

MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE

ANNUAL WATER MANAGEMENT PROGRAM

January 31, 1991

Submitted by:

Thomas J. Lannon
Refuge Manager

Date:

3/25/91

Reviewed by:

John V. Ramsom
Regional Engineer

Date:

4/1/91

Reviewed by:

John W. Blakely
Division Biologist

Date:

3/29/91

Approved by:

John J. Pickett
Wildlife Associate Manager 1

Date:

4/11/91

TABLE OF CONTENTS

- I. General Water Management Objectives
- II. Summary of Proposed Management Plans for 1991
- III. 1990 Water Management Maintenance Program
- IV. Water Level Management Monitoring Program
- V. Purple Loosestrife Program
- VI. Individual Water Management Units -
1991 Plans/1990 Management Analysis

I. GENERAL WATER MANAGEMENT OBJECTIVE

The primary objective of the refuge's water management plan is to create water conditions that will result in an ecologically diverse wetland community. Sedimentation has adversely impacted submergent growth and reduced water level fluctuations in floodplain wetlands. Moderate to heavy infestations of carp have also uprooted vegetation and resuspended bottom sediments. As a result, submergent vegetation has declined; river bulrush and american lotus, which become established when water levels remain static, are now dominant emergents in many wetlands; and the lack of exposure of bottom sediments has curtailed the recycling of nutrients and the establishment of moist soil vegetation.

Primarily through water level manipulations, the refuge is working towards improving wetland quality. Drawdowns on refuge wetlands have met with minimal success. Beaver activity and silt deposits at wetland outlets have curtailed efforts to lower water levels on Fisher Lake and Continental Grain Marsh. Water levels will be kept as low as possible on these wetlands again in 1991.

Two years of moderately low water levels on Blue Lake have resulted in an increase in river bulrush. Therefore, water levels will be held at maximum pool in 1991. The drawdown and burn on Louisville Marsh was successful in opening up the marsh and water levels will be kept high during 1991 to ensure river bulrush is kept under control.

Different drawdowns approaches will be implemented on the several small artificial and modified wetlands on the Long Meadow Lake Unit. Response to the drawdowns will be closely monitored to establish baseline data which will help fine tune future water management plans.

Negotiations are currently underway with the Northern States Power Company to initiate another drawdown of Blackdog Lake in 1991. The past two years have resulted in positive vegetative and wildlife response, significantly increasing wetland quality.

Although the 494 moist soil unit, blackdog pools 1 and 2 and big rice lake have water control structures, they remain unmanageable without further construction or equipment purchase.

II. SUMMARY OF PROPOSED MANAGEMENT PLANS FOR 1990

A. LONG MEADOW LAKE UNIT

<u>Wetland</u>	<u>Management Plan</u>	<u>Management Objective</u>
Big Bass Ponds	Spring & late summer drawdowns	Provide resting/feeding habitat for shorebirds
Little Bass Ponds	Full drawdown; duration of growing season	Spring shorebird use; moist soil plant production/nutrient recycl.
Hogback Ridge Marsh	Maintain levels at or near full pool	To increase percent interspersions, primarily in the west half of the pond, by decreasing emergent growth
Orchard Springs Pond	Early spring full drawdown; full pool during rest of growing season	Spring drawdown for migrating shorebirds; maximum pool for waterfowl use
Old Cedar Moist Soil Unit	Gradual drawdown in spring/gradual refilling in late summer	To encourage moist soil plant growth for summer and fall waterfowl use
494 Moist Soil Unit	No Management - Water Unavailable	
Wood Duck Pond	Maintain 12 to 18 Inches in Pond	Dabbling duck breeding pair and migratory habitat

B. BLACKDOG LAKE UNIT

Blackdog Lake	Partial Drawdown - Gradual	To recycle nutrients and encourage moist soil plants
Pool 1	Maintain Maximum Pool	To provide resting and feeding area for terns, cormorants & geese; to maintain high water levels in Pool 2
Pool 2	Maintain Maximum Pool	To thin out emergent vegetation

C. UPGRALA UNIT

<u>Wetland</u>	<u>Management Plan</u>	<u>Management Objectives</u>
Big Rice Lake	Leave outlet structure fully open	To drop water as much as possible; allow drawdown of little rice lake by private owner

D. WILKIE/RICE LAKE UNIT

Continental Grain	Early Spring Full Drawdown	To recycle nutrients & encourage vegetative growth
Fisher Lake	Lower water levels as much as possible	To discourage the growth of lotus & encourage other species of emergents in the lake basin
Blue Lake	Hold water levels at maximum pool (700 ft. elevation)	To increase interspersions and bring waterfowl use back to pre-1989 levels

E. LOUISVILLE SWAMP UNIT

Louisville Marsh	Maximum Pool	To discourage regrowth of monotypic stands of bulrush
------------------	--------------	---

III. 1990 WATER MANAGEMENT MAINTENANCE PROGRAM

The following maintenance projects were conducted on refuge wetlands in 1990:

<u>Wetland</u>	<u>Project</u>	<u>Cost Summary</u>
Big Bass Pond	Beaver Plug Removal	\$ 202.00
	Nuisance Beaver Control	56.00
Little Bass Pond	Beaver Plug Removal	152.00
Hogback Ridge Marsh	Catwalk Repair	40.00
	Beaver Plug Removal	127.00
Orchard Springs Pond	Dike Repair	131.00
	Debris Removal	88.00
Old Cedar MSU	Dike Repair	136.00
Blackdog Pools 1 & 2	Dike Repair	156.00
Fisher Lake	Beaver Dam/Plug Removal	139.00
	Nuisance Beaver Control	1120.00
Blue Lake	Beaver Debris Removal	103.00
Louisville Marsh	Dike Repair	225.00
	Flood Debris Removal	100.00

		\$ 2775.00

Approximately 68% of 1990 maintenance costs were spent on freeing structures and outlets of beaver cuttings or controlling nuisance animals. Cost estimates to repair damage done to Continental Grain Marsh as a result of a beaver plug in the outlet structure is estimated at \$5,000.00. No new construction was initiated in 1990.

IV. 1990 WATER MANAGEMENT MONITORING PROGRAM

In 1990, the following vegetation surveys were performed on refuge wetlands:

<u>Wetland</u>	<u>Survey Date</u>	<u>Survey Type</u>	<u>Objective</u>
Big Bass Ponds	08/28	Random Plots	Determine Composition & % Cover of Regenerating Plant Community
Little Bass Ponds		--No Vegetation Survey--	
Hogback Ridge Marsh	1/8/91	Random Plots	Determine Percent Interspersion
Orchard Springs Pond		--No Vegetation Survey--	
Old Cedar MSU	August	Walk-through	General Vegetative Community Makeup
Blackdog Lake	8/29-9/4	Random Plots	Determine Composition & % Cover of Regenerating Plant Community
Big Rice Lake		--No Vegetation Survey--	
Cont. Grain Marsh		--No Vegetation Survey--	
Fisher Lake	9/25	Grid Cell (Main Basin)	Determine Composition & % Cover of Emergents and Composition & Occurrence of Submergent Vegetation
	8/14	Random Plots (Shoreline)	Determine Composition & % Cover of Shoreline Plant Community
Blue Lake	9/19	Grid Cell (Main Basin)	Determine Composition & % Cover of Emergents and Composition & Occurrence of Submergent Vegetation
	8/9	Random Plots (Shoreline)	Determine Composition & % Cover of Shoreline Plant Community
Louisville Marsh	9/12	Canoe Survey (Main Basin)	Determine % Interspersion & General Plant Community; Determine Occurrence of Submergent Vegetation
	9/10	Random Plots (Shoreline)	Determine Composition & % Cover of Shoreline Plant Community

Invertebrate samples were taken in August and September during lake surveys on Blackdog Lake, Fisher Lake, Blue Lake and Louisville Marsh. Invertebrate sampling will be expanded to include spring sampling to determine the food availability during the peak demand period for waterfowl and shorebirds. A program to monitor water parameters will be postponed until additional water quality testing equipment can be purchased.

Permanent waterfowl survey points have been established on all wetlands currently being actively managed.

V. PURPLE LOOSESTRIFE PROGRAM

The control of purple loosestrife (Lythrum salicaria) was initiated on the refuge in 1985. Since then purple loosestrife has been identified on five of the seven refuge units and affects a total of 95 acres. The table below summarizes the spread of purple loosestrife on the refuge.

	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Acres Affected	2	28	70	95	95
Units Affected	2	3	4	5	5
Wetlands Affected (No. of Basins)	3	4	7	10	10

The largest stands of purple loosestrife are found on the Long Meadow Lake and Blackdog Lake units. There was no increase in coverage of purple loosestrife within existing areas since 1989 and no new infestations. A total of 39 of the 95 affected acres were treated in 1990.

All wetlands are monitored for loosestrife and control efforts are concentrated on the boundaries of affected areas and smaller, newly established stands. The objective of the control program is to arrest the spread of purple loosestrife, not to eliminate it. Currently, only Rodea is being applied using backpack or truck-mounted sprayers, although 2,4-D compounds have been used in the past.

If a wetland with water control capability is put into a drawdown phase, the wetland is monitored for purple loosestrife, particularly if purple loosestrife already exists on an adjacent shoreline or dike.

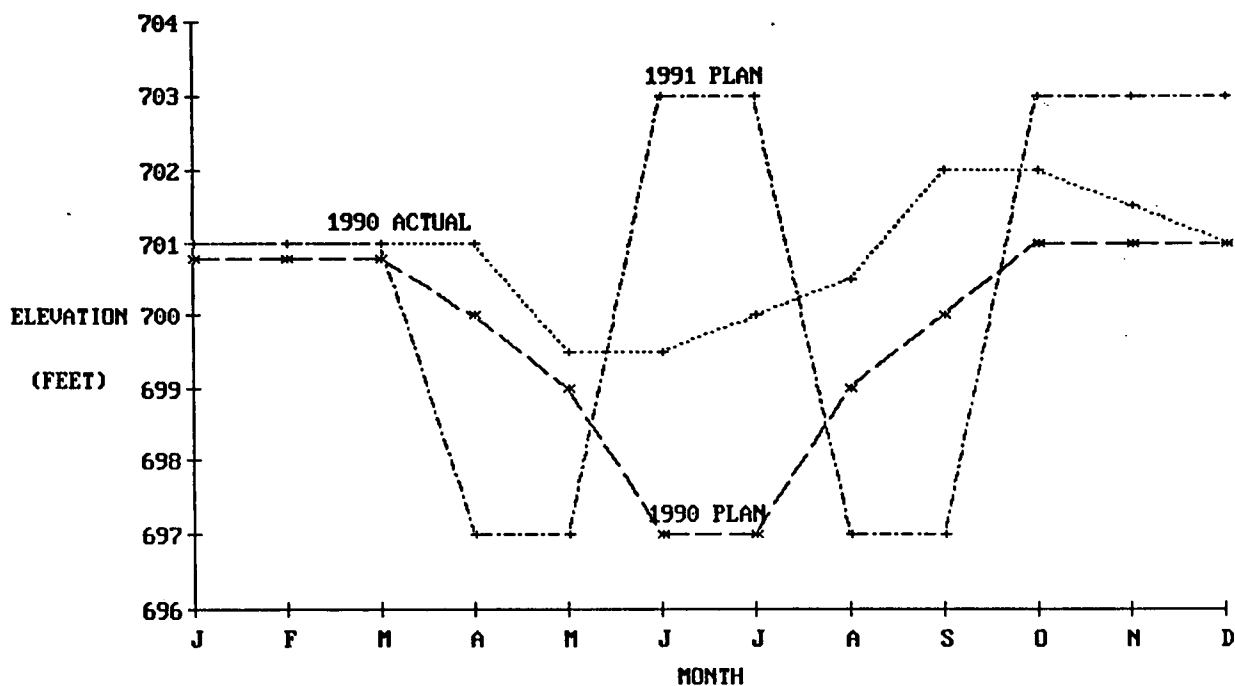
VI. INDIVIDUAL WATER MANAGEMENT UNITS

1991 PLANS

1990 MANAGEMENT ANALYSIS

1. REFUGE UNIT: Long Meadow Lake
2. WETLAND: Big Bass Ponds
3. ACRES: 3.3
4. MAXIMUM ELEVATION PERMISSIBLE: 703.7 Feet
5. MINIMUM ELEVATION PERMISSIBLE: 696.0 Feet
6. WATER ELEVATION WITH 50% BOTTOM EXPOSED: Unknown
WITH 90% BOTTOM EXPOSED: Unknown

WATER LEVEL CHART



7. VEGETATION

SPECIES	% COVERAGE		
	1988	1989	1990
Open Water	75	50	34
Aquatics		14	0
Cattail	14	25	13
Moist Soil Plants			34
Upland Grasses	11	11	11
Woody Vegetation			8

8. WILDLIFE USE

SPECIES	USE DAYS (# BROODS)		
	1988	1989	1990
Ducks	0	210(1)	1110(1)
Geese	0	0	45
Waterbirds	0	90	30
Shorebirds	0	690	495

9. Purple Loosestrife: Loosestrife increased significantly in 1990, reaching over 300 plants. The infestation has spread throughout the small island created in the back of the pond and along the pond's perimeter.

WETLAND: Long Meadow Lake Unit/Big Bass Ponds

Effects of Past Year's Water Levels

Levels The Big Bass Ponds was no longer needed as an alternative site for the graduate study being conducted in the Bass Ponds Environmental Study Area. Therefore, the pond was drawn down for the duration of the growing season.

Results

Vegetation Moist soil plant response to the drawdown was promising, however, growth was stunted in early August when beaver began plugging the outlet structure and inundating the plants with water. Moist soil plants were composed primarily of chufa flatsedge (Cyperus esculentus) and blunt spikerush (Eleocharis obtusa). Softstem bulrush (Scirpus validus) was also a conspicuous component intermixed with the moist soil plants. Woody vegetation continues to spread on the small island.

Wildlife Avian use of the pond continued to respond favorably to the lower water levels. Four species of shorebirds used the pond during spring migration. Mallard and blue-winged teal were often observed loafing on the mudflats and 1990 marked the second year in a row that a mallard hen with her brood used the pond.

Facilities The water control structure and dikes are in good condition; no repairs were needed. However, beaver began plugging the structure in August and approximately 16 hours were spent on keeping the structure open until freeze-up. An additional 4 hours were spent by the law enforcement officer in trying to remove the nuisance beaver. Removal efforts were unsuccessful.

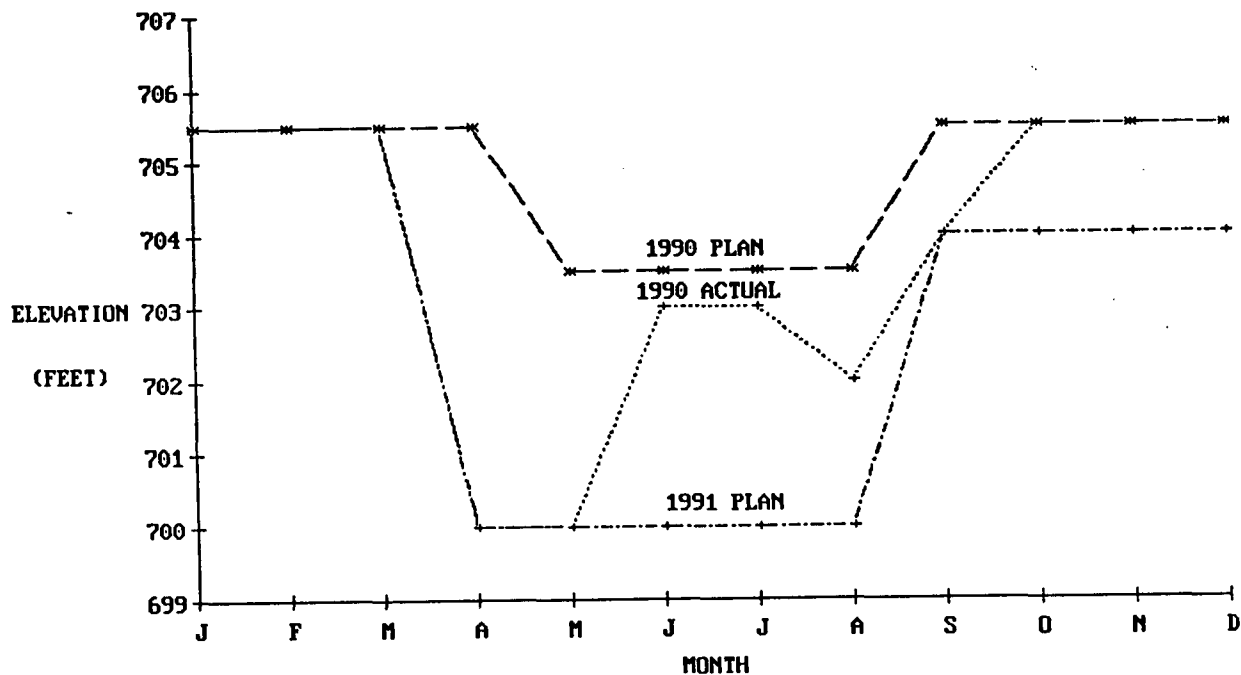
Costs Approximately \$202.40 was spent trying to keep the outlet structure open and an additional \$56.15 in beaver removal activities, for a total of \$258.55 in salary costs.

Objectives of the 1991 Proposed Water Levels

The primary management objective for the Big Bass Ponds in 1991 will be to provide resting and feeding habitat for migratory shorebirds. Immediate full drawdowns will be implemented during the spring and fall migratory periods (4/15 - 5/15 and 7/30 - 8/30). The pond will be returned to full pool in between drawdowns. Benthic invertebrate samples will be taken during both drawdown periods to evaluate chironomid levels. Elevations at which 50% and 90% of the pond bottom are exposed will be determined.

1. REFUGE UNIT: Long Meadow Lake
2. WETLAND: Little Bass Ponds
3. ACRES: 2.2
4. MAXIMUM ELEVATION PERMISSIBLE: 707 Feet
5. MINIMUM ELEVATION PERMISSIBLE: 700 Feet
6. WATER ELEVATION WITH 50% BOTTOM EXPOSED: Unknown
WITH 90% BOTTOM EXPOSED: Unknown

W A T E R L E V E L C H A R T



7. VEGETATION

SPECIES	% COVERAGE		
	%1988	%1989	%1990
Cattail	44	45	50
Hardstem Bulrush	0	5	5
Open Water/Aquatics	56	50	45

8. WILDLIFE USE

SPECIES	USE DAYS (# BROODS)		
	1988	1989	1990
Ducks	6390(1)	540(2)	2490(2)
Geese		60(1)	30
Waterbirds		120	90
Shorebirds	1050	30	120

9. Purple Loosestrife: Approximately 50 plants were treated just below the inlet to the Little Bass Pond; 1990 marked the first year of treatment.

WETLAND: Long Meadow Lake Unit/Little Bass Ponds

Effects of Past Year's Water Levels

Levels Water levels were held at an elevation of approximately 702.5 feet throughout the summer to create a maximum area with an 18 to 24 inch water depth. 1990 was the second and final year in which the pond was used as part of a graduate study investigating the effects of a bacterial mosquito larvacide on benthic invertebrates. The pond was held about 1 foot lower than originally planned per the request of the researcher.

Results

Vegetation At 702.5, approximately 60% of the pool is exposed. No vegetative changes occurred in 1990.

Wildlife Waterfowl use in 1990 increased significantly from use in 1989 which may be attributed to less intense use of the pond during the second year of research. Two hens with broods utilized the little bass ponds; one in early June, the other in late June.

Facilities The water control structure and dikes are in good condition; no repairs were needed. However, beaver began plugging the structure in July and approximately 12 hours were spent later in the fall to keep the structure open until freeze-up.

Costs Approximately \$152.00 in salary costs were incurred in 1990 to keep the water control structure free of beaver cuttings.

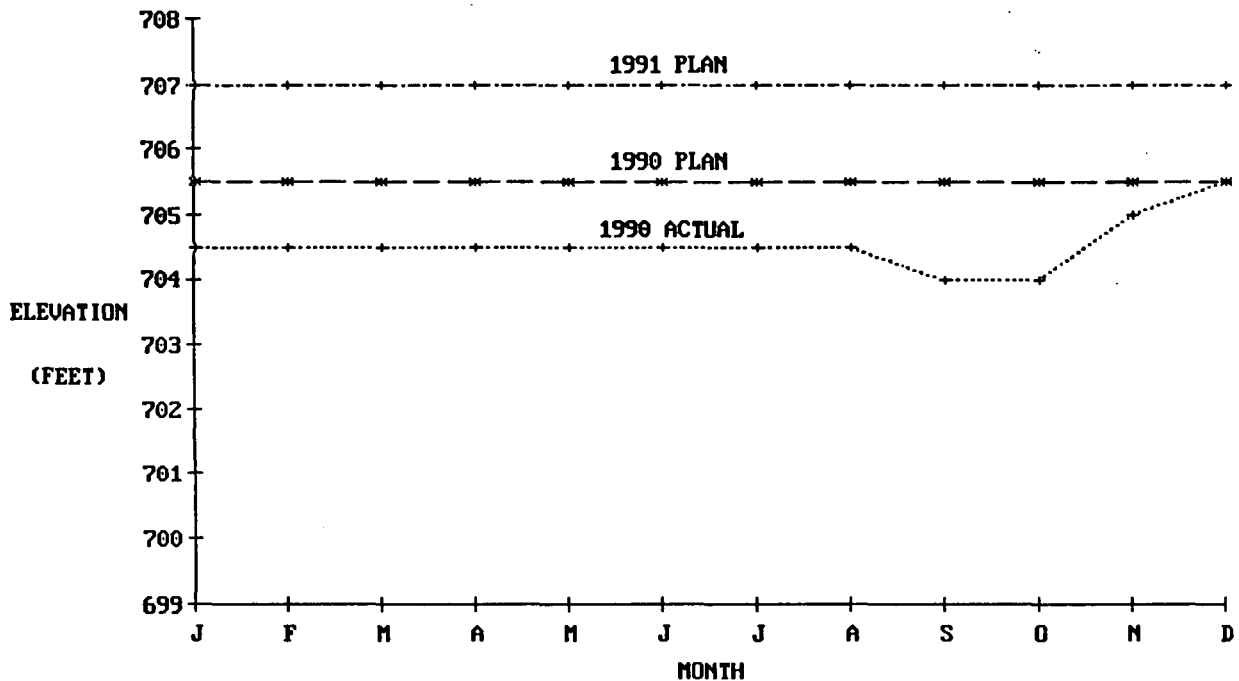
Objectives of the 1991 Proposed Water Levels

In 1991, an immediate full drawdown will be implemented on the Little Bass Pond. The objective of the early full drawdown will be to provide habitat for migratory shorebirds. The pond will remain drawn down through the summer to encourage the growth of moist soil plants. Plant growth will be monitored and if desired growth and seed production is achieved by mid-August, enough water will be put over the plants to cover them and make the seeds available to migratory waterfowl. Otherwise, water will not be put over the plants until the first hard frost. Enough water will be put on the pond to completely cover the plants in preparation for the winter months. Elevations at which 50% and 90% of the bottom are exposed will be determined.

The pond will be managed for shorebird use in 1992 with the implementation of two drawdown periods and a return to full pool in between. The 1991 drawdown should provide the nutrient base necessary to improve chironomid production for shorebird feeding. To measure the effectiveness of the drawdown, benthic invertebrate samples will be taken during each drawdown period in 1991 and 1992.

1. REFUGE UNIT: Long Meadow Lake
2. WETLAND: Hogback Ridge Marsh
3. ACRES: 13.8
4. MAXIMUM ELEVATION PERMISSIBLE: 708 Feet
5. MINIMUM ELEVATION PERMISSIBLE: 700 Feet
6. WATER ELEVATION WITH 50% BOTTOM EXPOSED: 703
WITH 90% BOTTOM EXPOSED: 701.5

W A T E R L E V E L C H A R T



7. VEGETATION

SPECIES	% COVERAGE		
	%1988	%1989	%1990
Exposed Soil		35	
Moist Soil Plants		28	
Emergents (Alive)	41	19	60
Emergents (Dead)		15	
Open Water/Aquatics	47	2	40
Shrubs/Trees	12		

8. WILDLIFE USE

SPECIES	USE DAYS (# BROODS)		
	1988	1989	1990
Ducks	7830(3)	2880(3)	8610(4)
Geese	495(5)	330(4)	2190(4)
Waterbirds	1260	150	
Shorebirds			

9. Purple Loosestrife: Over 280 plants were treated along the dike bordering the south edge of the marsh. Another 100 plants were treated in the southwest corner of the marsh.

WETLAND: Long Meadow Lake Unit/Hogback Ridge Marsh

Effects of Past Year's Water Levels

Levels The plan for 1990 was to leave water levels moderately high, about 2.5 feet below maximum pool. Water levels were maintained about one to 1.5 feet lower than planned in an effort to maintain emergent growth which had established itself in the east 25% of the pond in response to the 1989 drawdown.

Results

Vegetation Holding water levels slightly lower than planned helped retain some of the vegetation that had established itself in the east end of the pond. However, it appeared that cattail was again closing in on the west two-thirds of the pond.

In January of 1991, a brief survey of the marsh vegetation was run to record percent interspersation. When averaged over the entire survey, interspersation appeared to be ideal at 60/40. However, when readings for the west half of the pond were averaged, interspersation deviated from the ideal to 85/15. Broad-leaved cattail was the only emergent encountered.

Wildlife Waterfowl use of the pond in 1990 (post-drawdown year) did not increase when compared with use days for 1987 (pre-drawdown year). Mallards, wood ducks, blue-winged teal, widgeon and gadwall were observed using the pond. Two mallard broods, two wood ducks broods and four groups of goslings frequented the pond during May, June and July.

Facilities A broken board in the wooden catwalk over the water control structure was repaired. Beaver activity was also encountered at this water control structure.

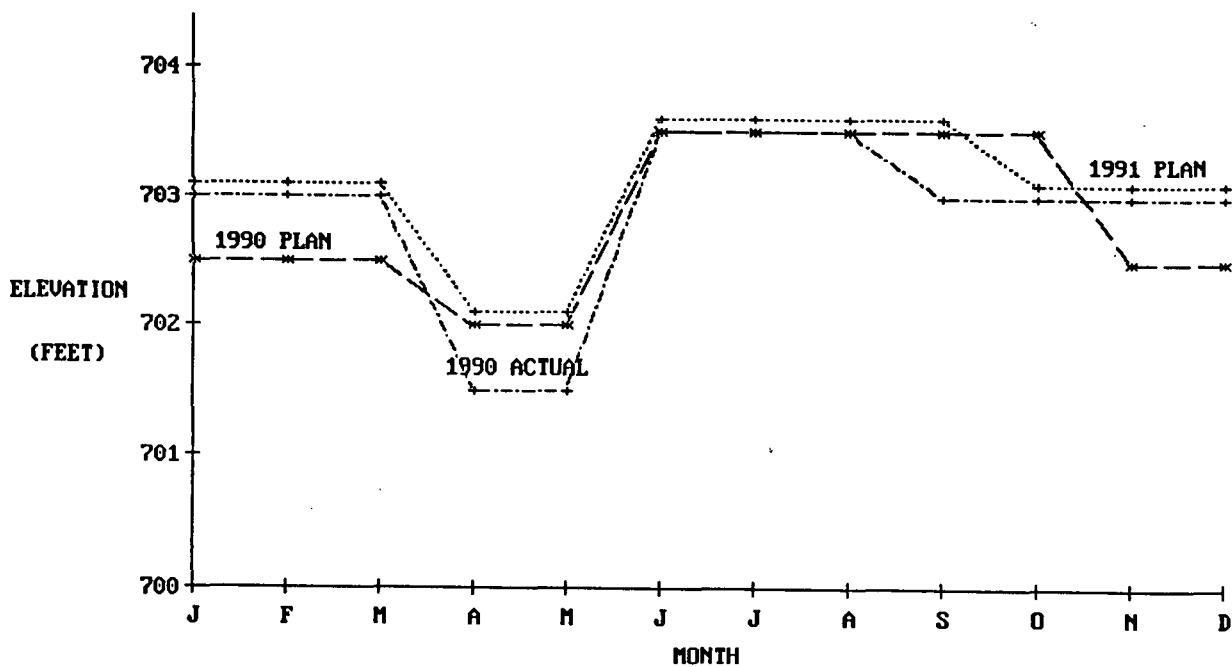
Costs Repair to the catwalk required replaced of one board and two maintenance staff hours, for a cost of approximately \$40.00. Approximately 10 hours were spent clearing the structure of beaver cuttings at a cost of \$127.00.

Objectives of the 1991 Proposed Water Levels

In 1991, water levels will be maintained as near maximum pool as possible. The objective of water management will be to decrease emergent vegetation in the west half of the pond. Interspersation will be measured using the same survey method used in 1990.

1. REFUGE UNIT: Long Meadow Lake
 2. WETLAND: Orchard Springs
 3. ACRES: .25
 4. MAXIMUM ELEVATION PERMISSIBLE: 703.5 Feet
 5. MINIMUM ELEVATION PERMISSIBLE: 701.0 Feet
 6. WATER ELEVATION WITH 50% BOTTOM EXPOSED: Unknown*
WITH 90% BOTTOM EXPOSED: Unknown*
- *No staff gauge on structure.

WATER LEVEL CHART



7. VEGETATION

SPECIES	% COVERAGE		
	%1988	%1989	%1990
Muck or Unconsolidated Bottom	60	9	43
Aquatics		25	25
Emergents	20		
Moist Soil Plants		34	
Reed Canarygrass		12	12
Trees/Shrubs	20	20	20

8. WILDLIFE USE

SPECIES	USE DAYS (# BROODS)		
	1988*	1989	1990
Ducks	(2)	420(0)	1790(2)
Geese			
Waterbirds			15
Shorebirds			15

9. Purple Loosestrife: Approximately 75 plants were treated within Orchard Springs Pond. The surrounding area is heavily infested.

WETLAND: Long Meadow Lake Unit/Orchard Springs Pond

Effects of Past Year's Water Levels

Levels The pool was left at maximum water levels during 1990, except for a brief spring drawdown. In the fall, water levels were dropped by about .5 feet to allow for slight water fluctuations the following spring.

Results

Vegetation Except for the absence of moist soil plants, the vegetation of the pool remained unchanged during 1990. The submergent vegetation in the middle of the pool appears healthy.

Wildlife The brief spring drawdown did not increase the number of shorebirds using the pond. A drawdown will be implemented again in 1991, however, more bottom will be exposed to see if more shorebirds can be attracted to the area. Mallard and blue-winged teal used the pond through the waterfowl season and two mallard broods were successfully raised on the pond.

Facilities In mid-September, dead submergent vegetation and falling leaves from surrounding trees began blocking the grate over the water control structure. Although the grate was kept free of debris after the problem was discovered, pond levels had risen significantly to flow over the spillway. Minor damage to the dike occurred during the overflow.

Costs One maintenance staff day and one pickup load of gravel was needed to repair the dike at a cost of \$131.00 (\$111.00/salaries + \$20.00/material). An additional 7 biological technician staff hours were spent in keeping the structure cleaned out during the fall at a cost of \$88.55.

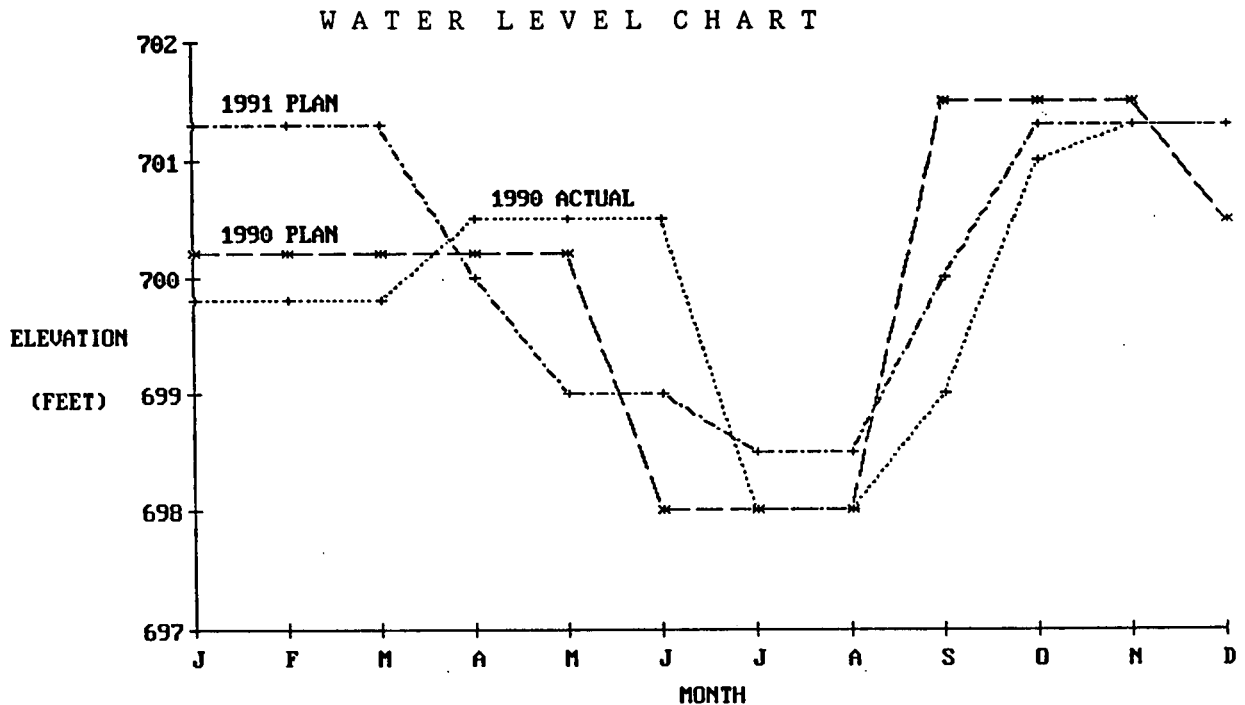
Objectives of the 1991 Proposed Water Levels

During the second week of April, water levels will be dropped enough to expose about 90% of the pond bottom. The purpose of the drawdown is to provide mudflats for migratory shorebirds. Water levels will be gradually returned to near full pool between May 15 and May 31 for the remainder of the season to provide for dabbling duck broods. At the end of August, pool levels will be dropped to 702.5 to ensure that water levels do not overtop the dike when vegetative senescence occurs.

1. REFUGE UNIT: Long Meadow Lake
2. WETLAND: Old Cedar Moist Soil Unit
3. ACRES: 10
4. MAXIMUM ELEVATION PERMISSIBLE: 701.5 Feet
5. MINIMUM ELEVATION PERMISSIBLE: 698.0 Feet
6. WATER ELEVATION WITH 50% BOTTOM EXPOSED: 701.5*

WITH 90% BOTTOM EXPOSED: 699.0

*Due to slope in Unit, it is only possible to flood 50% of the bottom.



7. VEGETATION

SPECIES	% COVERAGE		
	%1988	%1989	%1990
Buckwheat	100		
Naturally Occurring Upland Cover		100	
Moist Soil Plants			100

8. WILDLIFE USE

SPECIES		USE DAYS (# BROODS)		
		1988*	1989	1990
Ducks	*Data combined with Old Cedar Survey Pt.; brood data only avail.	(4)	600	10935(3)
Geese				300
Waterbirds				15
Shorebirds				150

9. Purple Loosestrife: Without farming on the unit in the past two years, purple loosestrife has spread quickly. Whereas, only spot spraying was necessary in 1989, over 500 plants spread throughout the unit needed to be treated.

WETLAND: Long Meadow Lake Unit/Old Cedar Moist Soil Unit

Effects of Past Year's Water Levels

Levels In April, the artesian well was turned on and water levels were at 702 ft, the highest elevation possible since dike repair had lowered the elevation of the dike in 1989. In July, the unit was drained and the dike elevation was returned to the proper elevation. In August, a gradual refilling of the basin was initiated and the basin was .5 feet below maximum pool by freeze-up.

Results

Vegetation Even though the unit was not farmed in 1989 or 1990, the vegetative cover was very different between years. In 1989, the unit was dominated by burdock and velvetleaf and other upland herbaceous vegetation; in 1990 moist soil plants were predominant with toothcup and chufa flatsedge significant components of the vegetation. The difference in management between the two years was in the length of time water was held on the unit in the spring. In 1989, water was drawn off the unit in early May; in 1990 water was kept on the unit until July. Therefore, future water management plans will not include a complete drawdown of the unit but will maintain enough water to keep the soil moist throughout the growing season.

Wildlife The unit was particularly attractive to migratory waterfowl during the month of October. During spring migration, a white-faced ibis could be observed on the unit for about 10 days. Unusual birds seem to be attracted to the moist soil unit during spring migration (i.e., a hudsonian godwit in 1988), making it especially valuable to local birding enthusiasts. Three mallard broods used the unit during May and June.

Facilities Repairs to the dike in 1989 had lowered the top of the dike at the water control structure. Approximately one maintenance staff day was spent raising the dike to the proper elevation.

Costs Cost for dike repair was approximately \$136.00. Repair was done using refuge equipment.

Objectives of the 1991 Proposed Water Levels

Since a cooperative farmer is no longer available in the Long Meadow Lake area, no plans will be made to plant the moist soil unit to a high yield seed crop. Instead, the unit will be managed for moist soil plant production with a gradual drawdown in the spring and gradual refilling in the fall in .5 foot increments. Vegetative monitoring will be conducted in August to determine the best time to initiate reflooding.

WETLAND: Long Meadow Lake Unit/494 Moist Soil Unit

Effects of Past Year's Water Levels

Levels With the continuing below-normal precipitation, the 494 Moist Soil Unit has remained dry due to the lack of spring flooding. There is no alternative source of water for the unit.

Results

Vegetation Woody vegetation continues to thrive, however, the area does not show signs of excessive woody growth.

Wildlife Since the unit is non-functional as a green tree impoundment at this time, the wildlife management objectives of the unit are not being reached.

Facilities The dike and stoplog structure are in good condition.

Costs No maintenance costs were incurred in 1990.

Objectives of the 1991 Proposed Water Levels

No water level manipulations are proposed for 1991.

WETLAND: Long Meadow Lake Unit/Wood Duck Pond

Effects of Past Year's Water Levels

Levels The Wood Duck Pond remained dry during the 1990 season. The water control structure on the inlet to the pond was plugged by beaver in 1989 and efforts to remove the plug were unsuccessful. The plug is lodged in a small diameter culvert running from the water control structure to the pond and removal will not be possible without special equipment.

Results

Vegetation The vegetation in the pond consists of woodland herbs; no woody encroachment has occurred.

Wildlife No wildlife use of the pond was observed.

Facilities The culvert to the pond is plugged and will require the use of specialized equipment to clean it out before water can be diverted to the pond.

Costs No maintenance costs were incurred in 1990.

Objectives of the 1991 Proposed Water Levels

In the event water flow is restored to the pond, it will be managed as a green tree impoundment. Immediately following spring thaw, 8-12 inches of water will be put into the pond. The pond will then be completely drawn down from June 1 through September 15. Eight to 12 inches of water will be put back on the pond September 15 until it is drained for the winter in mid-November. If deciduous seedlings become established, the pond will not be refilled in September but left empty until the following spring.

WETLAND: Blackdog Lake Unit - Blackdog Lake

Effects of Past Year's Water Levels

Levels For the second year in a row, Northern States Power Company agreed to draw down water levels on Blackdog Lake. Briefly, the drawdown scenario occurred as follows:

05/15/90: Targeted partial drawdown to 693 ft. initiated.
06/15/90: Flooding from river brings lake to full pool (oil brought into lake at this time from upriver oil spill).
06/22/90: Lake partially drawn down to approximately 694.5 ft.
07/15/90: Target drawdown of 693 ft. reestablished.
10/15/90: Lake back to full pool.

Results

Vegetation A vegetation cover survey was conducted between 08/29 and 09/04. Five randomly placed transects encompassing 60 plots were run in both the east and west pools of Blackdog Lake. Percent coverage of each plant species was estimated within each plot.

In summary, vegetative response to the drawdown was as follows:

	<u>Blackdog East</u>	<u>Blackdog West</u>	<u>Blackdog Lake East & West</u>
Open Ground	39%	53%	46%
Chufa Flatsedge	22%	20%	21%
Other Moist Soil Plants	31%	14%	23%
Woody Vegetation	8%	13%	10%
Species Richness	27	18	29

Several inferences can be made from the transect data:

- 1) OPEN GROUND: The area of exposed mudflat varies significantly between pools, with more exposed mudflat in the west pool. This could be due to several factors including differences in: a) substrate (the west pool is sandier and more coarse than the east pool; b) degree of water fluctuations (the west end fluctuated more throughout the growing season); and c) the effects of the 1989 drawdown (the west end did not get appreciable benefits from the 1989 drawdown).
- 2) SPECIES RICHNESS: The east pool has a significantly higher species richness than the west pool. The factors in (1) above could be influential in difference in species richness.

WETLAND: Blackdog Lake Unit/Blackdog Lake

- 3) SPECIES EVENNESS: Although chufa flatsedge is the dominant plant in both pools, the east pool has more even distribution among species than the west pool.
- 4) % WOODY VEGETATION: The occurrence of deciduous seedlings is significantly higher in the west pool. This is most likely due to a larger proportion of woody shoreline on the west pool than on the east pool. At this time, woody vegetation does compose a significant proportion of the vegetative cover although it is only in the seedling stage. During subsequent drawdowns, this component of the vegetation will need to be closely monitored.
- 5) EMERGENT VEGETATION: Another indication that the east pool has benefited more from the drawdowns of 1989 and 1990 is the occurrence of emergent vegetation. Both cattail and softstem bulrush are significant components of the vegetation in the east pool, composing 6% of the vegetative cover. The emergent component in the west pool is only 1% of the vegetative cover and consists solely of river bulrush.

Wildlife BENTHIC INVERTEBRATES were also sampled during the vegetation survey. Samples were collected in triplicate at the water/mudflat interfaces of each transect.

The most abundant benthic invertebrates were aquatic worms (Oligochaeta, Family Tubificidae). Oligochaetes were found in all samples but varied widely from site to site, being particularly low in two samples. Once sample, collected from the east pool, was void of any other benthic invertebrates and an oil sheen was present at the site. Failure to reach the water/mudflat interface on a sample site in the west pool was probably responsible for low numbers in that sample.

Species diversity was low in all samples, with four species the highest number found in any one sample. Species abundance and diversity was highest in sampling areas where vegetation, mudflats and water were all present.

Shorebirds were feeding within the immediate area of one sample site. The sample was low in invertebrate abundance and the only characteristic which distinguished it from other samples was the noticeable presence of dead gastropods. Mallards were found feeding within the immediate area of another sample site, however, no unusual invertebrate characteristics were found in the sample.

WATERFOWL response to the 1990 drawdown was even more dramatic than that experienced in 1989. Partially responsible for this increase is the full duration of the drawdown on both pools; in 1989 the west pool water levels fluctuated throughout the summer and the moist soil plants were unable to mature. The following table shows waterfowl response in relation to the drawdown implement in 1989 and 1990. Mallards were used to represent waterfowl response since they are the most common dabbling duck using Blackdog Lake.

WETLAND: Blackdog Lake Unit/Blackdog Lake

Month	Number of Mallards		
	1988 Pre-Drawdown	1989 Drawdown	1990 Drawdown
April	14	20	47
May	26	134	77
June	46	39	6
July	23	402	41
August	0	189	646
September	38	160	201
October	3	3	4525
November	214	1055	6272
December	10	1600	2756
January	805 (1989)	7750 (1990)	3000 (1991)

The change in mallard numbers throughout the 1990 season is probably related to the following events:

- 1) A drop in the number of mallards using Blackdog Lake in June is characteristic of past use patterns. However, a continued low mallard population on Blackdog Lake in July was not expected. The cause of low use is probably due to flooding of the Minnesota River which put Blackdog Lake up to full pool in mid-June. The lake was not fully returned to drawdown condition until mid-July.
- 2) The buildup of mallard use in August coincides with flowering of the abundant moist soil plants available. Blue-winged teal numbers also responded to the drawdown in August when numbers increased to about 400.
- 3) Migratory flocks of mallards responded well to the results of the drawdown in October and November with numbers exceeding even the record breaking numbers reached in 1989.
- 4) The December and January mallard numbers are probably reflective of the resident metropolitan winter population. However, January numbers were less than half that experienced in 1990. Weather is most likely the primary factor in the difference observed.

1990 marked the first year that waterfowl broods were observed in either the east or west pool of Blackdog Lake. Three broods of 3, 2 and 5 ducklings were observed. Although the broods were small (possibly due to high predation by snapping turtles), this does indicate that the drawdowns are significantly improving the quality of the lake for wildlife.

Facilities None of the water control facilities are under U.S. Fish and Wildlife Service jurisdiction.

Costs Not applicable.

WETLAND: Blackdog Lake Unit/Blackdog Lake

Objectives of the 1991 Proposed Water Levels

A drawdown may be implemented again in 1991. Benthic invertebrates samples will be collected when the drawdown is initiated to determine what the invertebrate response is at the onset of the drawdown and to the increased nutrient base. Another vegetation survey will be conducted in late summer to measure vegetative response, with particular attention given to woody species.

WETLAND: Blackdog Lake Unit/Blackdog Pool 1

Effects of Past Year's Water Levels

Levels Water levels were not managed during 1990.

Results

Vegetation No noticeable change in vegetation occurred during 1990.

Wildlife Waterfowl and waterbird use is low on this pool and remained unchanged from past years. Canada geese, cormorants and forster's terns are the primary birds observed using the pool but even these are only seen sporadically and in small numbers.

Facilities Several holes and washouts developed on the dike/trail running along the north side of Blackdog Pools 1 and 2.

Costs Aproximately one maintenance staff day (salary cost: \$136.00) and \$20.00 in gravel was used to repair the dike for a total cost of \$156.00.

Objectives of the 1991 Proposed Water Levels

A full drawdown of Blackdog Pool 1 cannot be accomplished without pumping. As a result, the pool will be left at present pool levels unless funding and staff time become available for effective water management.

WETLAND: Blackdog Lake Unit/Blackdog Pool 2

Effects of Past Year's Water Levels

Levels Water levels did not increase although all water control structures were closed.

Results

Vegetation No noticeable change in vegetation occurred in 1990.

Wildlife Waterfowl and waterbird use is low on this pool and remained unchanged from past years. Mallards, blue-winged teal and green-backed herons are the primary birds observed using the pool but even these are only seen sporadically and in small numbers.

Facilities Refer to Blackdog Pool 1 for discussion of facility repair and costs.

Costs Refer to Blackdog Pool 1 narrative.

Objectives of the 1991 Proposed Water Levels

Water control structures will remain closed to retain as much water as possible. The objective of water management is to decrease emergent vegetation.

WETLAND: Upgrala Unit/Big Rice Lake

Effects of Past Year's Water Levels

Levels The dike and water control structure on the outlet of Big Rice Lake is not capable of drawing the lake down. Therefore, when a private landowner proposed building a channel between Big Rice and Little Rice Lakes and placing an outlet on Little Rice Lake to drain both basins, the refuge concurred with the project concept.

As soon as construction was completed on the channel and new outlet in mid-May of 1990, an attempt was made to draw down both lakes. However, by late June it was apparent that the capacity of the new outlet structure was not big enough to exceed inflow into Big Rice Lake. Therefore, attempts to draw down Big Rice Lake were abandoned and the channel was sandbagged so dewatering of Little Rice Lake could be affected. A draw down was initiated on Little Rice Lake on July 15, however, the Minnesota River rose and backed up the outlet into the lake. Although the lake was finally drawn down by mid-August, the benefits of the drawdown were minimal.

Results

Vegetation Vegetative conditions of the lake have not changed significantly since 1988. However, the continued trend towards higher dabbling duck use of the lake may suggest a slight improvement in habitat quality.

Wildlife Waterfowl use continued to be higher than years prior to the drought of 1988. During spring migration, waterfowl numbers peaked at around 1,000 birds and a flock of 150 tundra swans used the lake in April. Fall migration use peaked at around 375 birds in early October. The largest number of waterbirds (great blue herons and common egrets) was recorded in late May at 400 birds. A flock of 100 white pelicans used the lake during September.

Facilities The dike and stoplog structure are in good condition.

Costs The refuge incurred no maintenance costs in 1990.

Objectives of the 1991 Proposed Water Levels

Neither the water control structure on the outlet stream nor the channel and outlet through Little Rice Lake can lower water levels on Big Rice Lake significantly. Therefore, with the present water management capabilities, Big Rice Lake cannot be drawn down sufficiently to affect a positive vegetative response.

However, 1990 demonstrated that the outlet structure on Little Rice Lake can completely drain that basin. Since control of Little Rice Lake is in the hands of a private landowner, only recommendations can be made concerning management of the marsh.

WETLAND: Upgrala Unit/Big Rice Lake

The refuge will recommend to the landowner that the marsh be completely dewatered as soon as possible in the spring and allowed to dry out. The lake basin should then be thoroughly disced to destroy American lotus tubers, followed by the planting of a moist soil annual seed crop such as millet or buckwheat in preparation for fall return to normal pool levels.

WETLAND: Wilkie/Rice Lake Unit - Continental Grain Marsh

Effects of Past Year's Water Levels

Levels Water levels were at maximum pool throughout the summer and could not be lowered as planned because of a beaver plug in the water control structure.

Results

Vegetation Vegetative conditions remained unchanged from 1989. In summary, the lake bottom is anaerobic with sparse beds of submergent vegetation. The marsh edges are composed of river bulrush and phragmites with two bays supporting dense beds of arrowhead. No purple loosestrife infestations were found in 1990.

Wildlife Only spring and fall waterfowl use was monitored on Continental Grain, although periodic visits were made to the marsh throughout the summer. Spring migratory use was light, with only 2160 use days recorded for March, April and May. However, during fall migration, 14,040 use days were recorded for waterfowl, with mallards and widgeon predominating. Although black and forster's terns are commonly seen on Continental Grain Marsh, the 1990 Black Tern Survey revealed that the marsh, in its present condition, is not used for nesting.

Facilities In 1988, Scott County installed a dike and water control structure on the Continental Grain Marsh outlet. The installation is of poor design with the water control structure placed upstream from the dike by about 5 feet. As a result, maintenance is not only difficult but unsafe. The problem with maintenance came to light when beaver began plugging the water control structure in the fall of 1989. They were able to completely plug the structure, lodging mud and logs not only in the structure but down into the neck of the culvert.

Since the beaver plug could not be dislodged without heavy equipment and considerable maintenance staff time, the decision was made to leave the structure unplugged for the 1990 season. No problems were expected to arise since, before construction of the dike and water control structure, flow through the outlet had been restricted by beaver dams.

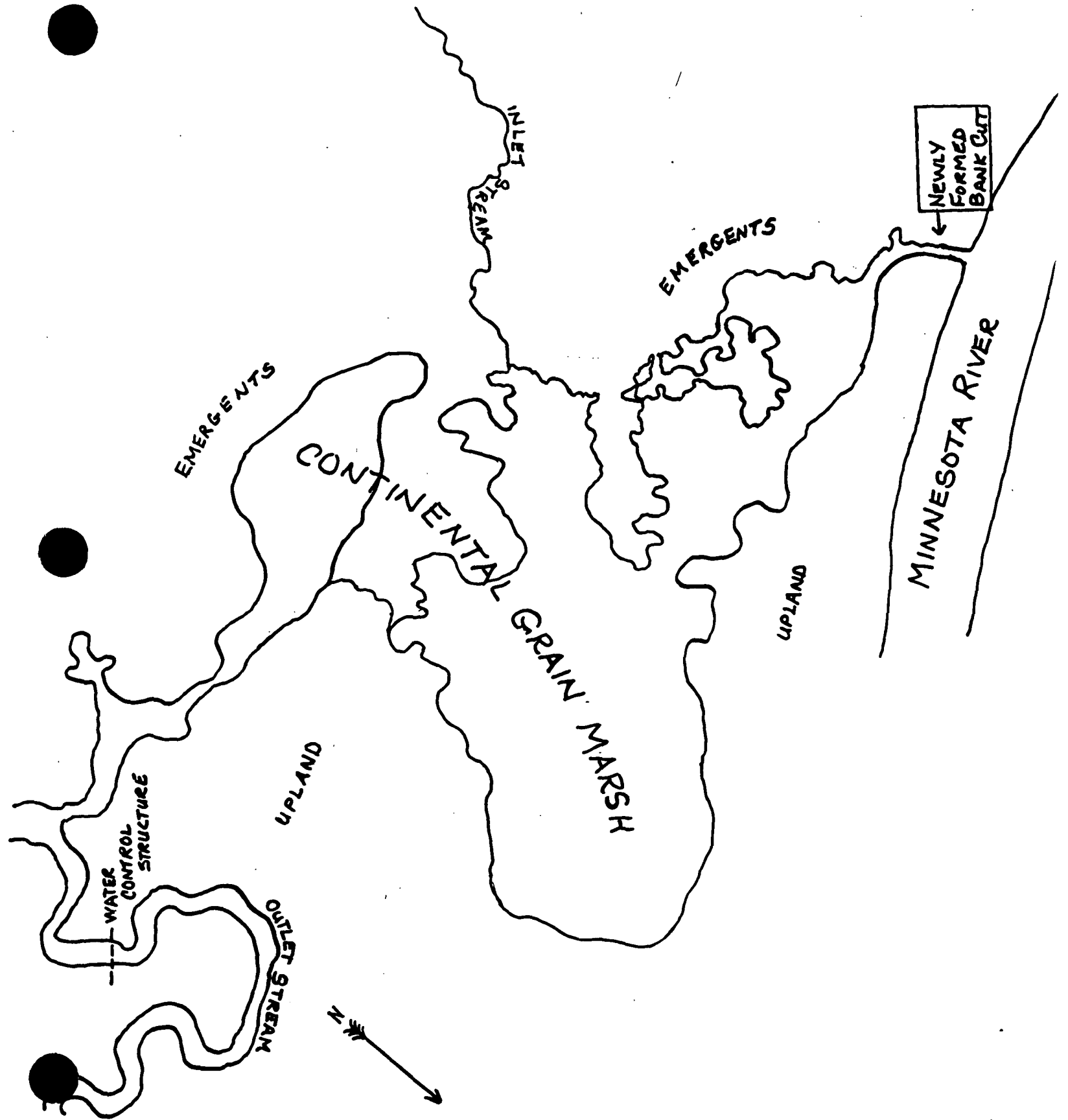
However, sometime during the fall of 1990 water levels rose enough to cause the flow from Continental Grain to seek an alternative outlet. The result was the formation of a deep cut running from the northwest side of the marsh to the Minnesota River (refer to map).

Costs No maintenance costs were incurred in 1990. However, the costs of cleaning the water control structure and filling and stabilizing the cut made on the northwest side of the marsh is estimated at \$5,000.00.

WETLAND: Wilkie/Rice Lake Unit - Continental Grain Marsh

Objectives of the 1991 Proposed Water Levels

If repairs are completed by mid-May, a full drawdown will be implemented. Wetland vegetation will be monitored and the drawdown will be followed by a gradual return to maximum pool once moist soil plants have matured.



1. REFUGE UNIT: Wilkie/Rice Lake
2. WETLAND: Fisher Lake
3. ACRES: 300
4. MAXIMUM ELEVATION PERMISSIBLE: 702'(Inlet)/701.6'(Outlet)
5. MINIMUM ELEVATION PERMISSIBLE: 698.25'(Inlet)/697.65'(Outlet)
6. WATER ELEVATION WITH 50% BOTTOM EXPOSED: Not possible to expose
WITH 90% BOTTOM EXPOSED: more than 10% w/o additional
dredging at outlet.

W A T E R L E V E L C H A R T

7. VEGETATION

SPECIES	% COVERAGE()		
	%1988	%1989	%1990
Open Water	8	28(44)	0(60)
Submergent Vegetation			
Emergent Vegetation	44	34(56)	35(40)
Moist Soil Plants	48	35	41
Muck Bottom		2	20
Shrubs	4	4	4

():1989 Game Lake Survey Results

8. WILDLIFE USE

SPECIES	USE DAYS (# BROODS)		
	1988	1988	1990
Ducks	239085	32100(7)	186580
Geese	4800(3)	600	360
Waterbirds	9735	2310	22505
Shorebirds			

9. Purple Loosestrife: One plant was treated at the mouth of the Fisher Lake outlet.

WETLAND: Fisher Lake - Wilkie/Rice Lake Unit

Effects of Past Year's Water Levels

Levels Water levels in Fisher Lake were 1.5 feet lower than in 1989 and the same as water levels experienced in 1988. Changes in water levels are more accurately determined during the September game lake survey than from the water control staff gauge because of beaver activity at the outlet structure.

Water levels remained low despite continuous beaver activity at the outlet throughout the summer. Beaver activity was hindered long enough in the spring to allow spring runoff to

Results

Vegetation The greater occurrence of exposed bottom sediments during the shoreline vegetation surveys run in August verifies the presence of lower water levels throughout the summer.

An increase in emergent vegetation was expected with lower water levels. However, interspersions decreased from 56/44 to 40/60, primarily due to a decrease in white water lily (*Nymphaea odorata*) and American lotus (*Nelumbo lutea*), the dominant emergent species. This is a favorable response since the suppression of these species is desired. However, a concurrent increase in other more desirable emergent species did not occur. Water levels were at an average of 1.3 feet in 1990 and if these water levels can be maintained for several more growing seasons, it is hoped water lily and lotus will continue to decrease and other forms of emergent vegetation will find conditions suitable for growth.

Submergent vegetation responded well to the decrease in water lily and lotus. During the game lake survey, occurrence and relative abundance of submergent vegetation is measured. Rated on a scale of 1 to 4, submergent vegetation in Fisher Lake was assigned a value of 1.96 in 1989. In 1990, the value increased to 3.39, reflecting a significant increase in the occurrence of submergents. The major components of the submergent aquatic community are coontail (*Ceratophyllum demersum*) and watermilfoil (*Myriophyllum exalbescens*).

Wildlife In 1990, waterfowl use on Fisher Lake increased to 1988 levels from an 85% drop in use experienced in 1989. The most significant use was during the fall migration where waterfowl numbers peaked at 4,400 birds. Over 200 white pelicans also used the lake during September and October.

Five tern nests were found on Fisher Lake during the 1990 tern nesting survey. Four of the nests were initiated by Forster's terns, the other nest by a black tern. One Forster's tern nest successfully fledged. Fisher Lake had the highest number of nesting Forster's terns on the refuge during the 1990 survey.

Facilities Approximately 11 hours were spent removing dams and debris from the stoplog structure at the Fisher Lake outlet during the spring and summer months. One very savvy and persistent beaver kept a dam built at the mouth to

the outlet and the law enforcement officer spent approximately 80 hours in attempting to remove the beaver. He was outwitted.

WETLAND: Wilkie/Rice Lake Unit - Fisher Lake

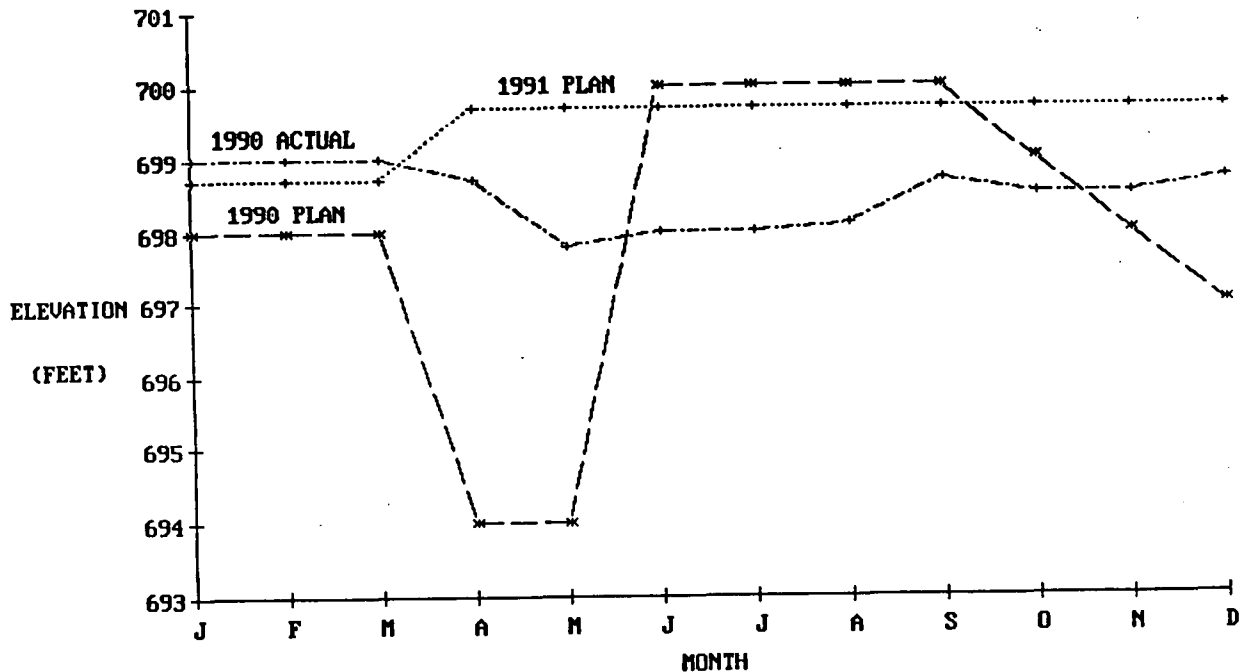
Costs Dam removal and cleaning of the stoplog structure was accomplished by the refuge biological staff with hand tools at a cost of \$139.00 (salary costs only). Beaver removal efforts by the refuge law enforcement officer cost \$1,120.00.

Objectives of the 1991 Proposed Water Levels

In 1991, barring serious interference from beaver at the outlet, water levels will be kept as low as possible to see if trends set in 1990 will continue. A full drawdown is necessary, however, until accumulated silt at the outlet is removed, only minimal water manipulations can be accomplished.

1. REFUGE UNIT: Wilkie/Rice Lake
2. WETLAND: Blue Lake
3. ACRES: 250
4. MAXIMUM ELEVATION PERMISSIBLE: 700 Feet
5. MINIMUM ELEVATION PERMISSIBLE: 693 Feet
6. WATER ELEVATION WITH 50% BOTTOM EXPOSED: 697.5
WITH 90% BOTTOM EXPOSED: 80% Max. Exposure @ 696.5

W A T E R L E V E L C H A R T



7. VEGETATION

SPECIES	% COVERAGE		
	%1988	%1989	%1990
Emergent Vegetation	10	10(32)	35(50)
Moist Soil Plants	11	5	23
Open Water	42	69(68)	3(50)
Exposed Marsh Bottom			29
Submergent Vegetation	37	16	10
():Game Lake Survey Results/Explained In Narrative.			

8. WILDLIFE USE

SPECIES		USE DAYS (# BROODS)*		
		1988	1989	1990
Ducks	*No brood survey	200550(14)	23250(15)	21850
Geese	in 1990	8010	1500(2)	675
Waterbirds		3000	1500	1470
Shorebirds				

9. Purple Loosestrife: As in 1989, a few plants were treated at the blue lake outlet and the middle road culvert. At this time, there is not indication the outbreaks are spreading.

WETLAND: Wilkie/Rice Lake Unit - Blue Lake

Effects of Past Year's Water Levels

Levels All four bays in the outlet structure were dropped to 697 feet by the second week of May, short of the planned drawdown elevation but sufficient to expose more than 50% of the basin bottom. The control structure was not raised to the 699 foot elevation until August 10 since fluctuating water levels during the summer would have influenced black tern nesting and biased the data being collected during the 1990 refuge-wide black tern research study.

Water levels, on the average, were one foot lower during the September game lake survey in 1990 (2.2 feet) than in 1989 (3.4 feet), although rainfall in August and September of both years was about the same and the outlet structure was set at the same elevation. In past years, Shiely Company has pumped groundwater from their quarry operation into Blue Lake. Since plans are to close the quarry in the near future, operations were cut back in 1990 and the quarry was not pumped during the fall. In addition, the Blue Lake Treatment Plant discontinued pumping from their expansion construction site. The lack of these additional sources of water combined with the partial drawdown in 1990 were probably responsible for lower water levels.

Over the past few years, data shows that water levels at the outlet structure and the middle road do not fluctuate relative to each other, at least in a way that can be reliably correlated. The difference in readings taken at the two structures on the same day can vary from -.3 feet to +1.2 feet. Therefore, the middle road reading cannot be used to reflect what is happening to water levels at the outlet, as was originally thought.

Results

Vegetation Both shoreline and game lake vegetation surveys reflected the effects of lower water levels. With lower water levels, the percent of exposed soil increased along the shoreline as did the occurrence of moist soil plants. In the main lake basin, the ratio of emergents to open water increased from 32/68 to 50/50.

Submergent vegetation was found at 83% of the sampling points during the game lake survey. Plant growth was vigorous. The submergent aquatic plant community was composed of watermilfoil (Myriophyllum exalbescentis), coontail (Ceratophyllum demersum) and sago pondweed (Potamogeton pectinatus), with watermilfoil dominating.

In addition to the two surveys, aerial photos were taken of the lake in December of 1990. Since no aerial photos were taken in 1989, a year-to-year comparison could not be made. However, the photos indicate that, although the south shore of the lake is still comparatively open, emergent vegetation in the majority of the lake basin is greater than desired.

WETLAND: Wilkie/Rice Lake Unit - Blue Lake

Wildlife Waterfowl sightings on Blue Lake remain low, with annual waterfowl use days remaining at about 10% of numbers recorded in 1987 and 1988. Conditions at the permanent waterfowl survey point have improved, although not to pre-construction conditions. With improving conditions, waterfowl use in the area was expected to increase. However, sightings remained low with even a small decrease from 1989 numbers, pointing more strongly to a possible decline in waterfowl use on Blue Lake.

Four benthic and one submergent vegetation invertebrate samples were collected during the game lake survey. Benthic invertebrates were relatively low when compared with samples collected from Fisher and Rice Lakes, Wilkie/Rice Lake Unit, averaging about 660 invertebrates/m². However, invertebrates were abundant in the submergent vegetation collected. Seven species and 343 individuals were collected in a one quart sample of aquatic vegetation. Eight-seven percent (87%) of the sample consisted of Amphipoda, Hylalella azteca.

The largest colony of nesting black terns (Chlidonias niger) was found on Blue Lake during the 1990 black tern nesting survey. However, all of the 54 nesting attempts were unsuccessful, primarily due to flooding of the nests prior to hatching. The colony was abandoned sometime between June 23 and July 14 which coincides with a period of unusually frequent and severe rain storms. Most nests located after colony abandonment were waterlogged or completely submerged.

Facilities Although beaver cuttings were pulled from structure twice during the year, beaver did not hinder water management efforts. Beaver did not reconstruct the dam that was removed from in front of the outlet structure in 1989. Deer repellent was placed on cloth strips and hung from a wire across the top of the structure. It is not known whether the repellent was instrumental in keeping beaver away from the structure.

Costs Eight hours of biological staff time were spent cleaning the structure of beaver cuttings and placing the repellent for a cost of \$103.00.

Objectives of the 1991 Proposed Water Levels

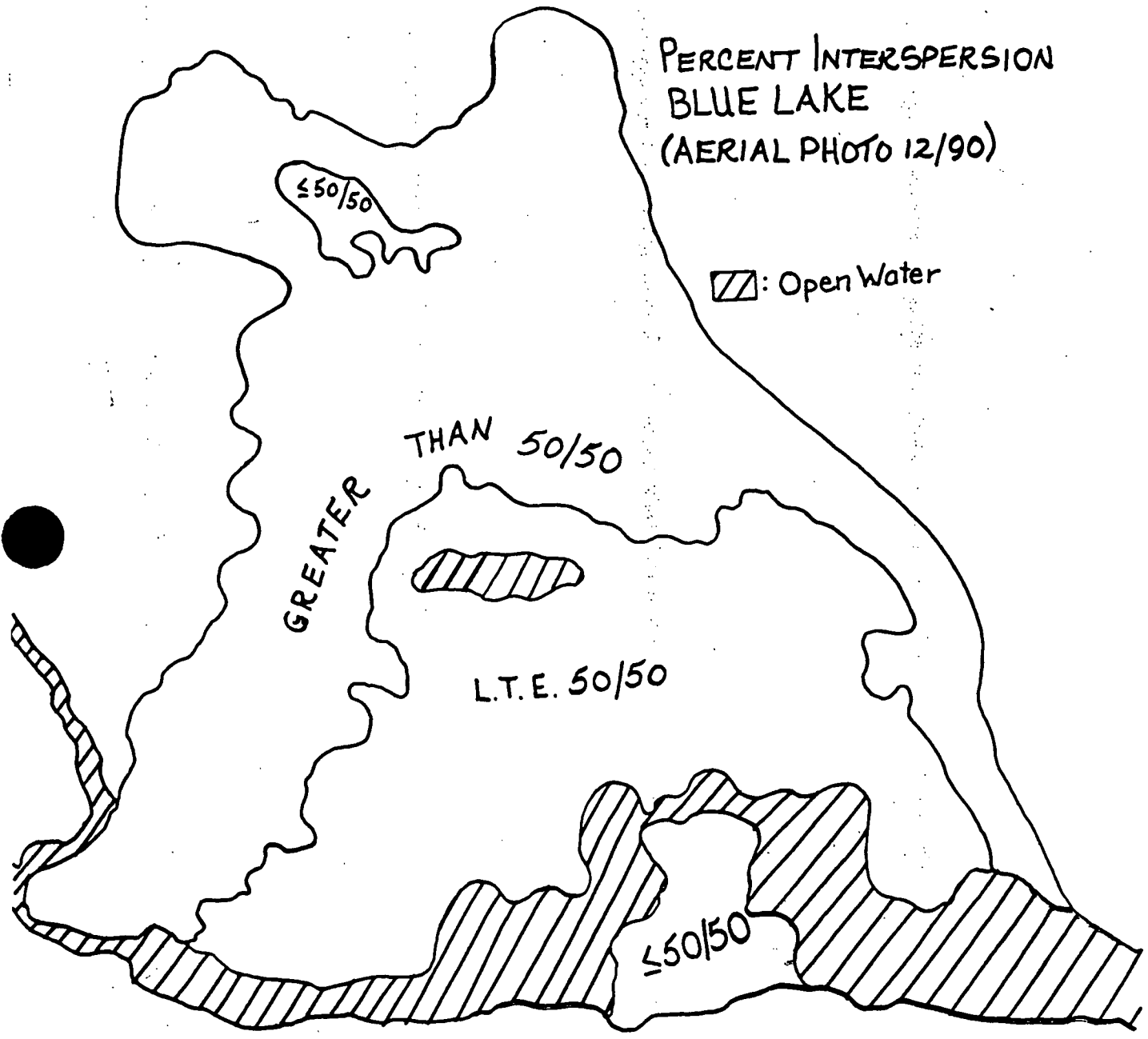
The partial drawdown on Blue Lake during 1990 resulted in a significant increase in emergent vegetation. In addition, with lake levels being held at or below 699 feet for the past two years, waterfowl use continues to drop. During 1987 and 1988 when lake levels were held at 700 feet, waterfowl use was significantly higher. This may be, to a partial degree, a function of the waterfowl survey counting point location.

However, increasing emergent vegetation and declining waterfowl use indicate that management objectives are not being met. In addition, when water levels are held below 700 feet, unfavorable waterfowl conditions predominate -- exposed lake bottom, water depths greater than 2 feet and, in the zone where ideal water depths occur, rank stands of river bulrush are also present.

WETLAND: Wilkie/Rice Lake Unit - Blue Lake

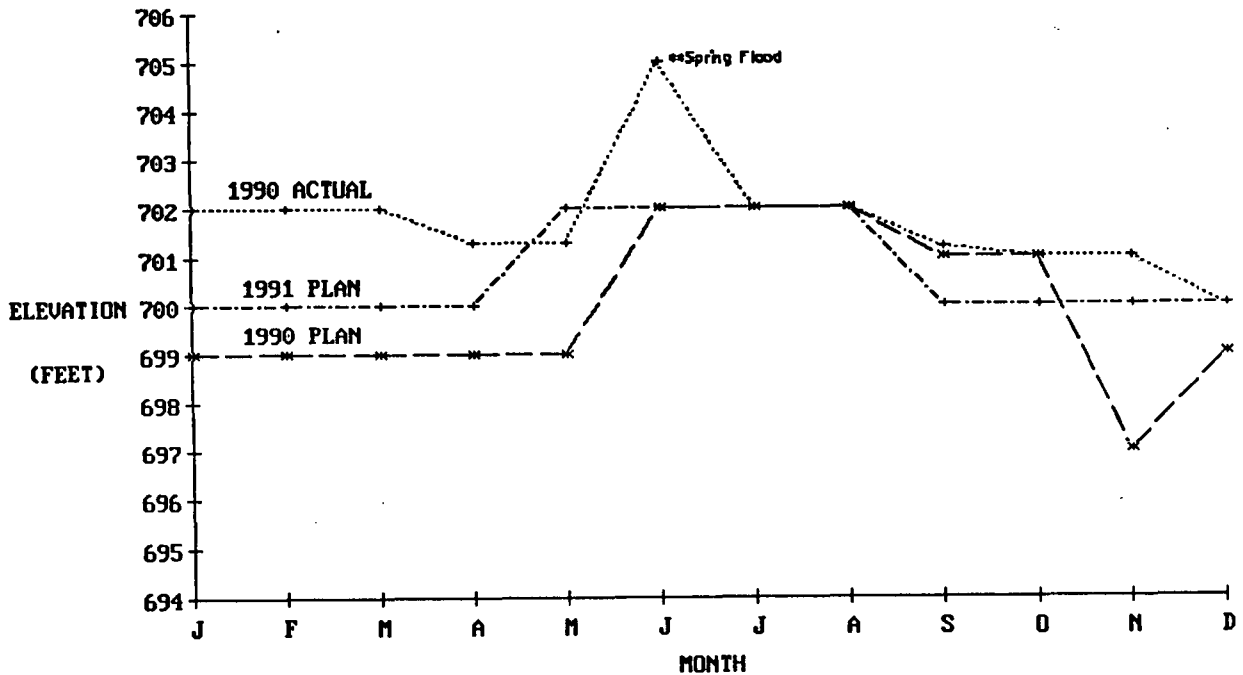
Therefore, water levels will be brought up to 700 foot elevation in the spring and held there throughout the growing season. The objective of higher water levels will be to increase interspersion and waterfowl use.

PERCENT INTERSPERSION
BLUE LAKE
(AERIAL PHOTO 12/90)



1. REFUGE UNIT: Louisville Swamp
2. WETLAND: Louisville Marsh
3. ACRES: 350
4. MAXIMUM ELEVATION PERMISSIBLE: 703 Feet
5. MINIMUM ELEVATION PERMISSIBLE: 695 Feet
6. WATER ELEVATION WITH 50% BOTTOM EXPOSED: 698 Feet
WITH 90% BOTTOM EXPOSED: 696 Feet

WATER LEVEL CHART



7. VEGETATION

SPECIES	% COVERAGE		
	%1988	%1989	%1990
Emergent Vegetation	58	46	16
Moist Soil Plants	33	39	33
Exposed Bottom	9	15	51

8. WILDLIFE USE

SPECIES		USE DAYS (Spring/Fall)		
		1988*	1989*	1990
Ducks	*No regular surveys; only trace wetland- dependent bird use.			5850/40360
Geese				1110/4035
Waterbirds				0/1200
Shorebirds				

9. Purple Loosestrife: No loosestrife was found in Louisville Swamp in 1990 or in past years.

WETLAND: Louisville Swamp Unit/Louisville Marsh

Effects of Past Year's Water Levels

Levels

Results

Vegetation Permanent transects established in 1988 within Louisville Marsh showed a dramatic change in coverage in 1990. Basically, the burn management that was applied in 1989 followed by high water levels in 1990, set back the growth of river bulrush by 30%.

In September, a canoe survey was made of Louisville Marsh to examine the full extent of the devegetation that occurred as a result of management. The canoe survey revealed that the river bulrush in approximately 40% (140 acres) of the 350 acre main basin was impacted by the control measures (refer to map). Approximately 29% (100 acres) of the basin was absent of any vegetation, although the remnants of burned river bulrush stalks were still present. Along the east edge of the basin, an area of about 30 acres, marsh smartweed intermixed with river bulrush was present in a ratio of about 75/25. Ten acres which had been disced up in 1989 was covered by a monotypic stand of marsh smartweed.

Although management efforts caused a significant reduction in river bulrush, the increased light penetration to the bottom did not result in the growth of submergents. Virtually no submergents were found during the canoe survey. The continued lack of submergents may be a result of the high water velocities and turbulence caused by the frequent flooding of Sand Creek and/or high herbicide levels in the water.

Wildlife During the September canoe survey, four benthic samples were taken in four different microhabitats throughout the basin. Benthic invertebrate numbers were very low although species diversity was high when compared with other benthic invertebrate samples collected on the refuge. The highest species diversity and abundance was found in the smartweed sample site. The lack of benthic invertebrates may be related to the same factors causing a lack of submergent vegetation and to the lack of submergent vegetation itself.

Waterfowl use of Louisville Marsh appeared to have increased significantly during the spring and fall migration periods in 1990. However, summer use is still virtually non-existent. Because of time constraints, observation platforms were not used in 1990 but are planned for implementation in 1991. Five permanent counting points, two of which are located on the main basin of Louisville Marsh, will be added to the refuge monthly waterfowl inventory in 1991 to keep a more systematic record of wetland bird use.

WETLAND: Louisville Swamp Unit/Louisville Marsh

Facilities Several times during the summer Sand Creek overtopped the dike resulting in minor erosion of the dike. Eight hours were spent cleaning the structure of flood debris.

Costs One maintenance staff day and three pickup loads of riprap were needed to repair dike erosion for a total repair cost of \$225.00 (\$135.00 salaries; \$90.00 riprap). An additional \$100.00 was spent on cleaning the structure out after flooding.

Objectives of the 1991 Proposed Water Levels

Louisville Marsh water levels will be held near maximum pool throughout the growing season. The objectives of high water levels will be to continue stressing the river bulrush while giving the marsh adequate time to establish submergent growth. Benthic invertebrates and vegetation will be monitored during the growing season.

LOUISVILLE SWAMP VEGETATION SURVEY
SEPTEMBER 12, 1990

