951.4'	"	"
May 1	951.4'	"	"
15	951.0'	"	"
Jun. 1	950.9'	"	"
15	951.0'	"	"
Jul. 1	951.3'	"	"
15	951.0'	"	"
Aug. 1	946.4'	948.0	Drain west portion for moist soil
15	947.0'	"	green browse production (spike rush).
Sep. 1	947.1'	"	"
15	947.8'	"	"
Oct. 1	948.3'	"	"
15	948.0'	"	"
Nov. 1	948.3'	"	"
15	949.6'	"	"
Dec. 1	949.7'	949.0	Raise to prevent freeze-drying
15	"	"	of spike rush flats.
31	"	"	

A. 2. Effects of Past Year's (1993) Water Management Program - Pools 19E and 19W

Water levels in Pools 19W and 19E can not be managed separately. A water control structure should be placed in the ditch that connects these two pools to permit separate management of the pools.

In 1993, surplus water was released from these pools throughout the year. The planned August drawdown for Spike rush development was went as planned. The beaver plug on "Pool 19 Road", just south of the Pool 19W control structure, has been a chronic problem in the past several years. Thanks to beaver control efforts and the use of a back-hoe the culvert was only plugged briefly in 1993.

Water levels on these pools were raised to 949.0' on December 1 to prevent freeze-drying on the mudflats.

B. 2. Objectives of Proposed Levels (1994) Pools 19E and 19W

Water levels will be kept at full pool in both pools through July 25, and then lowered to 948.0' by August 1. At this level, the pools will be drained of surface water leaving enough water in the ditch that the mudflats remain near saturated for best spike rush production. Levels will be maintained at this level through November, then water will be raised to 949.0', which will cover the mudflats to prevent air freeze-drying over the winter.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name No. Remington

Maximum elevation permissible: 958.5'

Flowline elevation of lowest drain structure: 953.0'

Elevation of general pool bottom (not borrow pit bottom): This structure is a metered diversion structure on an inflow ditch. Water above structure is not managed as a pool for waterfowl habitat. Managed water is allowed to enter the refuge through four 5' bays at constant flows between 957.5' and 958.0' only.
Emergency spillway flow level: 960.5' (Top of long stoplogs)

Level of dike top:

Level of dam top:

A. 1. Water Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations		Water Surface Elevations
Jan. 1	959.7'	Stoplogs will be left at 958.92' until agreement as to what level the stoplogs will be held at is determined.	
15	"		
Feb. 1	"		
15	"		
Mar. 1	"		
15	"		
Apr. 1	959.7'		
15	959.8'		
May 1	959.5'	958.0'	The stoplogs will be to allow water to flow at this level.
15	"		
Jun. 1	959.5'		
15	954.4'		"
Jul. 1	957.5'		"
15	959.0'		"
Aug. 1	959.1'		"
15	"		"
Sep. 1	"		"
15	"		"
Oct. 1	"		"
15	"		"
Nov. 1	"		"
15	"		"
Dec. 1	"		"
15	"		"
31	"		"

A. 2. Effects of Past Year's (1993) Water Management Program - Remington Dam

1) Water Supply. The Remington control structure is operated to divert surplus water from the Remington Ditch into the Refuge in a controlled manner. Normally, the five foot long stoplogs are set so that the water higher than 957.5' and lower than 958.0' (a 6 inch gap) would be allowed to pass into the refuge. The 11' long stoplogs are normally set to exclude all flood waters higher than 958.0' from entering the refuge in order to prevent flood damage to refuge and township road culvert sites within the refuge.

Commencing on May 4, 1989, water was shut off at the Remington structure. So, other than leakage, no water was permitted to enter the refuge through this source for the remainder of the year 1989 to facilitate the reconstruction of the Rynearson Dam 1.

Rynearson Dam 1 was completed by November 1989, but the channel banks downstream form the new Dam 1 had to be resloped and riprapped with rock. This work wasn't completed until July 1990. In the meantime, the Remington structure was kept closed to facilitate the work on Dam 1. In fact, because of more than adequate rainfall received during the summer and fall of 1990, there was no need for water from the Remington structure to maintain planned water levels in the other refuge pools downstream. So the Remington structure was kept closed through the remainder of the year 1990. No water passed through the closed Remington structure except for some minor leakage. After September 1990, beaver had blocked up the leak between the stoplogs in the Remington structure.

In 1991, the beaver blocked stoplogs remained in the same situation into the spring when the refuge manager was notified that the Township of Necedah intended to replace four of its road bridges within the refuge starting in May. All of these bridges were downstream from the Remington control structure. The Refuge agreed to try to control water flows through these construction sites as best it could to facilitate the earth work involved. That meant water flows had to be diverted or stopped at times from their normal flow patterns. To facilitate this, all stoplogs including the beaver plug were left in the Remington control structure through September 1991, shutting off all possible water flowing through the bridge construction sites downstream. As it turned out, the refuge didn't need this inflow anyway in order to manage planned 1991 water levels in impoundments downstream of the Remington structure. Rain fall was adequate during the summer and even excessive in the fall. The bridge work was completed in late September. All stoplogs and the beaver plug remained in the Remington control structure through the end of the year. All water normally flowing into the refuge through this structure was surplus to refuge needs.

Commencing on June 15, 1992, because of their decrepit state, all the stoplogs in the Remington structure were removed and the water level allowed to drop to 954.4'. On June 18, 1992 all new stoplogs were put in the Remington structure to replace the old ones. The two long stoplogs which sit on top of the short bay risers were placed back in the structure at this time. This returned the stop logs to the same state they were in prior to 1989. This allowed the refuge to get 6 inches of water between the 957.5' and 958.0 levels. Replacing the old stoplogs was done at the request of Gene Miller who had called the refuge and complained that the structure was leaking. On June 19, 1992 the water level had raised to 957.58' (0.08 feet over the stoplogs) and on June 29, 1992 the water level was at 957.54' (0.04 feet over the stoplogs). On July 2, 1992 one stoplog was placed in each of the bays. This brought the level of the short stoplogs up the level of the long stoplogs and eliminated the 6 inch gap in the stoplogs. This raised the overall level of the stoplogs to

958.92'. This was done at the request of the refuge manager. On June 7, 1992 the water level was at 958.0' (0.0 feet over the stoplogs). Also on July 7, 1992 both of the long stoplogs and one of the short stoplogs from each bay were removed from the Remington structure. This returned the level of the stoplogs to their historic level (957.0') with the exception of the 2 long stoplogs being removed. With the 2 long stoplogs removed there was no longer a 6 inch gap between the logs. This was also done at the request of the refuge manager. On July 9, 1992 the water level was at 957.62' (0.62 feet over the stoplogs). Also on July 9, 1992 both of the long stoplogs and both of the short stoplogs were placed back into the Remington structure. This was done at the request of Gene Miller. This brought the level of the stoplogs up to 958.92' with no gaps in the logs. Also on this date, locks were placed on the stoplogs and "Government Property" signs were placed at the structure. On July 16, 1992 the water level was at 959.02' (0.16 feet over the stoplogs). The water level at the Remington structure stayed within 0.3 feet of this level for the rest of the year.

During 1993 the stoplogs remained at the same height the were left at in 1992 (959.02'). During 1993 the water stayed within 0.2' of this level.

2) Water Level Effects on Habitat Conditions. Management of water levels above this structure is not intended to benefit any type of wildlife habitat. Water levels above this structure are more or less stabilized and confined to only a short stretch of steep banked artificial ditch. During the low flow periods, water levels below 957.5' in the area above the Remington Dam as far east as Miller's 1 Dam are and have always been controlled by the stoplog setting placed in Miller's Dam. He controls how much water if any is permitted to go east toward the Yellow River. Miller controls how much is pumped north or south or diverted south out of the Remington Ditch at all levels. Water above 957.5' and below 958.0' is normally diverted into the refuge. Water below 957.5' and above 958.0' are both held back by the government's Remington structure.

During 1991, most of the inflow of water to the refuge was cut off at the Remington structure as mentioned previously. This allowed Gene Miller, downstream on the Remington Ditch, absolute control over water levels. He kept water levels behind his dam up to and exceeding two feet higher than it had been kept prior to 1989 during the first 6 months of 1991. Levels receded to near below normal in August and September because of below normal rainfall. However, by the deer season in late November, he had brought the levels up to about 959.0' for the winter. As a result, large cottonwood trees, some up to 20" DBH, on government land near the Remington structure were flooded most of the year again. This will probably cause their destruction.

The water which passes through the Remington structure is used to maintain optimum waterfowl habitat in up to 16 refuge pools downstream. In 1993 very little waster passed onto the Refuge from this structure because it was held at a high level.

B. 2. Objectives of Proposed Levels (1994) Remington Dam.

Water levels in the Remington ditch have been maintained in the past high enough, using the Stellmacher-Miller Dam, to guarantee adequate water levels backing up against the FWS Remington control structure to pass 0.5' of water, through each of the four 5' stoplogs bays, at a constant rate throughout the year. This means that the levels above the Remington structure were maintained, in the past, at or slightly above 958.0', but never below 957.5'. The 11' stoplogs above the 5' stoplog piers were maintained so as to block all flood waters above the 958.0' level from entering the refuge as a flood damage precaution.

In past years, no more than one stoplog (.5' high) was removed from each of the four 5' stoplog bays. If more were removed, during low flow periods, water levels would be lowered in the Remington Ditch causing water to escape from the Stellmacher-Miller marshes. Complaints from Mr. Stellmacher, or Mr. Miller, would be assured. As outlined above, the proper management of these two water control structures has accommodated both the refuge's and Stellmacher's use of water in the Remington Ditch without conflicts.

Now that Gene Miller owns the Stellmacher Dam and has constructed 80 acres of new cranberry beds nearby, he wants to raise and maintain the level of the Remington Ditch above his dam. This will mean that the Service must agree to readjust the stoplog levels on the Service's Remington control structure upwards. To date, an agreement regarding the levels has not been reached.

The 1994 proposals for the management setting of the stoplogs in the Service's Remington water control structure will be to lower the level of the stoplogs to 958.0' on May 1. This level will be maintained from the point on. This level is subject to the litigation which may follow this action.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name/No: Pool #28

Maximum Elevation Permissible: 954.6

Flowline Elevation of Lowest Drain Structure: 948.6

Elevation of General Pool Bottom: 951.0

Emergency Spillway Flow Level: Unknown

Level of Dike Top: 956.0 +/-

Level of Riser Top: Bench mark: 955.18 +/-

A. 1. Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994
Date	Water Surface Elevations	Water Surface Elevations
Jan. 1	953.5'	953.5'
15	"	"
Feb. 1	"	"
15	"	"
Mar. 1	"	Raise to full pool levels or next highest level to provide optimum flooded willow brood cover.
15	"	
Apr. 1	953.2'	"
15	953.5'	"
May 1	954.0'	"
15	953.8'	"
Jun. 1	954.0'	"
15	953.5'	"
Jul. 1	954.4'	"
15	"	"
Aug. 1	954.0'	Lower water as needed to supply other pools with water.
15	"	
Sep. 1	"	"
15	"	"
Oct. 1	"	"
15	"	"
Nov. 1	954.4'	"
15	954.0'	"
Dec. 1	954.1'	"
15	"	"
31	953.8'	"

A. 2. Effects of Past Year's (1993) Water Management Program - Pool #28.
The Wisconsin DNR has managed this pool since 1985. Because of budgetary constraints the WDNR was unable to maintain the stoplogs in the outlet structure. By July, 1992 all of the stoplogs in this structure were leaking and the pool was nearly dry. A verbal agreement was made with the WDNR which allowed the Service to manage these pools as it sees fit. In return the Service replaced all of the stoplogs in the structure. In August, 1992 the Service replaced all of the stoplogs in this structure. Heavy rains in mid-August brought the pool up to full pool level by the end of August.

B. 2. Objectives for Proposed Levels (1994) Pool #28

This pool will be raised to full pool level by March 1. It will be left at this level throughout the summer. Beginning in August, water levels will be lowered in this pool as water is needed downstream on the Refuge. Water from this pool can be used to supplement flood flows or to reflood pools drawdown for moist soil plant production.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name/No: Pool #27

Maximum Elevation Permissible: 952.0

Flowline Elevation of Lowest Drain Structure: 944.5

Elevation of General Pool Bottom: 948.3

Emergency Spillway Flow Level: 952.0

Level of Dike Top: 956.0 +/-

Level of Riser Top: Bench mark: 954.13

A. 1. Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994
Date	Water Surface Elevations	Water Surface Elevations
Jan. 1	951.5'	951.5'
15	"	"
Feb. 1	"	"
15	"	"
Mar. 1	"	Raise to full pool levels or next highest level to provide optimum flooded willow brood cover.
15	"	
Apr. 1	952.4'	"
15	952.5'	"
May 1	952.5'	"
15	952.2'	"
Jun. 1	"	"
15	951.9'	"
Jul. 1	952.2'	"
15	952.0'	"
Aug. 1	951.7'	Lower water levels as needed to other pools with water.
15	"	
Sep. 1	951.5'	
15	"	"
Oct. 1	951.7'	"
15	"	"
Nov. 1	951.8'	"
15	"	"
Dec. 1	951.6'	"
15	"	"
31	"	"

A. 2. Effects of Past Year's (1994) Water Management Program - Pool #27.
The Wisconsin DNR has managed this pool since 1985. Because of budgetary constraints the WDNR was unable to maintain the stoplogs in the outlet structure. By July, 1992 all of the stoplogs in this structure were leaking and the pool was nearly dry. A verbal agreement was made with the WDNR which allowed the Service to manage these pools as it sees fit. In return the Service replaced all of the stoplogs in the structure. In August, 1992 the Service replaced all of the stoplogs in this structure. Heavy rains in mid-August brought the pool up to full pool level by the end of August.

B. 2. Objectives for Proposed Levels (1994) Pool #27.

This pool will be raised to full pool level by March 1. It will be left at this level throughout the summer. Beginning in August, water levels will be lowered in this pool as water is needed downstream on the Refuge. Water from this pool can be used to supplement flood flows or to reflood pools drawdown for moist soil plant production.

WATER MANAGEMENT PROGRAM OUTLINE

Refuge: Necedah NWR Water Unit Name/No: All Remaining Pools

Maximum Elevation Permissible: Unknown

Flowline Elevation of Lowest Drain Structure: Unknown

Elevation of General Pool Bottom: Unknown

Emergency Spillway Flow Level: Unknown

Level of Dike Top: Unknown

Level of Riser Top: Unknown

** = Top of control Structure

A. 1. Surface Elevations For Past Year 1993		B. 1. Planned Elevation for Program Year 1994	
Date	Water Surface Elevations		Water Surface Elevations
Jan. 1	Drained		Drained
15	"		"
Feb. 1	"		"
15	"		"
Mar. 1	"		"
15	"		"
Apr. 1	Filled to full pool level		Filled to full pool level
15	"		"
May 1	"		"
15	"		"
Jun. 1	"		"
15	"		"
Jul. 1	"		"
15	"		"
Aug. 1	"		"
15	"		"
Sep. 1	"		"
15	"		"
Oct. 1	"		"
15	"		"
Nov. 1	"		"
15	"		"
Dec. 1	Lowered to prevent ice		Lowered to prevent ice heaving
15	heaving damage on dike		damage on the dike
31	"		"

A. 2. Effects of Past Year's (1993) Water Management Program - Remaining Pools. Little Goose Pool, Beaver Pool, Becker Pool, Rice Pool, Coaver Road Pool East, Stub Ditch Pool, Pahrm Pool, Killdeer Pool, Canfield Pool, Pool 18N, Pool 18SW, Pool 18S, Turkey Track Pool, Otter Pool, Mink Pool, Upper Rice Pool, Rattail Pool, Cranberry Pool, Upper Cranberry Pool, Coaver Road Pool South, Camp Road Pool, East Turkey Track Pool and the four new pools south and east of the Turkey Track Diversion Dam.

All of these pools were held at full pool level during 1993. This provided many loafing and brood rearing areas for several species of waterfowl. Many songbird and reptiles species used these areas as well. The stable water levels these areas provide is particularly valuable for hibernating reptiles.

B. 2. Objectives for Proposed Levels (1994) Remaining Pools

All of these pools are managed at the full pool levels. No water level management is conducted on them because they are to small and/or their water supply is not good enough to reflood exposed mudflats.

These pools provide excellent nesting habitat for all cavity nesting birds because the flooded timber on them quickly become snags. In addition to bird species, a wide range of reptile and amphibian species use these pools. Some examples of reptile and amphibian species which are found in these areas are:

1. Blue-spotted salamander (Ambystoma laterale)
2. Eastern American toad (Bufo americanus americanus)
3. Western chorus frog (Pseudacris triseriata triseriata)
4. Northern spring peeper (Hyla crucifer crucifer)
5. Eastern gray treefrog (Hyla versicolor)
6. Green frog (Rana clamitans melanota)
7. Northern leopard frog (Rana pipiens)
8. Wood frog (Rana sylvatica)
9. Common snapping turtle (Chelydra serpentina serpentina)
10. Blanding's turtle (Emydoidea blandingi)
11. Painted turtle (Chrysemys picta)
13. Eastern hognose snake (Heterodon platyrhinos)
15. Eastern garter snake (Thamnophis sirtalis sirtalis)
18. Eastern massasauga rattlesnake (Sistrurus c. cantenatus)
19. Northern water snake (Nerodia sipedon sipedon)

1994 Pool Levels

	January		February		March		April		May		June		July		August		September		October		November		December	
	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15
Pool #1	922.5	922.5	922.5	922.5	925	925	925	925	925	925	925	925	925	925	925	925	925	924.5	924	923.5	923	922.5	922.5	922.5
Pool #2	923	923	923	923	923	923	924.5	924.5	924.5	924.5	918	918	918	918	918	918	918	921	921.5	922	922.5	923	922	922
Suk Cerney	921.5	921.5	921.5	921.5	921.5	921.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	923.5	921	921
Pool #29	937.7	937.7	937.7	937.7	940	940	940	940	940	940	940	940	940	940	936.6	936.6	936.6	936.6	936.6	936.6	936.6	936.6	938	938
Pool #30	938.7	938.7	938.7	938.7	939	939	939	939	939	939	Drain	Drain	Drain	Drain	Drain	Drain	Drain	Drain	937.5	938	938.5	939	939	939
Pool #31	938.7	938.7	938.7	938.7	939	939	939	939	939	939	938.5	938.5	938.5	938.5	938.5	938.5	938.5	938.5	938.5	937.5	937.5	937.5	937.5	937.5
Pool #33	939.7	939.7	939.7	939.7	942	942	942	942	942	942	942	942	942	942	940	940	940	940	940	940	940	939	939	939
Pool #9	946.1	946.1	946.1	946.1	946.2	946.2	946.2	946.2	946.2	946.2	Drain	Drain	Drain	Drain	Drain	Drain	Drain	945.5	946	946	946	946	945.5	945.5
Pool #13	943.6	943.6	943.6	943.6	944	944	944	944	944	944	944	944	944	944	944	944	944	944	942.5	942.5	942.5	942.5	942.5	942.5
Pools 19E & 19W	950.9	950.9	950.9	950.9	951	951	951	951	951	951	951	951	951	951	948	948	948	948	948	949	949	949	949	949

1994 Pool Levels																								
	January		February		March		April		May		June		July		August		September		October		November		December	
Carter-Wog Pool	924.2	924.2	924.2	924.2	926.6	926.6	926.6	926.6	926.6	926.6	926.6	926.6	926.6	926.6	923	923	923	923	923	924	924	924	924	924
Remington Struct.	959	959	959	959	959	959	959	959	958	958	958	958	958	958	958	958	958	958	958	958	958	958	958	958
Pool #28	953.5	953.5	953.5	953.5	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6	954.6
Pool #27	951.5	951.5	951.5	951.5	952	952	952	952	952	952	952	952	952	952	952	952	952	952	952	952	952	952	952	952
Remaining Pools	Full	Full	Full	Full	ull	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Furl	Full	Full	Full	Full	Full	Full	Full
* Pool levels numbers without decimals are even (i.e. 959 = 959.0)																								