United States Department of the Interior

Fish and Wildlife Service
Ottawa National Wildlife Refuge
14000 West State Route 2
Oak Harbor, Ohio 43449

TAKE PRIDE IN AMERICA

In Reply Refer to:

March 24, 1993

MEMORANDUM

To: Regional Director, Twin Cities, MN (ARW/WAM2)

From: Act. Refuge Manager, Ottawa NWR, Oak Harbor, OH.

Subject: 1993 Annual Water Management Plan

Attached is the 1993 Annual Water Management Plan for Ottawa NWR. The plan is not quite complete as the Navarre Unit is still missing and some waterfowl data has not yet been tabulated and entered. However, this will give you some ideas on the plans for 1993.

The 1993 plan calls for considerable moist soil seedbed manipulation which is need to restore several of these units. Many of our marsh and moist soil units currently have very high water levels and with expected high lake levels, considerable pumping costs are likely to be incurred. However, this is neccessary for proper management. I believe that this plan can considerably increase our waterfowl use over the past two years.

A final version will be prepared after Mr. Adams has a chance to review this, however, we do not expect much change.

Stanley Cornelius

OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

(OTTAWA NWR, CEDAR POINT NWR, DARBY DIVISION, NAVARRE DIVISION)

OAK HARBOR, OHIO

1993 ANNUAL WATER MANAGEMENT PROGRAM

NATIONAL WILDLIFE REFUGE SYSTEM
FISH AND WILDLIFE SERVICE
U.S. DEPARTMENT OF THE INTERIOR

OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

ANNUAL WATER MANAGEMENT PROGRAM

1993

REVIEW AND APPROVAL

Approved By: Steve Lang 3/22/93
Acting Project Leader — Date

Reviewed By: _____ _____
Division Biologist 2 — Date

Reviewed By: _____ _____
Assistant Wildlife Associate Manager 2 — Date

Approved By: _____ _____
Wildlife Associate Manager 2 — Date

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1993 WATER MANAGEMENT PLAN

This annual water management plan provides guidelines for water levels during impoundment rehabilitation, moist soil plant production, and spring and fall migrations. The objectives of this comprehensive plan is to ensure a diversified habitat is available to a variety of wildlife species throughout the planning year.

In the past, most of Ottawa's management capabilities revolved around gravity drainage. In the mid to late 1970's, energy conservation was a factor in the design of water control structures. Dual flap gates on screw gates that faced in opposite directions were installed. Gravity was all the energy needed and the system worked well during those years. The key was to have a water source that periodically fluctuated and wind tides on Lake Erie cooperated with each blow from the southwest and northeast.

With record high water levels set in 1985, 1986 and early 1987, gravity control structures were no longer adequate. High water levels in pools could not be relieved without a major cost in money and human effort to pump it out with portable Crissifulli pumps. Severe erosion took place on all unprotected dikes. Defects in dikes caused by woodchuck and muskrat became evident.

Since 1989 new pumps were put in place to enable the manager to manipulate water levels with out having to rely on gravity drainage. Units which were directly affected by installation of pumps include: Mini-Marsh, MSU 7A, MSU 8A, MSU 8B and Cedar Point Pool 1. Units indirectly influenced are Pools 2A, 2B, 2C, MSU 7B and Cedar Point pool 2. Darby units 1, 2, 3 and 4 can all be controlled by one centrally located pumping structure. The main moist soil pump at Ottawa NWR enables manipulation of MSU 3, MSU 4 and MSU 5.

During the construction season of 1992, dike rehab on the south and west sides of MS-6 was completed to allow for good management of this unit once additional culverts are installed into the Moist Soil pump structure.

The station is in the process of writing a Wetland Management Plan. This plan should give more instruction on management for Ottawa as a whole including the major management goals such as spring migration, fall migration, brood habitat, and endangered species. The hopes are that future management will divide the refuge into core sections which will provide diverse habitat within a general area.

The refuge master plan which was written in 1979 broadly defines the objectives of some of the units.

Managed Wetlands are those impounded units that would have good water control facilities and would be managed as permanent or semi-permanent marshes. These include pools 1,2, 3, 4, 6, and 8 at Ottawa, all of Navarre and Darby units, and the main pools at Cedar Point. Moist Soil areas include units MS-3,MS-4,MS-5, F-6,MS-6, MS-7A,MS-7B,MS-7C,MS-8A, and MS-8B. Currently, all units except F-6 and MS-7C are managed as moist soil units. MS-7C is primarily a wet meadow area since the flooding of the unit is highly impractical due to its elevation and lack of dikes, and pumps to accomplish this task. Use as a managed wetland is very impractical, if not impossible and it is better managed as wet meadow or converted to either woodland or cropland. Unit F-6 is also difficult to manage as a moist soil unit due to its elevation which would require considerable pumping and a considerable amount of dike improvement. Current dikes exist that allow the unit to function as a cropland, but long term flooding would extensively damage these dikes without considerable investment in dike rehab, rip-rap, etc. Current use is better as a cropland and woodland area.

The mini-marsh has been managed as a permanent marsh over the past 10-15 years due to its location to the Butternut Lodge area with provided birdwatching groups with the opportunity for viewing in a excellent marsh location. However, with the rehab of the dikes, new pumping facilities, and the elimination of Butternut Lodge as a public use facility, this unit is better served as a moist soil area. The unit on the west edge of unit 8, now called MS-LL, now has a new dike and pumping capability and will be managed as a moist soil unit.

Unit 1 was an uncontrolled area in 1978 and is shown as unimproved aquatic habitat and wet meadow. However, a natural dike has formed on the lakeshore and we now have some control over this unit. Additional improvements are planned to allow full control of the unit. It is planned that this unit will become a managed marsh area.

All pools at the Darby unit have been managed as semi-permanent marshes in the past, primarily because of the lack of pumping facilities to give reliable water control. However, with the installation of the new pump system, this water control now exists and some moist soil management on this unit will be beneficial to waterfowl. The smaller units, pool 2 and 3, can now be managed as moist soil units and occasionally pool 4 can be cycled through a moist soil stage.

Objectives:

Ottawa National Wildlife Refuge was established in 1961 to preserve and improve a portion of the remaining Lake Erie Marshes for waterfowl. Currently, the refuge contains approximately 4900 acres of managed wetlands of which 850-1000 acres are managed as moist soil units.

Objectives of the refuge that are supported by this plan are, in order of priority, as follows:

1) To provide nesting and feeding habitat for the endangered bald eagle.
2) To provide maintenance habitat for migratory waterfowl during the spring and fall migrations.
3) To provide maintenance habitat for other migratory birds (marshbirds, shorebirds, gulls, terns, and raptors).3)
4) To provide habitat for the maintenance of balanced populations of all wildlife species.
5) To provide the public with wildlife-oriented recreation opportunities when this is compatible with the other uses.

In support of overall refuge objectives , the water management program will specifically assist in the accomplishment of each listed refuge objective as follows:

REFUGE OBJECTIVE

1. To Provide Nesting and Feeding Habitat for the Endangered Bald Eagle.

The maintenance of marshes and moist soil unit to provide for a variety of wildlife and vegetation types will provide eagles with natural feeding areas where they will feed on fish, muskrats, and waterfowl. Nesting sites are usually provided in large trees on the marsh borders.

REFUGE OBJECTIVE

2. To Provide Maintenance Habitat For Migratory Waterfowl During the Spring and Fall Migrations.

Refuge wetlands are managed to provide a optimum amount of food and cover for migrating waterfowl. Permanent and semi-permanent marshes of cattail, bulrush, and other emergent vegetation as well as a variety of submergent vegetation provides habitat for all species of waterfowl during both the spring migration. These marshes provide seeds, roots, tubers, and a variety of

aquatic invertebrates to provide food for migrating waterfowl. Management is directed at keeping these marshes in a highly productive state by simulating the natural cycle of water fluctuation which stimulates good aquatic growth and a variety of plant and animal organisms within these marshes. Many species of waterfowl such as gadwall, widgeon, teals, coots, etc. find that they can meet most, it not all, of their resource needs in these marshes during migration. Marshes are managed to provide a maximum amount of edge between open water, submergent vegetation, and emergent vegetation to provide areas that waterfowl may need for feeding and resting as well as courtship and pairing. Water levels are fluctuated during the year by lowering levels during the growing season to stimulate plants, then raising levels slightly during the fall to enhance the habitat for waterfowl use. Some units that have reduced vegetative growth may be completely drained during the growing season to germinate new growth. Other units that may have excessive vegetative cover may be held at a high water level during the summer to reduce growth and provide more open areas.

Some refuge units have been set aside specially for management as moist soil units where management is directed to provide a maximum amount of food from annual weed species, such as smartweeds and wild millet. These seed producing species provide the bulk of the food requirements for refuge waterfowl during the fall, late winter, and early spring when their requirement for high carbohydrate foods is dominant. During the mid and late spring seasons, these units also provide a substantial source of aquatic invertebrates for breeding waterfowl.

These units are annually drained during the growing season to produce non-wetlands species that have adapted to grow in the drained marsh bottoms. These species are generally seed producing annuals of the primary successional stages, such as smartweed, wild millet, various species of dock, foxtail, panicgrass, etc. They have adapted to invade bare ground areas, mudflats, etc and to germinate quickly, produce a vast amount of seeds before any fall flooding may occur. Thus, when reflooded either naturally or by management, they provide a high energy food source to waterfowl. The units are managed to maintain this cycle. When drained, the units are often disked, plowed, or the soils otherwise disturbed to keep the areas in the early or primary successional stages.

REFUGE OBJECTIVE

3. To provide maintenance habitat for other migratory birds (marshbirds, shorebirds, gulls, terns, and raptors)

4. To Provide Habitat for the Maintenance of Balanced Populations of All Wildlife Species.

In managing the marshes and moist soil units for waterfowl, consideration is also given to the benefits and resources needed by other species of wildlife, especially migrating shorebirds, wading birds, raptors, etc. Marshes and moist soil areas provide substantial mudflats during the draining and flooding phases of the management and these areas provide feeding and resting areas for a variety of wading birds such as herons, egret, shorebirds, gulls, terns, etc. Emergent vegetation areas of the permanent marshes provide habitat for migrating bitterns, rails, blackbirds, as well as resident species such as such as muskrat and mink. Hawks, owls, and eagles find an abundance of food in the marshes and moist soil areas. Fox, pheasants, rabbits, deer, etc. also find cattail stands as useful cover during the winter months.

REFUGE OBJECTIVE

5. To provide the public with wildlife-oriented recreation opportunities when this is compatible with the other uses.

A portion of Ottawa National Wildlife Refuge provides an area where visitors can walk dikes and dike road and trails through a variety of woodlands, grasslands, marshes, and moist soil units. Interpretive signs are provided. Management within these areas incorporates features to provide a variety of viewing opportunities by attracting different species of waterfowl, shorebirds, etc. Marshes are managed to provide both shallow water and deep water areas, heavy emergent vegetation stands and open water areas, and marshes and moist soil plants.

1993 Objectives:

Although the moist soil dikes, pumps, and other physical facilities are in the best condition of several years, many of the units have suffered from lack of physical manipulations and many are in later stages of vegetative succession or dominated by cattail, reed Canarygrass, willow, cottonwood, and other undesirable species. Of the 800 acres, over 600 are dominated by these species, especially in MS-3,4,5,& 6. Other units have been kept in a flooded condition for several years and are now dominated by emergent vegetation (MS-8B) or are losing the emergent vegetation in the more permanent pools, such as 2A,2B, & 2C. A great deal of pumping will be required in the coming year to reduce these water levels. Less than 120 acres of the high seed producers, such as smartweed and millet, are present and actual seed production on these are relatively low.

In 1993 priorities are to: 1) Bring the MS-6 and new Lindsey-Limestone unit into effective management by installing culverts into the Main Moist Soil Pump and the 8A pump to allow water control of these units,

2) control the willow, cottonwood, and reed canarygrass in MS-3,4,5, and 6 by heavy disking, 3)reduce water levels in pools 2a,b,&c to reestablish moist soil and marsh plants, 4) Finish the rehab work at Darby, and 5) if time permits, to renovate dikes at Pheasant Farm Pool at Cedar Point.

The vegetation control efforts will have to be started early in order to be completed and be effective and not conflict with other refuge programs such as farming and dike rehabilation. It is planned that MS-6 will be drained in February and dozer-disking started and completed in March. MS-4 will be drained in March to allow disking in April. MS-3 will be drained in late March and early April to allow control by May. Disking of MS-5 should be done in June and July. This amount of work will take an extensive effort and commitment. Some of the areas may have to be disked up to three times to kill the reed canarygrass, cattail, and willows. With disking of 10 to 30 acres/day, up to 40 man-days may be required for MS-3,4,5, & 6.

Summary of Activities:

Drawdown Activities:

Date	Unit	Method
03/01-04/15	MS-8A,P.2A	Electric, 8A pump
03/01-03/15	MS-6	Crissifulli/Tractor
03/10-04/01	MS-4	Electric-Main Pump
03/15-04/01	Pool 2B	Crissifulli/Tractor & U-6 with 16"vertical*
03/15-04/01	Mini-Marsh	Electric, Mini-Marsh pump
03/15-04/15	Ced.Pt. 1,2	Electric, Main CP pump
03/15-04/01	Darby 4	Electric,
04/15-05/01	Ced.Pt Phea	???, All available
04/01-05/01	MS-3	Electric, Main MS pump
04/01-04/15	MS-7B	release into 7A
04/01-04/15	Pool 2C	Crissifulli
04/15-05/01	MS=7A &7B	Electric, 7A pump
04/15-05/01	MS-8B	Electric, 8B pump
04/15-05/15	Pool 1	U-6 pump
04/15-05/01	Darby 2&3	Electric
04/15-05/01	Ent. Pool	Thompson, Ford, 1070-House
05/01-06/01	MS-5	Electric, Main MS pump
05/15-06/15	Show Pool	Thompson, Ford

* If this is not installed by ice-out, 2B water will be released into 2A and pumped out with the 8A pump. This may delay work in 8A.

Disking Activities:

Date	Unit	Method
04/01-04/15	MS-6	750-Rome Disk, White-Offset
04/15-05/01	MS-4	750-Rome Disk, White-Offset AC-moldboard plow
05/01-05/15	MS-8A	White-Offset
05/01-05/15	MS-7A,7B	White-Offset
05/01-05/15	MS-8B	White-Offset
05-15-07/15	MS-3	750-Rome Disk, White-offset
06-01-05/15	Mini-Marsh	White-Offset
06/15-08/01	MS5 (brush)	White-Offset
07/01-08/01	Show Pool	White-Offset

Flooding Activities*:

Date	Unit	Method
	Ottawa Units	
08/15-09/15	MS-6	Main MS pump**
08/15-09/15	Show Pool	Gravity, Ford,Thompson
08/15-10/15	Mini-marsh	Electric pump
08/15-10/15	MS-5	Electric, Main MS pump
09/01-10/15	Pool 2A,2B	Gravity, Thru 2B/R.ditch structure
09/01-09/15	MS-LL	Electric, 8A-(or portable)
09/01-10/15	Ent.Pool	Gravity
09/01-10/15	MS-3	Electric, Main MS pump
09/01-10/01	MS-8B	Electric, 8B
10/01-10/15	MS-7B	Ford, Thompson, Crissifulli
10/15-11/01	MS-4	Electric, Main MS pump
10/15-11/15	MS-8A	Electric, 8A pump
11/01-12/15	MS-7A & 7B	Electric, 7A
	Darby Units	
09/01-09/15	Darby 2	Electric
09/15-10/01	Darby 3	Electric
10/01-10/15	Darby 4	Electric

* Only areas of significant moist soil production are shown, most semi-permanent pools will be raised slightly in fall.

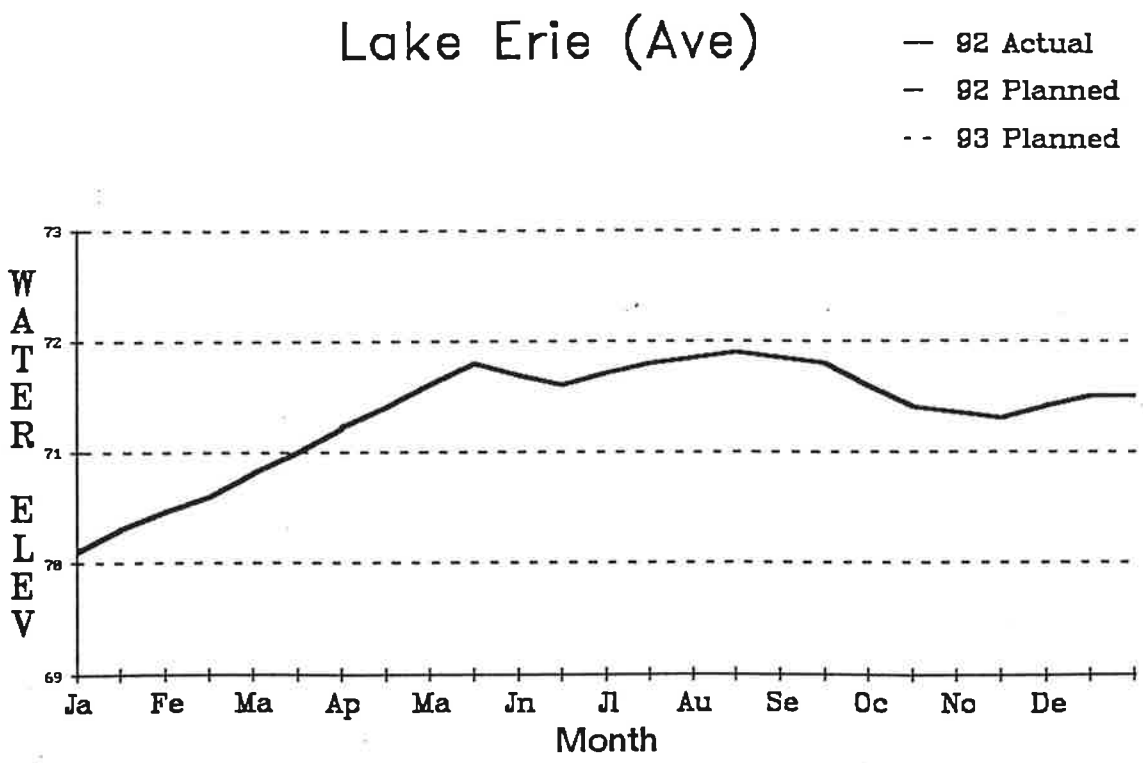
** MS-6 may be flooded earlier if culverts to main pump are installed and moist soil production is poor on the late disked areas.

Lake Erie Water Levels:

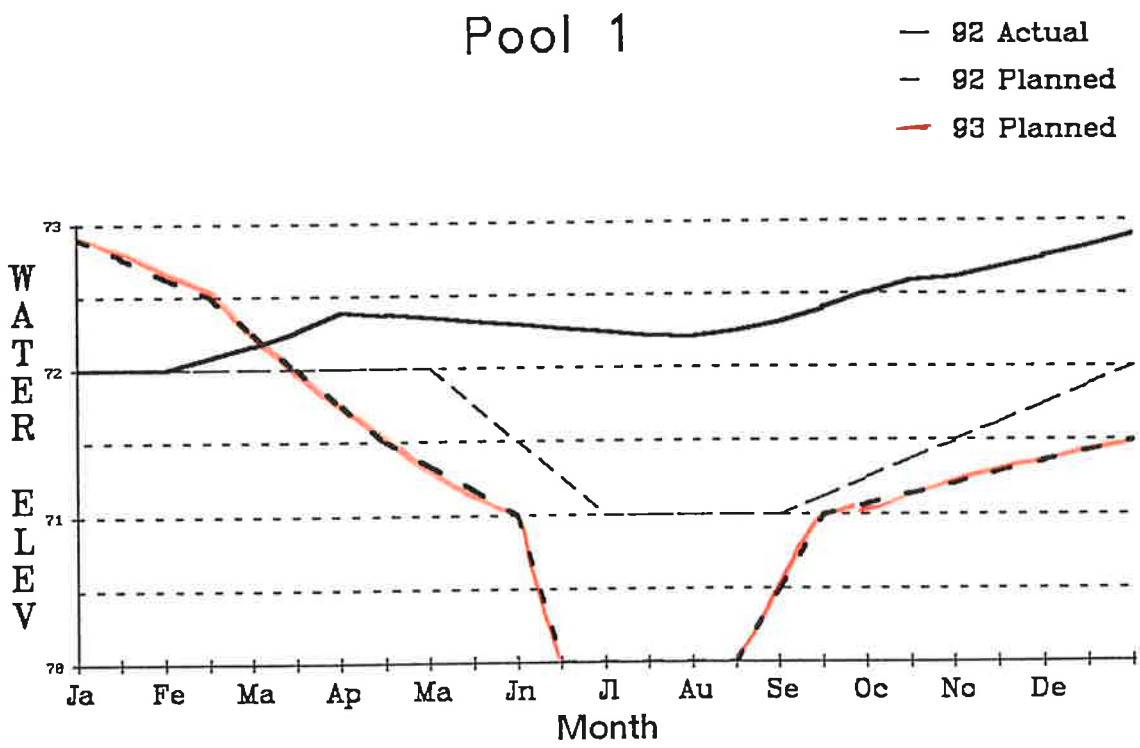
Lake Erie average water levels were similar to the past 2-4 years (89-91) and were relatively stable compared to the mid-80's. The monthly average lake level was lowest in February at 571.0 and highest in August at 571.9. Recorded lows occurred on January 20th at 568.4 and at Nov 13th at 567.5. Recorded high occurred on Dec. 10th at 573.4.

Average lake levels started out in January at approximately 570.2 and steadily rose through early May to reach approximately 571.8. After a small drop, they peaked in August at 571.9, then fell again until November to a fall low of 571.3. Levels were again increasing throughout December.

Predictions for 1993 show lake levels to increase substantially over 1992 and may be from 12" to 24" above the 1991 and 1992 levels. This will substantially affect our abilities to drain any pools which depend on gravity drainage and will increase our pumping costs for all pools considerably. However, fall flooding costs may be reduced somewhat.



1. Unit Pool 1
2. Acres 275
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 570.5
5. Water Elev. with 50% bottom exposed - 569
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	30	35	30	30
Cattail	25	20	35	35
Aquatic Smartweed	10	5	5	5
Smartweed/Nutsedge	20	15	10	10
Other	5	10	10	10
Willow/Mallow	10	15	10	10

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	80,000	101,010	115,500	
Geese	15,500	44,490	68,390	
GBH	3,000	6,450	5,250	

9. Purple Loosestrife:

Pool 1

A.2 Effects of Past Year's Water Levels

Levels:

Water levels increased throughout the year and were extremely high by the end of the year. Water levels are currently higher than anytime in the past 5 years and are 12-18" above normal water levels. They have overtopped the rip-rap along the NW dike.

Results:

High water levels together with high muskrat populations have opened many areas in the cattail vegetation. Open water areas are significant on the south end.

Facilities:

Dikes were mowed once in summer.

Costs:

No costs were incurred as only gravity was used to fill the pool.

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

This unit is managed as a permanent marsh area. The area provides year around habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed to providing a well balanced hemi-marsh over most of the area.

B: Planned Management Actions:

Water levels will have to be decreased as soon as possible to prevent loss of marsh vegetation and damage to dikes where current water levels are overtopping the rip-rap. Draining should start in mid-winter by gravity draining into Radar ditch during the late winter and spring. If this does not reduce water level sufficiently, pumping via Ohio DNR pumps may be possible or portable pumps will be used. Medium water levels will be maintained through the summer months to encourage emergent plants and water levels raised slightly during the fall.

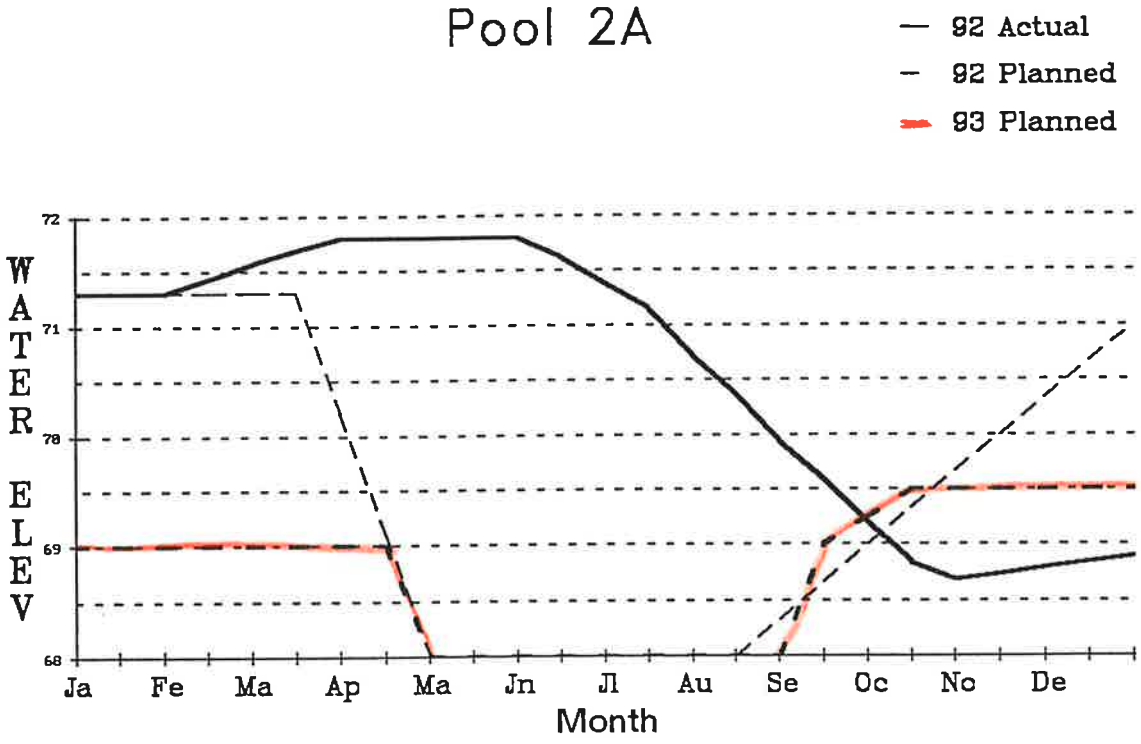
C: Potential Problems:

High lake levels during the spring months could prevent significant gravity drainage and require considerable pumping via portable pumps to complete the above actions. If so, manpower may not be available to fully accomplish the planned actions.

D: Expected Results:

A reduction of water levels early in the spring to a normal level of 572 should allow existing vegetation to survive well and provide a excellent marsh habitat throughout the year.

1. Unit Pool 2A
2. Acres 70
3. Maximum elevation permissible 572
4. Flowline elevation of lowest structure 569
5. Water Elev. with 10% bottom exposed - 569.3
   50% bottom exposed - 568
   90% bottom exposed - 567.70



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	40	55	85	90
Mixed Forbes/Other	25	10	0	
Smartweed/Velvet Leaf	5	5	5	
Aquatic Smartweed	15	10	0	
Mud flats/Bidens	5	0	0	
Willow/Cottonwood	10	20	10	10

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	41,900	31,740	25,090	
Geese	47,400	67,500	23,390	
GBH	800	240	100	

9. Purple Loosestrife:

Pool 2A

A.2 Effects of Past Year's Water Levels

Levels:

Water levels in this unit were extremely high through the spring and early summer. In June, a new culvert was placed to allow drainage into Unit 8A and to the 8A pump. Pumping was started, but required most of the summer to draw off the almost 4 feet of excess water. Little bottom was exposed before September and little vegetation germinated.

Results:

The pool did not hold a lot of attraction to wildlife during the year. Geese and a few ducks were observed loafing in the pool.

Facilities:

The north, south and west dikes are in excellent condition. The east dike has some erosion problems at the toe.

Costs:

The dikes were mowed once and the roads were graded. Purple loosestrife was not observed in this pool this year. Pumping was done Through the 8A pump.

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

This unit has relatively low ground elevations and no pumping facilities. It is best managed as a permanent marsh to reduce the pumping requirements. It can occasionally be cycled into a moist soil production to enhance vegetation growth.

The above management also benefits wildlife recreation as this unit is part of the public use areas and this management will attract a variety of waterfowl, shorebirds, waterbirds, and wetland birds and mammals to provide opportunities for wildlife viewing.

The 1993 objectives will be to drain the area as much as possible to allow moist soil plants to germinate. This will stabilize the bottom sediments to improve water clarity in future years and allow better growth of emergent and submergent plants in future years.

B: Planned Management Actions:

This pool will be reflooded briefly in the late winter or very early spring due to winter precipation and possibly by releasing water from 2B and 2C. All three units can be released into 8A and then all units will be drawn down during the late spring. Hopefully, this unit can be exposed again by late April or early May.

Summer water levels will be held with very shallow depths (1-2") over the lowest elevations with periodic drying and flooding to germinate emergent marsh plants in these areas. Higher elevations will remain dry, but

should retain good soil moisture levels. Mowing of cottonwood may be done during the summer.

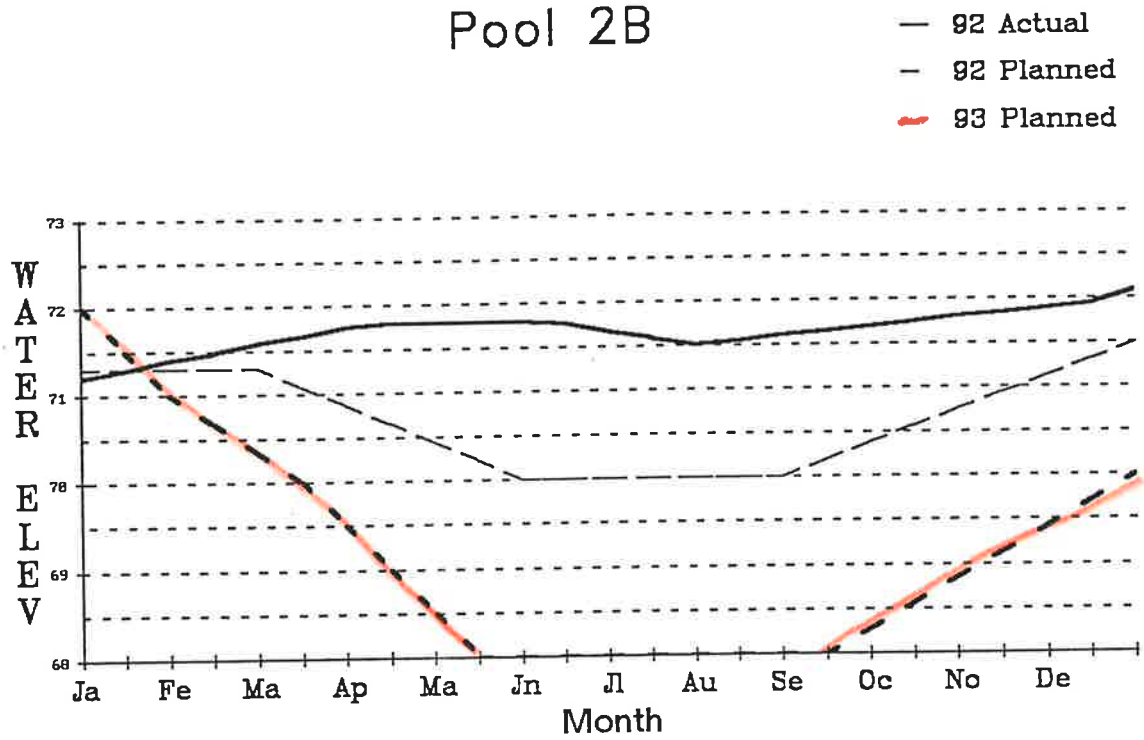
Reflooding should begin in early fall to reflood the moist soil plants for waterfowl use.

C: Potential Problems:

D: Expected Results:

Emergent plants such as cattail and bulrush should germinate in the areas where water remains in an ebb and flow situation during the early summer months. Good stands of smartweeds should grow in the other mudflat areas that become exposed by May 1st. Good shorebird use is expected during the spring drawdown stages and good waterfowl use of the moist soil areas should occur in the fall when these areas are flooded.

1. Unit Pool 2B
2. Acres 95
3. Maximum elevation permissible 572
4. Flowline elevation of lowest structure 570
5. Water Elev. with 50% bottom exposed - 568
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Cattail	3	3	3	
Willow/Cottonwood	10	17	20	10
Smartweed/Millet	35	0	10	
Open Water/Cottonwood Seed	10	20	30	50
Smartweed/Cottonwood Seed	10	40	10	
Bidens/Milkweed/Other	10	0	5	
Submerged aquatics	20	20	20	20
American Lotus	2	1	1	5

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	45,000	36,090	93,240	
Geese	37,800	73,170	55,150	
GBH	1,400	930	850	

9. Purple Loosestrife: No loosestrife visible.

A.2 Effects of Past Year's Water Levels

Levels:

This pool was kept very high during the year and is currently over 1 foot higher than any time in the past several years.

Results:

High water levels have eliminated much of the emergent and moist soil plants from the unit. Some submerged aquatics have continued. Significant erosion to the dike toes has occurred where water levels have overtopped the rip-rap, especially along the NE and the south dikes.

Facilities:

The north dike of this unit is in need of additional rip-rap and recent high water have overtopped the rip-rap here and along the south dike. Severe damage can be expected unless we can reduce the water levels before spring.

Costs:

No costs occurred this year.

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

This unit has relatively low ground elevations and no pumping facilities. It is best managed as a permanent marsh to reduce the pumping requirements. It can occasionally be cycled into a moist soil production.

The above management also benefits wildlife recreation as this unit is part of the public use areas and this management will attract a variety of waterfowl, shorebirds, waterbirds, and wetland birds and mammals to provide opportunities for wildlife viewing.

The 1993 objectives will be to drain the area as much as possible to allow marsh and moist soil plants to germinate. This will stabilize the bottom sediments to improve water clarity in future years and allow better growth of emergent and submergent plants in future years. Where drainage is incomplete, hopefully, an ebb and flow situation can be established where cattail and other emergent plants will germinate readily.

B: Planned Management Actions:

This pool will be drawn down to expose some bottom areas in an attempt to reestablish some vegetation. This will be done by draining as much as possible directly into Radar Ditch and then releasing the rest through 2A and 8A to the 8A pump and by pumping with a crissifulli pump. Hopefully, we can repair the damaged dike toes.

C: Potential Problems:

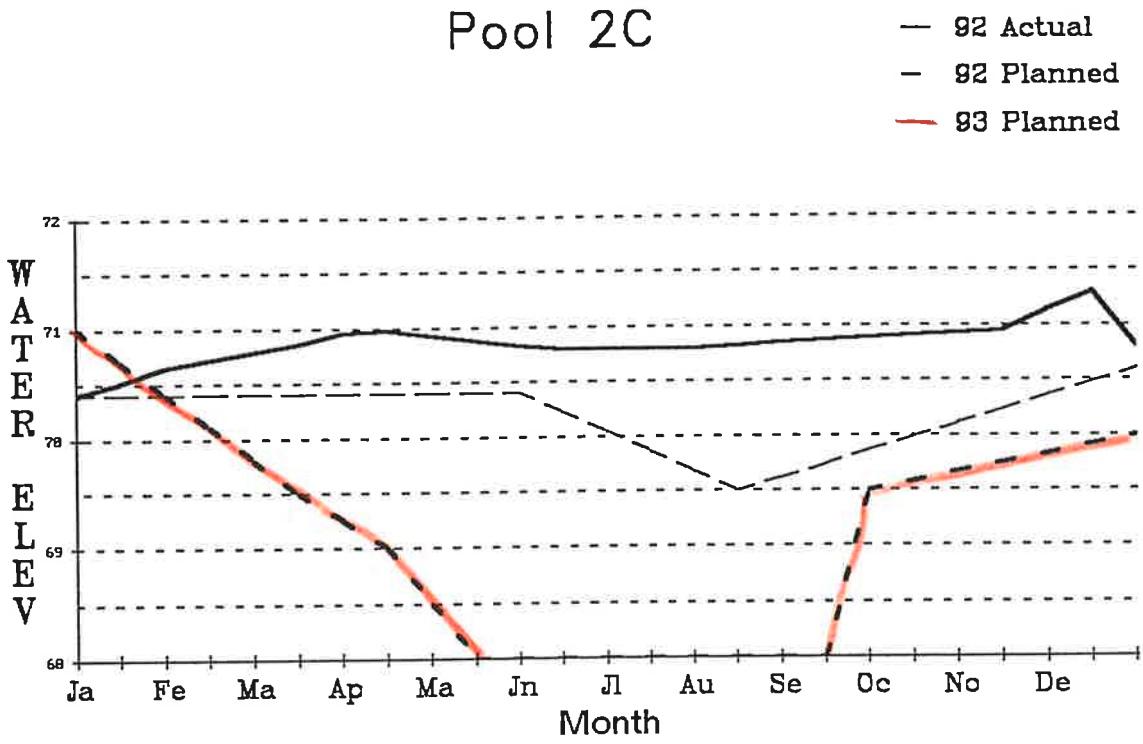
Considerable cost and manpower will be required to complete the pumping activities in this unit. With limitations on the refuge manpower and budget, it may not be possible to fully complete the planned activities.

D: Expected Results:

If considerable areas of the bottom can be exposed, excellent stands of

moist soil plants should be produced. Areas exposed before May 1st should produce good stands of annual smartweeds. Mudflat areas exposed in May and the areas which are currently water smartweeds should produce good stands of wild millet. Areas which have 1-2" of water and periodic drying and flooding during June have good potential for the germination of cattail, bulrush, and other emergent marsh plants. High waterfowl use in the fall is expected.

1. Unit Pool 2C
2. Acres 80
3. Maximum elevation permissible 571
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - ~~569~~
   90% bottom exposed - 570.5



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Aquatic Smartweed	2	5	25	20
Smartweed	10	35	10	
Millet/Other	25	3	15	
Open Water/Submergents	40	16	25	40
Cattail	20	16	5	10
American Lotus	3	5	10	15
Mud flats	0	20	10	

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	49,900	66,720	116,280	
Geese	45,000	29,190	111,520	
GBH	2,000	1,920	2,230	

9. Purple Loosestrife:

Pool 2C

A.2 Effects of Past Year's Water Levels

Levels:

This pool was kept very high during the year and is currently 6-12" higher than any time in the past several years.

Results:

This pool had a variety of emergents, moist soil plants, and a few submergents. However, high water levels during the late summer and fall have eliminated much of this vegetation.

Facilities:

The dikes surrounding the unit were mowed several times because the refuge's public use trails go around the unit.

Costs:

No costs occurred this year.

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

This unit has relatively low ground elevations and no pumping facilities. It is best managed as a permanent marsh to reduce the pumping requirements. It can occasionally be cycled into a moist soil production.

The above management also benefits wildlife recreation as this unit is part of the public use areas and this management will attract a variety of waterfowl, shorebirds, waterbirds, and wetland birds and mammals to provide opportunities for wildlife viewing.

The 1993 objectives will be to lower water levels somewhat to reduce dike erosion and encourage existing vegetation.

B: Planned Management Actions:

As much water as possible will be drained into Radar Ditch during the low water days before spring, then water levels will be lowered even more with a crissifulli pump to drain the unit in early spring to allow moist soil and marsh plants to germinate. Water levels should be maintained so the higher elevations are partially exposed. These areas will be reflooded in the fall for migrating waterfowl.

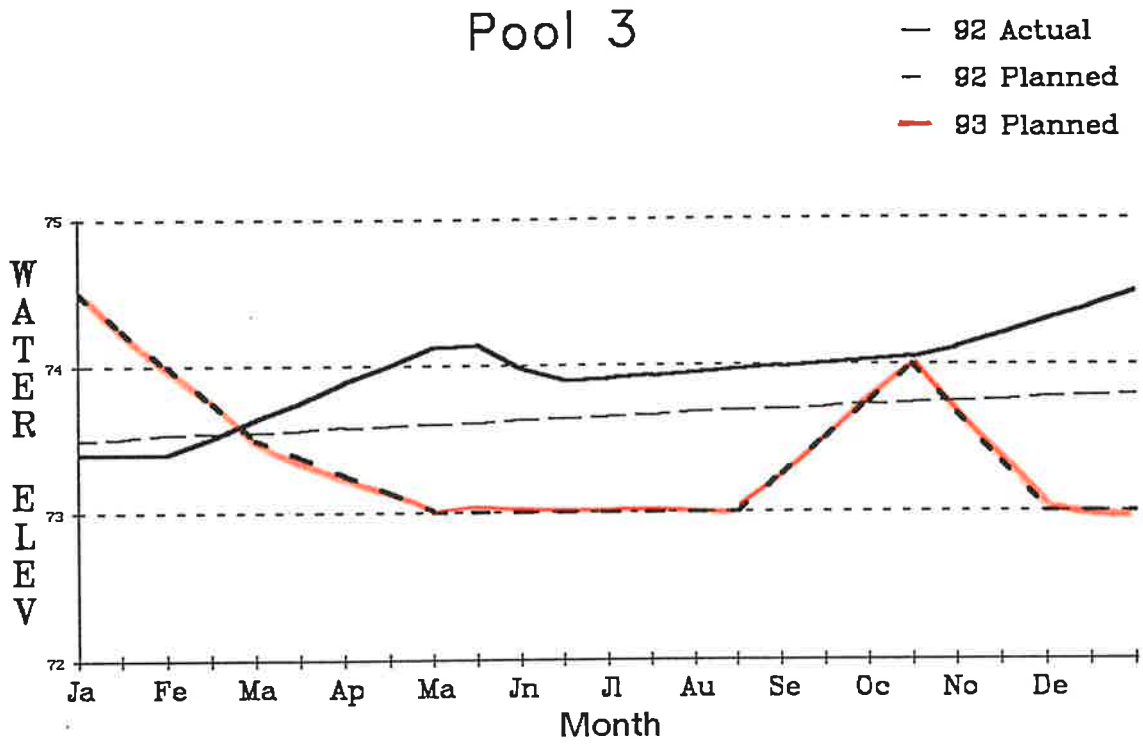
C: Potential Problems:

With rising lake levels, no further gravity draining may be possible, increasing the time and costs needed by pumping. Such costs may be excessive and may not be possible with the current manpower and budget limitations.

D: Expected Results:

Existing vegetation should expand readily in the shallow water areas. Any areas that are exposed throughout the summer should revegetate to annual smartweeds and/or millets. Areas which have fluctuations of exposed and flooded soils should revegetate to emergent vegetation species. Drying and shallow water areas should receive high use by herons and shorebirds during the late spring, summer,and early fall months. Good waterfowl use should occur during the fall.

1. Unit Pool 3
2. Acres 260
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 570
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - 570.5



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water/Mud Flats	50	40	50	50
Wooded	12	16	16	16
Cattail	12	23	29	30
Smartweed/Millet	15	18	2	
Annual Smartweed	1	0	0	
Submergents	10	3	3	

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	120,800	212,340	150,000	
Geese	51,000	113,310	74,260	
GBH	2,800	3,570	3,160	

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels remained relatively stable throughout the year with a slight lowering during the spring and early summer and the a slight rise during the latter half of the year. Levels were high at the end of the year.

Results:

Little change was noticed over previous years.

Facilities:

Costs:

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

Water Levels will be reduced from the current high levels as much as possible with gravity drainage and evaporation during the spring and early summer months to reduce the wave erosion against the north dike. During the summer, water levels will be held at a mid-range level. If construction of the Metzger's Marsh dike requires a borrow pit in this area, the unit may be completely pumped down. If so, drawdown by May 15th is desired to get moist soil plants started.

B: Planned Management Actions:

None

C: Potential Problems:

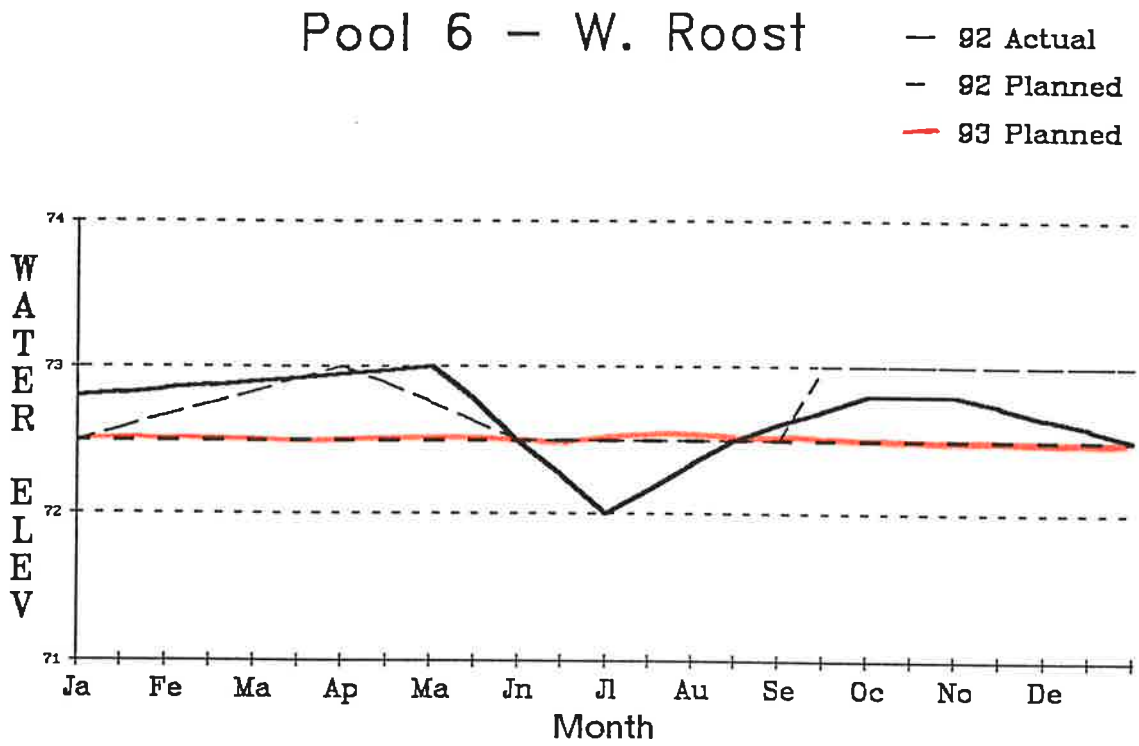
If water levels cannot be brought down, pumping may be required to reduce water levels to a point where dike erosion is stopped.

D: Expected Results:

Little change in the vegetation is expected under the planned management. If complete drawdown is necessary and can be done early enough, good moist soil plant development should occur in the eastern one-half of the unit. If drawdown is not completed by early June, this area will be primarily mudflat with little plant growth.

Fall reflooding is not expected if construction work is in progress

1. Unit Pool 6 (Woodies Roost)
2. Acres 160
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	40	40	40	40
Wooded	10	10	10	10
Cattail	35	40	40	40
Smartweed/Millet	10	5	5	
Aquatic Smartweed	5	5	5	5

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	5,500	14,250	24,480	
Geese	5,800	7,620	11,620	
GBH	1,500	720	640	

9. Purple Loosestrife:

Pool 6 (Woodies Roost)

A.2 Effects of Past Year's Water Levels

Levels:

Levels were stable throughout the year.

Results:

No change from last years vegetation was noticed. Waterfowl use was low.

Facilities:

East and south dikes are no longer capable of retaining water. Both dikes are severely eroded in areas and are riddled with muskrat/woodchuck holes. The north half of the east dike is overgrown with sumac and dogwood and is barely wide enough to ride an ATV on. The north dike also has some erosion and muskrat hole problems.

Costs:

None incurred.

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

Water levels will be allowed to remain stable throughout the year.

B: Planned Management Actions:

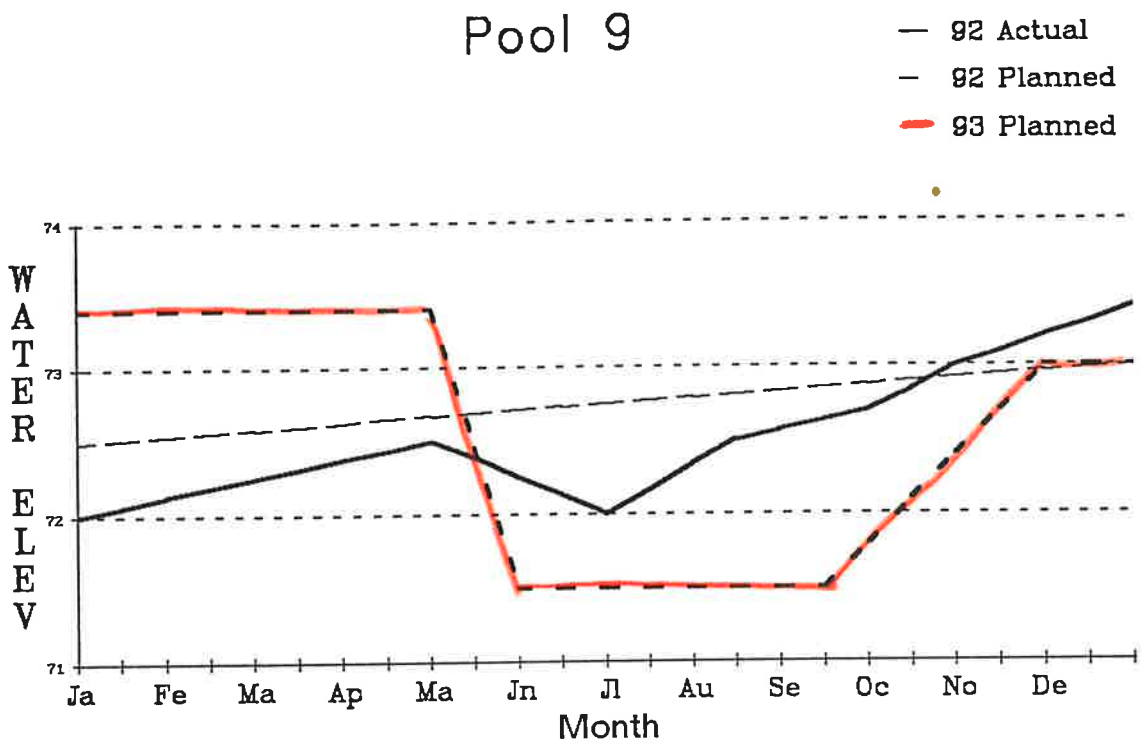
None.

C: Potential Problems:

D: Expected Results:

Little vegetation change is expected and low migrant waterfowl is expected. Some waterfowl use by broods will occur.

1. Unit Pool 9
2. Acres 158
3. Maximum elevation permissible _____
4. Flowline elevation of lowest structure _____
5. Water Elev. with 50% bottom exposed - _____
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Cattail		76	80	75
Phragmites		10	10	10
Open water		4	0	5
Smartweed/mud flat		3	1	
Cottonwood/willow		7	5	5
Reed Canary Grass			4	5

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks		7,320	1,200	
Geese		810	200	
GBH		810	150	

9. Purple Loosestrife: No purple loosestrife seen.

Pool 9

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were allow to remain stable throughout the year.

Results:

Little vegetation change was noted.

Facilities:

The north dike is eroded and riddled with muskrat/woodchuck holes and covered with trees and brush. It is scheduled for reconstruction along with Metzger's Marsh according to the North American Plan, St. Lawrence Project. The west dike also has some holes and brush on it.

Costs:

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

This unit will be allowed to evaporate as much as possible. If dike construction funding becomes available, the unit will be pumped dry for the construction work.

B: Planned Management Actions:

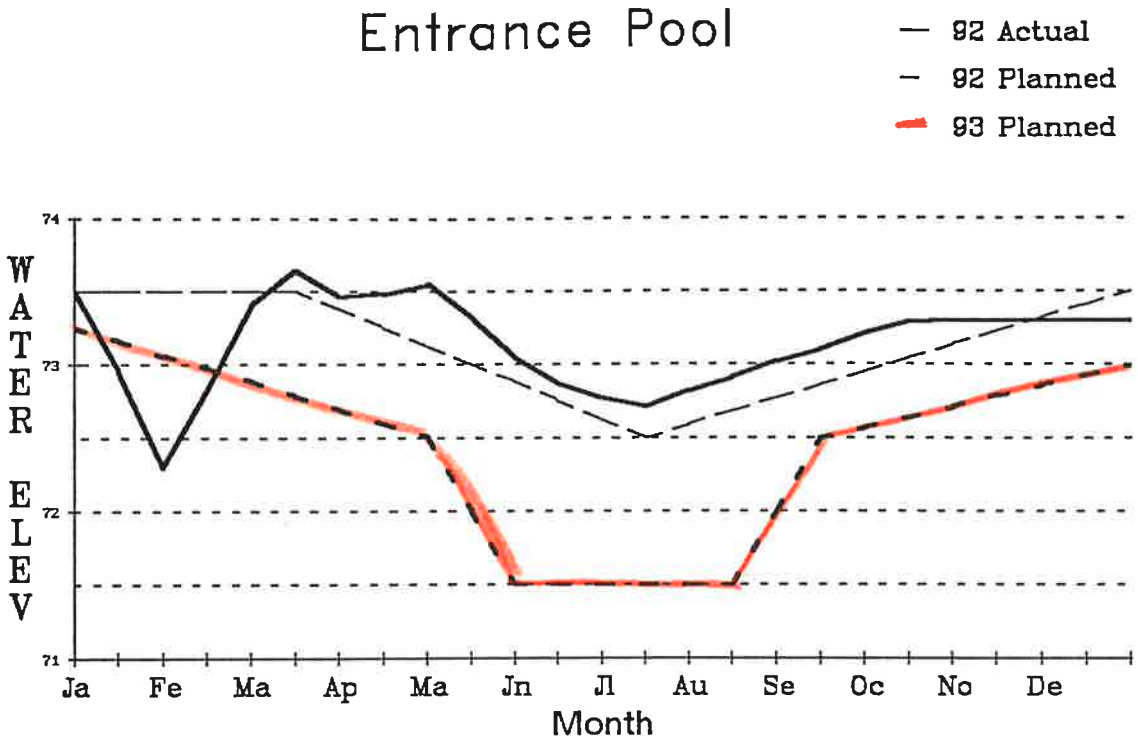
None

C: Potential Problems:

D: Expected Results:

Heavy cattail growth is expected to remain.

1. Unit Entrance Pool
2. Acres 30
3. Maximum elevation permissible 572.5
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	10	20	33	30
Cattail	15	20	20	20
Wet Meadow	20	15	15	15
Smartweed	10	5	2	
Willow/Brush	12	15	5	
Upland	33	25	25	

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	5,600	34,620	61,200	
Geese	6,500	31,110	47,630	
GBH	1,300	1,200	5,350	

9. Purple Loosestrife:

Entrance Pool

A.2 Effects of Past Year's Water Levels

Levels:

Water was kept high throughout the year.

Results:

The pool has cattail around the south and east borders. Waterfowl use has declined.

Facilities:

The interior slope of the north dike is without rip-rap and is starting to erode. Some erosion has also occurred on the entrance road where water has been allow to overtop the rip-rap.

Costs:

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

The location of this unit along the entrance road make the unit highly visible to refuge visitors and is the first area that the refuge visitor sees when entering the refuge. Thus, the unit is managed to provide a wide diversity of marsh type habitats, ranging from cattail stands to open water. It is occasionally cycled through a drawdown stage which produces moist soil plants.

B: Planned Management Actions:

The unit will be drawn down in the summer to encourage vegetation of the open water areas. The north dike may be resloped and rip-rapped if funds and manpower are available. If rip-rapping is not possible, the unit should be kept low enough to prevent further damage. If drawdown is complete and the bottom drys enough to support equipment, the old dead willows should be mowed for better wildlife viewing.

C: Potential Problems:

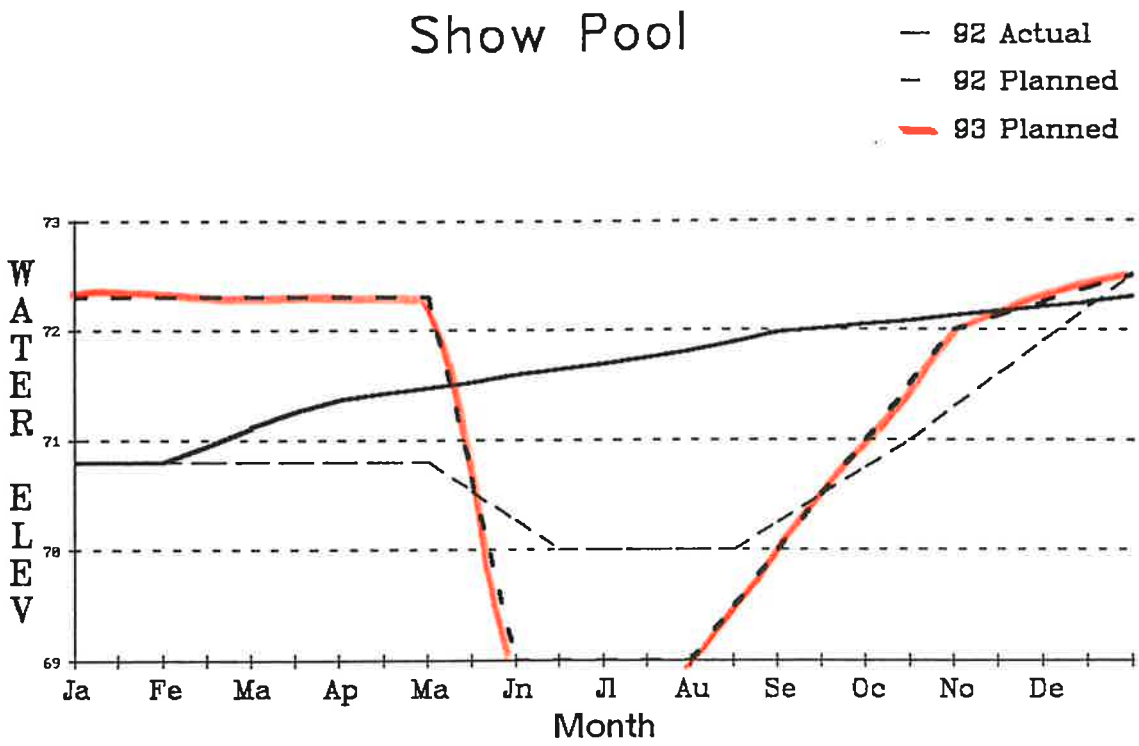
Since the drawdown of the unit will require pumping with portable pumps, frequent and heavy rains could hamper the drawdown and/or require excessive manpower and equipment at a time when this manpower and equipment is needed in other units or other activities. A possible solution will be to not completely drawdown the unit for this year.

D: Expected Results:

If the unit is drawn down completely by mid or late spring, good stands of smartweed should germinate on the mudflat area. Excellent use by shorebirds can be expected during the drawdown and the unit should receive high use by waterfowl in the fall. Emergent vegetation should germinate in the lower areas which experience periodic flooding from rains during June.

If drawdown is late or incomplete, little change in vegetation is expected.

1. Unit Show Pool
2. Acres 30
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 572
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	35	35	25	25
Cattail/Bulrush	15	20	15	15
Wet Meadow/Smartweed	10	15	10	10
Cottonwood/uplands	15	15	35	35
Submergents	10	5	5	
Phragmites	15	10	10	10

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	2,500	1,560	650	
Geese	8,200	7,980	5,620	
GBH	1,100	330	720	

9. Purple Loosestrife:

Show Pool

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were maintained stable, but relatively high during the season.

Results:

This pool has an island/remnant dike in the middle which most times is a moist meadow. The open water areas are devoid of any vegetative growth. Cattail and phragmites predominate with sections of loosestrife. Limited use by ducks, geese and great blue herons occurred.

Facilities:

The north and east dikes were totally redone in 1988-89. The south dike leaks into the wooded area around the shop and office. There are currently no plans for repair.

Costs:

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

Because of the location of this pool to the office, it has been designated as a "Show " pool with the intent that it can provide viewing of waterfowl and be model wetland area. However, because it was also used as a borrow pit area in the past, but otherwise has relatively high elevation, it does not provide the best settings for this. In order to keep this pool as a high quality permanent marsh water levels must be kept high via pumping with portable pumps. Some dikes are not rip-rapped to withstand these levels on a permanent basis.

The unit would better serve this planned purpose as a moist soil unit with annual drawdowns, with normal or maximum flooding only during the fall and spring months. This would attract substantial waterfowl during the migrations periods and would allow unprotected dikes to maintain good vegetation and allow them to withstand the fall and spring flooding.

Objectives for 1993 should be to drain the unit and completely set back the unit to a mudflat area by disking the unit late in the summer. It would then be flooded shallowly during the early and mid fall, primarily for shorebird use. This will set the stage for excellent moist soil production in 1994.

B: Planned Management Actions:

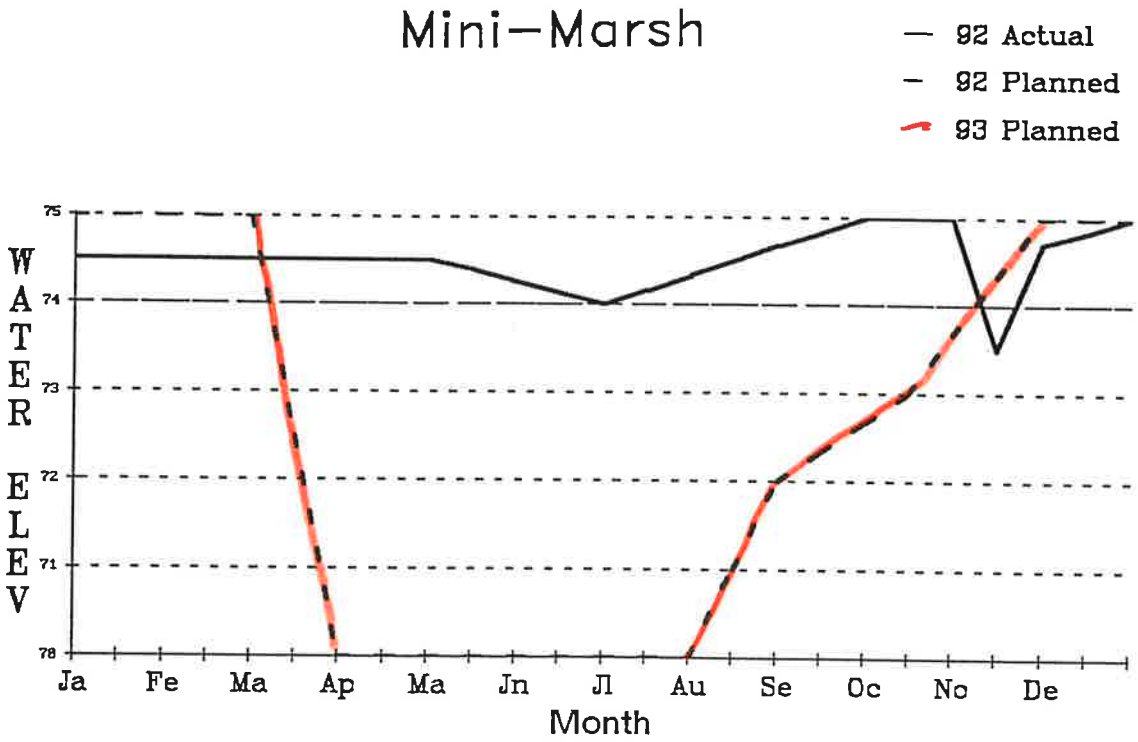
If time and personnel are available, the unit should be drained, heavily disked during the late summer, then water slowly added to encourage shorebird use. Otherwise try to maintain a high water level to discourage anymore encroachment by undesirable plants.

C: Potential Problems:

D: Expected Results:

If drainage and summer disking is completed, excellent shorebird use should occur during September and October, along with moderate waterfowl use.

1. Unit Mini-Marsh
2. Acres 16
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 571
5. Water Elev. with 50% bottom exposed - 570.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	15	30	30	20
Cattail	40	25	25	70
Other	30	10	10	10
Dead Cattail (Submergents)	5	0	0	
Smartweed/Millet	10	25	5	
Cottonwood/Willow		10	30	

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	1,000	1,020	1,630	
Geese	1,200	1,950	2,910	
GBH	800	150	200	

9. Purple Loosestrife:

Mini-Marsh

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were maintained for a deep marsh.

Results:

Cattails dominated the pool along with open water.

Facilities:

A control box was installed in the pump outlet pipe that allows water to be pumped directly into Crane Creek. The adjacent ditch which was cleaned in 1989 was resloped, and filter fabric and rip-rap placed on the slopes.

Costs:

B.2 Objectives of 1993 Proposed Water Levels

A: Objectives:

This unit will be converted to a moist soil unit by draining in the early spring and maintained in a dry condition until early fall. Disking to remove the cattail growth will be done during the summer.

B: Planned Management Actions:

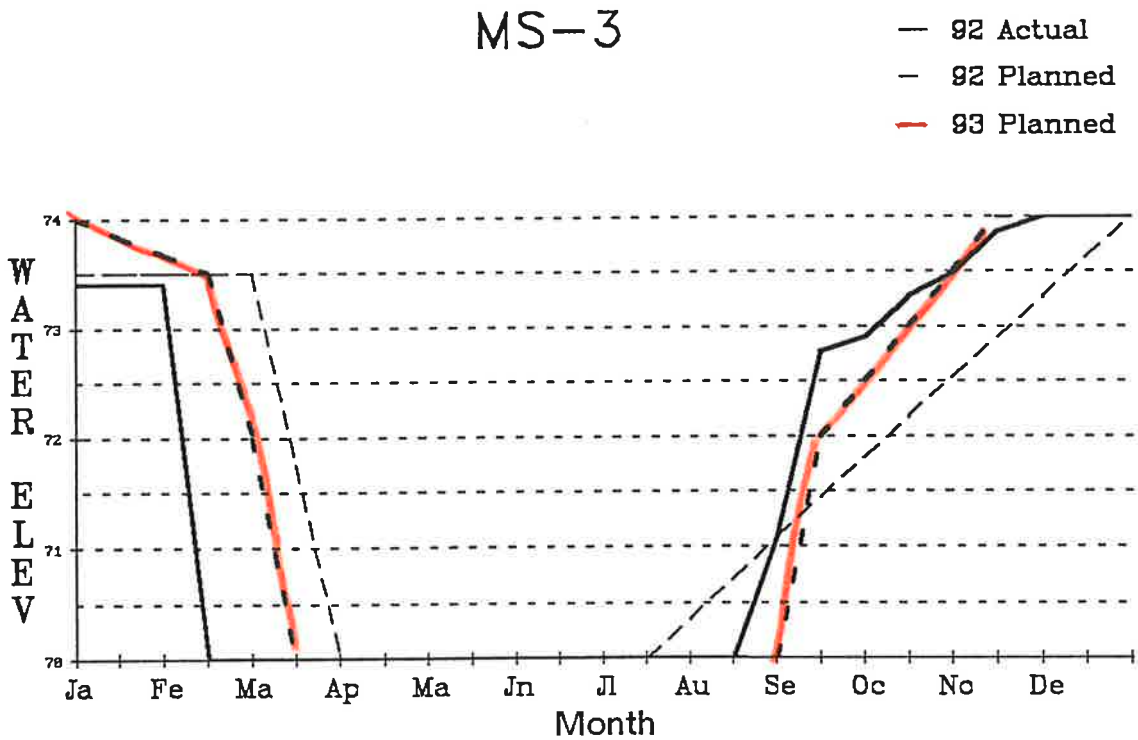
The unit will be disked periodically during the summer months to remove cattail growth.

C: Potential Problems:

D: Expected Results:

The cattail in this unit should be eliminated with periodic heavy disking and dry conditions. Early fall flooding of the disked areas should provide good shorebird habitat.

1. Unit MSU 3
2. Acres 213
3. Maximum elevation permissible 574.5
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Emergents	63	7	5	30
Open Water	2	2	5	
Smartweed/Millet	10	6	5	5
Cottonwood/Willow	15	40	40	25
Wet Meadow	10	5	5	
Uplands		40	40	10
Reed Canarygrass				30

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	32,000	21,120	16,720	
Geese	55,000	3,630	2,830	
GBH	1,000	1,470	850	

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

The unit was drained in mid spring to allow drying for vegetation control efforts and the unit maintained as dry as possible through September. Water levels were raised in October and reached full pool by the end of November.

Results:

Reed canary grass, cattail, sedges, willow and cottonwood make up most of the vegetation in this unit. Much of the willow and cottonwood was disked with the dozer and Rome-disk which appears to be very effective in reducing this growth. Most of the cattail and reed canarygrass areas were mowed. While this made good habitat of ducks during the fall period, it probably will have little effect on the control of these species.

Facilities:

This unit is still dominated by undesirable plants such as willow, reed canarygrass, and cattail which severely restricts it ability to provide a significant amount of moist soil vegetation. In addition, flooding to full level is difficult, if not impossible, since the main ditch bank was lowered in the rebuilding of the adjacent road.

The south dike needs to be rebuilt and reshaped and the underlying tile removed. A larger inlet tube from the main pump ditch may help in flooding by reducing the amount of water head required to force water into the unit.

Costs:

Pumping costs were incurred along with filling of other units.

B.2 Objectives of the 1993 Proposed Water Levels

A. Objectives:

The primary objective of this unit is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1200 lbs of high energy foods on at least 150 acres of the unit and provide up to 350,000-400,000 duck-use days during the fall migration period and an additional 75,000-100,000 use days again during the spring as waterfowl are feeding on invertebrate populations. Overall management will be to keep this unit in a early successional stages to retain the high productivity necessary to produce these foods.

The 1993 objectives will be to control the willow-cottonwood, reed canarygrass, and cattail areas and return these areas to a primary successional stage of seed producing annuals for maximum waterfowl food production and provide food resources for fall migrating waterfowl.

B. Planned Management Actions:

Much of this unit is still in the later successional wet meadow and/or permanent marsh stages with large areas of solid reed canarygrass, cattail, or willow-cottonwood. The willow cottonwood was disked in 1992 and considerable control was achieved. These vegetation control efforts will be continued with heavy disking to control willow, cottonwood, cattail, and reed-canarygrass and return the vegetation to a early successional stage. Cattail and Reed-canarygrass areas will have to be disked several times,

including during the summer, in order to kill these perennial plants.

The unit will be drained in early spring to allow the vegetation control activities to start as soon as possible. The area will be reflooded during the fall when moist soil plants are mature.

C. Potential Problems:

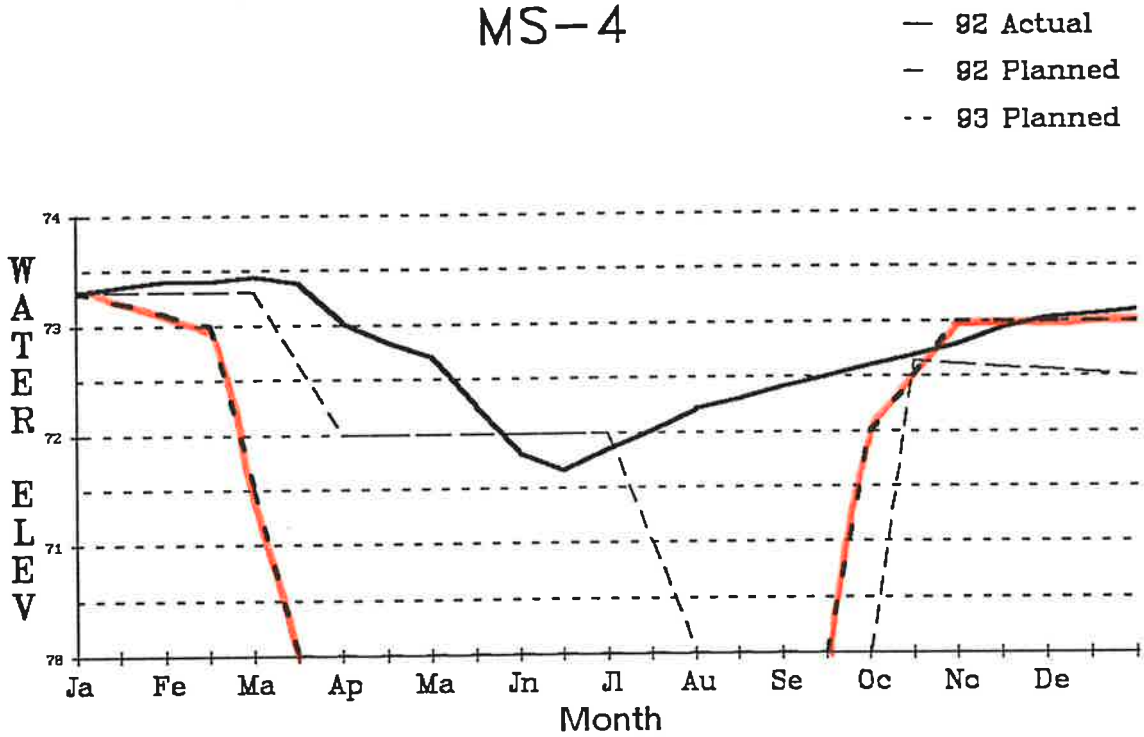
No significant problems are expected with normal summer weather conditions.

D. Expected Results:

Little moist soil production is expected in reed canarygrass and cattail areas where disking and control efforts are continued past June 15th. The areas of willow control should have significant moist soil plants if any needed work this year is done very early. No physical work may be needed in some of these willow areas where heavy disking occurred last year and these areas should have excellent moist soil response by smartweeds and millets if they can be exposed before April 15th. With a large amount of work, this unit is expected to be in excellent condition for moist soil production in 1994.

The unit should receive good shorebird and waterfowl use during the spring drawdown stages. Areas that produce good smartweed and millet stands should receive good waterfowl use in the fall and areas which receive late disking should receive good fall shorebird use.

1. Unit MSU 4
2. Acres 106
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed -



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Reed Canary grass/Willow	20	10	20	90
Millet/Bidens/Smartweed	15	10	60	7
Agriculture	5	0	0	
Borrow	5	5	5	
Upland	55	0	0	
Planted Millet/Buckwheat		30	0	
Planted Wheat		45	0	

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	3,000	31,170	248,000	
Geese	4,000	33,990	32,230	
GBH	200	960	850	

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water was lowered in late spring then allowed to evaporate through summer. However, summer levels were maintained considerably higher than previous years, resulting in saturated soil moisture levels throughout the year. Water was added in the fall to allow the unit to be utilized by migrating waterfowl.

Results:

The slow drawdowns and saturated soil moisture of the past two years have encouraged the reed canarygrass in this unit and this grass has overgrown the entire unit. Approximately 15 acres, was mowed in early June and produced some millet, but actual seed production appears to be very low. Fall waterfowl use has been low.

Facilities:

Dikes and water control structures are in good shape, however, there is considerable amount of willow in the north end and the entire unit is dominated heavily by reed canarygrass which almost eliminates any moist soil production.

Costs:

B.2 Objectives of the 1993 Proposed Water Levels

A. Objectives

The primary objective of this unit is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1200 lbs/acre of high energy foods on at least 90 acres of the unit and provide up to 200,000 duck-use days during the fall migration period and an additional 30-40,000 use days again during the spring as waterfowl are feeding on invertebrate populations. Overall management will be to keep this unit in a early successional stages to retain the high productivity necessary to produce these foods.

The 1993 objectives will be to control the willow-cottonwood and reed canarygrass areas and return these areas to a primary successional stage of seed producing annuals for maximum waterfowl food production and provide food resources for fall migrating waterfowl.

B. Planned Management Actions:

The reed canarygrass in this unit needs to be controlled before significant moist soil plant production can occur. The unit will be drawdown in late winter or very early spring so the unit can be worked heavily. The unit should be heavily disked or even moldboard plowed in the spring and then disked every 2-3 weeks through May and early June. If grass control efforts appear to be working at that time, it can be left for millet germination. If such germination does not occur quickly or reed canarygrass control is

not complete, it would be best to disk again and then drill milo or buckwheat for fall food production. Flooding should occur as soon as plants are mature.

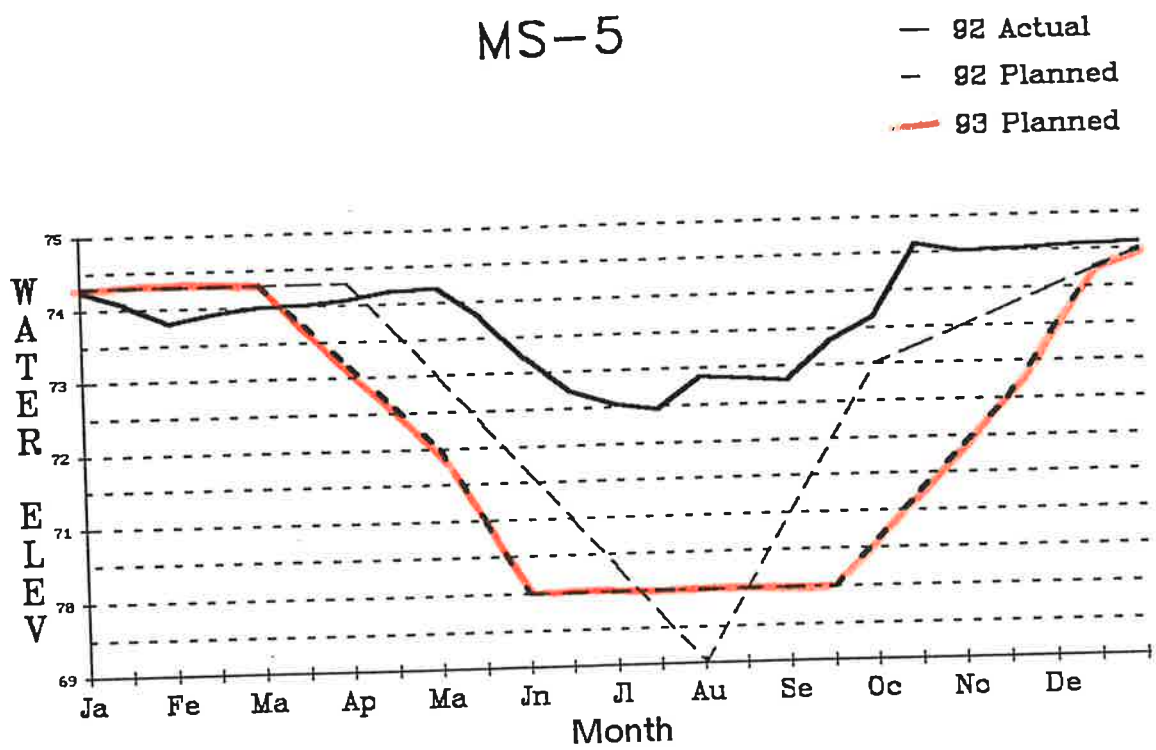
C. Potential Problems:

No significant problems are expected with normal summer weather conditions.

D. Expected Results:

Little moist soil production is expected in reed canarygrass and/or willow areas where disking and control efforts are continued past June 15th. With a large amount of work, this unit is expected to be in excellent condition for moist soil production in 1994.

1. Unit MSU 5
2. Acres 250
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - ~~570.5~~
   90% bottom exposed - 572.0



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Millet/Smartweed	40	5	10	25
Agriculture	0	0	0	
Bidens	10	0	5	
Cattail/Reed Canary grass	5	15	15	20
Cottonwood/Willow	40	50	50	35
Velvet Leaf	5	0	0	
Open Water			20	15

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	10,000	121,020	212,160	
Geese	20,000	87,390	143,590	
GBH	400	3,240	4,230	

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept high due to the infestation of willow. In June, the unit was dried and some of the willow areas were disked. The unit was then reflooded in early fall and brought up to full pool quickly because a swim-in duck trap, for the black duck physioecology study, is located in this unit.

Results:

The mowing to control the willow in 1991 was partially effective, but considerable re-sprouting occurred. Considerable millet growth occurred in 1992. Good waterfowl use occurred in early fall when the lower areas were first flooded, but later flooding made most of the unit too deep for good waterfowl feeding and waterfowl use was low for the rest of the fall. The shallower areas were then next to the duck trap and the road and disturbance reduced the waterfowl use.

The duck trapping program in this unit has had a significant detrimental on the waterfowl use of this area which is a significant portion of the moist soil areas on Ottawa NWR. This has significantly reduced the overall waterfowl use at Ottawa NWR.

Facilities:

Considerable willow control is still needed in this unit.

Costs:

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

The primary objective of this unit is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1200 lbs/acre of high energy foods on at least 220 acres of the unit and provide up to 500,000 duck-use days during the fall migration period and an additional 100,000 use days again during the spring as waterfowl are feeding on invertebrate populations. Overall management will be to keep this unit in a early successional stages to retain the high productivity necessary to produce these foods.

The 1993 objectives will be to control the willow-cottonwood, while allowing the other areas to produce as much millet as possible to provide food resources for fall migrating waterfowl. Fall flooding should be planned to keep the fallow areas very shallow as long as possible to provide shorebird habitat.

B: Planned Management Actions:

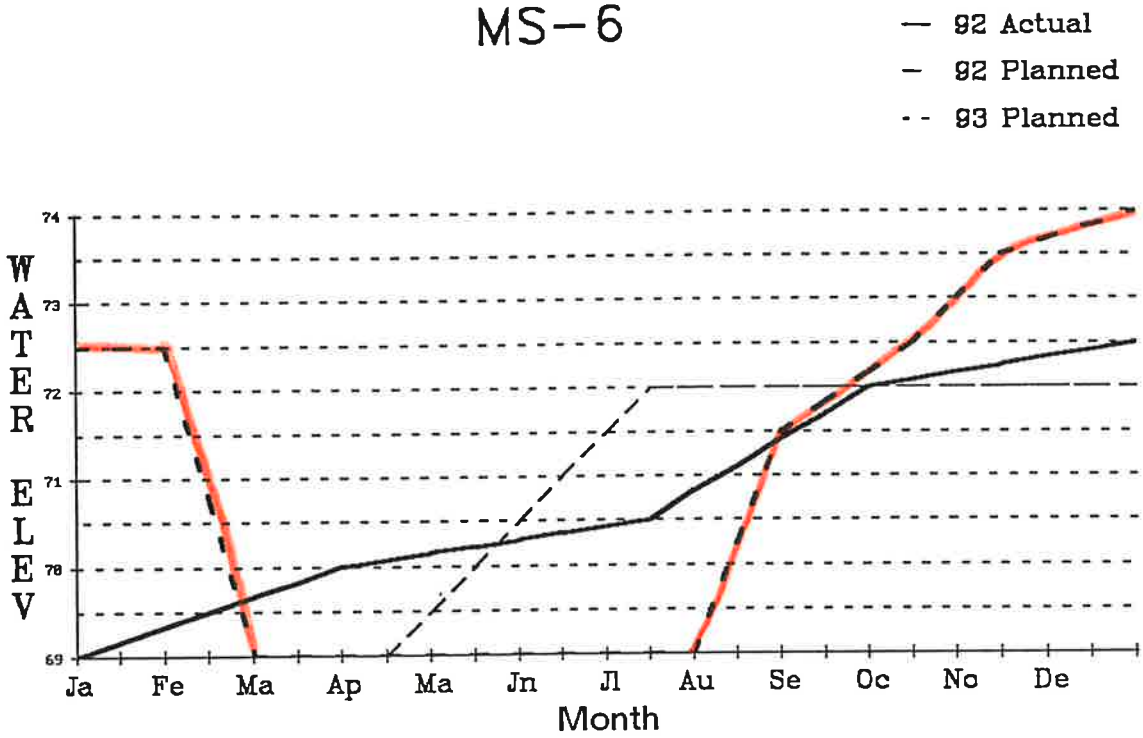
Water levels will reduced in late winter or early spring by gravity drainage to reduce pumping costs and then drained in late-spring to allow for willow control. Heavy disking of the willow areas will be done during June and

July. Approximately 75 acres of the unit will need to be disked for the willow control. Flooding should occur as soon as possible in the fall or late summer to allow the lower areas to be utilized by waterfowl before higher flooding occurs for the duck trapping. The duck trapping should be timed to coincide with the proper flooding of the unit, rather than managing the water level for duck trapping.

C: Potential Problems:
None

D: Expected Results:
Good millet production is expected in much of the areas, however, this will be reduced in the areas where willow control efforts are in effect. Excellent fall waterfowl use is expected in this unit as waterfowl utilized the millet areas. The willow control areas are expected to produce little food resources for waterfowl this fall, but will provide excellent loafing areas and these areas should provide excellent shorebird habitat as they are flooded.

1. Unit MSU 6
2. Acres 70
3. Maximum elevation permissible varies with lake
4. Flowline elevation of lowest structure None
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Cottonwood/Willow	35	35	45	25
Wet Meadow	5	5	0	
Cattail	50	55	55	60
Other	5	0	0	
Smartweed/Millet	5	3	0	5
Open Water	0	2	0	

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	2,800	30	500	
Geese	1,800	0	200	
GBH	500	150	360	

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels remained low in the unit during the construction of the south and west dikes which was completed in June. Level increased during the summer and fall months due to rainfall.

Results:

Cattail is dominate with willow, cottonwood and phragmites expanding into the area. Waterfowl use was very low this year.

Facilities:

Construction of a new dike along the south and west side of the unit was completed in June. Minor extension of inlet/outlet culverts to the moist soil pump is all that's needed to provide active water level control. A water gauge is needed to accurately record the units progress.

Considerable vegetation control of cattail and willow is needed. Some of this willow is reaching the stage where control by mowing is no longer feasible and dozer disking will be required.

Costs:

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

The primary objective of this unit is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1200 lbs/acre of high energy foods on at least 50 acres of the unit and provide up to 100-120,000 duck-use days during the fall migration period and an additional 25,000 use days again during the spring as waterfowl are feeding on invertebrate populations. Overall management will be to keep this unit in a early successional stages to retain the high productivity necessary to produce these foods.

The 1993 objectives will be to control the willow-cottonwood and cattail areas and return these areas to a primary successional stage of seed producing annuals for maximum waterfowl food production and provide food resources for fall migrating waterfowl. If possible, this work will be accomplished early enough to allow for some moist soil production this year for fall waterfowl use.

B: Planned Management Actions:

The unit will be drained in late winter(February) by pumping either with the MS pump or by portable pump and the area disked heavily during the spring months to control willow and cattail. Hopefully, this can be complete by mid-May to allow germination of millet and other moist soil plants. If not, disking will continue into the summer months to complete the control efforts. The unit will be reflooded in the fall.

Culverts to allow pumping of the unit by the main moist soil pump will be

installed during the year.

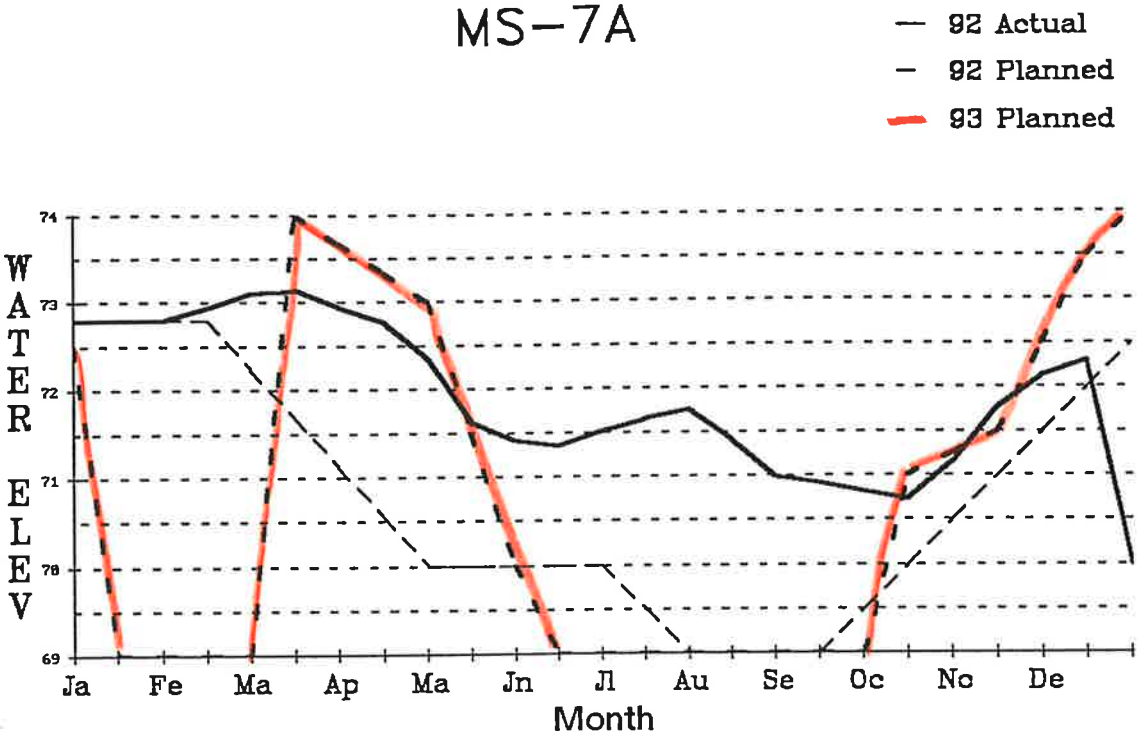
C: Potential Problems:

Wet weather could delay the disking during the months of March and April. It so, the disking may not be completed soon enough for good plant germination and would reduce the fall food production.

D: Expected Results:

If the unit work can be completed by mid-April as planned, excellent moist soil plant production should occur during the summer and the unit should receive heavy fall waterfowl use.

1. Unit MSU 7A
2. Acres 49
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 570.5
5. Water Elev. with 50% bottom exposed - 572.0
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Upland Species	35	0	30	30
Cattail	5	0	0	2
Millet	10	0	0	15
Bidens	20	0	10	10
Smartweed	15	18	10	0
Cottonwood/willow	15	2	5	0
Planted Millet/Buckwheat		47	0	0
Planted Wheat/Upland Grass		33	45	15

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	12,000	240	15,400	
Geese	8,000	6,420	29,290	
GBH	350	360	220	

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept steady through spring months. Then the unit was drained for rip-rapping of the north dike. Wet weather prevented the rip-rap placement and the area partially refilled due to rainfall. It was drained again at the end of the year for rip-rap placement during the winter.

Results:

Upland plant species were predominate in this unit along with a scattering of moist soil plants. Ducks and geese were attracted newly flooded areas in late fall

Facilities:

The north dike still needs to be rip-rapped and the dike between MSU 7A and 7B needs to be reshaped.

Costs:

Electricity cost for pumping was Area surrounding the hunting blind was mowed by State personnel.

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

Management will be directed at producing moist soil plants for fall flooding.

B: Planned Management Actions:

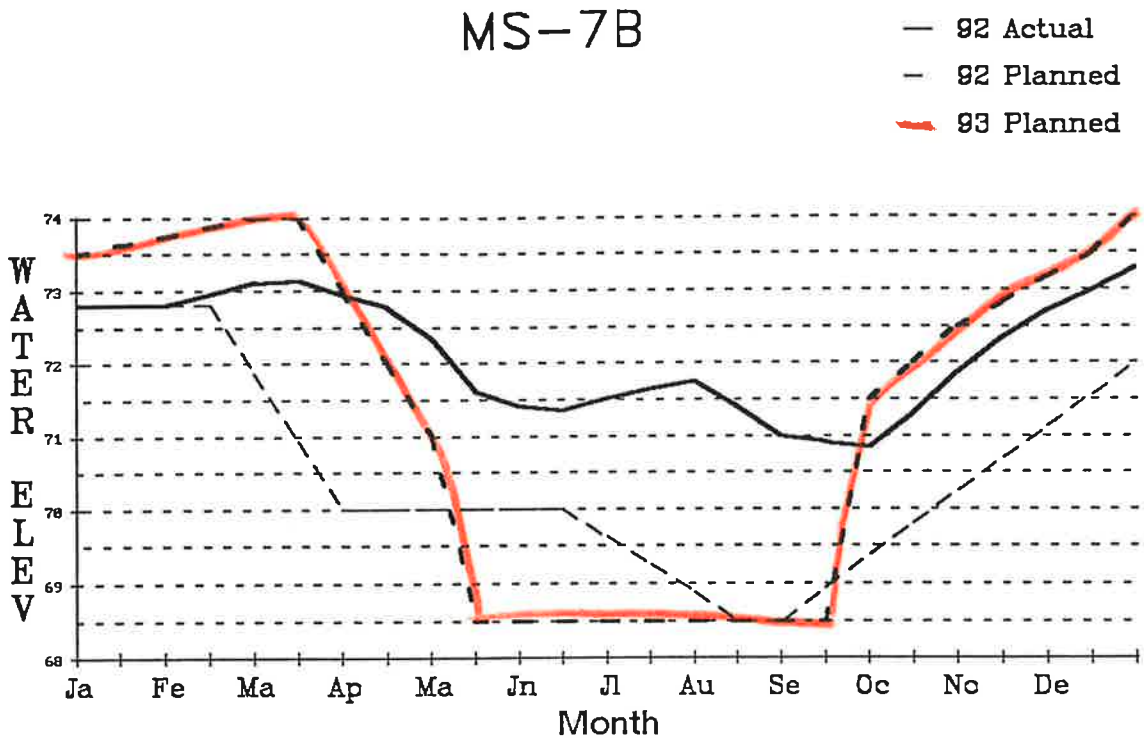
The unit will be kept drained during the winter months to allow for possible rip-rapping of the north dike. If this can be completed before spring, the unit will be refilled for spring use. Then, water levels will be lowered again in April for the production of moist soil plants and reflooded in the fall. The unit will be disked as early as possible to retard aster and grasses and encourage germination of millet.

C: Potential Problems:

D: Expected Results:

If disking can be done early, good production of millet can be expected. If disking is not done, growth will include a high amount of aster, grasses, and other undesirable plants.

1. Unit MSU 7B
2. Acres 44
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure None
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Upland	35	12	30	10
Smartweed/Cattail/Water	20	1	10	
Smartweed/Millet	25	6	10	5
Bidens/Stonecrop	15	10	10	25
Plowed	0	70	0	
Cottonwood/Willow	5	1	0	
Cocklebur				25

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	25,000	100	5,400	
Geese	20,500	600	6,000	
GBH	450	510	1,120	

9. Purple Loosestrife:

MSU 7B

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were lowered during the summer for possible rip-rapping of the north dike. Late summer and fall rains prevented this work and refilled the unit to normal levels which were maintained for the fall months.

Results:

Some damage to the new dike occurred from the normal water levels

Facilities:

The north dike needs to be rip-rapped. The water levels should be kept low until this is completed. This unit could be drained and partially flooded via the mini-marsh pump if a connecting drainage ditch were cleaned and a culvert and screwgate installed.

Costs:

B.2 Objectives of the 1993 Water Levels

A: Objectives:

Management will be directed at producing moist soil plants for fall flooding.

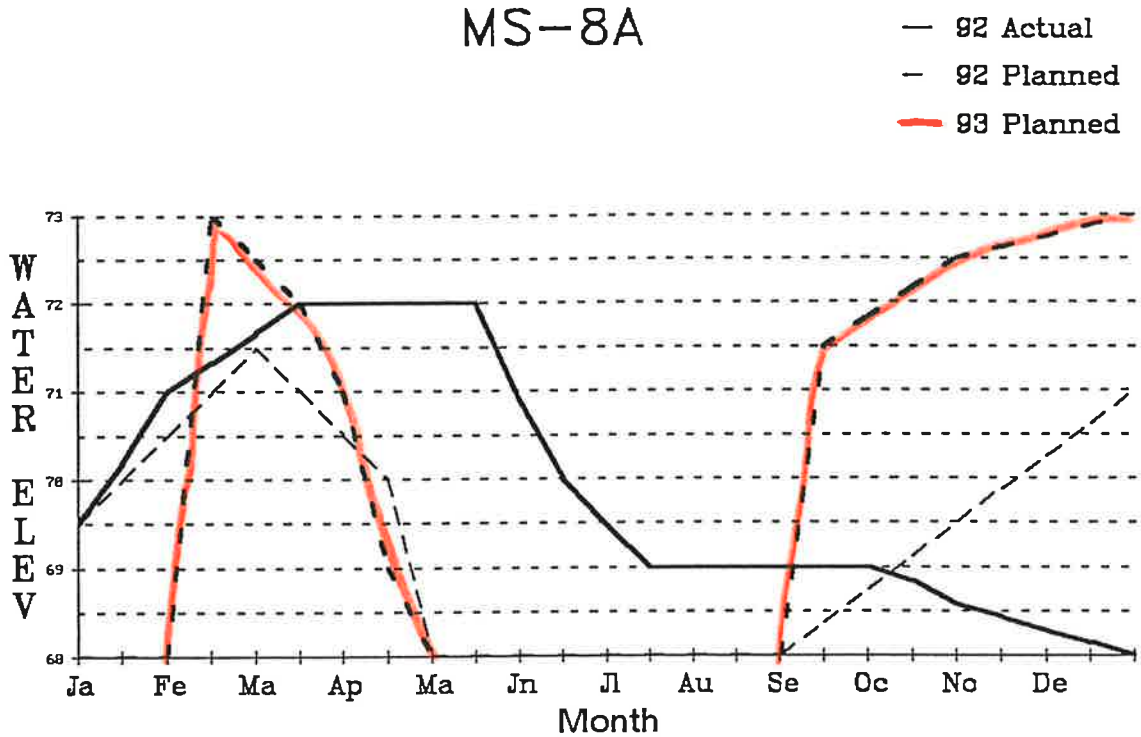
B: Planned Management Actions:

This unit will be kept flooded until the rip-rapping of the adjacent unit (7A) is complete, then the water released into and pumped into 7A to reflood that unit and the rip-rapping of this unit completed. This unit should be then kept dry the remainder of the spring and summer and reflooded in early fall. Early reflooding via portable pump is desirable

C: Potential Problems:

D: Expected Results:

1. Unit MSU 8A
2. Acres 44
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 570
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Millet/Smartweed (mud flats)	25	42	50	30
Bidens	5	5	5	20
Open Water	45	8	20	
Upland Sup./Velvet Leaf	20	40	10	10
Cottonwood/Willow	5	5	15	3
Ditch-Stonecrop				10

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	36,500	14,370	80,480	
Geese	12,300	24,900	68,340	
GBH	2,900	750	1,070	

9. Purple Loosestrife:

MSU 8A

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept steady through spring and then dropped in early summer for rehabilitation of the south dike toe. It remained dry throughout the fall to complete this work.

Results:

This unit has a variety of moist soil plants including millet, smartweed, and bidens. Some willow and cottonwood were intermingled with the moist soil plants. However, plants seem to be stunted and small with small seedhead, in spite of the excellent moist soil growing conditions created by the abundant rainfall this year. Some sort of manipulation is needed to restore the unit.

Facilities:

Work on repairing the dike toe erosion on the south and east dikes was started this fall and still underway at the end of the year.

Costs:

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

The primary objective of this unit is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1200 lbs/acre of high energy foods on at least 30 acres of the unit and provide up to 50-70,000 duck-use days during the fall migration period and an additional 15,000 use days again during the spring as waterfowl are feeding on invertebrate populations. Overall management will be to keep this unit in a early successional stages to retain the high productivity necessary to produce these foods.

The 1993 objectives will be produce smartweeds and millet as waterfowl foods by drawing down the unit in the early to mid spring period, allowing these plants to grow to maturity and reflood during the early fall.

B: Planned Management Actions:

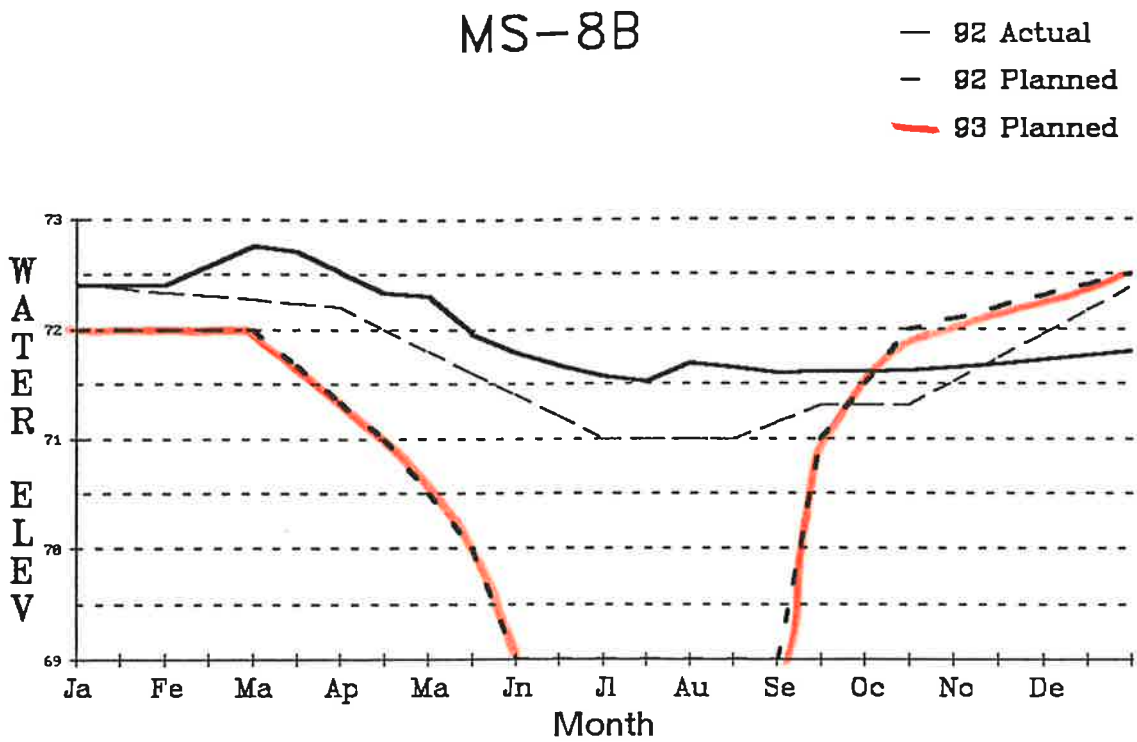
The unit will be reflooded for a short period beginning in early February for early migrants and then drained to allow pumping of the adjacent unit (2A,2B, and possibly 2C). Dike work, if not completed, will be postponed. Flooding will be brief and the unit will drained by April 1st to encourage smartweed germination on the newly disturbed soils. Disking may be done on the higher and more vegetated areas in April or early May. The unit will be reflooded in the early fall.

C: Potential Problems:

D: Expected Results:

Excellent smartweed production is expected on areas next to the dike rehab where late fall and winter disturbance occurred. Millet production is expected in areas where dozer work and/or disking is done during the later spring(April 15th-May 15th) and little moist soil production is expected in areas disturbed after June 1st. Undisturbed areas are expected to provide only moderate moist soil plants. This unit should produce excellent waterfowl use during the fall months.

1. Unit MSU 8B
2. Acres 85
3. Maximum elevation permissible 572.5
4. Flowline elevation of lowest structure 571.5
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Millet (+ velvet leaf)	28	38	35	5
Bidens	15	0	10	
Upland Species	5	10	10	5
Cocklebur	2	2	0	
Water/Submerged Aquatics	15	5	15	20
Emergents (Rushes)		45	30	70

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	85,000	49,800	117,720	
Geese	32,000	27,000	80,660	
GBH	12,000	2,310	4,520	

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were kept high until June when levels were decreased slightly. Rainfall kept the unit high through-out the summer. Water was added to the unit starting in September.

Results:

The water levels encouraged large beds of rushes and other emergents and the unit is becoming a permanent marsh area. Moist soil plants are limited to a few scattered areas along the higher edges. Although the rushes provided some goose browse, other waterfowl use in the fall was low. The unit has a significant amount of muskrat use.

Facilities:

Several muskrat holes in the south dike were repaired in the fall. The unit is mostly semi-permanent vegetation and provides little moist soil foods for fall waterfowl. A large scale vegetation control is needed for the unit to return it to moist soil production.

Cost:

The electricity for the pump was $ which included draining of the woods to the west and the surrounding ditches as well as the pumping of Unit 8B.

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

The primary objective of this unit is to provide waterfowl food resources as a moist soil unit. A secondary objective is to provide waterfowl and wetland wildlife for viewing by refuge visitors. The unit is within the visitor trail system and adjacent to the visitor parking areas and the office complex. Under optimum conditions, this unit should be able to provide up to 1200 lbs/acre of high energy foods on at least 60 acres of the unit and provide up to 100-125,000 duck-use days during the fall migration period and an additional 30,000 use days again during the spring as waterfowl are feeding on invertebrate populations. However, disturbance by visitors as well as refuge personnel often reduce this use. Overall management will be to keep this unit in a early successional stages to retain the high productivity necessary to produce these moist soil foods to attract and feed waterfowl.

The 1993 objectives will be produce smartweeds and millet as waterfowl foods by drawing down the unit in the early to mid spring period, allowing these plants to grow to maturity and reflood during the early fall.

B: Planned Management Actions:

This unit will be managed to encourage more moist soil plants by draining earlier and more completely than in previous years. It will be drawn down in mid April to encourage moist soil production on the deeper water areas that are now open water. The large spikerush and other emergent vegetation will be disked to set back the succession in these areas. It will be reflooded in September for waterfowl use. This unit should provide habitat

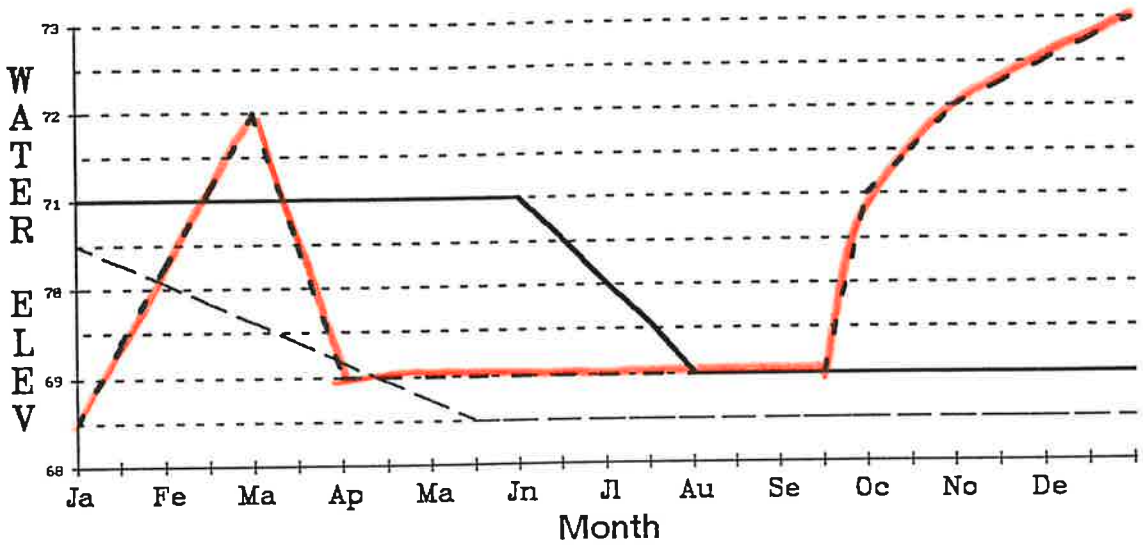
for migrating shorebirds in both the spring and fall.

C: Potential Problems:

D: Expected Results:

If an early drawdown is completed and soil disturbance can be completed by mid-May, good millet production and good fall waterfowl use can be expected. Areas which are disturbed after June 1st will not likely produce a significant amount of waterfowl foods, but may produce good shorebird areas during the early fall migrations.

1. Unit MSU LL
2. Acres 20
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure _____
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



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7. Vegetation:

Species	%1989	%1990	%1991	%1992
Foxtail & panic grass				39
Bidens				4
Upland Species				12
Willow, Cottonwood, Dogwood				22
Bare ground				20
Rushes				7

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks				0
Geese				0
GBH				0

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Unit was not managed as a wetland in 1992 and was dry for the entire year.

Results:

The unit produced some moist soil plants during the year, but flooding was not possible and no waterfowl use occurred.

Facilities:

Cost:

B.2 Objectives of the 1993 Proposed Water Levels

A: Objectives:

The primary objective of this unit is to provide waterfowl food resources as a moist soil unit. A secondary objective is to provide waterfowl and wetland wildlife for viewing by refuge visitors. Under optimum conditions, this unit should be able to provide up to 1200 lbs/acre of high energy foods on at least 20 acres of the unit and provide up to 22-30,000 duck-use days during the fall migration period and an additional 10,000 use days again during the spring as waterfowl are feeding on invertebrate populations. However, disturbance by visitors as well as refuge personnel often reduce this use. Overall management will be to keep this unit in a early successional stages to retain the high productivity necessary to produce these moist soil foods to attract and feed waterfowl.

The 1993 objectives will be produce smartweeds and millet as waterfowl foods by drawing down the unit in the early to mid spring period, allowing these plants to grow to maturity and reflood during the early fall.

B: Planned Management Actions:

Some willow control may be necessary over approximately 2 acres on the north end. This was mowed in 1992 and regrowth should be mowed or sprayed.
The spoil pile areas on the north end should be leveled with a dozer. The north end of the spoil pile area was rough leveled in 1992 and should produce excellent stands of smartweed with no further disturbance.

Some disking of the higher and grassy areas may be done in early May.

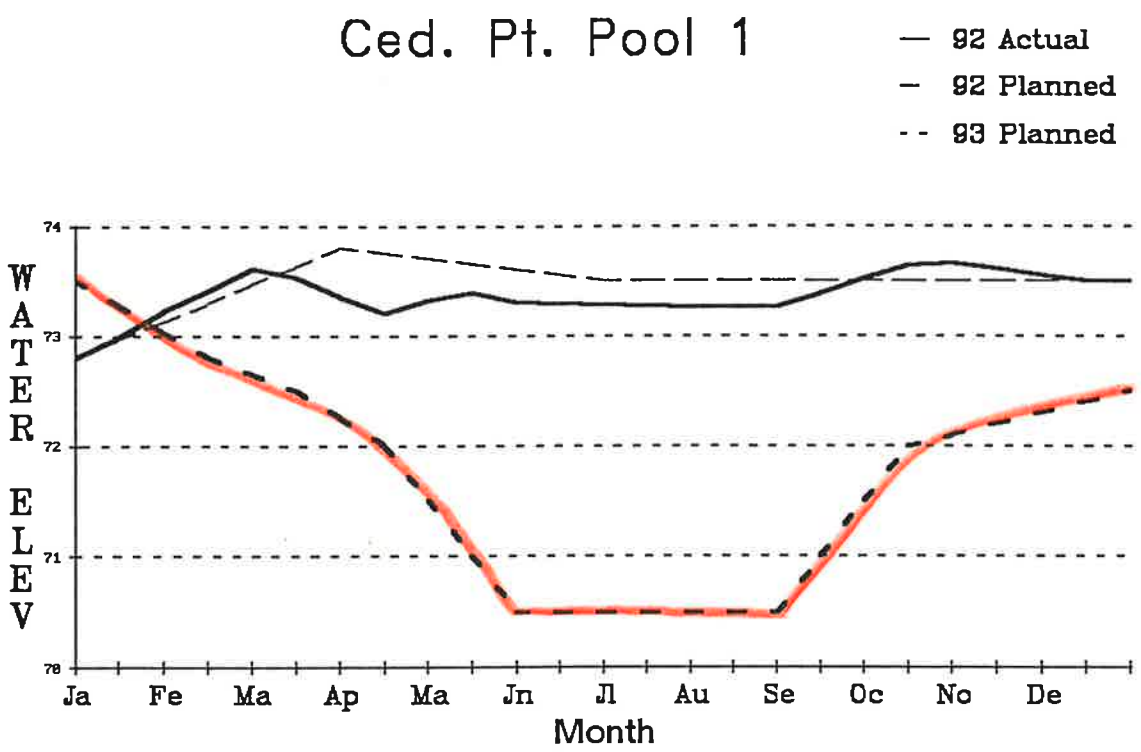
C: Potential Problems:

Flooding as planned depends on the installation of culverts into the 8A pump. If maintenance crews cannot complete this, then portable pumps can be used to flood and will be required for draining in the following year.

D: Expected Results:

Excellent stands of smartweed are expected on the south end of the spoil pile areas. The north end of these areas may produce some millet stands if the leveling can be done before mid-May. Otherwise, little production is expected in this area, however, some shorebird use is expected upon flooding. Millet production should be good on any disked areas.

1. Unit Cedar Point - Pool 1
2. Acres 1,460
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 569.4
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	25	15	15	
Water Lily	3	3	3	
Cattail	30	30	60	
Burreed/Bulrush	5	25	10	
Other	10	2	2	
Smartweed/Millets/Nutsedge	10	15	5	
Phragmites/Purple Loosestrife	17	15	5	

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	589,000	1,211,280	874,810	
Geese	96,300	77,640	144,825	
GBH	25,600	6,990	5,090	

9. Purple Loosestrife:

Cedar Point - Pool 1

A.2 Effects of Past Year's Water Levels

Levels:

Water levels increased throughout the year because of constant rainfall. Rainfall during the late summer and fall continued this steady rise and fall levels were higher than any year in the past 10 years. Water levels have been raised each year since the 1988 drawdown and 1992 summer and fall levels were maintained even higher than levels during the 1985-87 period when high lake levels and lack of pumping facilities prevented drainage and almost all of the cattail and other emergent plants were lost or areas reverted to lotus and lily. This fall levels were maintained approximately 1 foot above normal levels and over 2 feet above average lake levels.

Results:

High water levels and high muskrat populations appeared to have been determintal to the emergent vegetation and considerable loss is expected. This may be beneficial if the loss is not to severe and levels can be reduced in the future to produce moist soil plants. However, the high water levels have also produced a considerable amount of dike erosion and damage where water levels have overtopped the rip-rap.

Facilities:

A majority of the road system needs gravel except along drainage canal where roads were redone along with construction.

Costs:

B.2 Objectives of 1993 Proposed Water Levels

A: Objectives:

This unit is managed as a permanent marsh area. The area provides year around habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed to providing a well balanced hemi-marsh over most of the area.

B: Planned Management Actions:

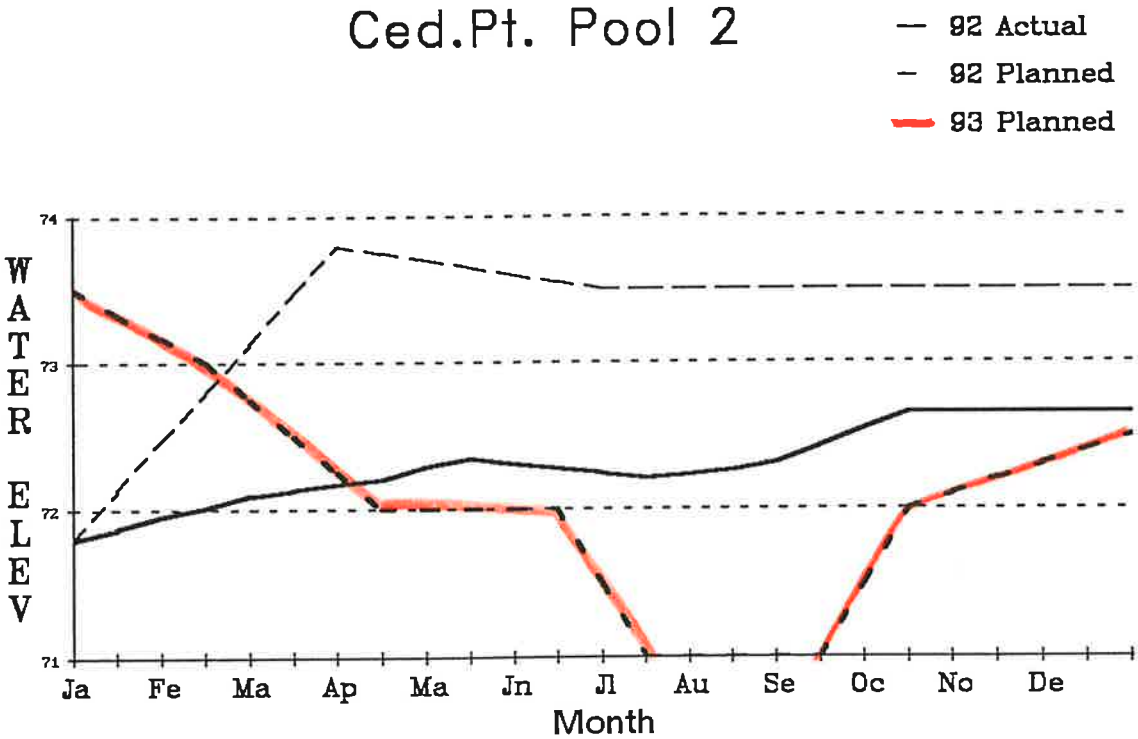
Water levels will be reduced during the winter as much as possible without undue disturbance to the trapping program. In March, the levels will be reduced as much as the lake levels will allow and then the unit will be pumped to a point where some marsh bottoms are exposed and moist soil plants can germinate. In the fall, water levels will be returned to normal levels for fall migrants.

C: Potential Problems:

Budget problems may reduce the amount of pumping below the necessary level for optimum marsh conditions.

D: Expected Results:

1. Unit Cedar Point - Pool 2
2. Acres 135
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 569.4
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water(submergent &barrow)	5	13	20	
Cattail	28	37	45	
Bulrush	5	2	5	
Burreed	2	0	0	
Phragmites/Willow	10	15	10	
Smartweed/Millet/Nutsedge	20	10	20	
Cottonwood/Willow	30	23	10	

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	117,100	23,760	18,040	
Geese	13,500	1,050	4,500	
GBH	6,500	1,020	1,000	

9. Purple Loosestrife: Single plants scattered throughout the unit.

Cedar Point - Pool 2

A.2 Effects of Past Year's Water Levels

Levels:

Pool 2 water levels are directly connected with Pool 1 through a water control structure. Water levels approximate the pool 1 levels.

Results:

Cottonwood seedlings, phragmites, purple loosestrife and cattail dominate this pool. Very little waterfowl use occurred.

Facilities:

The main water control structure connected directly to Lake Erie has been silted in for years. The elevation difference between Pool 1 & 2 makes it difficult to add water to Pool 2 from that direction. The north and east dikes are in good condition.

Costs:

Dikes were mowed once.

B.2 Objectives of 1993 Proposed Water Levels

A: Objectives:

This unit is managed as a permanent marsh area. The area provides year around habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed to providing a well balanced hemi-marsh over most of the area.

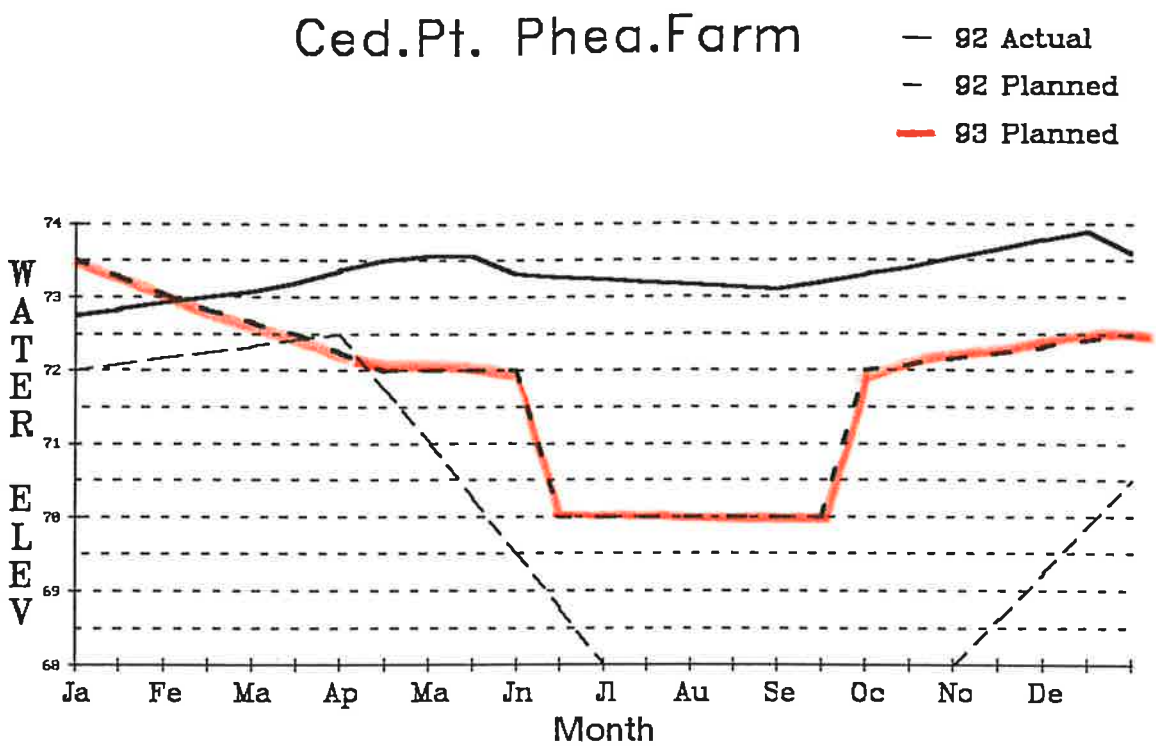
B: Planned Management Actions:

This unit will be managed the same as pool 1, although water levels will be maintained higher during the summer months. This will lessen pumping costs and will encourage emergents and submergents and discourage purple loosestrife.

C: Potential Problems:

D: Expected Results:

1. Unit Cedar Point - Pheasant Farm
2. Acres 155
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 571
5. Water Elev. with 50% bottom exposed - 571
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Cattail	40	36	40	
Open Water (submerg.aquatics)	10	15	10	
Burreed/Arrowhead	5	5	5	
Smartweed/Millet	10	5	5	
Other (Purple Loosestrife)	35	25	25	
Open Water (barrow pits)	0	14	15	

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	71,905	15,810	9,019	
Geese	4,100	26,940	1,540	
GBH	2,500	1,500	890	

9. Purple Loosestrife:

Cedar Point - Pheasant Farm

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were allowed raised steadily during the year. The planned drawdown for construction work was not implemented as the work could not be done because heavy rains delayed other scheduled work. These rains also raised water levels in this unit much higher than planned. Current levels are up to 2 feet above normal levels.

Results:

Additional erosion has occurred, especially along the southwest and east dikes. Vegetation still appears in good condition, but could be eliminated easily if high water levels are continued.

Facilities:

The dikes of this unit are in poor condition. Banks of the west and east dikes severely eroded. The south and north dikes are eroded on the interior side only. The dike around the water control structure has eroded somewhat. Hopefully, reconstruction of these dike will be done in 1992.

Costs:

B.2 Objectives of 1993 Proposed Water Levels

A: Objectives:

This unit is managed as a permanent marsh area. The area provides year around habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed to providing a well balanced hemi-marsh over most of the area. The area would be an excellent moist soil unit if more permanent pumping facilities were available.

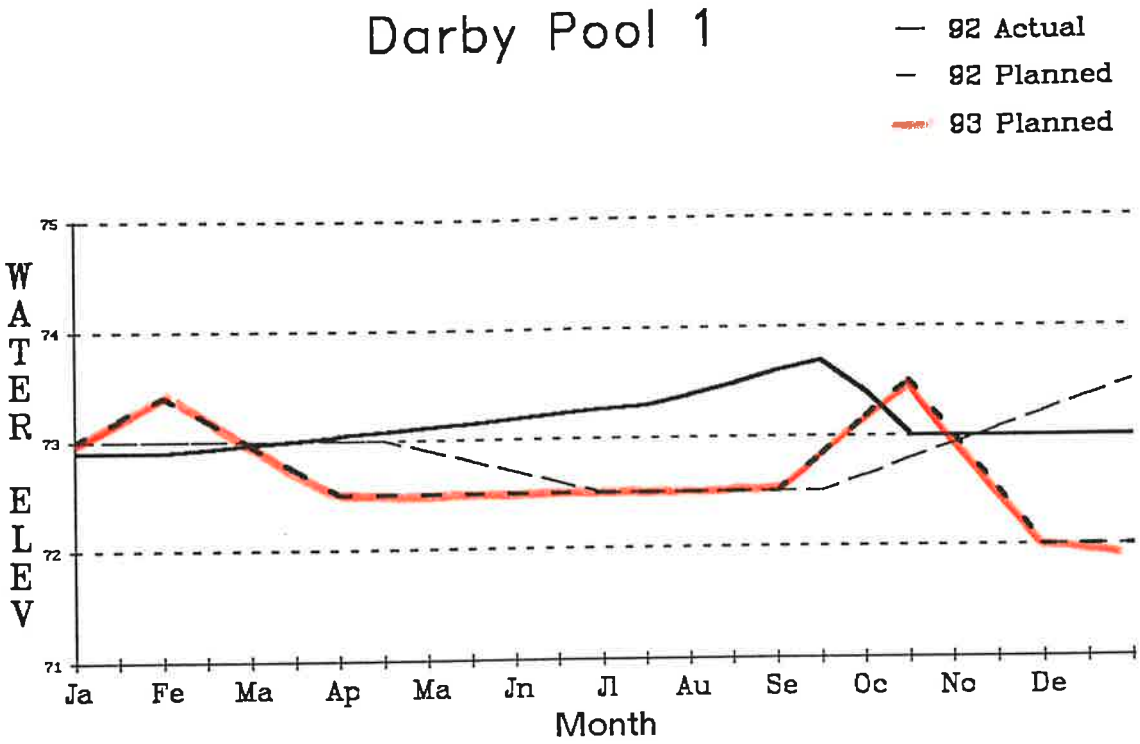
B: Planned Management Actions:

Water levels will be reduced during the winter as much as possible without undue disturbance to the trapping program. In March, the levels will be reduced as much as the lake levels will allow. Hopefully, evaporation will reduce levels even more. Pumping will be done in June to dry up the unit for summer construction and allow the germination of moist soil plants. Rehabilitation of the dikes mentioned above is a high priority this year and work will commence as soon as work at Darby is complete. Depending on construction progress and plant response to the draw down, flooding will take place sometime in the fall.

C: Potential Problems:

D: Expected Results:

1. Unit Darby - Pool 1
2. Acres 200
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 566
5. Water Elev. with 50% bottom exposed - 569
   90% bottom exposed - _____



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7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	25	30	30	
Bulrush/Burreed	5	4	4	
Cattail, Bluejoint, Other	15	20	15	
Floating Emergents	25	25	25	
Smartweed/Millet/Nutsedge	10	5	5	
Phragmites	10	2	2	
Other	10	4	4	
Cottonwood/willow	0	10	15	

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	110,000	65,610	55,610	
Geese	35,700	45,060	45,300	
GBH	6,720	4,770	5,300	

9. Purple Loosestrife:

Darby - Pool 1

A.2 Effects of Past Year's Water Levels

Levels:

Water levels increased steadily during the year.

Results:

No significant vegetation change was noted.

Facilities:

Costs:

B.2 Objectives of 1993 Proposed Water Levels

A: Objectives:

This unit is managed as a permanent marsh area. The area provides year around habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed to providing a well balanced hemi-marsh over most of the area.

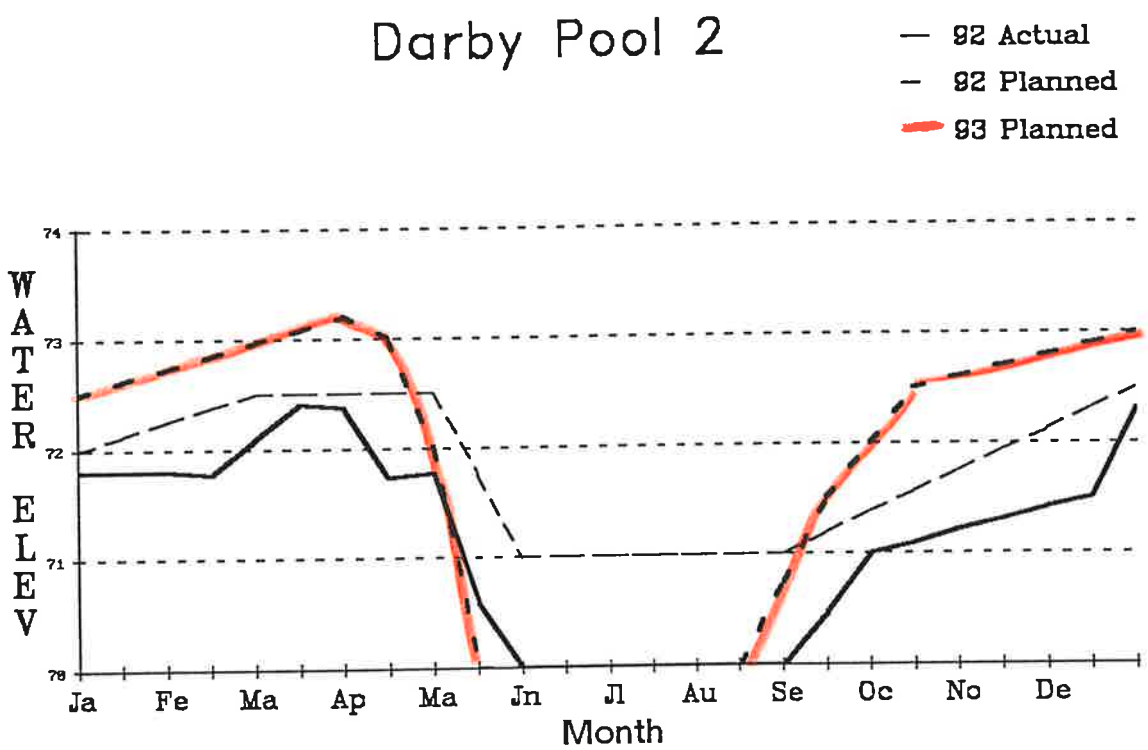
B: Planned Management Actions:

The area will be drained as much as possible to the normal lake levels during the spring and summer period. This will maintain a natural marsh during the summer. Water levels will be raised slightly in the fall.

C: Potential Problems:

D: Expected Results:

1. Unit Darby - Pool 2
2. Acres 25
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water/Submergents	30	26	40	0
Cattail	20	32	20	15
Pickerel Weed	30	18	10	0
Other (Inc. Purple Loosestrife)	10	7	7	
Smartweed/Millet/Nutsedge	10	0	3	75
Cottonwood/willow	0	17	20	5

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	6,100	14,940	14,940	
Geese	850	2,880	2,880	
GBH	1,500	210	920	

9. Purple Loosestrife:

Darby - Pool 2

A.2 Effects of Past Year's Levels

Levels:

Water levels remained normal until May when the unit was drained to start dike rehab work. The unit was kept drained all summer, but frequent rains during July and August kept the soils very moist to allow good growing conditions. Screwgates were closed in mid-September to trap rainfall and the unit became partially flooded for late fall use. The unit was completely flooded by early-December, but water levels were still low.

Results:

The unit resulted in excellent smartweed and millet production and produced some of the best moist soil plants anywhere on the refuge in several years. Waterfowl started using the areas as soon as it was partially flooded.

Facilities:

Dike repairs were done during the summer months and included work on both the south and east dikes. Finishing of the east dike is still required and will be completed in 1993 when the spoil placed on this dike dries. Rip-rap placement on the south dike will also be completed.

Costs:

B.2 Objectives of 1993 Proposed Water Levels

A: Objectives:

In the past this unit was managed as a permanent marsh, since no pumping facilities were available for frequent pumping. With the installation of the Darby pump system, this small unit is much more manageable and is better suited for management as a moist soil unit. Thus, management over the next few years should be directed at moist soil management.

B: Planned Management Actions:

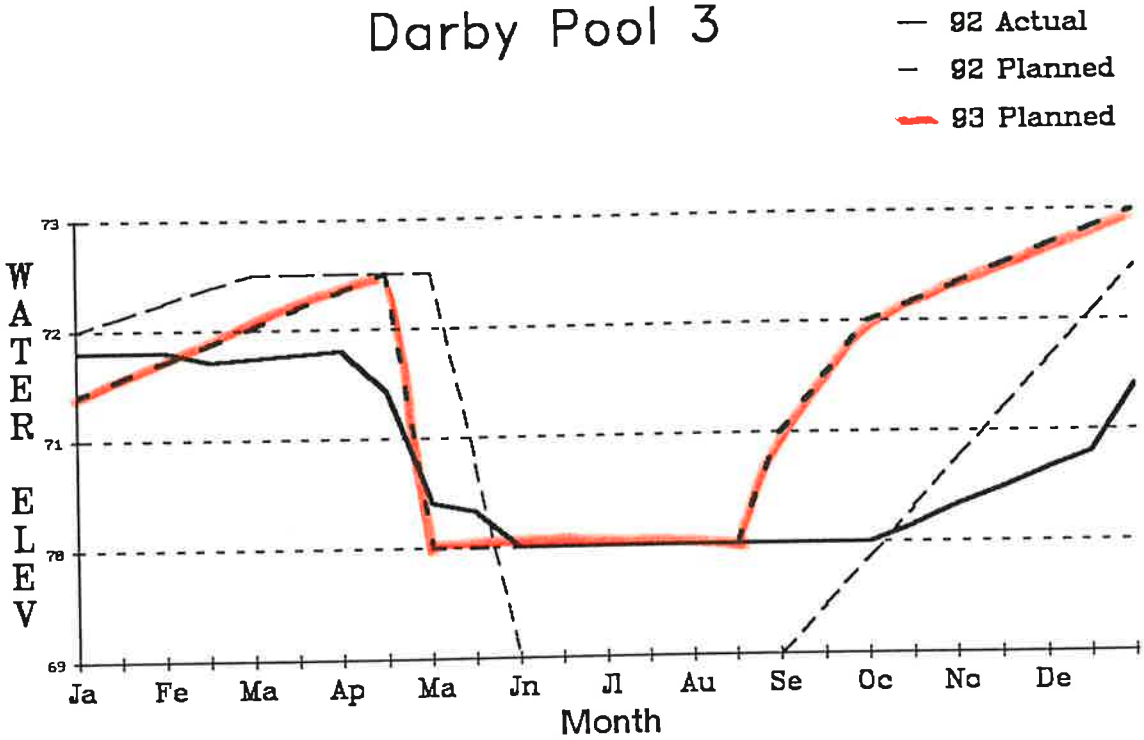
Water levels will be raised in late winter for early spring migrants and then the unit drained in mid April for summer construction and for the production of moist soil plants. The unit will be reflooded in very early fall (late August) for early migrants.

C: Potential Problems:

D: Expected Results:

Good production of millet should occur to give excellent fall waterfowl use.

1. Unit Darby - Pool 3
2. Acres 25
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	30	18	10	0
Aquatic Smartweed	10	0	10	0
Smartweed/Millet/Nutsedge	5	5	5	75
Other	15	15	3	
Pickerel Weed	40	24	10	0
Cattail		37	40	20
Loosestrife		5	2	
Cottonwood/Willow		16	20	

8. Wildlife Use:

	Use Days 1989	1990	1991	1992
Ducks	25,470	2,100	3,380	
Geese	1,500	60	205	
GBH	800	870	1,220	

9. Purple Loosestrife:

Darby - Pool 3

A.2 Effects of Past Year's Levels

Levels:

Water levels remained normal until April when the unit was drained to start dike rehab work. The unit was kept drained all summer, but frequent rains during July and August kept the soils very moist to allow good growing conditions. Screwgates were closed in mid-Oct to trap rainfall and the unit became partially flooded for late fall use. The unit was completely flooded by late-December, but water levels remained low.

Results:

The unit resulted in excellent smartweed and millet production and produced some of the best moist soil plants anywhere on the refuge in several years.

Facilities:

Dike repairs were done during the summer months and included work on both the south, east, and west dikes. Finishing of the west dike is still required and will be completed in 1993 when the spoil placed on this dike dries. Rip-rap placement on the south and possibly the east dikes will also be completed.

Costs:

B.2 Objectives of 1993 Proposed Water Levels

A: Objectives:

In the past this unit was managed as a permanent marsh, since no pumping facilities were available for frequent pumping. With the installation of the Darby pump system, this small unit is much more manageable and is better suited for management as a moist soil unit. Thus, management over the next few years should be directed at moist soil management.

B: Planned Management Actions:

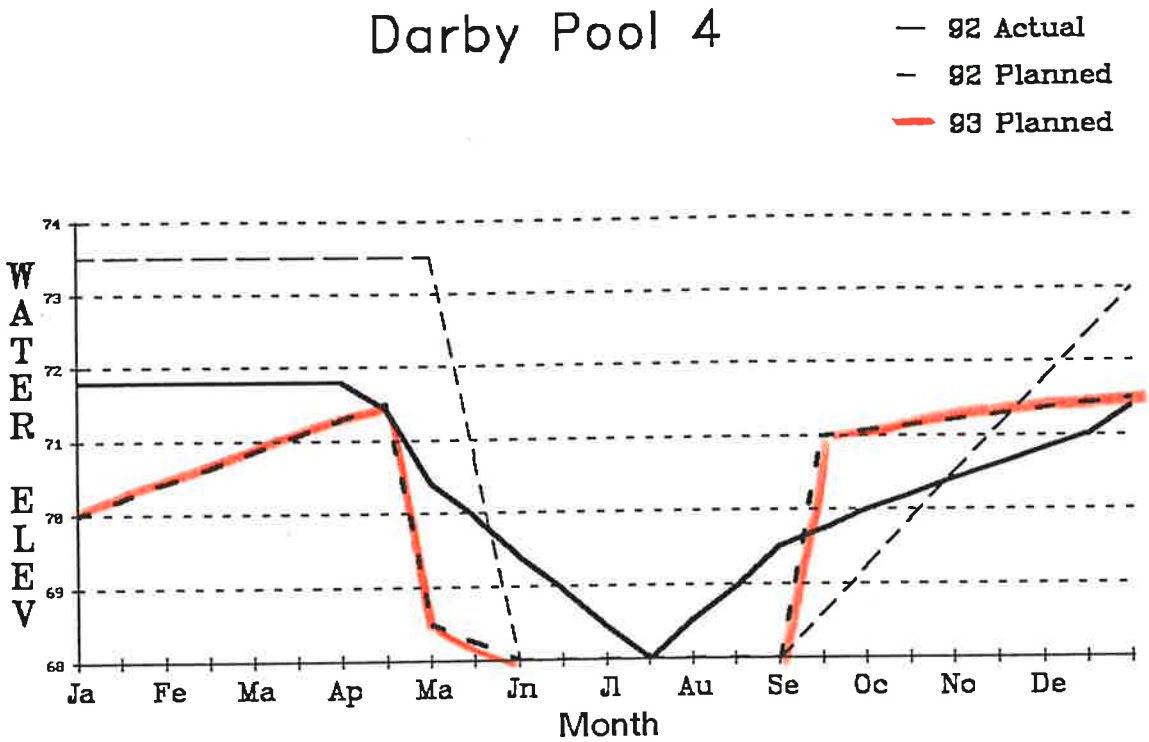
Water levels will be raised in late winter for early spring migrants and then the unit drained in mid April for summer construction and for the production of moist soil plants. The unit will be reflooded in very early fall (late August) for early migrants.

C: Potential Problems:

D: Expected Results:

Good stands of millet and smartweed should be produced with good fall waterfowl use.

1. Unit Darby - Pool 4
2. Acres 170
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 566.6
5. Water Elev. with 50% bottom exposed - 567.5
   90% bottom exposed - _____



7. Vegetation:

Species	%1989	%1990	%1991	%1992
Open Water	75	56	70	60
Floating emergents	1	5	5	0
Cattail	5	17	10	15
Cottonwood/Willow	10	18	10	5
Other	4	4	5	
Smartweed/Millet/Nutsedge	5	0	0	20

8. Wildlife Use:

	Use Days			
	1989	1990	1991	1992
Ducks	53,486	51,600	28,670	
Geese	28,600	10,650	10,560	
GBH	3,000	3,540	2,980	

9. Purple Loosestrife:

Darby - Pool 4

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were maintained until April to allow fish population studies and then the unit was drained as far as possible by pumping. This drainage exposed approximately 50% of the bottom, but left much of the central area still flooded. This was allowed to dry by evaporation and was almost complete by early July, although considerable water remained in small pools. Rainfall started refilling the pools immediately and slowly raised water levels back to the during the summer and fall months. Pumping to keep levels down was not possible because of the incomplete drainage system.

Results:

The much of the central area remained as open water during the fall months, but large amounts of smartweed grew around the edges of this area. The cattail areas in the SE corner remained and expanded slightly. The unit received excellent use by waterfowl during the fall as they fed on the smartweed on the edges of the central area.

Facilities:

The construction plans called for the construction of a dike and ditch to isolate the private land drainage from this pool. However, the summer raise in water levels prevented this work. The work is now planned for 1993. The dike/ditch is being constructed so that drainage from private lands can be diverted directed into barrow ditch and then into Lake Erie and not have to go through any of the pools. This is necessary before good water control can be done in this unit.

Costs:

B.2 Objectives of 1993 Proposed Water Levels

A: Objectives:

In the past this unit was managed as a permanent marsh, since no pumping facilities were available for frequent pumping. With the installation of the Darby pump system, this unit is much more manageable and can be managed as a moist soil unit. The optimum management is probably to cycle the unit through both moist soil units and permanent marsh by giving a complete drawdown for one to three years for management as a moist soil unit. As the unit enters later successional stages and/or wetland emergent plants develop, then switch the management over to a permanent marsh management until significant open water occurs and the unit is again drained to start the moist soil cycle. This cycle may take for 6-10 years.

As the unit is now primarily open water and a complete draining is necessary for construction work, the management over the next few years should be directed at moist soil management.

B: Planned Management Actions:

The water levels will be allowed to rise with rainfall until mid-spring,

then the unit will be drained in early spring and allowed to dry as much as possible by summer. Hopefully, complete drying will be possible this year and moist soil plants will germinate to vegetate the entire unit. The dike/ditch will be completed. The unit will be reflooded in early fall.

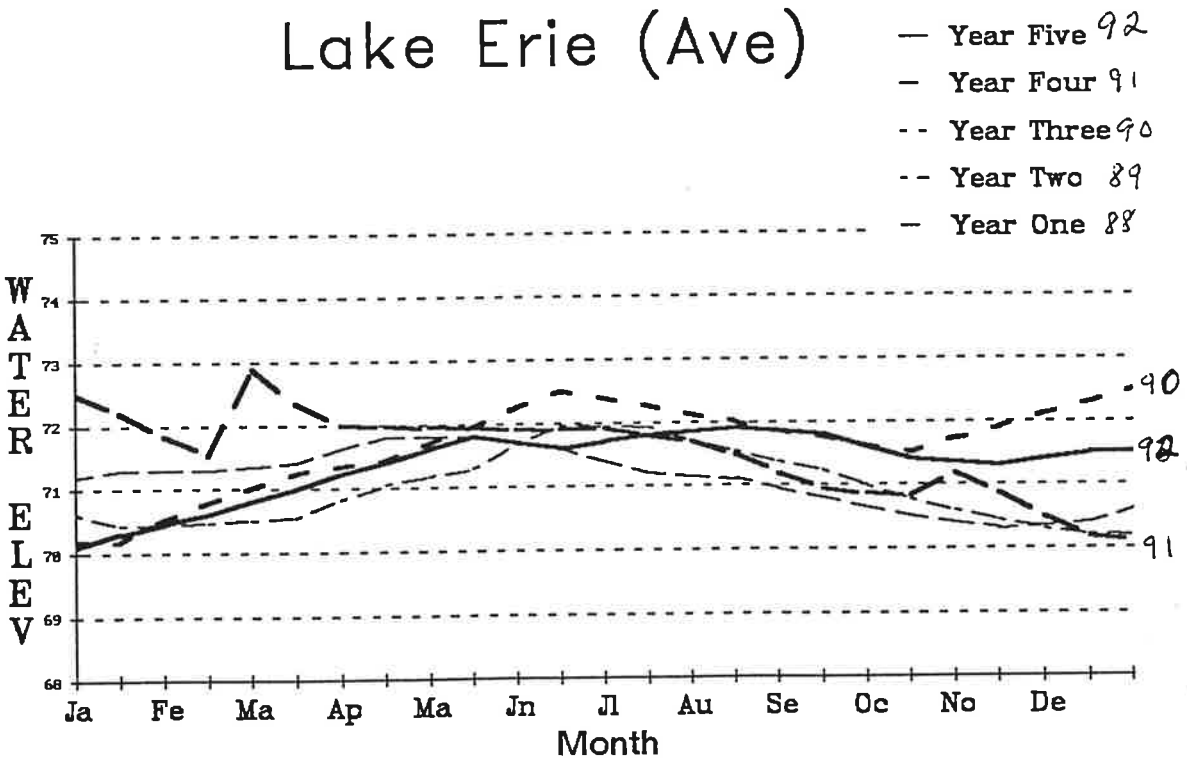
C: Potential Problems:

With above average rainfalls during the summer months, drainage from private lands may prevent drying as necessary to allow easy construction work. However, this may encourage and partially irrigate moist soil plants.

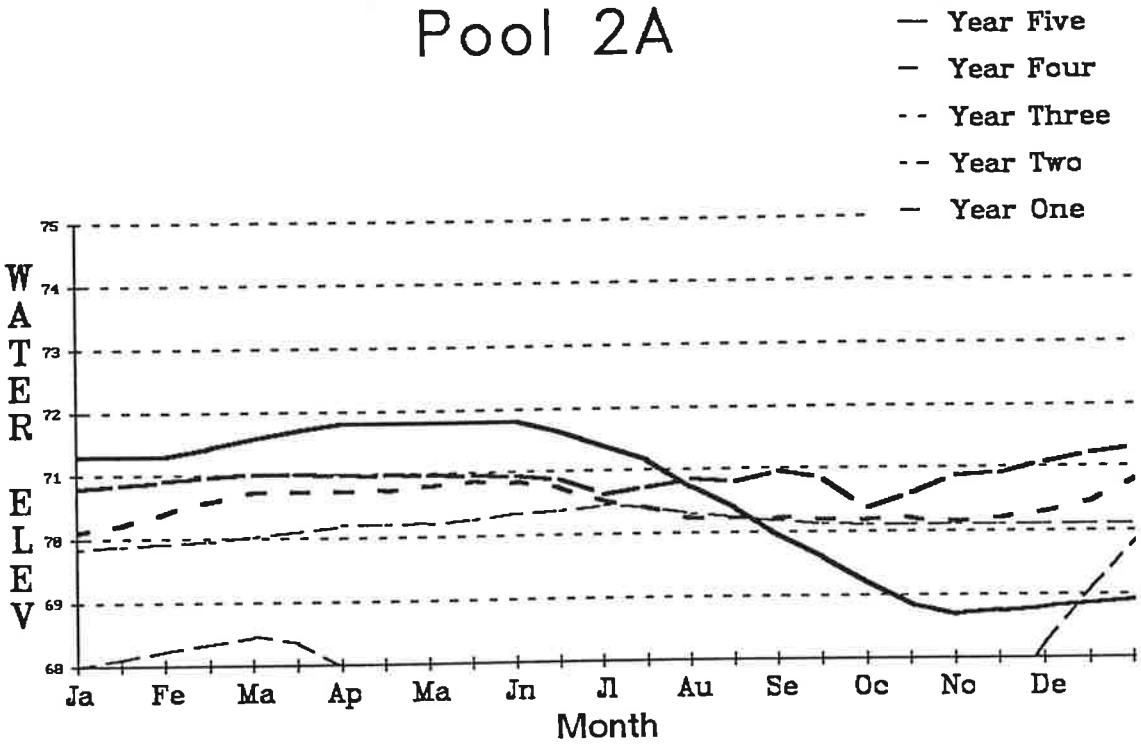
D: Expected Results:

With a early drawdown of the exposed and unvegetated bottom, heavy stands of smartweed are expected. With early fall flooding, heavy waterfowl use is expected. Good shorebird use should occur during the drawdown.

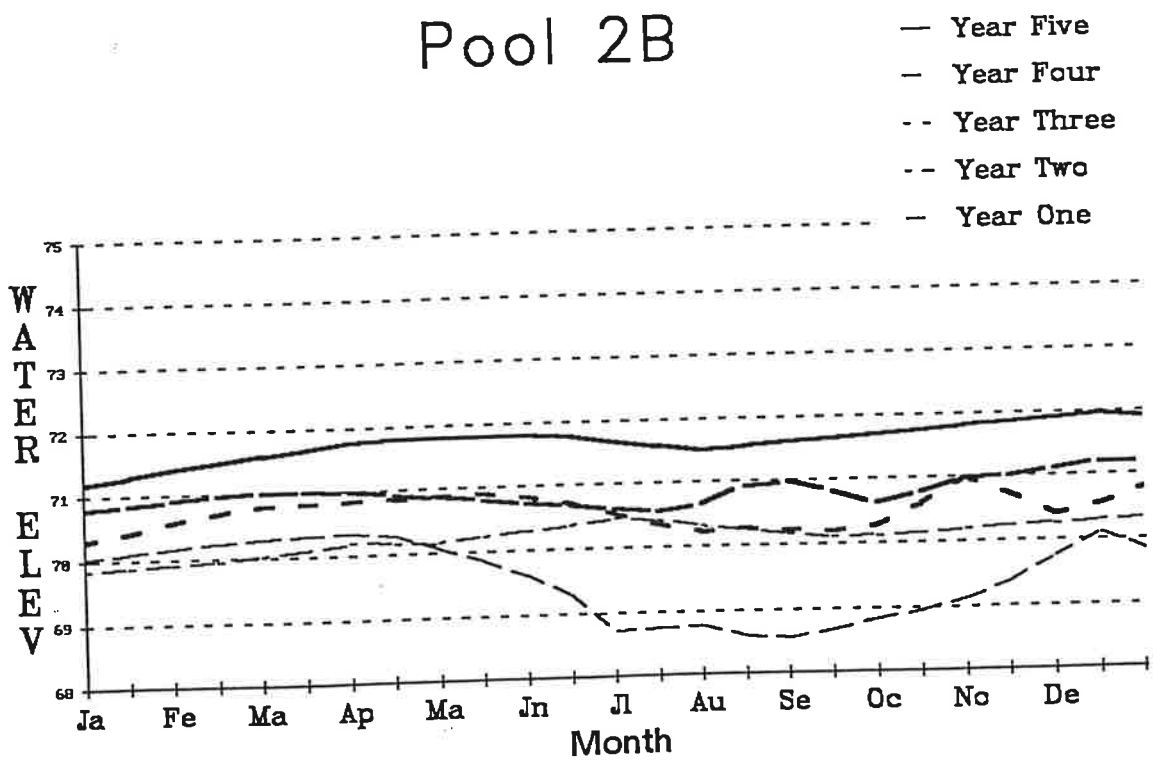
Lake Erie (Ave)



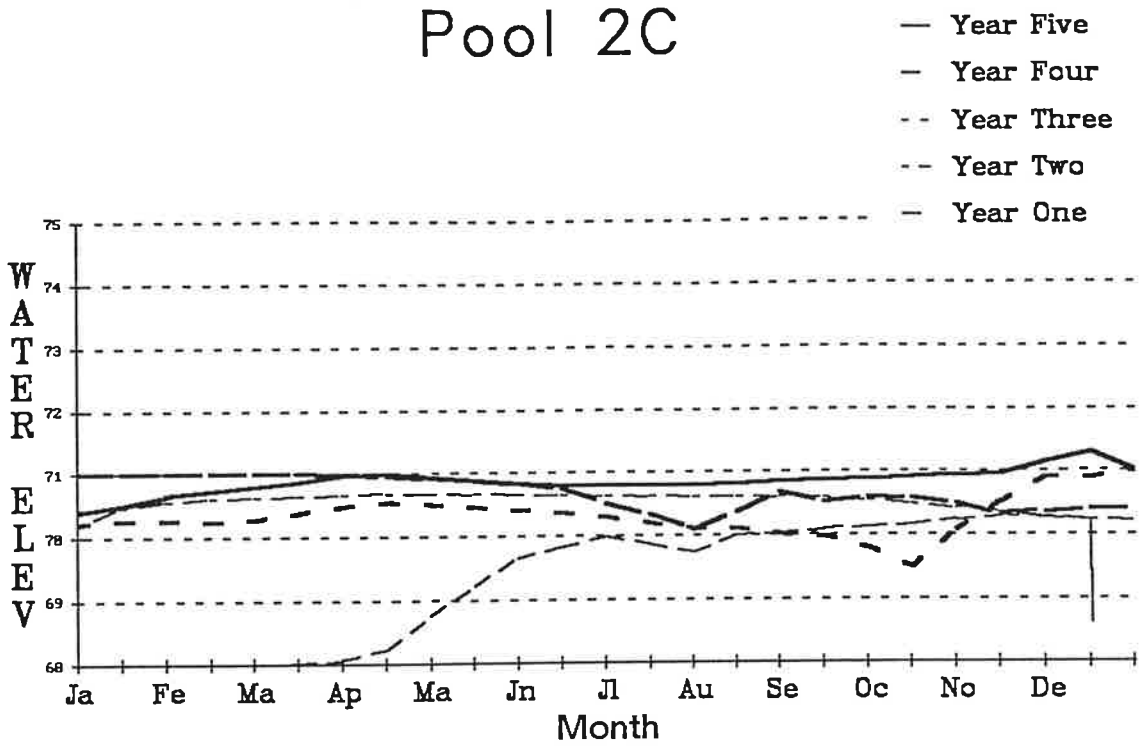
Pool 2A



Pool 2B



Pool 2C


Year Five
Year Four
Year Three
Year Two
Year One
WATER ELEV
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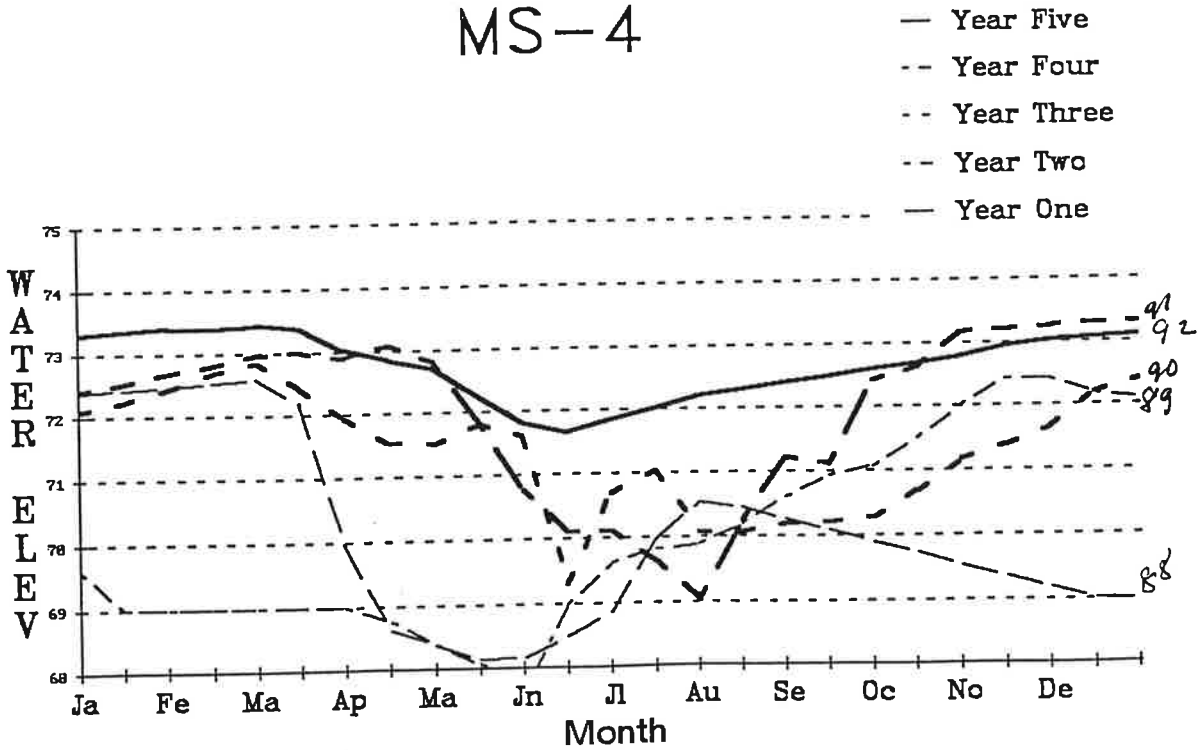
MS-4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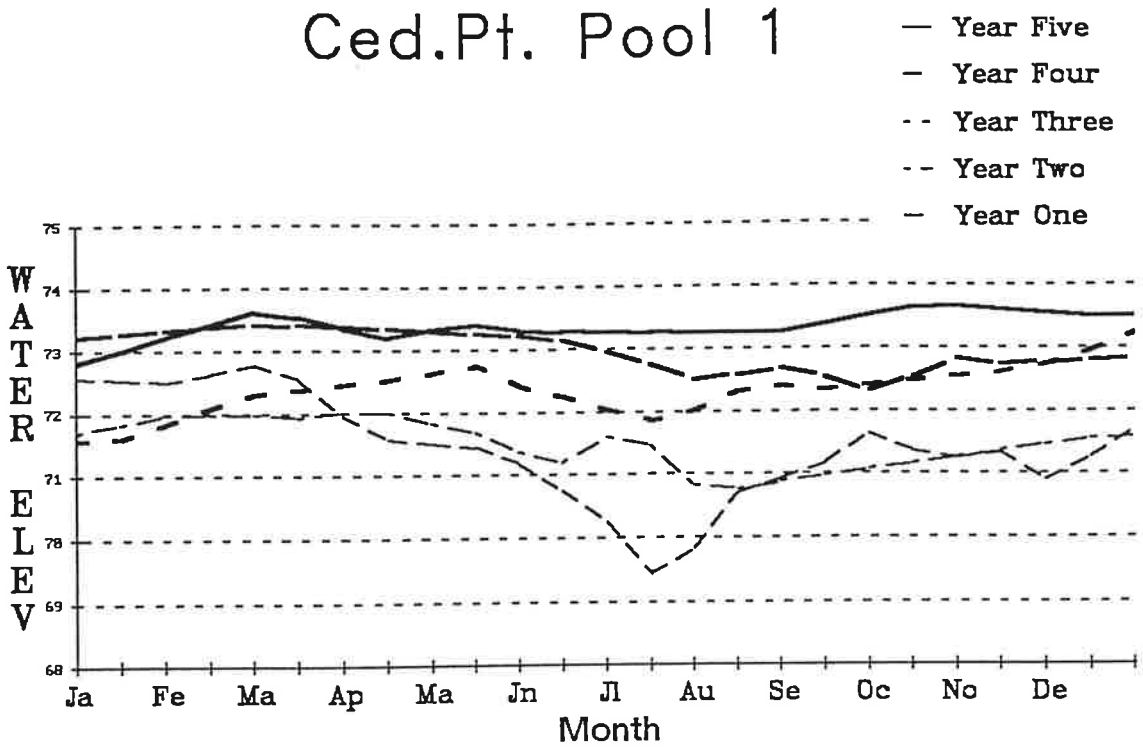
Ced.Pt. Pool 1
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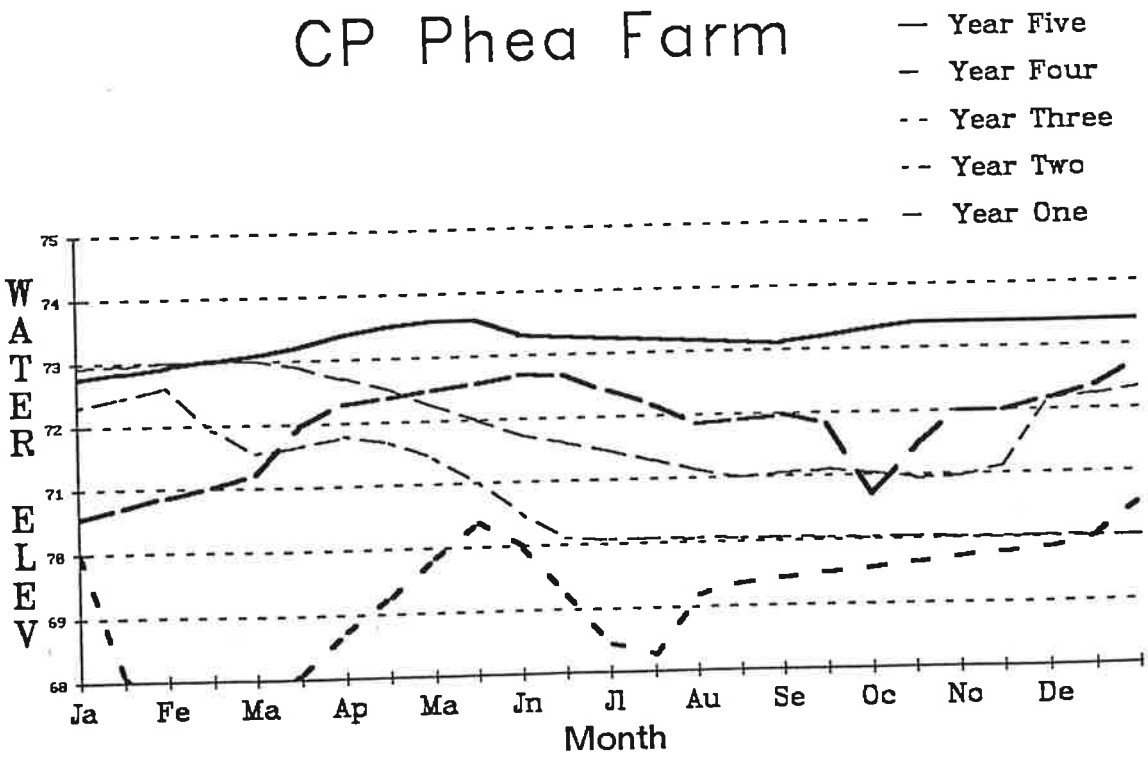
CP Phea Farm
Year Five
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Year Three
Year Two
Year One
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