OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

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

OAK HARBOR, OHIO

1995 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

1995

REVIEW AND APPROVAL

Approved By: D. Ross Adams — 4-2-95
Project Leader — Date

Reviewed By: _____ _____
Division Biologist 2 — Date

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

Approved By: _____ _____
Wildlife Associate Manager 2 — Date

TABLE OF CONTENTS

Introduction:

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 without having to rely on gravity drainage. Units which are directly affected by installation of pumps include: Pool 1, Pool 2B, Mini-Marsh, MSU 7A, MSU 8A, MSU 8B, and Cedar Point Pool 1. Units indirectly influenced are Pools 2A, 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, MSU 5, and MSU 6.

The station has an approved a long term marsh, water, and moist soil management plan, which gives more instruction on management for Ottawa as a whole including the major management goals for 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 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 MSU 3, MSU 4, MSU 5, F-6, MSU 6, MSU 7A, MSU 7B, MSU 7C, MSU 8A, and MSU 8B. Currently, all units except F-6 and MSU 7C are managed as moist soil units. MSU 7C was planted to hardwood trees in 1994. 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 rehabilitation, rip-rap, etc. Current use is better as a cropland or 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 which provided bird watching groups with the opportunity for viewing in a excellent marsh location. However, with the rehabilitation 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 unit. The unit on the west edge of unit 8, now called MSU LL, now has a new dike and pumping capability and will be managed as a moist soil unit.

Pool 9 was an uncontrolled area in 1978 and is shown as unimproved aquatic habitat and wet meadow. However, a natural dike has formed on the lake shore and we now have some control over this unit. The eastern side of this unit is being used as a borrow area for the Metzger's Marsh Project. Any improvements that are needed at the conclusion of the project will be conducted to obtain good water control over the unit.

All pools at the Darby Division 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, pools 2 and 3, can now be managed as moist soil units and occasionally pool 4 can be cycled through a moist soil stage.

Refuge 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 4,900 acres of managed wetlands of which 850-1,000 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 (marsh birds, shorebirds, gulls, terns, and raptors).
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 units to provide for a variety of wildlife and vegetation types that will provide eagles with natural feeding areas where they can feed on fish, muskrats, and waterfowl. Nesting sites are usually provided through large trees along marsh borders.

REFUGE OBJECTIVE

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

Refuge wetlands are managed to provide an 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 and fall migration. These marshes provide waterfowl foods in the form of seeds, roots, tubers, and aquatic invertebrates. Management is directed at keeping these marshes in a highly productive state by simulating the natural cycle of water fluctuation which in turn stimulates good aquatic growth and a variety of plant and animal organisms within these marshes. Many species of waterfowl such as gadwall, wigeon, teals, coots, etc. potentially meet most, if 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, and emergent vegetation communities. This interspersion provides zones 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 plant germination and growth and concentrate invertebrates, then raising levels slowly through 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 increase open areas.

Some refuge units have been designated 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 waterfowl require high carbohydrate foods. During the mid- and late-spring seasons, these units also provide a substantial source of aquatic invertebrates for breeding waterfowl.

Moist soil units are annually drained during the growing season to encourage plant 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. Thus, when reflooded either naturally or by management, they provide a high energy food source available to waterfowl. These units are managed to maintain this cycle. When drained, the units are occasionally 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 (marsh birds, 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 between the draining and flooding phases of 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 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 maintains an area where visitors can walk dikes, roads, 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, submergent plants, open water areas, and other marsh and moist soil plants.

1995 Objectives:

In 1995 priorities are: 1) set back the upland communities in MSU 7A and LL; 2) control willow, cottonwood, and reed canarygrass in MSU 3, 5, and 6; 3) Make improvements to pool 9, Goose Pen, and Cedar Point - Pheasant Farm to increase water management; 4) to repair/install water gauges in MSU 3, MSU 6, MSU 8A, MSU LL, Goose Pen, Mini-Marsh, Pool 9, Darby pools 1 and 4, and GTR 7.

Traditionally, the vegetation section of the water management plan was categorized with several different types of plant species lumped together. This method was not consistent between units nor was it relative in distinguishing the undesirable plants from the desirable species. Beginning in 1993, the vegetation analysis was categorized as follows:

1) **Open Water** - including mudflats
2) **Moist Soil** - smartweeds, millets, sedges, rushes, beggarticks, etc.
3) **Submergents** - coontail, pondweeds, naiads, etc.
4) **Emergents** - cattail, burreed, pickerel weed, etc.
5) **Woody Vegetation** - cottonwood, willow, etc.
6) **Undesirables** - cocklebur, velvetleaf, loosestrife, rose mallow, etc.

In 1994 a GIS system was used to evaluate the vegetation composition of the wetland units. Aerial photos of the refuge were taken in September and early October. Ground truthing was conducted after the photos were received and vegetation types classified. Photos were then scanned into a computer file and individual habitats isolated and overlaid onto a base map. Ideally, this process would take place every year around September 1 for best results. Unless color infra-red is used then photos would need to be taken earlier during the growing season. The classification was only completed for Ottawa Unit in 1994, however, the other management units will be completed in future years. The GIS analysis will greatly increase the accuracy of vegetation communities, however, standards need to be set so that the data is gathered and analyzed in the same manner year after year.

The Ottawa NWR Complex water management program is multifarious and very comprehensive, so summary tables have been added to safeguard against objectives being overlooked. A summary of activities with regards to species and vegetation targeted is listed on page 7 to provide a quick reference of the year's management program. The table is setup to show the primary water activity, the species that should benefit and time of year, and vegetation objective. Not all species are mentioned here, only the major groups associated with wetlands.

Appendix A shows Ottawa Division's water management program mapped to visually illustrate the year's water program and ensure a complex of well managed units that still provide the habitat needed. Only monthly maps were made to describe the primary activity performed during that month. No maps were made for January or February because water movement usually does not occur. The following is a brief description of activity categories.

Flooded Optimum Pool - Majority of the pool is inundated to desired levels with increases associated with precipitation and decreases associated with evaporation.

Partial Drawdown - Unit is intentionally lowered to facilitate moist soil and emergent vegetation growth while maintaining submergent plant communities. The majority of the unit still retains water in the lower areas and the water is maintained through the growing season.

Drawdown Stage - Unit is intentionally lowered to stimulate germination of moist soil vegetation and at the peak of the drawdown, substrate will start to dry out.

Dry - Unit is intentionally lowered to assist in rehabilitation or mechanical manipulations of vegetation or the facilities. Usually these units are in a drought condition for a long period of time.

Flooding - Water is actively moving into the unit, usually at a slow rate.

Summary of Activities:

Summary		Target Species			Vegetation
Unit	Activity	Spring	Summer	Fall	Objective
Ottawa:					
Pool 1	Partial Drawdown	W-M	W-M-S	W-M	Ms-Mr
Pool 2A	Drawdown	W-S-M	S	W-S-M	Ms-Mr
Pool 2B	Partial Drawdown	W-M	W-S-M	W-M	Ms-Mr
Pool 2C	Partial Drawdown	W-M	W-S-M	W-S-M	Ms-Mr
Pool 3	Optimum Pool	W-M	W-M	W-M	Mr
Pool 9	Dry			W-M	
Entrance Pool	Drawdown	W-S-M	S	W-S-M	Ms-Mr
Show Pool	Optimum Pool	W-M	W-M	W-M	Mr
Mini-Marsh	Drawdown	W-S-M		W-S-M	Ms
MSU 3	Optimum Pool	W-M	W-M	W-M	C
MSU 4	Drawdown	W-S-M	S	W-M	Ms
MSU 5	Drawdown	W-S-M	W-S-M	W-M	Ms-C
MSU 6	Drawdown	W-M	S-M	W-M	Ms-C
MSU 7A	Drawdown	W-S-M	S	W-S-M	Ms-C
MSU 7B	Drawdown	W-S-M	S	W-S-M	Ms
MSU 8A	Drawdown	W-S-M	S	W-S-M	Ms
MSU 8B	Drawdown	W-M	S-M	W-S-M	Ms
MSU LL	Drawdown	W-M	W-S-M	W-S-M	Ms-C
GTR 7	Drawdown			W	Mt
Goose Pen	Drawdown	W-S-M		W-M	C
Cedar Point:					
Pool 1	Partial Drawdown	W-M	W-S-M	W-M	Ms-Mr
Pool 2	Optimum Pool	W-M	W-M	W-M	Mr-C
Pheasant Farm	Drawdown	W-S-M		W-M	
Darby:					
Pool 1	Optimum Pool	W-M	W-M	W-M	Mr
Pool 2	Drawdown	W-S-M	S	W-S-M	Ms
Pool 3	Drawdown	W-S-M	S	W-S-M	Ms
Pool 4	Partial Drawdown	W-M	W-S-M	W-M	Mr-C
Navarre:					
Pool 1	Partial Drawdown	W-M	W-S-M	W-M	Mr
Pool 2	Partial Drawdown	W-M	W-M	W-M	Mr
Pool 3	Drawdown	W-S-M	S	W-S-M	Ms-Mr

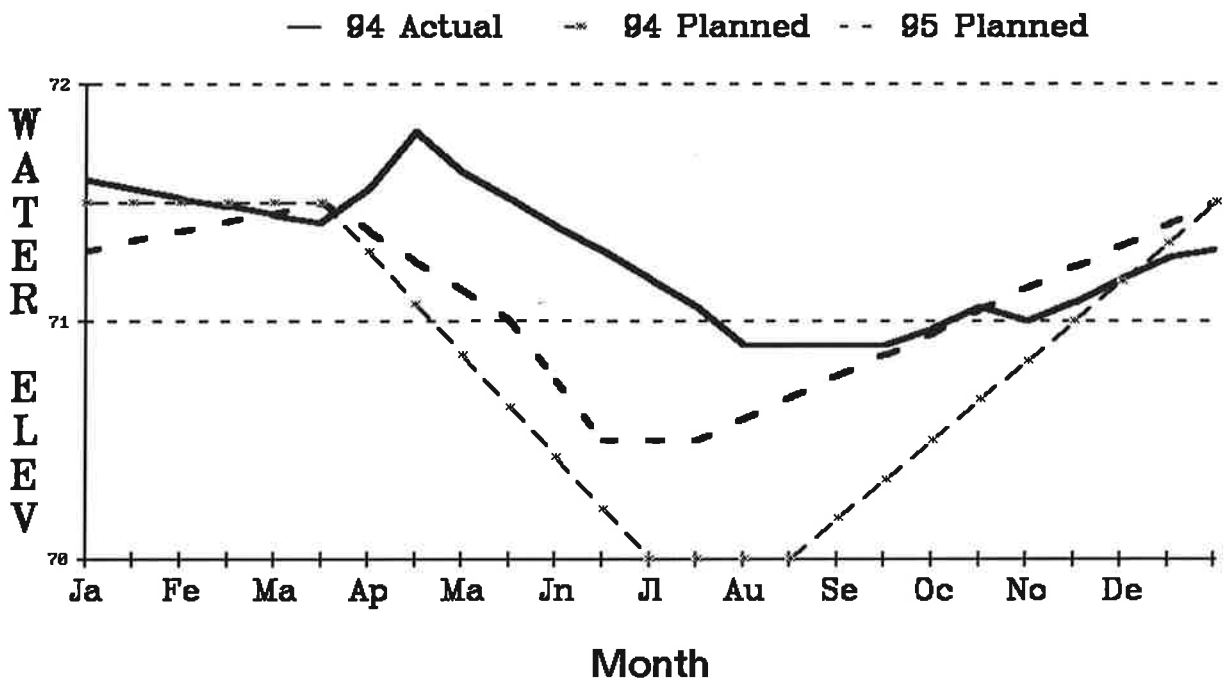
Target Species:

W - Waterfowl
S - Shorebirds
M - Marsh/Water Birds

Vegetation Objective:

Ms - Moist Soil Plant
Mr - Marsh/Emergent Plants
Mt - Mast Production
C - Control of Undesirables

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 - 569.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			40	37
Moist Soil			15	3
Submergents			5	
Emergents			30	41
Woody Veg.			5	7
Undesirables			5	2

8. Wildlife Use (Use Days):

Ducks	115,500	90,350	100,000	151,960
Geese	68,400	52,300	40,000	64,460
GBH	5,250			

9. Purple Loosestrife:

Pool 1

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were brought down by free flow starting in April. Flap gates remained open during the summer a water levels slowly decreased. By August a good proportion of the north end was dry or mudflats.

Management Actions:

None conducted.

Results:

The majority of the unit is either open water or emergent vegetation. A small amount of moist soil plants were produced. The lateness of water removal hindered any good moist soil production in the units northern part. This northern section had good waterfowl use during flooding in the fall.

Facilities:

Costs:

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

This unit is managed as a permanent marsh area. The area provides year-round habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed to providing a well balanced hemi-marsh. Waterfowl use is generally loafing/roosting and the unit should annually provide 200,000 waterfowl use days.

Planned Management Actions:

Water levels will be decreased in March and continued through the early summer to retain current marsh vegetation and expose mudflats to reestablish marsh vegetation. If gravity draining does not fulfil the needed decrease then some pumping will be done.

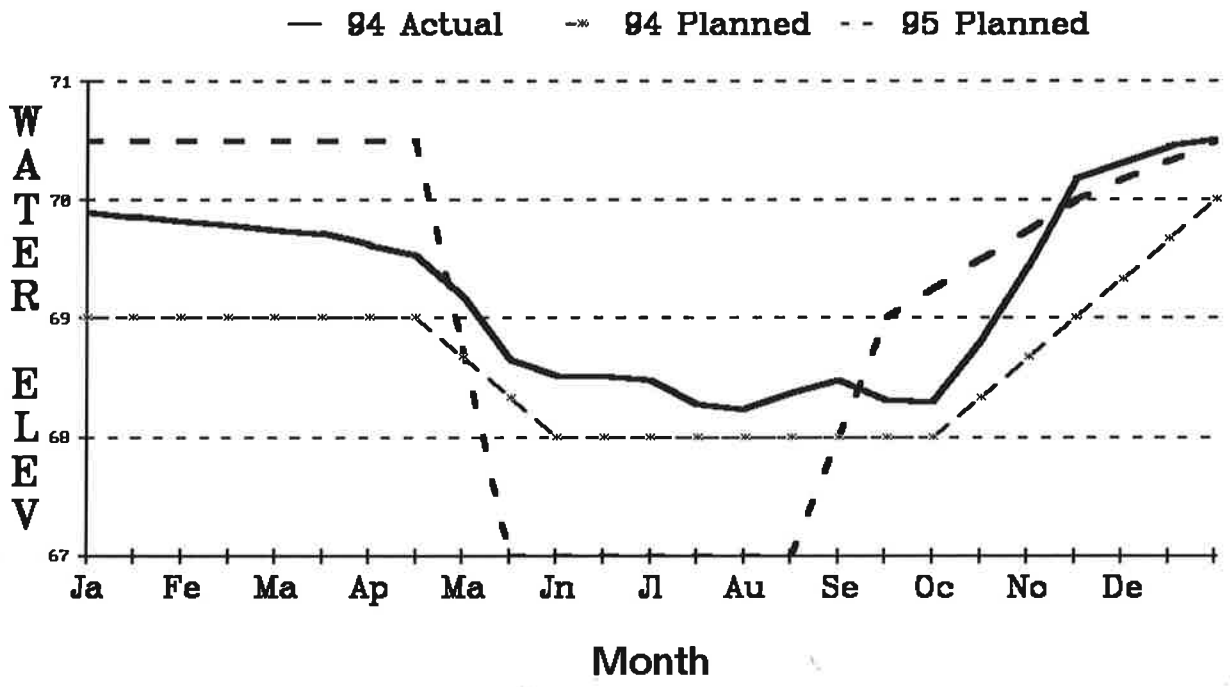
Expected Results:

The reduction in water levels early in spring should allow existing vegetation to survive and provide excellent marsh habitat throughout the year.

Potential Problems:

High lake levels during the spring months could prevent significant gravity drainage and require considerable pumping via the U-6 pump to accomplish the above actions.

1. Unit Pool 2A
2. Acres 70
3. Maximum elevation permissible 572
4. Flowline elevation of lowest structure 566.0
5. Water Elev. with 10% bottom exposed - 570.0
   50% bottom exposed - 569.0
   90% bottom exposed - 568.0



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			16	52
Moist Soil			44	6
Submergents			0	
Emergents			3	
Woody Veg.			6	4
Undesirables			31	11

8. Wildlife Use (Use Days):

Ducks	25,090	36,140	36,000	45,650
Geese	23,390	31,375	20,000	13,350
GBH				

9. Purple Loosestrife:

Pool 2A

A.2 Effects of Past Year's Water Levels

Levels:

Water levels followed close to planned levels, however, the unit was still mostly covered with water. Additional water was not removed due to the high temperatures which, with very little organic matter in this unit, the soil was drying fast and as hard as a rock.

Management Actions:

A small portion of the units cocklebur and velvet leaf was mowed to give underlying millet and smartweed some sunlight.

Results:

The area of ground exposed in April produced a fair stand of millet and smartweed. The remainder of the unit consisted of a mixture of vegetation and bare ground. A little cattail germination took place. But due to lack of organic matter this unit was not very productive in plant germination.

Facilities:

Costs:

A 148 hours of pumping time with the AC7010 and Crissifulli pump (this time also includes bring down pools 2B and 2C).

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

This unit has relatively low ground elevations and no direct pumping facilities. This area is best suited as a permanent marsh and occasionally cycled into a drawdown to retain/enhance vegetation and provide some moist soil production. This impoundment is part of the Refuge's public use area and management practices will attract a variety of waterfowl, shorebirds, water birds, and wetland mammals to provide opportunities for wildlife viewing. Annual waterfowl use days should average around 100,000.

Planned Management Actions:

The water levels will be brought down sooner and completely this year. Plans are to bring this unit down in mid-April using the pump in MSU 8A. Development of organic matter is our main objective this year. After the unit has been brought and depending on plant germination, this unit could be planted with a crop of Japanese millet to help build soil organics and provide wildlife food.

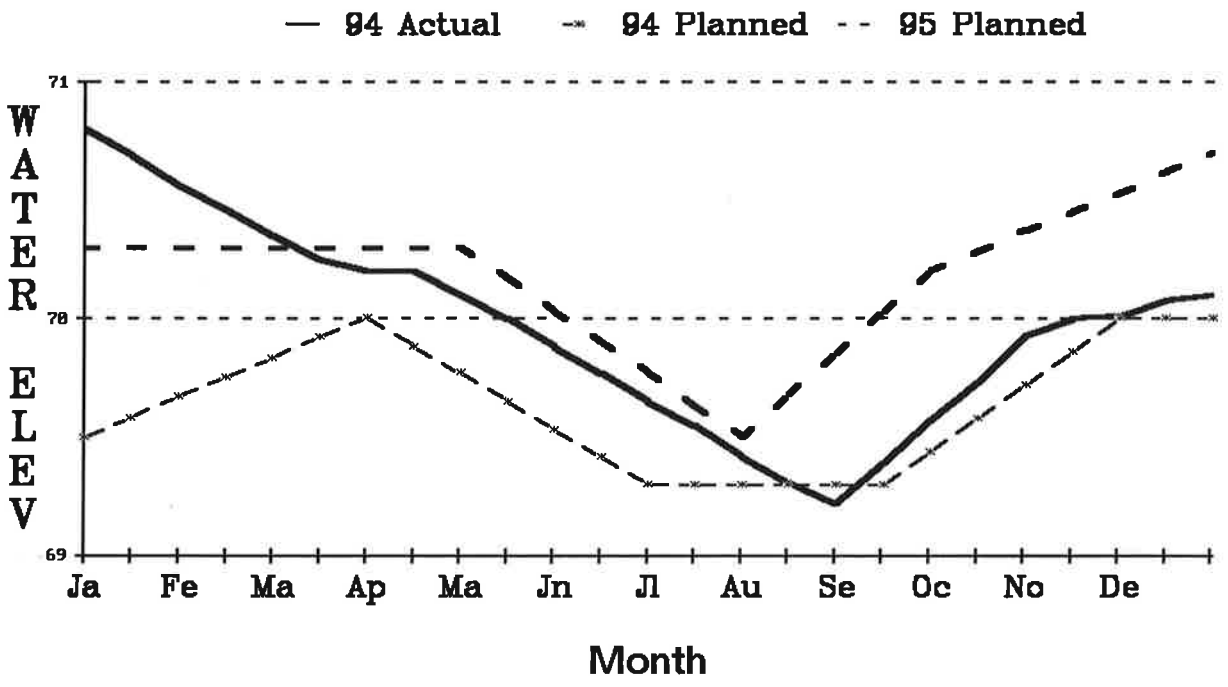
Expected Results:

Moist soil plant production should be fair over a small portion of the unit, however, without any organics vegetation germination will be limited.

Potential Problems:

Undesirable vegetation may develop and will need to be controlled either through disking or mowing.

1. Unit Pool 2B
2. Acres 95
3. Maximum elevation permissible 572.0
4. Flowline elevation of lowest structure 570.0
5. Water Elev. with 50% bottom exposed - 569.5
   90% bottom exposed - 569.0



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			5	47
Moist Soil			45	15
Submergents				
Emergents			1	26
Woody Veg.			6	5
Undesirables			33	1

8. Wildlife Use (Use Days):

Ducks	93,240	82,529	115,000	172,640
Geese	55,150	20,916	20,000	26,000
GBH	850			

9. Purple Loosestrife: No loosestrife visible.

Pool 2B

A.2 Effects of Past Year's Water Levels

Levels:

Water levels followed planned levels by removing water during winter and into the spring. Water levels were then held and allowed to evaporate. Water was then free flowed in starting in September.

Management Actions:

None conducted.

Results:

The unit had water coverage over approximately 50% of the unit during the summer. The majority of the remainder produced a fair stand of millet and other moist soil plants. Waterfowl use was heavy during September, especially by green-winged teal whose numbers approximated around 3,000 birds.

Facilities:

Dikes are in relatively good shape, however, some erosion has occurred from high water levels from previous years.

Costs:

Pumping costs were associated with the pool 2A drawdown.

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

This unit has relatively low ground elevations and no direct pumping facilities. This area is best suited as a permanent marsh and occasionally cycled into a drawdown to retain/enhance vegetation and provide some moist soil production. This impoundment is part of the Refuge's public use area and management practices will attract a variety of waterfowl, shorebirds, water birds, and wetland mammals to provide opportunities for wildlife viewing. Annual waterfowl use days should average around 100,000.

Planned Management Actions:

Water levels will be maintained during the winter and then brought down starting in May. Water levels will then be maintained in the 4-8" depth in the center area during the summer with around 40% of soil exposed. Water elevation will then be raised starting in early August.

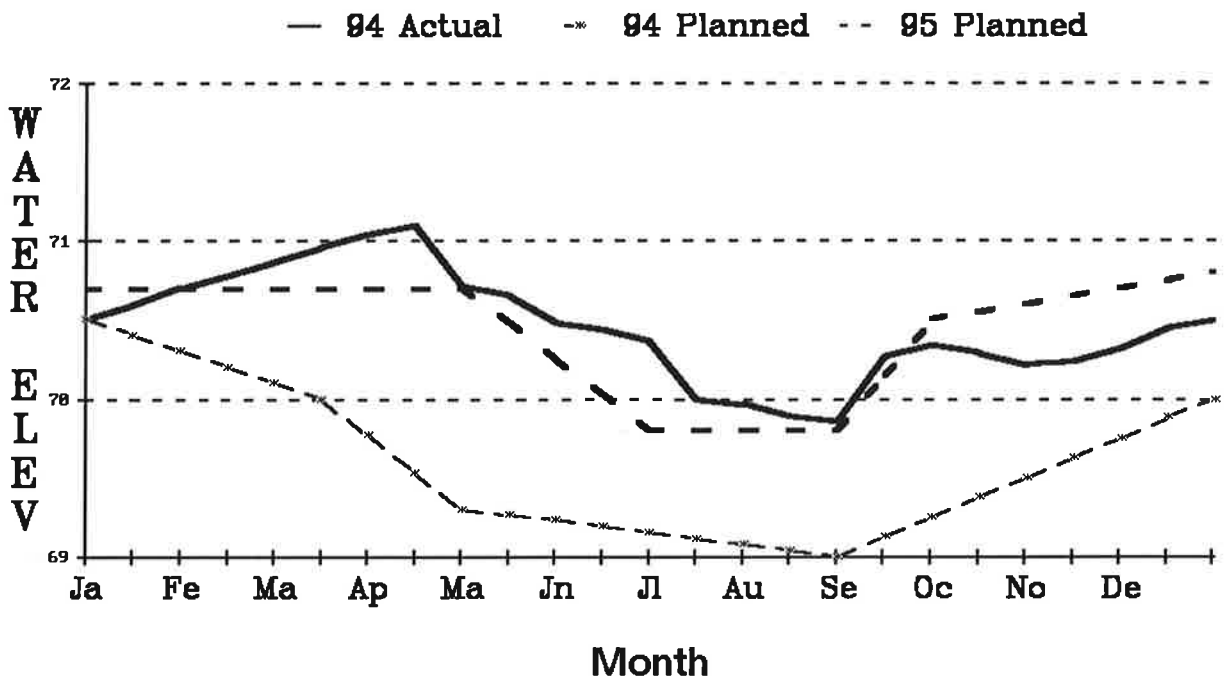
Expected Results:

Results are expected to be close to results in 1994 with the majority of plant response from emergents. Water maintained during the summer will provide benefits for marsh and water birds, waterfowl, and shorebirds.

Potential Problems:

None foreseen.

1. Unit Pool 2C
2. Acres 80
3. Maximum elevation permissible 571.0
4. Flowline elevation of lowest structure 567.0
5. Water Elev. with 50% bottom exposed - 570.0
   90% bottom exposed - 569.0



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			24	22
Moist Soil			54	7
Submergents				
Emergents			1	42
Woody Veg.				1
Undesirables			21	7

8. Wildlife Use (Use Days):

Ducks	116,280	118,070	200,000	100,000
Geese	111,520	41,833	22,000	18,500
GBH	2,230			

9. Purple Loosestrife:

Pool 2C

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were pumped down in spring and then allowed to evaporate during the summer. Water level then increased in fall primarily from precipitation.

Management Actions:

None conducted.

Results:

Vegetation component was mainly emergents like spikerush, cattail, and water smartweed. This unit received high use by wigeon during early fall.

Facilities:

The facilities are in good condition.

Costs:

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

This unit has relatively low ground elevations and no direct pumping facilities. This area is best suited as a permanent marsh and occasionally cycled into a drawdown to retain/enhance vegetation and provide some moist soil production. This impoundment is part of the Refuge's public use area and management practices will attract a variety of waterfowl, shorebirds, water birds, and wetland mammals to provide opportunities for wildlife viewing. Annual waterfowl use days should average around 150,000.

Planned Management Actions:

Excess water will be removed in early spring and the higher ground exposed. Shallow water will be maintained over most of the unit during the summer. Flooding during fall will be done mainly through precipitation.

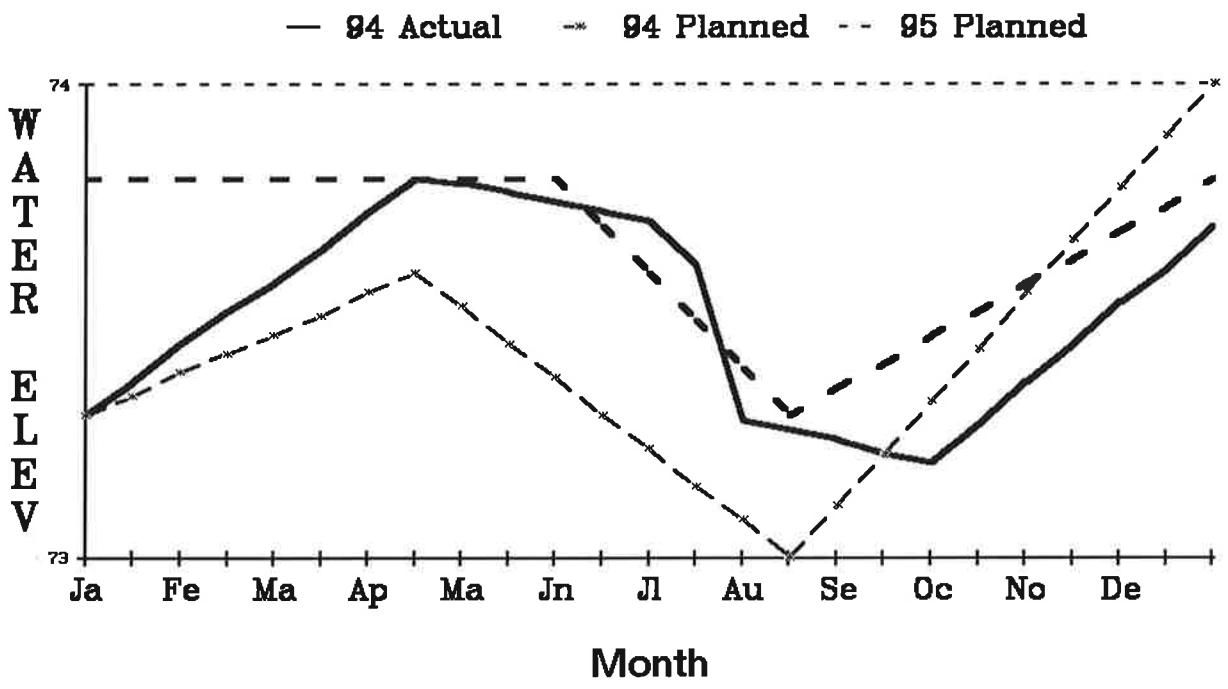
Expected Results:

Existing vegetation should expand readily in the shallow water areas and exposed mudflats should revegetate to annual smartweeds and/or millets. Emergent vegetation is also expected in areas where the water level fluctuates. Mudflats areas should receive high shorebird use.

Potential Problems:

None foreseen.

1. Unit Pool 3
2. Acres 260
3. Maximum elevation permissible 574.0
4. Flowline elevation of lowest structure 570.0
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - 570.5



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			30	33
Moist Soil				
Submergents			30	
Emergents			30	35
Woody Veg.			10	19
Undesirables				8

8. Wildlife Use (Use Days):

Ducks	150,000	172,281	150,000	90,000
Geese	74,260	41,833	110,000	50,000
GBH	3,160			

9. Purple Loosestrife:

Pool 3

A.2 Effects of Past Year's Water Levels

Levels:

High water was released during the winter and then water evaporated during the summer.

Results:

Little change was noticed over previous years.

Facilities:

Facilities are in good condition.

Costs:

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

This unit has been managed as a permanent marsh and the bulk of waterfowl use is loafing/roosting. A bald eagle nest is located along within the unit and first priority is to provide this species with nesting requirements. The area provides year round habitat for waterfowl, marsh and water birds, raptors, etc. Waterfowl use is expected to average around 200,000 use days annually.

Planned Management Actions:

Keep water level at optimum pool with only loses associated with evaporation. Other management units within this vicinity will be under construction or in drawdown conditions.

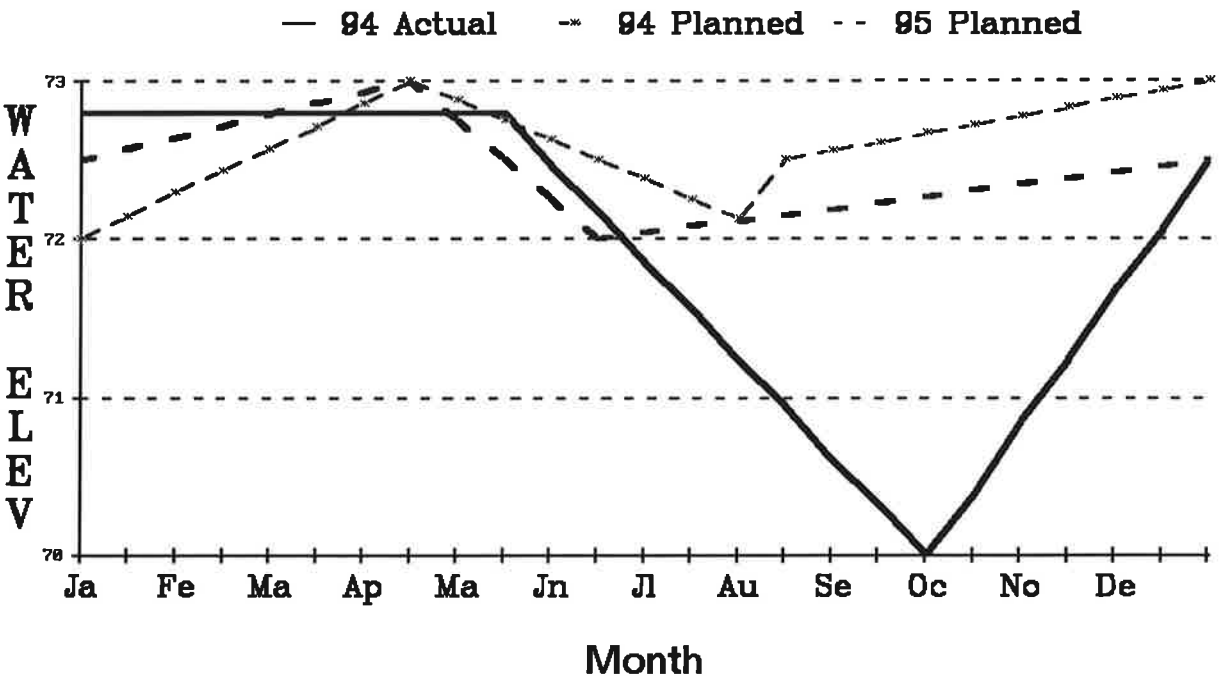
Expected Results:

Little change in the vegetation is expected under the planned management. This unit will still serve as a loafing/roosting area for waterfowl during the fall after the completion of the Metzger's Marsh Project.

Potential Problems:

Waterfowl may move away from this pool during the spring and summer due to the Metzger's Marsh Project.

1. Unit Pool 6 (Woodies Roost)
2. Acres 160
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 569.0
5. Water Elev. with 50% bottom exposed - 570.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			40	35
Moist Soil				2
Submergents				
Emergents			40	44
Woody Veg.			10	19
Undesirables			10	

8. Wildlife Use (Use Days):

Ducks	24,480	9,870	19,000	9,850
Geese	11,620	4,562	12,800	10,000
GBH	640			

9. Purple Loosestrife:

Pool 6 (Woodies Roost)

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were stable during the winter and spring. During the hot dry summer the evaporation almost completely dries the unit by September. Water was then added in October through Magee Marsh's main pump ditch.

Results:

No changes occurred from last years vegetation composition. Waterfowl use was average and shorebird use was heavy during the fall flooding.

Facilities:

East and south dikes are in terrible shape with both dikes severely eroded in areas and 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 the ATV on. The north dike also has some erosion and muskrat hole problems.

Costs:

None incurred, water was supplied by the State.

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

Pool 6 is managed as a semi-permanent marsh to provide habitat for waterfowl, marsh and water birds throughout the year.

Planned Management Actions:

Water levels will be maintained as much as possible, with losses due to evaporation expected.

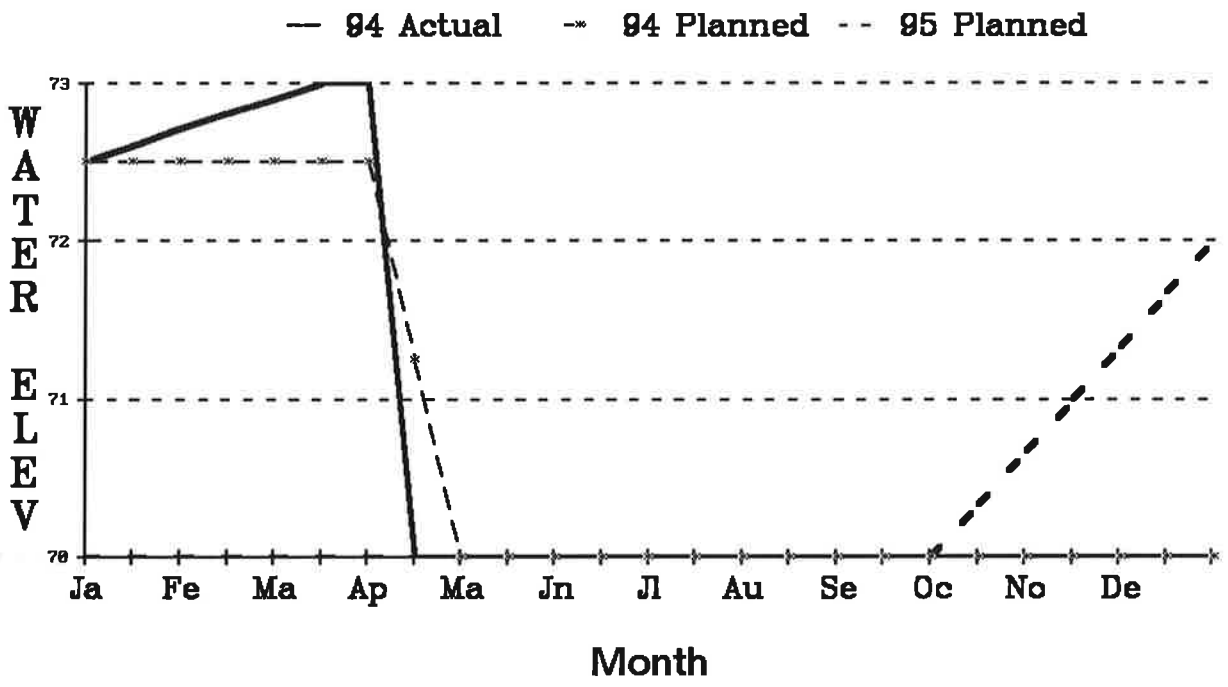
Expected Results:

Little vegetation change is expected and average waterfowl use is expected.

Potential Problems:

None foreseen.

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 (percent):

	1991	1992	1993	1994
Open Water				
Moist Soil			4	2
Submergents				
Emergents			90	58
Woody Veg.			3	26
Undesirables			3	10

8. Wildlife Use (Use Days):

Ducks	1,200	6,866	3,700	500
Geese	200	5,846	2,000	100
GBH	150			

9. Purple Loosestrife: No purple loosestrife seen.

Pool 9

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were dropped beginning April 1 and the flap gates remained open to allow any precipitation to drain. Unit was essentially dry by the end of April and throughout the entire year.

Results:

Vegetation composition has not changed much over the past few years. The west end of the unit is being excavated for dike material for the Metzger's Marsh Restoration Project.

Facilities:

The majority of the facilities are in good condition.

Costs:

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

The area provides year-round habitat for waterfowl, marsh and water birds, raptors, etc. Under optimum conditions this unit should provide 100,000-110,000 waterfowl use days annually.

Planned Management Actions:

This unit will again be dry for excavation work associated with the Metzger's Project. After completion of the project, Refuge staff will finish any "touch-up" work needed (dike rehab, removal of hunting blinds, placement of water gauge, etc.) to manage this unit as a semi-permanent wetland again.

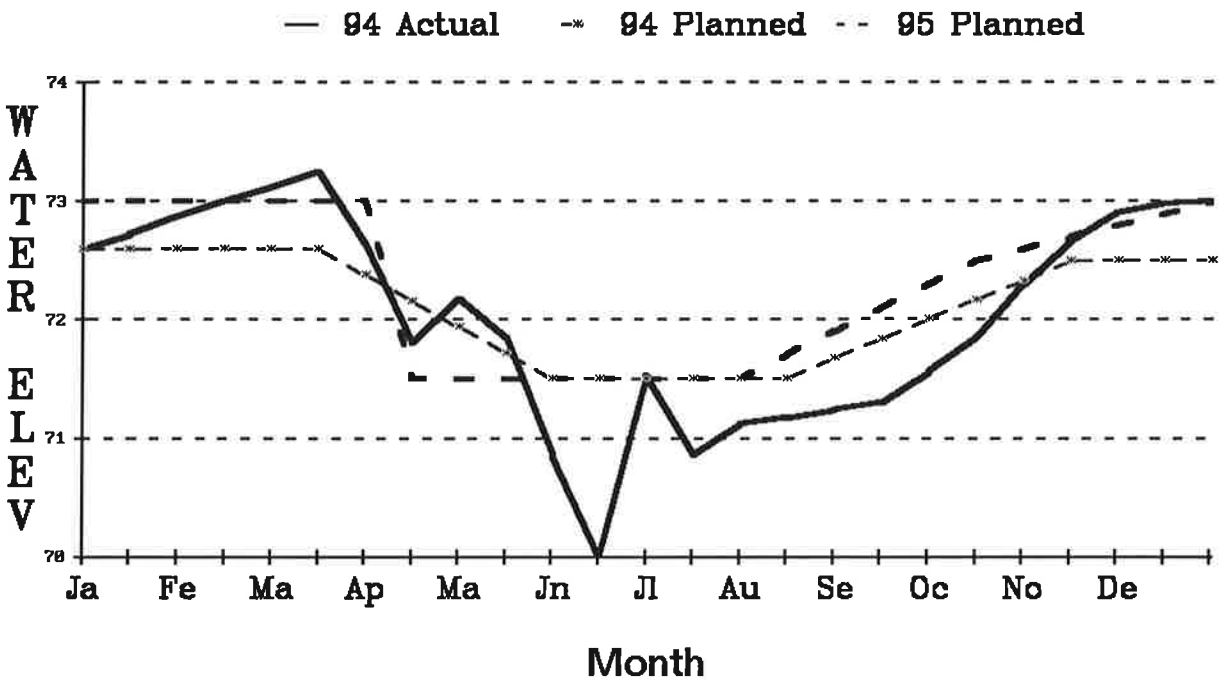
Expected Results:

Little wildlife use again this year due to construction activities. Unit should be in wetland condition and useable by late fall. However, flooding will depend on completion of construction activities from the Metzger's Marsh project and refuge "touch-up" work. If these projects are not completed then unit will remain dry.

Potential Problems:

None foreseen

1. Unit Entrance Pool
2. Acres 30
3. Maximum elevation permissible 572.5
4. Flowline elevation of lowest structure 569.0
5. Water Elev. with 50% bottom exposed - 570.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			40	5
Moist Soil			15	30
Submergents			5	
Emergents			30	56
Woody Veg.			5	2
Undesirables			5	2

8. Wildlife Use (Use Days):

Ducks	61,200	78,070	18,000	22,300
Geese	47,630	41,833	44,000	35,000
GBH	5,350			

9. Purple Loosestrife:

Entrance Pool

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were dropped beginning around mid-March and continued until June. Some water was maintained in the unit for soil moisture. Around the first of June water was completely removed to kill carp. Shallow flooding was then conducted for the rest of the summer and flooding of the unit commenced in September.

Management Actions:

None conducted.

Results:

An excellent stand of smartweed and millet was produced in areas that were flooded in late May and then reflooded in late June. Cattail is still the dominate vegetation. Shorebird use was excellent during the shallow flooding stages.

Facilities:

The screw gate slides have been twisted from ice or the walking platform and needs to be fixed. Some slumping from muskrat damage is apparent along the entrance road. The north dike has some erosion.

Costs:

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

The location of this unit along the entrance road is highly visible to refuge visitors and is the first area of the refuge they see while entering the refuge. Thus, the unit is managed to provide a diversity of marsh type habitats, ranging from cattail stands to open water. The unit receives large amounts of waterfowl, marsh and water birds use year long and shorebird use during drawdowns. Entrance pool should be able to provide 80-100,000 waterfowl use days annually.

Planned Management Actions:

Water levels will be dropped again starting in March and slowly brought down to mudflat conditions. Unit should be completely dewatered by April 15. This will allow the field just east of the unit to dry out enough for tree planting. Shallow flooding will again be conducted. Fall flooding will commence in late august.

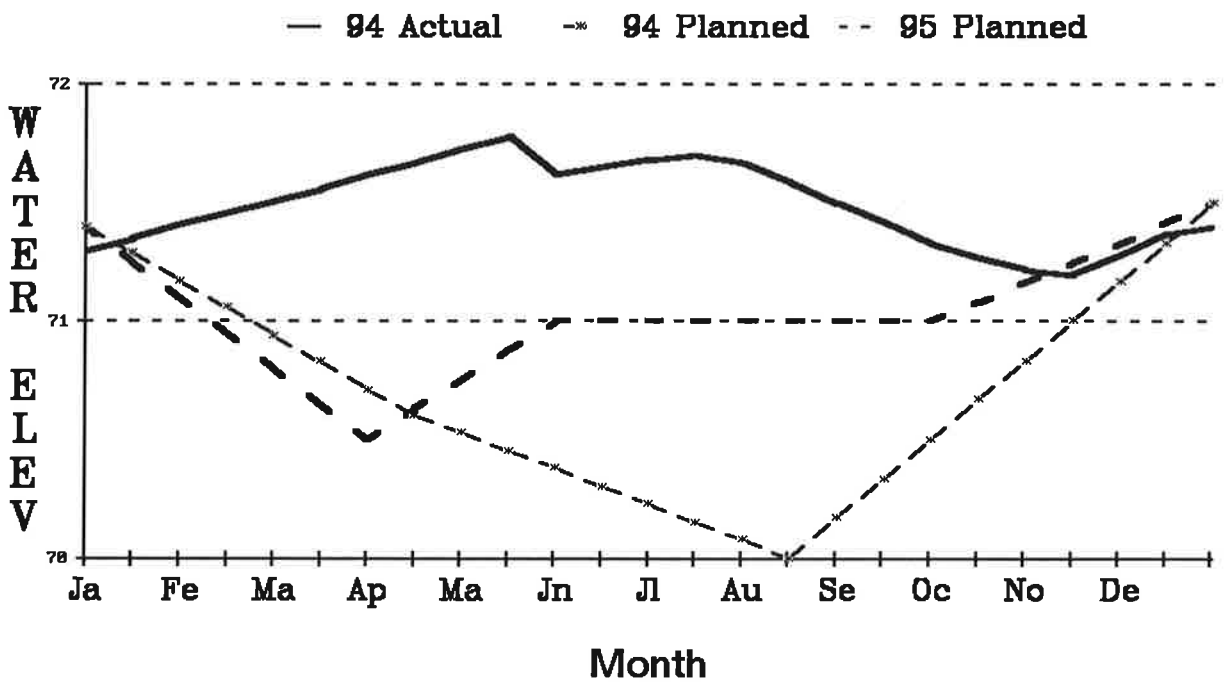
Expected Results:

Drawdown dates will coincide with good moist soil plant germination and waterfowl and shorebird migrations. Plant response should be close to what was produced in 1994, however, with the second year drawdown some cattail germination may take place. Shorebird and waterfowl use should again be excellent.

Potential Problems:

If needed, a portable pump may not be available during the time period required. However, evaporation may be enough to create plant germination.

1. Unit Show Pool
2. Acres 30
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 569.0
5. Water Elev. with 50% bottom exposed - 572.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			25	16
Moist Soil			10	5
Submergents				
Emergents			15	30
Woody Veg.			10	3
Undesirables			60	29

8. Wildlife Use (Use Days):

Ducks	650	1,265	3,000	1,500
Geese	5,620	3,765	5,000	6,300
GBH	720			

9. Purple Loosestrife:

Show Pool

A.2 Effects of Past Year's Water Levels

Levels:

Water levels fluctuated throughout the year above objective levels.

Management Actions:

None conducted.

Results:

This pool has an island/remnant dike in the middle which most of the times is a moist meadow. The open water areas are devoid of vegetation. Cattail and phragmites predominate with sections of loosestrife. Average waterfowl, marsh and water bird use occurred.

Facilities:

The south dike slowly leaks into the woods near the shop. There is currently no plans for repairs. Erosion along the south dike, in front of the office, is starting to become evident and will need attention in the near future. The screw gate appears to have a small leak and needs to be fixed.

Costs:

B.2 Objectives of the 1995 Proposed Water Levels

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 a model wetland.

Planned Management Actions:

Water level will again remain somewhat high and allowed to fluctuate with the weather conditions.

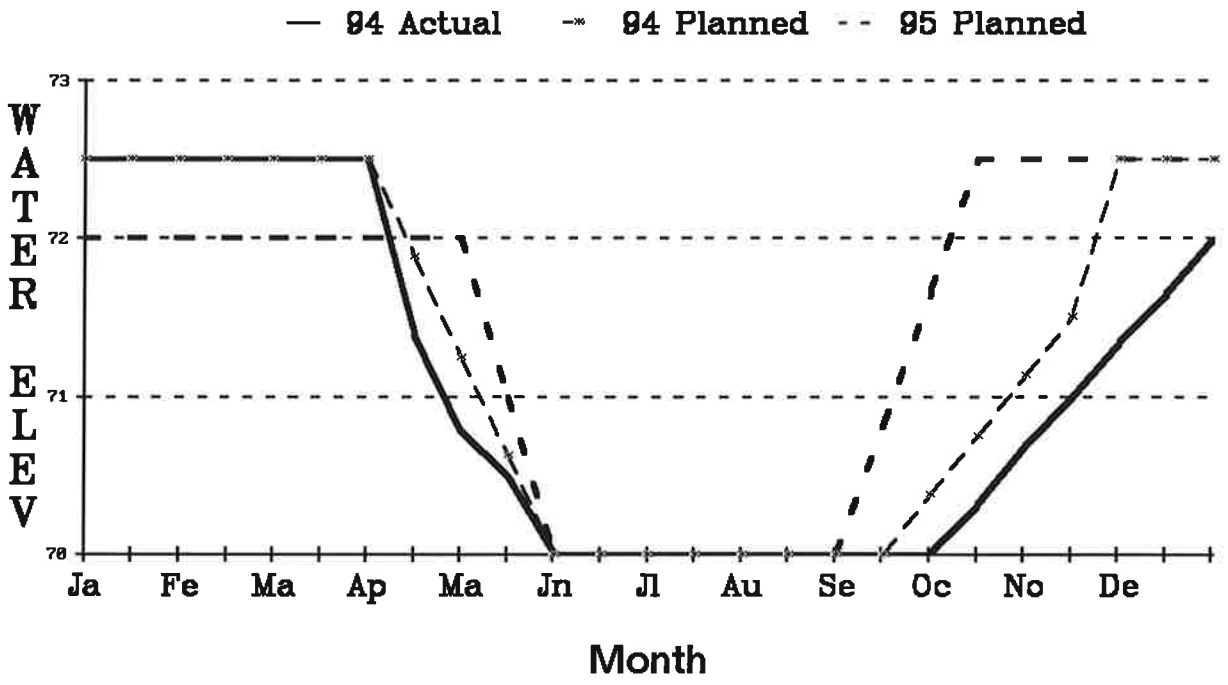
Expected Results:

Little change of vegetation composition is expected. Purple loosestrife is prevalent in this unit and the high water could knock it back for a year.

Potential Problems:

Purple loosestrife infestation will remain and control measures will be taken to prohibit further spreading.

1. Unit Mini-Marsh
2. Acres 16
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 571.0
5. Water Elev. with 50% bottom exposed - 570.5
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			19	
Moist Soil			32	40
Submergents				
Emergents			28	46
Woody Veg.			9	1
Undesirables			12	2

8. Wildlife Use (Use Days):

Ducks	1,630	903	8,600	5,450
Geese	2,910	3,864	2,900	2,200
GBH	200			

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were dropped starting in mid-April and slowly removed through early-May. Gates were closed and water level held for several days and then reopened and the remainder of ground exposed.

Management Actions:

Approximately 2 acres of cattails were disked in September just prior to flooding.

Results:

Higher ground, mostly cattail area, was exposed by 2 May. The remainder of the unit was exposed later and produced a excellent stand of millet and smartweed with some velvet leaf intermixed.

Facilities:

Facilities are in good condition.

Costs:

Electrical costs were $300.00, which also included dewatering of GTR 7.

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

The primary objective is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1,200 lbs/acre of high energy foods. Annual waterfowl use should be around 4-5,000 use days. Overall management will be to keep this unit in a early successional stages and retain high seed productivity from moist soil plants.

Planned Management Actions:

Water levels will be reduced starting in May and brought down slowly until June. Waiting until May will change the water regime because the last two years this unit has been brought down in April. A water gauge should be installed during April.

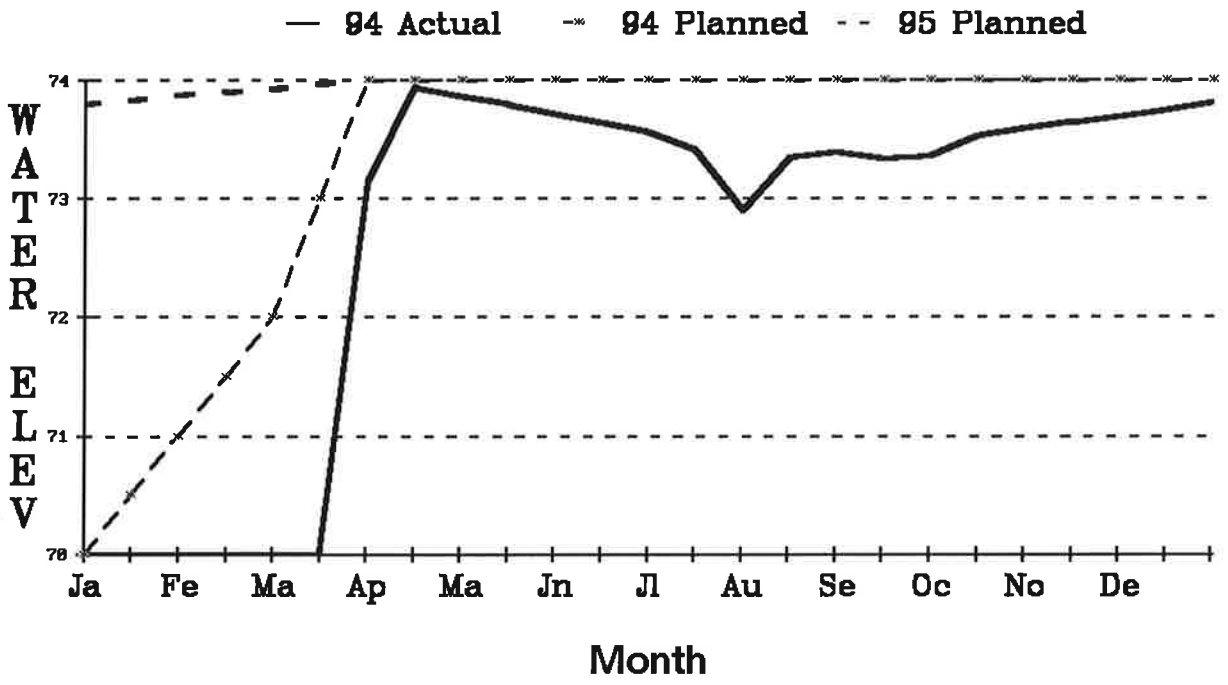
Expected Results:

Disked cattail areas should produce some moist soil plants and control the amount of cattail that returns. Other areas should produce a fair amount of moist soil plants.

Potential Problems:

None foreseen.

1. Unit MSU 3
2. Acres 213
3. Maximum elevation permissible 574.5
4. Flowline elevation of lowest structure 567.0
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water				
Moist Soil			5	
Submergents				
Emergents			5	41
Woody Veg.			10	4
Undesirables			80	53

8. Wildlife Use (Use Days):

Ducks	16,720	122,500	21,000	20,820
Geese	2,830	31,373	15,000	24,610
GBH	850			

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were raised in late March to optimum pool and then attempted to be maintained through the summer. Water levels were decreased during the summer due to evaporation and then replaced in the fall with pumping and precipitation.

Management Actions:

None conducted.

Results:

The vegetation composition remains around 53% reed canarygrass and 41% cattail. The reed canarygrass did not seam to be stressed out from maintaining water throughout the growing season. Cattail stand has appeared to expanded. With water maintained through the summer and fall, muskrats huts have increased dramatically and has reduced some of the reed canarygrass and cattail and more open water is present.

Facilities:

Are in good conditions. Rip-rap was laid along the interior-north dike to allow for deeper water to be maintained. An extra 18"-24" of dike was protected.

Costs:

Pumping costs from the moist soil pump totalled $5,150.00. However, total includes water movement for MS 4, 5, and 6 also.

B.2 Objectives of the 1995 Proposed Water Levels

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 1,200 lbs/acre of high energy foods. Waterfowl use days should range from 75-100,000 during spring migration and another 300-400,000 during the fall. Overall, management will be to keep this unit in an early successional stage to retain highly productive food resources.

Planned Management Actions:

This unit will again be at full pool for the entire year. Deep water will be over much of the unit but not all. This will give another year of high water levels to stress out the read canarygrass and willow. Pumping will probably be conducted weekly to maintain water depths. The water gauge for this unit still needs to be installed.

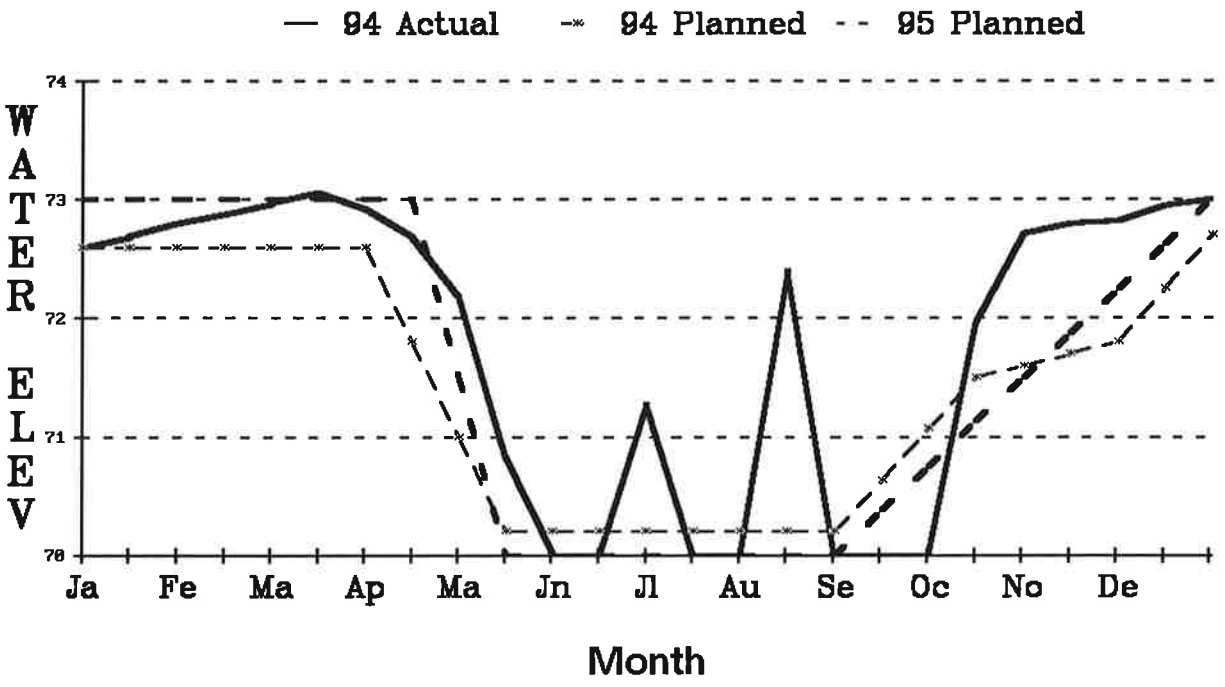
Expected Results:

No moist soil production is expected during the year. The main objective is to reduce the undesirable vegetation with deep water. This technique should impact the density of reed canarygrass and hopefully cattail. Use is expected during the spring migration as waterfowl feed on invertebrates and then again as a loafing area in the fall.

Potential Problems:

A hot, dry summer could hinder maintaining adequate water depths through the summer months to stress the reed canarygrass.

1. Unit MSU 4
2. Acres 106
3. Maximum elevation permissible 574.0
4. Flowline elevation of lowest structure 567.0
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation (percent):

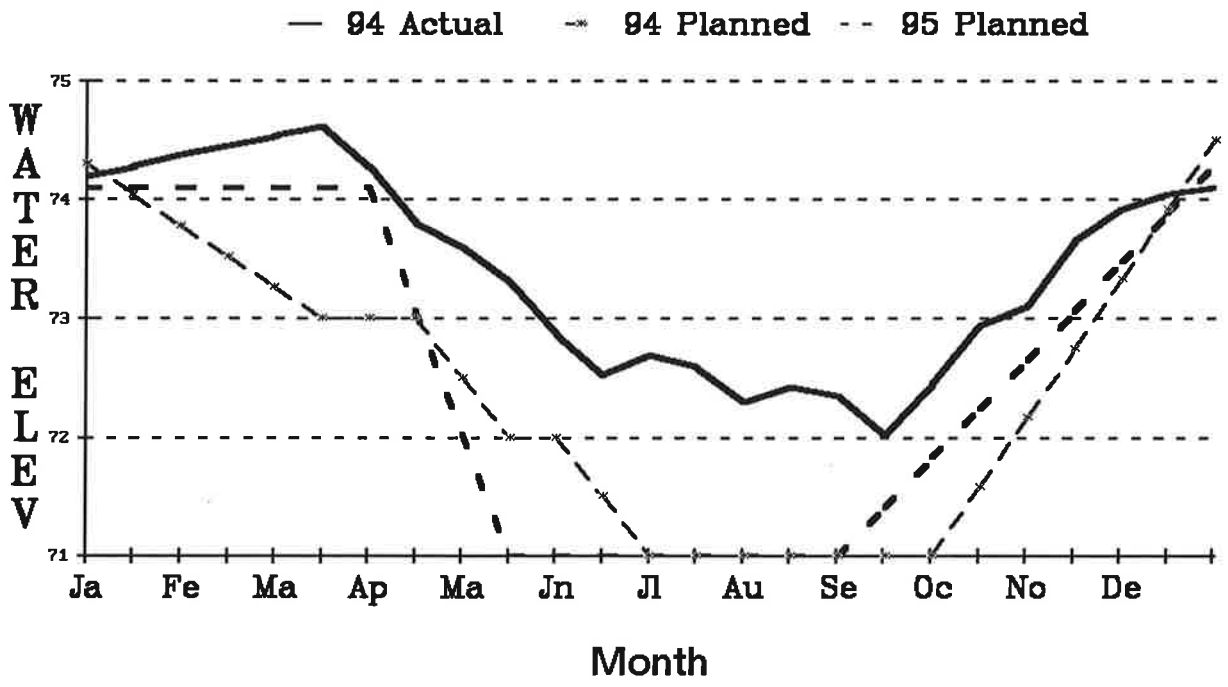
	1991	1992	1993	1994
Open Water			10	
Moist Soil			10	72
Submergents				
Emergents				
Woody Veg.				1
Undesirables			80	5

8. Wildlife Use (Use Days):

Ducks	248,000	216,843	43,000	550,000
Geese	32,230	17,941	15,000	22,650
GBH	850			

9. Purple Loosestrife:

1. Unit MSU 5
2. Acres 250
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 567.0
5. Water Elev. with 50% bottom exposed - 570.5
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			15	24
Moist Soil			35	20
Submergents				
Emergents			5	4
Woody Veg.			15	6
Undesirables			20	38

8. Wildlife Use (Use Days):

Ducks	212,150	295,450	330,000	730,000
Geese	143,590	104,583	125,000	197,600
GBH	4,230			

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were dropped starting in April and reduced slowly into May to ensure excellent conditions for moist soil plants. The unit was irrigated twice during the summer, once from a major rain storm and the second from the moist soil ditch. Flooding commenced in early-October.

Management Actions:

Twenty acres of resprouting reed canarygrass were disked up and planted to crops (14 acres corn and 6 acres milo). An additional 3 acres of reed canarygrass were disked moist soil plants allowed to germinate.

Results:

An excellent stand of millet and smartweed were produced on 80 acres. Areas disked up in 1994 also produced a good stand of millet after being flooded in the summer. Corn and milo crops did well but production was reduced due to the flooding of the unit in June, but moist soil plants responded well to the moisture. Waterfowl use was over twice the objective level.

Facilities:

Facilities are in good condition, however, some resloping of the south dike needs to be done and then seeded.

Costs:

Pumping costs from the moist soil pump totalled $5,150.00. However, total includes water movement for MS 3, 5, and 6 also.

B.2 Objectives of the 1995 Proposed Water Levels

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 1,200 lbs/acre of high energy foods. Waterfowl use days should be around 30-40,000 during the spring migration and an additional 200,000 in the fall. Overall, management will be to keep this unit in a early successional stage to retain highly productive food resources.

Planned Management Actions:

Water levels will be reduced starting in late April or early May to induce moist soil plants. Unit will be irrigated again during the summer to get the most production from moist soil plants. The unit will then be flooded starting in September. Any trouble spots with reed canarygrass will be disked and/or sprayed as soon as possible to get control the grass and allow time for germination of moist soil plants.

Expected Results:

Moist soil production is expected to be excellent again this year without much problem with reed canarygrass. This unit will be monitored closely to ensure that reed canarygrass does not get another chance to infest this unit. The drawdown will coincide with mainly shorebird migration and this unit should provide excellent habitat for migrating shorebirds.

Potential Problems:

None foreseen.

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were dropped starting in late-March and continued through mid-June. Water was maintained over a portion of the unit during the summer. A slight increase in water level was conducted to stress out cocklebur. Unit was flooded beginning in mid-September through the end of the year.

Management Actions:

Approximately 30 acres of cocklebur/willow was sprayed and mowed for control and to allow the underlying millet to be exposed and grow. Mowing had about a 60% kill on the cocklebur. The remainder of the cocklebur was too short for mowing to have an effect on it. Some of the willow had herbicide applied by a wick applicator. Fifteen acres of reed canarygrass was sprayed with Roundup in May and then deep disked in September.

Results:

Moist soil production was sparse. The areas that were mowed produced stunted millet, about a foot tall, and was stripped by geese in September. Patches of millet were throughout the unit, however, open water, and willow were mostly present.

Facilities:

Costs:

Pumping costs from the moist soil pump totalled $5,150.00. However, total includes water movement for MS 3, 4, and 6 also.

B.2 Objectives of the 1995 Proposed Water Levels

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 1,200 lbs/acre of high energy foods. The unit should be able to provide 100,000 waterfowl use days in the spring and an additional 500,000 use days during the fall period.

Planned Management Actions:

This unit will be brought down beginning in April and continued through the month and into May, if needed. The reed canarygrass that was disked will be watched closely to insure that reed canarygrass does not get reestablished. An additional disking and/or planting of crops may be conducted to prohibit the grass from taking over again. Unit will be flooded beginning in September.

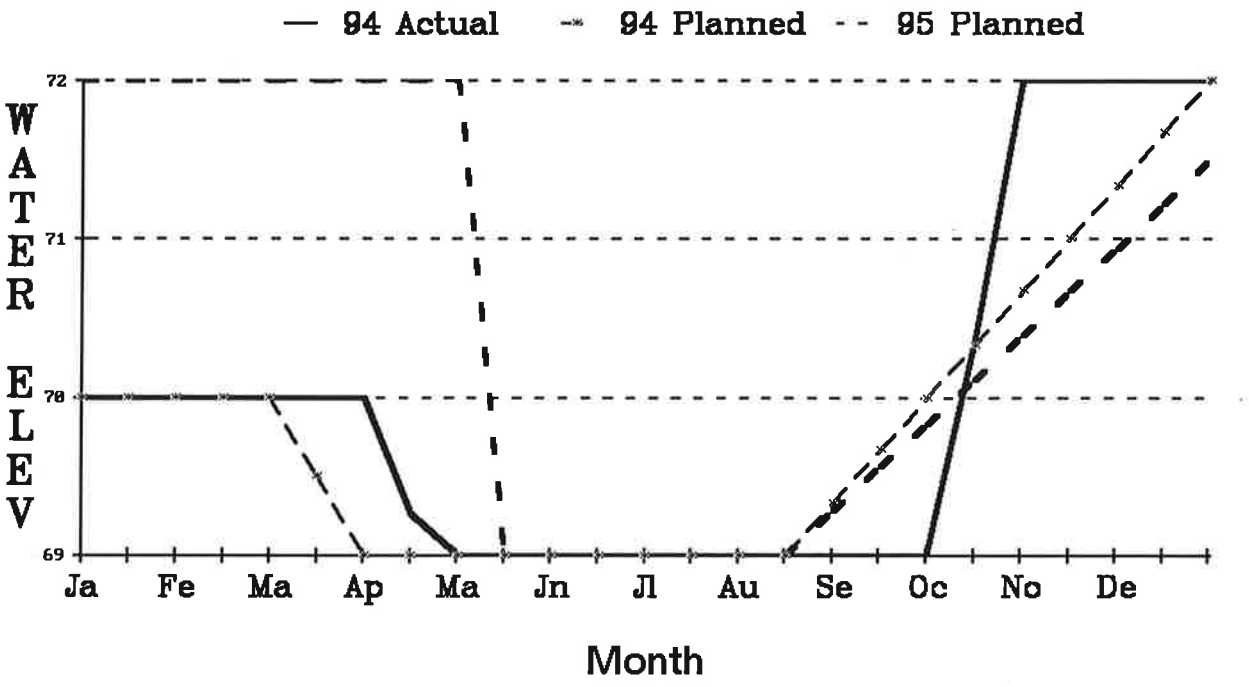
Expected Results:

Dewatering earlier in the year should allow for good moist soil germination. The disked reed canarygrass should produce some moist soil and allow for good shorebird habitat. Depending on what plants develop, control of willow and cocklebur may have to be done. This might involve disking or wick applying herbicide and if needed planting of some crops.

Potential Problems:

If the soil dries quickly, soil conditions produce cocklebur and velvetleaf and flooding or mechanical disturbance will be needed for control.

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



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water				
Moist Soil			10	25
Submergents				
Emergents			5	7
Woody Veg.			5	23
Undesirables				25

8. Wildlife Use (Use Days):

Ducks	500	7,770	18,000	8,000
Geese	200	2,091	12,000	6,000
GBH	360			

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were shallow over the winter and these were pumped down in early-April. The unit was then held in a dry state to provide a second consecutive year of drought conditions to stress the cattail. Water levels were then brought up in early-October and maintained.

Management Actions:

In addition to the drought conditions several acres of cattail had herbicide applied to them by way of a wick applicator. Applying the herbicide in this manner allowed for killing of the cattail but allowing the underlying moist soil plants to continue to grow.

Results:

The unit produced a fair stand of moist soil plants and the cattail that had herbicide applied appeared to kill the cattail. Good stands of smartweeds grew but little waterfowl use occurred.

Facilities:

Facilities are in good condition, but the south dike will need to be rip-rapped in the future. A water gauge is needed. A 30-inch CMP was finally put into this unit to connect it with the moist soil pump.

Costs:

Pumping costs from the moist soil pump totalled $5,150.00. However, total includes water movement for MS 3, 4, and 5 also.

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

The primary objective is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1,200 lbs/acre of high energy foods. Duck use days should be anywhere from 100-120,000 during the fall with an additional 25,000 in the spring while waterfowl are feeding on invertebrate populations.

Planned Management Actions:

Water levels will be maintained until May 1 and then dropped. More than likely, more cattail and willow will be controlled through wick applied herbicide. Some disking and mowing will also be conducted to set back succession in this unit. This unit will be one of the more intensively watched and worked moist soil units during the year. A water gauge will be installed to more accurately track water elevations.

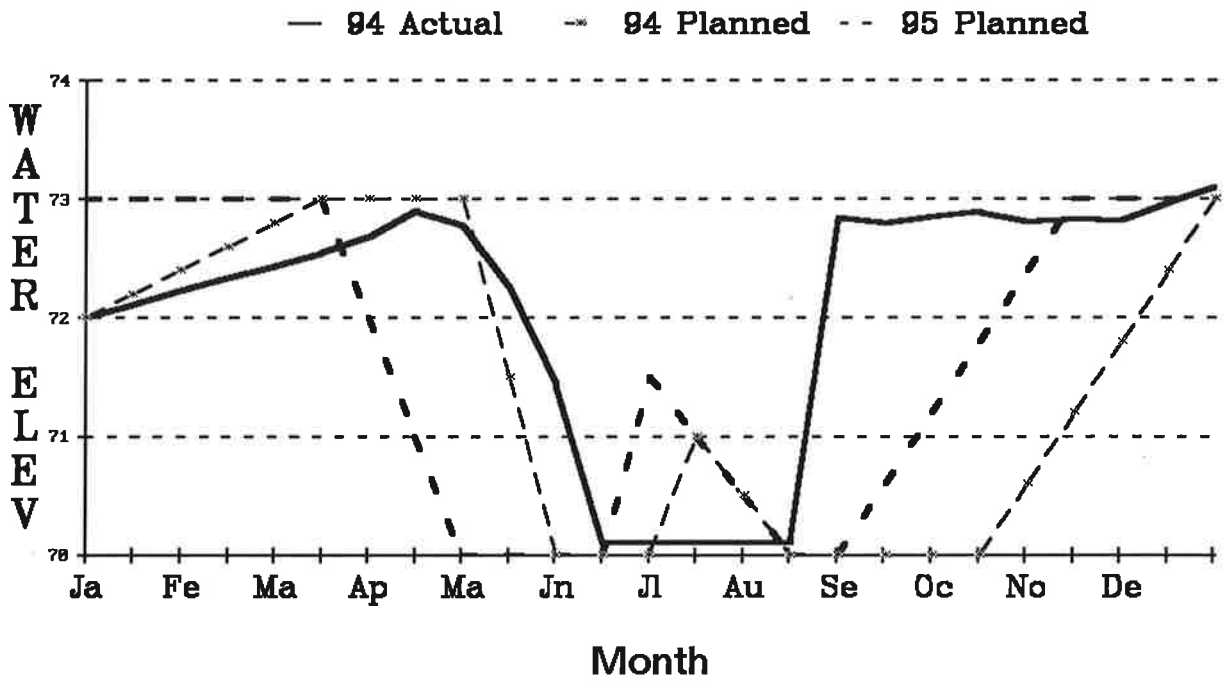
Expected Results:

Moist soil production should be good and cattail control should be fair. The delayed water removal will delay germination of moist soil plants after cattail has already started growing, thus allowing the cattail to be actively growing when/if herbicide will be applied.

Potential Problems:

None foreseen

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 (percent):

	1991	1992	1993	1994
Open Water			10	
Moist Soil			15	23
Submergents				
Emergents				3
Woody Veg.			5	7
Undesirables			70	52

8. Wildlife Use (Use Days):

Ducks	15,400	18,070	16,000	21,000
Geese	29,290	15,183	15,000	10,200
GBH	220			

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels increased slightly during the spring and then levels were slowly dropped with the unit dewatered by June. After completion of laying rip-rap on the interior dike the unit was then flooded to almost full pool.

Management Actions:

Approximately 2 acres of cocklebur was mowed in July to allow the underlying millet some sunlight and opportunity for growth. Approximately 3 acres of upland vegetation was disked just prior to flooding. Three to five acres of cocklebur and purple loosestrife was sprayed in August using 2,4-D.

Results:

Nearly 100% kill of cocklebur occurred in mowed areas producing an excellent millet stand. The disked areas have prepared the area for excellent moist soil production in 1995 and additionally provided good shorebird habitat in the fall when these areas were flooded. Waterfowl use was limited in the fall with the majority occurring just after flooding.

Facilities:

Rip-rap was placed on the north dike's interior slope.

Costs:

Pumping costs for the year were $410.00, which include pumping for MSU 7B.

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

The primary objective is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1,200 lbs/acre of high energy foods. Annual waterfowl use days should average around 40,000. Overall, management will be to keep this unit in early successional stages to retain highly productive moist soil plants.

Planned Management Actions:

Water levels will be drawn down in late winter/early spring in conjunction with MSU 7B so that areas in MSU 7B will dry enough for planting trees in spring. Depending on the outcome of vegetation germination, this unit could receive some disking and then irrigated during the summer. This unit still has a major upland plant community from being managed the same way for 3-4 years. Flooding for fall will commence in early September.

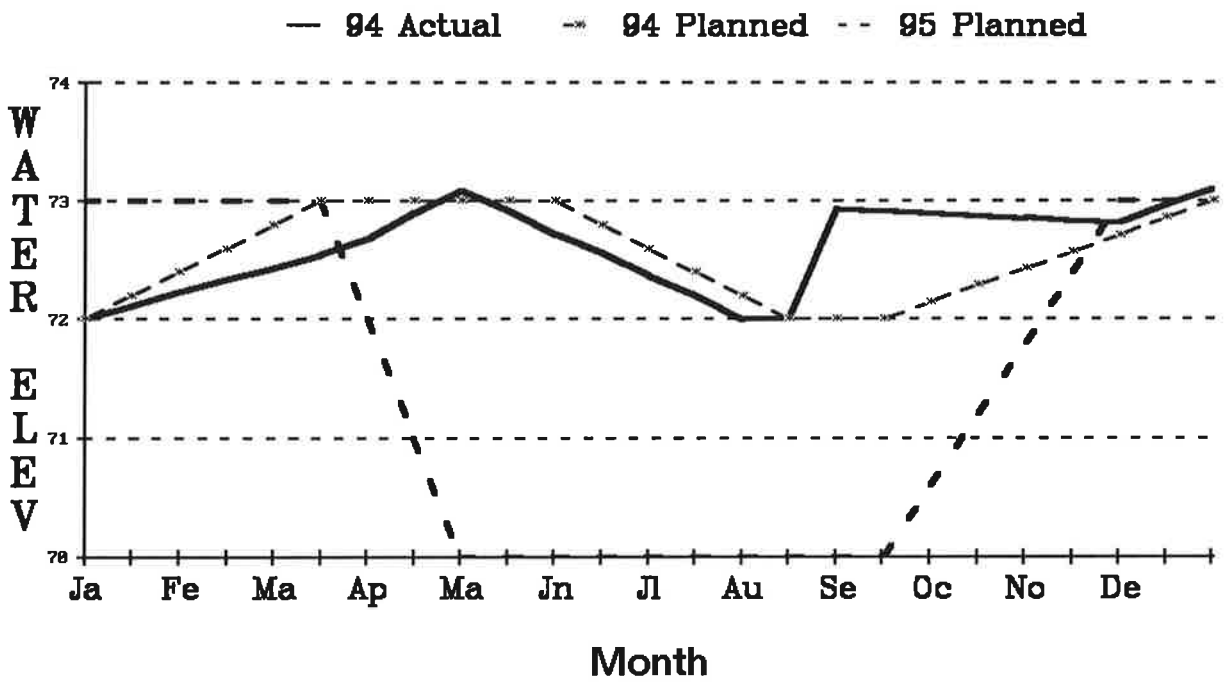
Expected Results:

The areas that were disked in 1994 should produce excellent moist soil plants. Disking and irrigation, if needed, should cause adequate disturbance and soil moisture for good millet germination if done prior to July 1. Spring shorebird and waterfowl use should again be good.

Potential Problems:

If disking and irrigation are conducted, the unit will have to be monitored to ensure undesirable vegetation such as cocklebur and velvetleaf are not the end result.

1. Unit MSU 7B
2. Acres 44
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure None
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water				11
Moist Soil			20	5
Submergents				
Emergents				25
Woody Veg.				3
Undesirables			80	38

8. Wildlife Use (Use Days):

Ducks	5,400	54,210	18,000	10,000
Geese	6,000	10,458	6,000	35,130
GBH	1,120			

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were raised in spring and maintained during early summer. Water evaporated during the summer and then was replaced when MSU 7A was flooded in August.

Management Actions:

The upland vegetation of timothy and forbs was disked and planted to buckwheat to prepare the area for tree planting during spring 1995.

Results:

Due to shallow water levels during the growing season the major component of vegetation is emergents like spikerush and water smartweed. However, a large proportion of the unit still consists of upland vegetation due to the dryness of this area from managing it the same way during the prior 3 years.

Facilities:

Costs:

Pumping costs for the year were $410.00, which includes pumping for MSU 7A.

B.2 Objectives of the 1995 Water Levels

Objectives:

A bald eagle nest is located along the units's edge and first priority is to provide this species with nesting and brood rearing requirements. The primary objective is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1,200 lbs/acre of high energy foods. Annual waterfowl use days should average 50,000. Overall, management will be to keep this unit in early successional stages to retain highly productive moist soil plants.

Planned Management Actions:

Water levels will be drawn down in late winter/early spring in conjunction with MSU 7A so that areas in MSU 7B will dry enough for planting trees in spring. Water levels will then be brought up starting in mid-September.

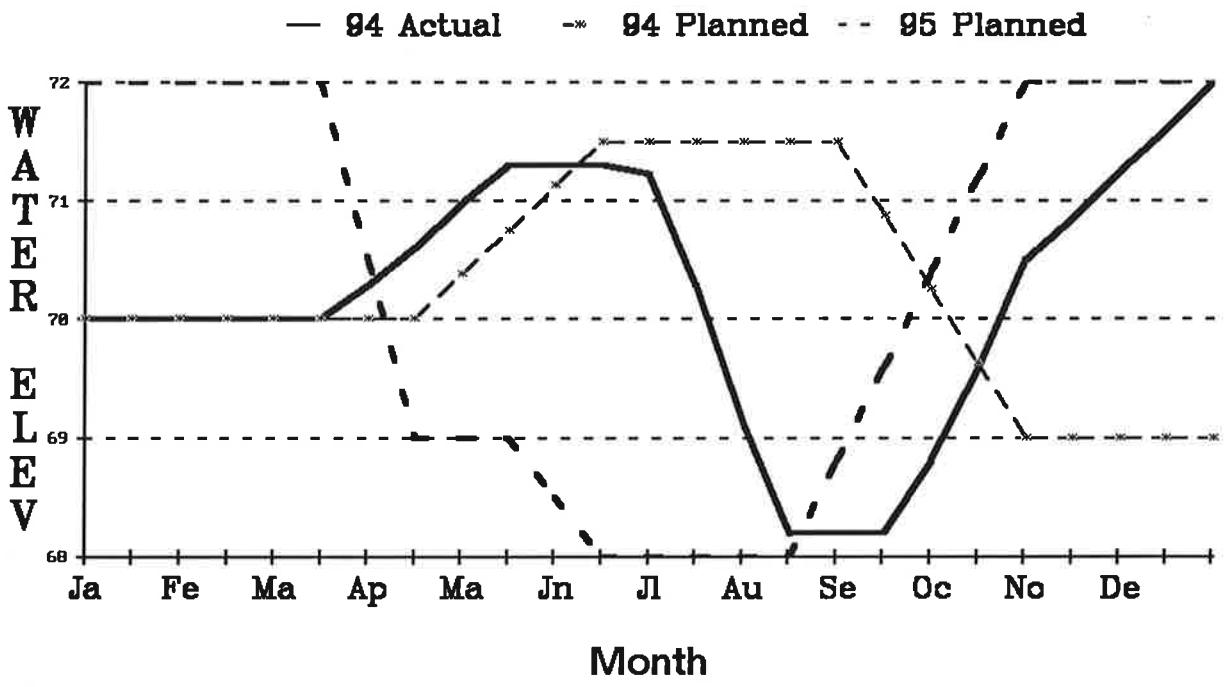
Expected Results:

Portions of the upland vegetation that were disked along the waters edge should produce a good stand of millet. The remainder of the unit which had water throughout the growing season in 1994 should produce a good quantity of moist soil plants. Shorebird use is expected to be excellent along the waters edges when the unit is being drawn down.

Potential Problems:

None foreseen

1. Unit MSU 8A
2. Acres 44
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 570.0
5. Water Elev. with 50% bottom exposed - 571.5
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			10	11
Moist Soil			15	10
Submergents				
Emergents				17
Woody Veg.			15	5
Undesirables			60	12

8. Wildlife Use (Use Days):

Ducks	80,480	53,614	25,000	14,580
Geese	68,340	82,750	18,000	46,420
GBH	1,070			

9. Purple Loosestrife:

MSU 8A

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were brought up in spring and held during the early summer. Water was then released to expose ground and allow for manipulation of undesirable vegetation. The screw gate to Lake Erie was opened in the fall and water level fluctuated with the lake while pool 2A was being brought up. Gate were then closed and this unit pumped up further.

Management Actions:

Eighteen acres of undesirable vegetation was disked in September. The majority of this vegetation consisted of cottonwood and willow seedlings.

Results:

Majority of the unit consists of woody and upland vegetation. A small amount of moist soil vegetation (10%) was produced along the waters edge as the water evaporated during spring and summer. Shorebird use was fair during fall flooding.

Facilities:

The dikes were completely rehabilitated over the last couple of years and are in good condition. The dikes do need to be sown with grass seed for protection. Replacement of water gauge is also needed.

Costs:

Pumping costs for the year were $510.00, which includes some pumping for MSU LL.

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

The primary objective is to provide waterfowl food resources as a moist soil unit. Under optimum conditions, this unit should be able to provide up to 1,200 lbs/acre of high energy foods. Waterfowl use is expected to be 15,000 during the spring migration with an additional 50-70,000 use days during the fall migration. Overall, management will be to keep this unit in a early successional stage to retain high seed producing plant resources.

Planned Management Actions:

Water levels will be dropped in late-March and early-April for moist soil plants. Water will then be let out of pool 2A into MSU 8A. Water released from pool 2A will be released at a rate that will only flood the ditch in MSU 8A. Thus, tiles throughout the unit should be inundated and keep soil moist until pool 2A is dewatered. Depending on plant response and effectiveness of control efforts some mowing and/or disking may take place. This unit's water gauge should be in place during April. This unit will then be flooded beginning in mid-August.

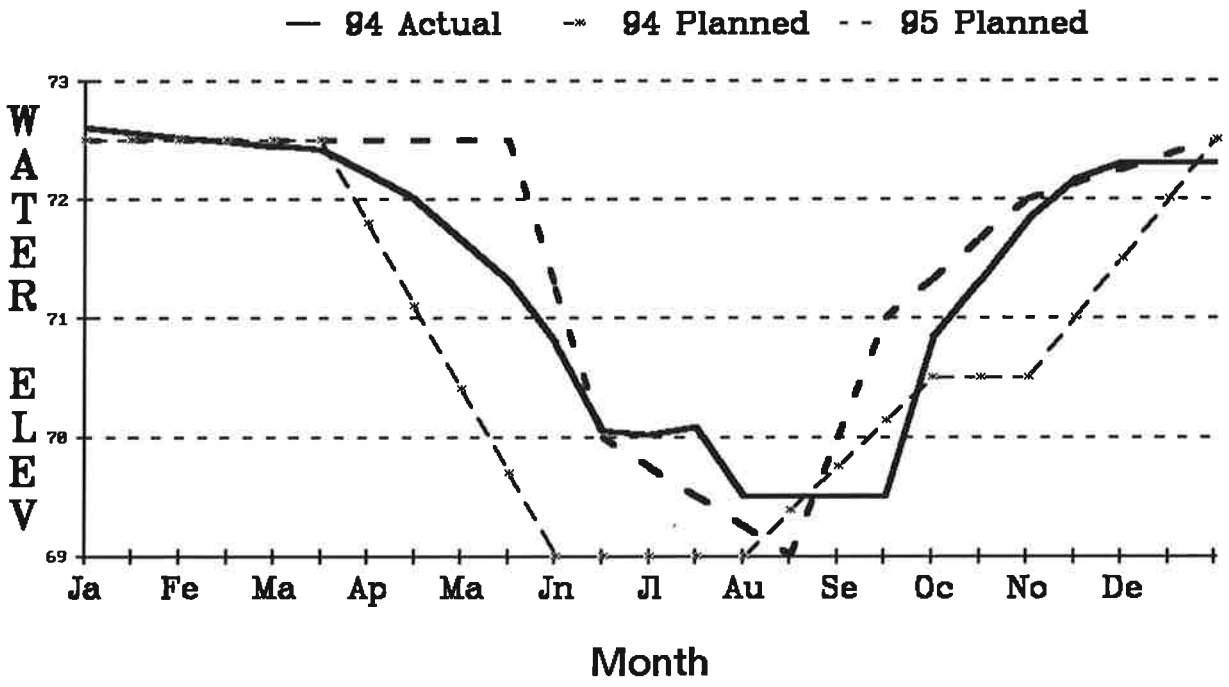
Expected Results:

Drawdown will coincide with germination of moist soil plants and shorebird migration. Excellent moist soil plant germination is expected in areas that were disked in 1994. Marginal plant response is anticipate throughout the remainder of the unit. Shorebird use should be excellent during drawdown.

Potential Problems:

None foreseen

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 - 571.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water				2
Moist Soil			31	72
Submergents				
Emergents				1
Woody Veg.			5	10
Undesirables			64	12

8. Wildlife Use (Use Days):

Ducks	117,720	88,020	155,000	164,390
Geese	80,660	100,791	34,000	67,660
GBH	4,520			

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were brought down starting in late March and continued through May. The unit maintained some water in the ditch during the summer, but by August most of this water was gone. Flooding commenced in mid-September and continued to November.

Management Actions:

Approximately 3 acres of upland vegetation was disked in September. Additionally, another 4-5 acres of swamp milkweed was mowed to open up the area for millet.

Results:

An excellent stand of millet was produced which covered almost 75% of the unit. Waterfowl use was excellent again. Shorebirds use was fair to good during the spring drawdown and again in the fall especially in the disked areas.

Facilities:

In the future there will have to be some dike work done on almost the entire unit.

Cost:

Pumping costs for the year were $430.00.

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

The primary objective is to provide waterfowl food resources as a moist soil unit. A secondary objective is to provide waterfowl and wetland wildlife viewing for refuge visitors. The units proximity next to the visitor parking lot lends itself to wonderful wildlife viewing for those visitors that can not use the walking trails. Under optimum conditions, this unit should be able to provide up to 1,200 lbs/acre of high energy foods. Waterfowl use days should average around 30,000 for waterfowl exploiting invertebrate populations during spring and another 120-150,000 use days during fall staging and feeding on moist soil plant food resources. Overall, management will be to keep this unit in an early successional stage and retain highly productive moist soil plants.

Planned Management Actions:

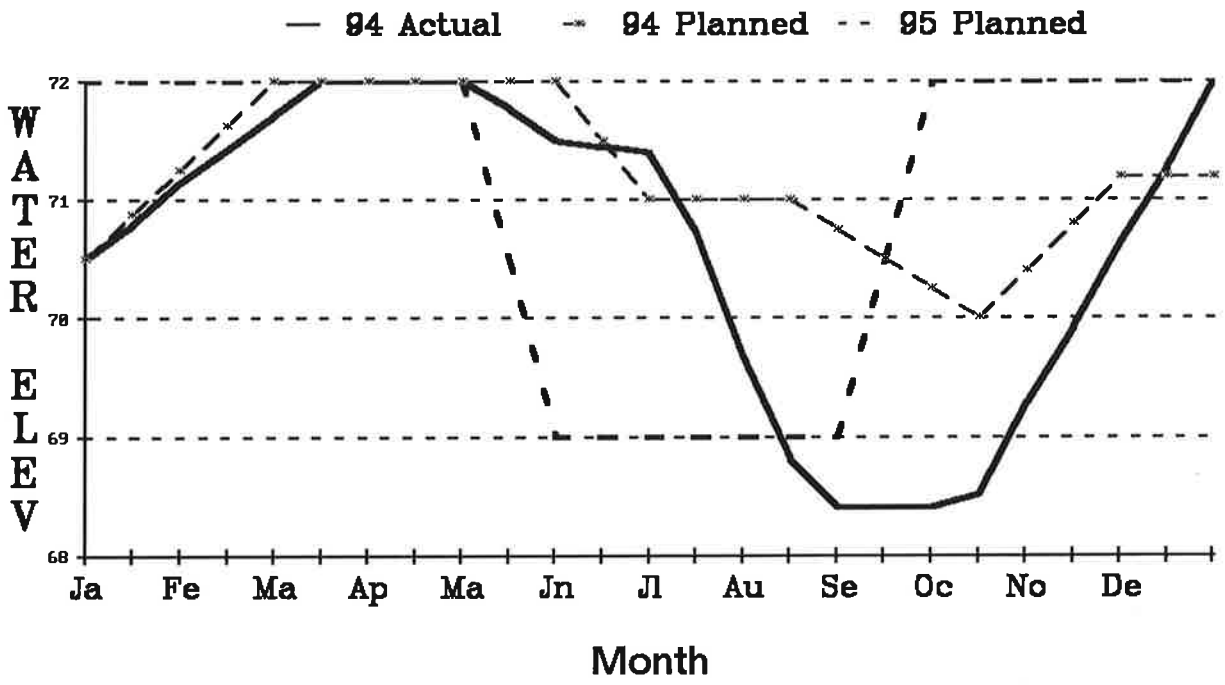
To change drawdown history, this unit will be held until May and then dewatered. Depending on results, some minor disking may take place to set back areas that are being taken over by upland vegetation. Flooding will commence in mid-August.

Expected Results:

Moist soil production should be excellent on the areas that were disked in fall 1994. Other areas should produce good to fair stands of moist soil and possible emergent vegetation. Drawdown will be after peak shorebird migration, but fair use is expected. Waterfowl use should again be tremendous during the fall.

Potential Problems: None Foreseen

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 - 571.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			10	
Moist Soil			10	16
Submergents				
Emergents			10	5
Woody Veg.			10	16
Undesirables			60	20

8. Wildlife Use (Use Days):

Ducks			25,000	15,200
Geese			2,600	8,950
GBH				

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were increased during winter and spring. Full pool was held into May and then water was decreased slightly to remove water from nearby forested area. Drawdown was then conducted in the summer. Flooding commenced in October and continued until years end.

Management Actions:

Approximately 2 acres of cottonwoods were mowed.

Results:

This unit still has a major component of upland forbs, woody vegetation, and yellow foxtail. However, some moist soil plant production was produced. Waterfowl use was limited and the majority of it did not occur until late-November and early-December.

Facilities:

A diversion box needs to be constructed and placed on MSU 8A pump structure for flooding this unit to lessen the need of a portable pump.

Cost:

A 162 hours were logged on the Thompson pump during flooding.

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

The primary objective is to provide waterfowl food resources as a moist soil unit. Under optimum conditions this unit should be able to provide up to 1,200 lbs/acre of high energy foods on at least 20 acres and provide up to 30,000 duck use days during the fall migration and an additional 10,000 use days during the spring as the waterfowl are feeding on invertebrate populations.

Planned Management Actions:

This unit will again maintain water into the spring and then be drawn down in May. If upland plant are still the predominant vegetation, then some disking may be conducted and the unit flooded and then drawn down. A water gauge will be installed to more accurately record water elevations.

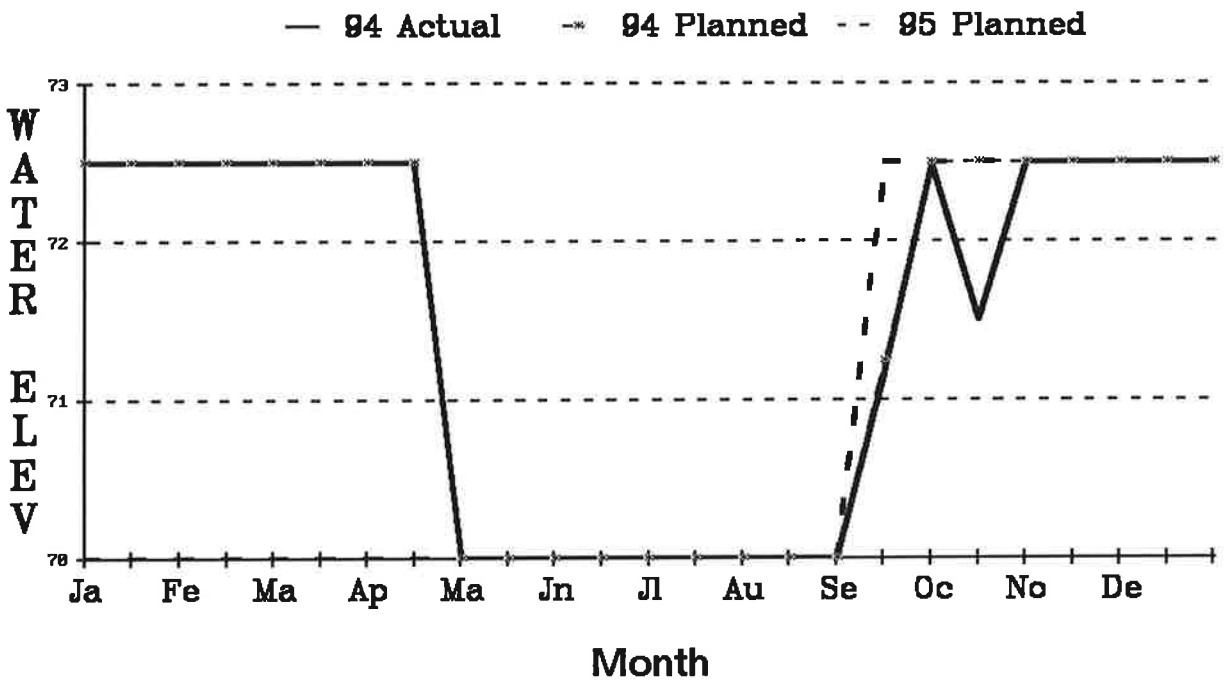
Expected Results:

The delayed removal of water should set back some of the upland plant community. If not, then the unit will be disked and flooded which should produce and excellent stand of millet if these actions are conducted prior to June 15. Waterfowl and shorebird use should be excellent during fall.

Potential Problems:

If disking and flooding take place, this unit will have to be watched closely so that cocklebur and velvetleaf are not the end results.

1. Unit GTR 7
2. Acres 13
3. Maximum elevation permissible _____
4. Flowline elevation of lowest structure _____
5. Water Elev. with 50% bottom exposed - _____
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Oaks (pin,red,swp.white)			37	37
Hickory (shelbark,shagbark)			9	9
Basswood			21	21
Ash			6	6
Other (elms, maples)			15	15
Undesirables				

8. Wildlife Use (Use Days):

Ducks			50	2,050
Geese				
GBH				

A.2 Effects of Past Year's Water Levels

Levels:

Water was removed from unit beginning in mid-April and took about 10 days to accomplish. Water was then pumped in again starting in early September. Problems with the water control structure were noticed after the unit was almost at full capacity. The structure was fixed and the unit pumped up again.

Management Actions:

Results:

Use by waterfowl during the spring was not determined because of the location of a bald eagle's nest. Waterfowl use in the fall definitely increased probably due to earlier flooding date. Wood ducks were the only species seen within the impoundment.

Facilities:

Water gauge needs to be added to determine water level more accurately.

Costs:

A total of 140 hours of pumping time with the Thompson pump was recorded. The amount of time includes reflooding after water control structure was sealed.

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

This greentree reservoir gives the refuge the opportunity to exploit resources that have not been promoted at the refuge. The primary objective is to provide a waterfowl food resources from mast production. Spring waterfowl use will be associated with invertebrate populations.

Planned Management Actions:

The water control structure, PVC riser and float, will be removed and replaced with a stop-log structure. A channel will be cut through the dike in winter to allow the water to drain out. This has to be done before eagle activity takes place. The stop-log structure will be put in during the summer. A water gauge should be added. Water will then be added starting in September and maintained throughout the winter.

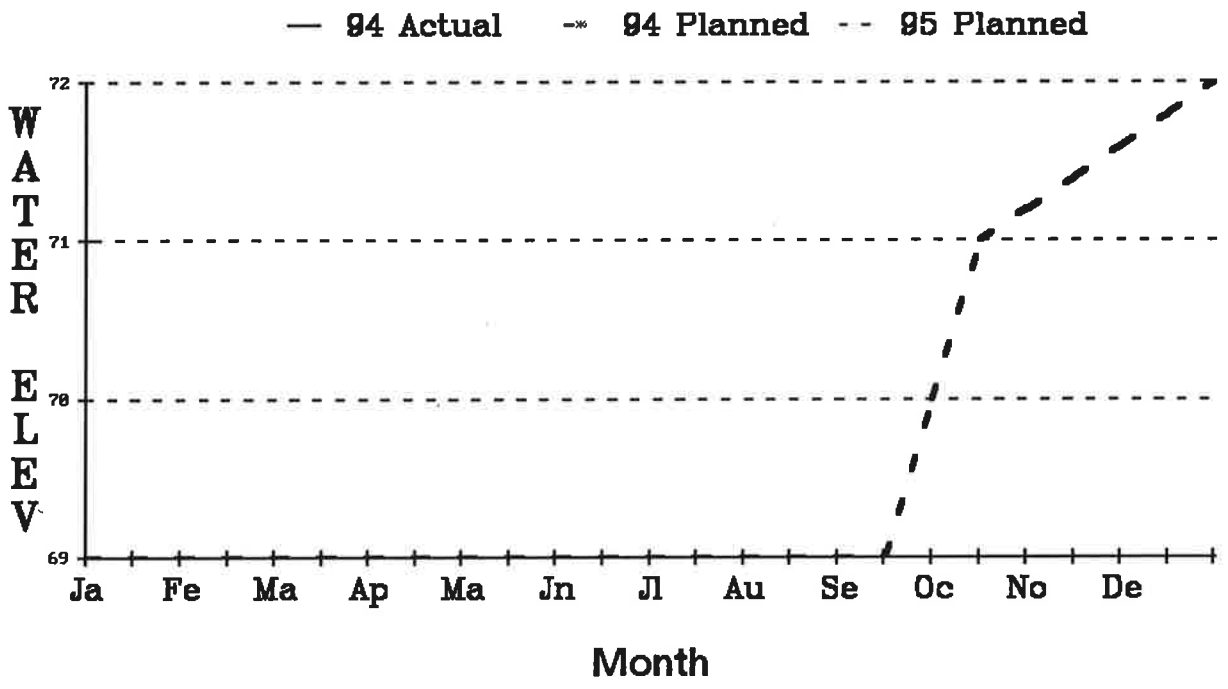
Expected Results:

Waterfowl use is expected to be close to or higher than 1994's use.

Potential Problems:

None foreseen.

1. Unit Goose Pen
2. Acres 35
3. Maximum elevation permissible _____
4. Flowline elevation of lowest structure _____
5. Water Elev. with 50% bottom exposed - _____
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water				36
Moist Soil				
Submergents				
Emergents				46
Woody Veg.				12
Undesirables				6

8. Wildlife Use (Use Days):

Ducks				1,000
Geese				2,750
GBH				

Goose Pen

A.2 Effects of Past Year's Water Levels

Levels:

This unit has not been intensively managed. A "hands off" approach has been taken and the unit water levels have fluctuated with climatic conditions. The impoundment usually fills during the spring and fall from precipitation and losses water during the hot summers. The unit consists of emergents such as spikerush and cattail, but mostly open water. Additionally, this unit is infested with purple loosestrife.

Management Actions:

Results:

Facilities:

Cost:

B.2 Objectives of the 1995 Proposed Water Levels

Objectives:

The primary objective is to provide waterfowl food resources as a moist soil unit. Under optimum conditions this unit should be able to provide up to 1,200 lbs/acre of high energy foods on at least 20 acres and provide up to 30,000 duck use days during the fall migration and an additional 10,000 use days during the spring as the waterfowl are feeding on invertebrate populations.

Planned Management Actions:

A 12" CMP and screw gate will be added to this unit through the south dike to allow for water level manipulation. The interior remnant dikes will be removed and the spoil used to fill the numerous ditches within the unit. The unit will then be drawn down and prepared for crops. Planting this unit to some agricultural crops will allow for some control over the purple loosestrife problem in addition to providing wildlife benefits. Depending on results, the unit will be flooded for the fall migration.

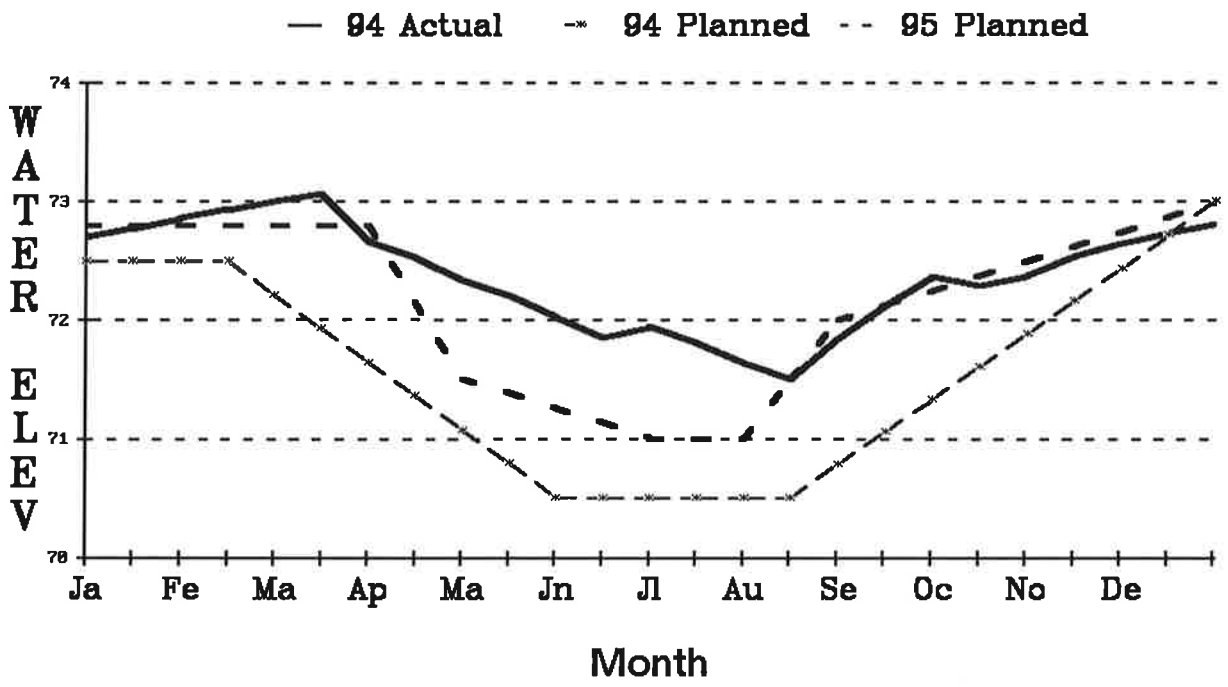
Expected Results:

The drier soil, soil disturbance and, if needed, herbicides should set back the amount of purple loosestrife present and provide fall waterfowl use. Exposed mudflats should produce excellent moist soil plants, however, purple loosestrife could expand. The disturbance will also prepare the area for moist soil plant production in 1996. However, cropping of this unit for two years in a row may be required to control purple loosestrife.

Potential Problems:

Purple loosestrife problem could intensify and then require a different control strategy.

1. Unit Cedar Point - Pool 1
2. Acres 1,460
3. Maximum elevation permissible 574.0
4. Flowline elevation of lowest structure 569.4
5. Water Elev. with 50% bottom exposed - 571.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			60	30
Moist Soil			5	35
Submergents				
Emergents			20	20
Woody Veg.			5	5
Undesirables			10	10

8. Wildlife Use (Use Days):

Ducks	874,810	1,018,090	1,223,700	1,654,210
Geese	144,825	109,828	73,850	66,230
GBH	5,090			

9. Purple Loosestrife:

Cedar Point - Pool 1

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were dropped starting in mid-March and steadily continued through June by way of gravity and evaporation. Shallow water persisted throughout some area. Flooding stared in late August and continued through the end of the year. Pumping for three weeks using one pump was required to increase the water level.

Management Actions:

None conducted.

Results:

Vegetation response was excellent with a tremendous amount of moist soil annuals being produced, mostly Walter's millet. Other plants responding well included smartweeds, rice-cutgrass, pickerelweed, arrowhead, and other emergents. However, an increase in cattail cover was not seen. Waterfowl use was excellent and almost reached 1.7 million use days.

Facilities:

Facilities are in good condition. Gravel was spread from the eastern gate to the pumps. However, the remaining roads are in dire need of being graded.

Costs:

Pumping cost for 1994 were $1,729.02.

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

A bald eagle nest is located along the units's edge and first priority is to provide this species with nesting and brood rearing requirements. This unit is managed as a semi-permanent marsh area. The area provides year round habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed to providing a well balanced hemi-marsh, with an occasional drawdown to retain emergent vegetation. Waterfowl use days should average around 1 million annually.

Planned Management Actions:

Water levels will be reduced starting in April and slowly continued until June. Water will be reduced slowly to retain soil moisture to plant germination. Flooding will commence in late summer to take advantage of the Lake Erie's seiche events to fill the unit as much as possible and lessen pumping costs.

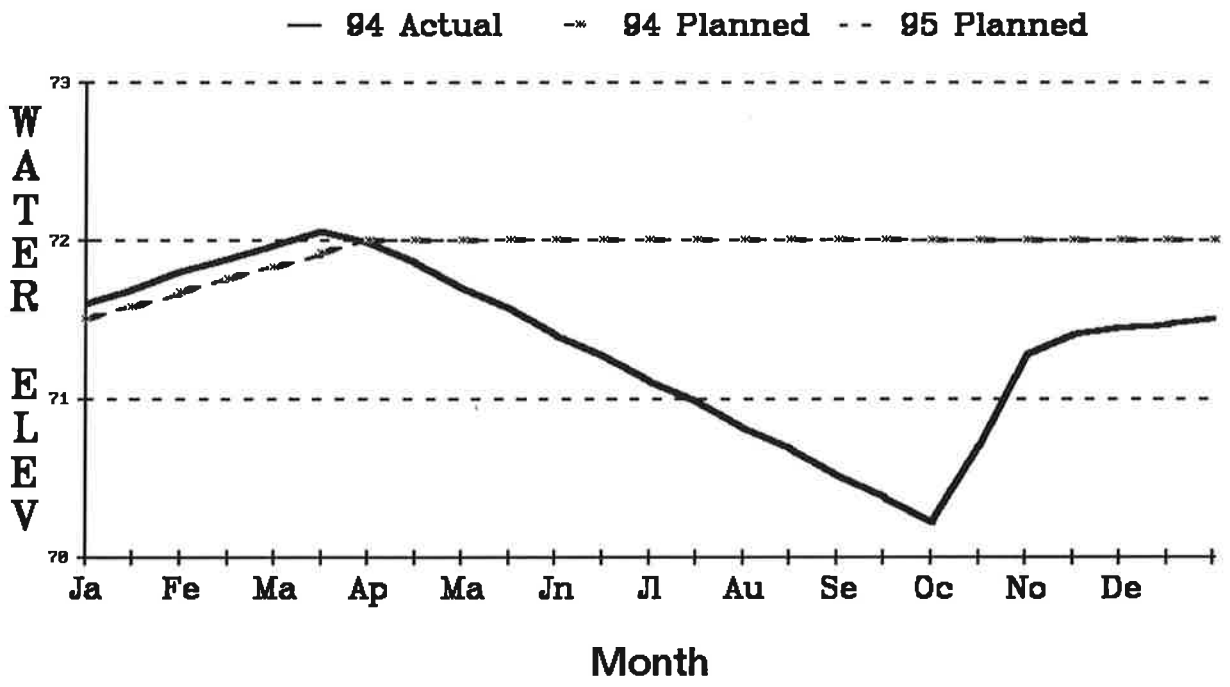
Expected Results:

This years drawdown should encourage moist soil annuals, such as millets and smartweeds, but not as robust as in 1994. Emergents like cattail and bulrush are desirable and the fluctuating water level throughout the spring and summer should induce these species.

Potential Problems:

An abnormally dry summer may bring on undesirable plant germination.

1. Unit Cedar Point - Pool 2
2. Acres 135
3. Maximum elevation permissible 574.0
4. Flowline elevation of lowest structure 569.4
5. Water Elev. with 50% bottom exposed - 571.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			30	15
Moist Soil			10	5
Submergents				
Emergents			40	50
Woody Veg.			10	10
Undesirables			10	20

8. Wildlife Use (Use Days):

Ducks	18,040	10,283	16,200	25,160
Geese	4,500	1,109	2,300	2,860
GBH	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:

Water levels dropped steadily through the spring and into the summer. Unit was then reflooded with water from pool 1.

Management Actions:

None conducted.

Results:

The unit is still heavily vegetated with emergents, phragmites, and woody vegetation. Waterfowl use was around average but occurred mostly in the late fall after flooding took place.

Facilities:

The main water control structure connected directly to Lake Erie has been silted in for many years. This structure needs to be repaired or replaced. The dike on the west side has a breech in it.

Costs:

Dikes were mowed once. Cost for pumping is associated with pool 1.

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

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

Planned Management Actions:

Water levels will increase during the winter and spring and be maintained through the summer. A tractor and Crissifulli pump may need to be set up to maintain water during the summer.

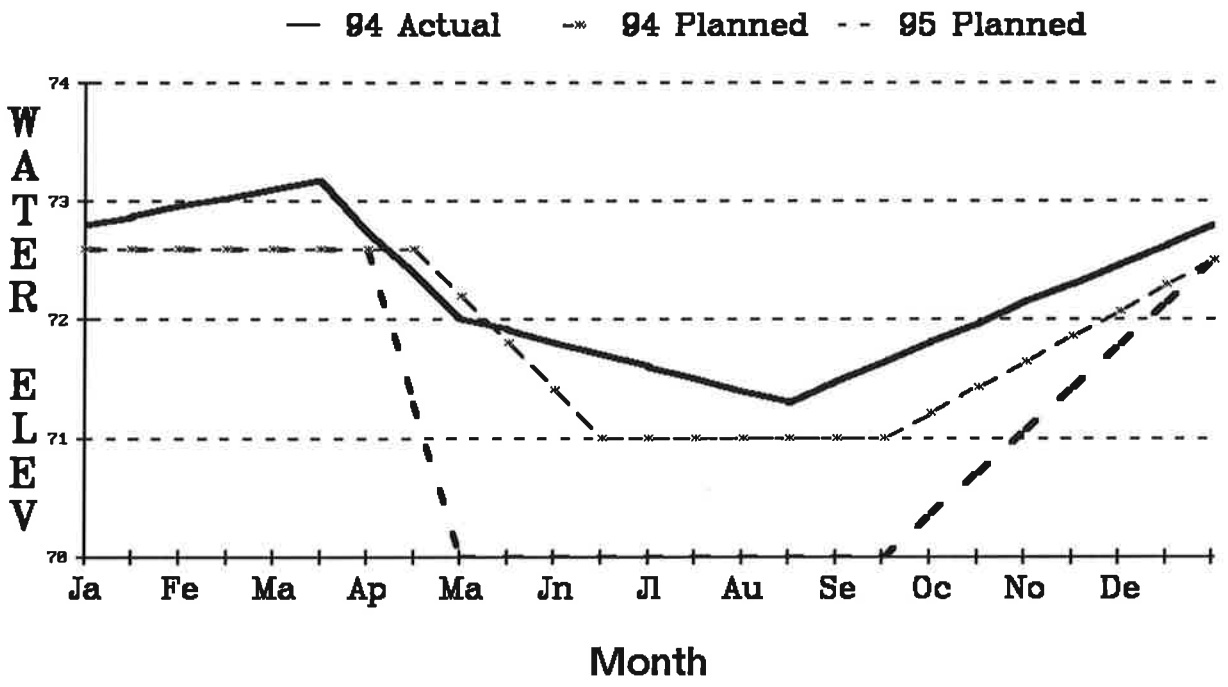
Expected Results:

The elevated water levels during the spring and summer should set back some emergent vegetation to open up small areas. Also, retaining water late summer and early fall will allow muskrats to work in the vegetation as well.

Potential Problems:

A hot, dry summer will evaporate the water relatively quickly and hinder management objectives.

1. Unit Cedar Point - Pheasant Farm
2. Acres 155
3. Maximum elevation permissible 574.0
4. Flowline elevation of lowest structure 571.0
5. Water Elev. with 50% bottom exposed - 571.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			30	50
Moist Soil			10	
Submergents				
Emergents			50	30
Woody Veg.				
Undesirables			10	20

8. Wildlife Use (Use Days):

Ducks	9,019	2,056	21,500	28,500
Geese	1,540	221	1,100	3,280
GBH	890			

9. Purple Loosestrife:

Cedar Point - Pheasant Farm

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were decreased in April as much as possible by using the Lake Erie's seiche events. Then water evaporated during the summer to further decrease the unit. Flooding from the fall was from precipitation and runoff.

Management Actions:

None conducted.

Results:

This unit was mainly shallow water and mudflats during the entire growing season. Vegetation composition has not changed from prior years. Waterfowl use was average. Shorebird use increased due to the shallow water and mudflats.

Facilities:

Costs:

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

This unit is managed as a permanent marsh. The area provides year round habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed at providing a well balanced hemi-marsh. This area would make an excellent moist soil unit if permanent pumping capabilities were available.

Planned Management Actions:

Water levels will be reduced during the spring to lessen dike damage and prepare the area for dike rehabilitation. Removal of water by pumping will have to be done.

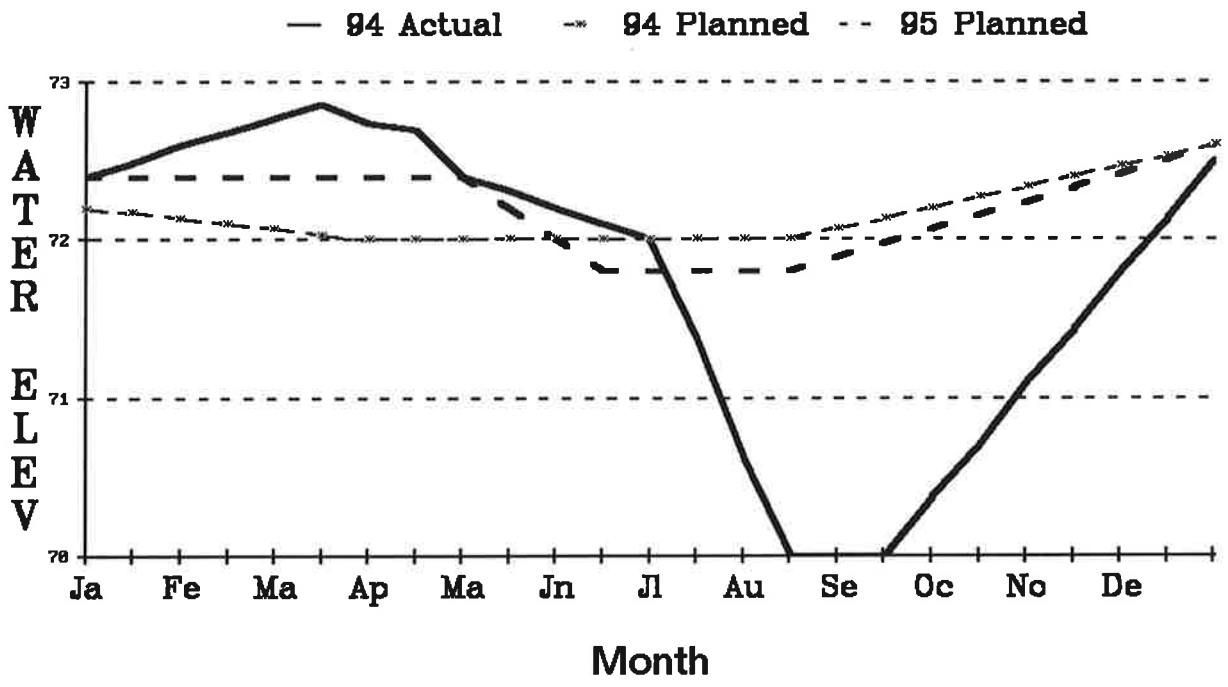
Expected Results:

Dewatering in spring will dry the area out for summer construction work and also removal during this time should provide excellent conditions for moist soil plant production. Waterfowl use will be limited during the spring and should be excellent in fall depending on moist soil seed production. Shorebird use should be excellent in spring due to the large expanse of mudflats.

Potential Problems:

Purple loosestrife is located in this unit and needs to be controlled during the drawdown.

1. Unit Darby - Pool 1
2. Acres 200
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 566.0
5. Water Elev. with 50% bottom exposed - 569.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			30	30
Moist Soil			5	10
Submergents			5	
Emergents			35	35
Woody Veg.			10	10
Undesirables			15	15

8. Wildlife Use (Use Days):

Ducks	55,610	195,826	176,100	162,760
Geese	45,300	44,478	42,500	34,240
GBH	5,300			

9. Purple Loosestrife:

A.2 Effects of Past Year's Water Levels

Levels:

Water levels increased in spring and then were decreased to remove excess water. Water evaporated a little during early summer and then due to dry weather the water evaporated quickly exposing mudflats in August and September. Water levels were then increased from mid-September on.

Results:

Vegetation composition has not changed much from prior years. The removal of water was too late to induce germination from moist soil or emergent plants. The large expanse of mudflats and shallow water provided excellent foraging areas for shorebirds and early migrating waterfowl.

Facilities:

The bottom half of the water gauge has fallen off and needs to be repaired.

Costs:

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

This unit is managed as a permanent marsh. A bald eagle nest is located within units edge and first priority is to provide this species with nesting and brood rearing requirements. The area provides year-round habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed at providing a well balanced hemi-marsh. Annual waterfowl use days should be around 130-160,000.

Planned Management Actions:

Water levels will be dropped slightly in spring and summer to maintain a hemi-marsh condition. If needed, water levels will be raised in fall.

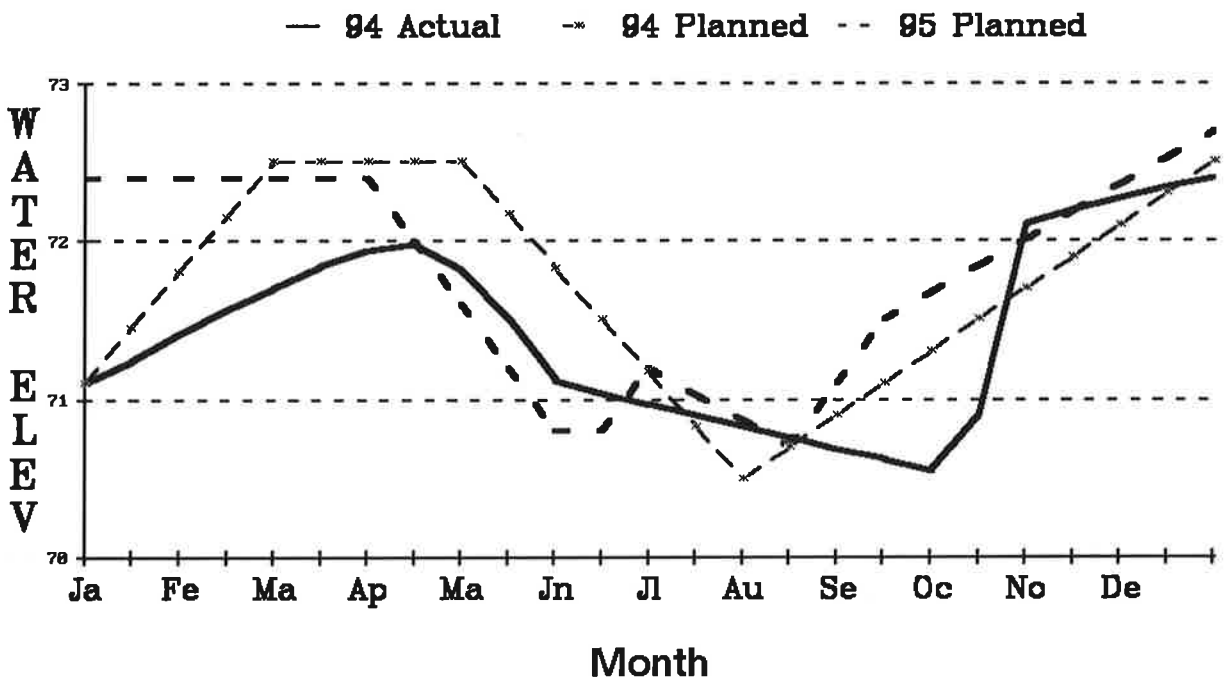
Expected Results:

Little vegetation change is expected. This unit should maintain a superb hemi-marsh condition. Waterfowl use should again be high with sizeable concentrations during the spring and fall migrations.

Potential Problems:

None Foreseen.

1. Unit Darby - Pool 2
2. Acres 25
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 569.0
5. Water Elev. with 50% bottom exposed - 570.0
   90% bottom exposed -



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water				
Moist Soil			90	80
Submergents				
Emergents			8	10
Woody Veg.			2	5
Undesirables				5

8. Wildlife Use (Use Days):

Ducks	14,940	4,079	6,000	26,330
Geese	2,880	925	1,100	1,880
GBH	920			

9. Purple Loosestrife:

Darby - Pool 2

A.2 Effects of Past Year's Levels

Levels:

Water levels were allowed to increase by precipitation during fall 1993 and spring 1994. Only a small portion of the unit was inundated. Flooding was conducted during late-winter and early-spring to provide resources for the spring migration. Water levels were then dropped for moist soil production. The unit was again flooded starting in October.

Results:

An excellent stand of moist soil plants were produced with the majority being comprised of millet. The change in management has increased the productivity of moist soil plants. Additionally, a large amount of residual plant material was shielding the soil probably assisting in retaining soil moisture and excellent conditions for germination.

Facilities:

Dikes that were reshaped in 1993, need to be seeded.

Costs:

Pumping costs totalled $501.00, which includes pool 3 and 4.

B.2 Objectives of 1995 Proposed Water Levels

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 pump system, this small unit is much more manageable and is better suited for a moist soil unit. Thus, management over the next few years will be directed towards moist soil production.

Planned Management Actions:

Water levels will be held until April and then slowly released to maintain soil moisture for plant germination. Irrigation will take place during mid-summer to give the moist soil plants extra vigor for seed production.

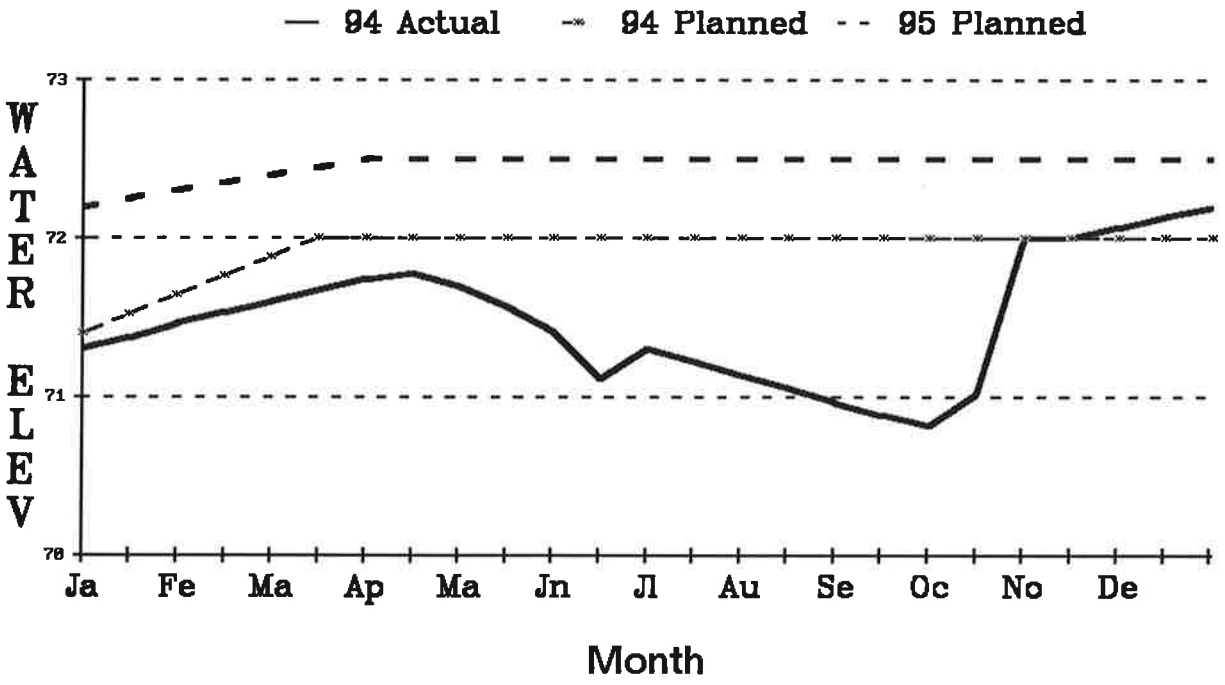
Expected Results:

Moist soil production has been excellent during the past two years and is expected again this year. Due to the large amount of plant material and shallow water, invertebrate populations should be excellent. Waterfowl use is expected to be great again and shorebird use should be good during the spring migration.

Potential Problems:

None foreseen.

1. Unit Darby - Pool 3
2. Acres 25
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 569.0
5. Water Elev. with 50% bottom exposed - 570.0
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water				
Moist Soil			66	20
Submergents				
Emergents			34	75
Woody Veg.				
Undesirables				5

8. Wildlife Use (Use Days):

Ducks	2,100	2,079	15,000	3,300
Geese	60	900	1,100	50
GBH	1,220			

9. Purple Loosestrife:

Darby - Pool 3

A.2 Effects of Past Year's Levels

Levels:

Maintaining water levels high during the growing season was planned, however, due to a hot, dry summer water evaporated creating shallow water pockets. Water levels were than increased in fall during the waterfowl migration.

Results:

After two excellent years of moist soil production the strategy was changed to keep the unit in a constant flux of water regimes. The conditions this year were excellent for emergent vegetation such as cattail, bulrush, etc. Waterfowl use was limited until flooding in the fall.

Facilities:

Dikes that were rehabilitated in 1993 need to be seeded.

Costs:

Pumping costs totalled $501.00, which includes pool 2 and 4.

B.2 Objectives of 1995 Proposed Water Levels

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 pump system, this small unit is much more manageable and is better suited for a moist soil unit. Thus, management over the next few years will be directed towards moist soil production.

Planned Management Actions:

This unit is covered mainly with cattail, bulrush, and other emergents. Planned actions will be to maintain water elevation and retain the emergent marsh.

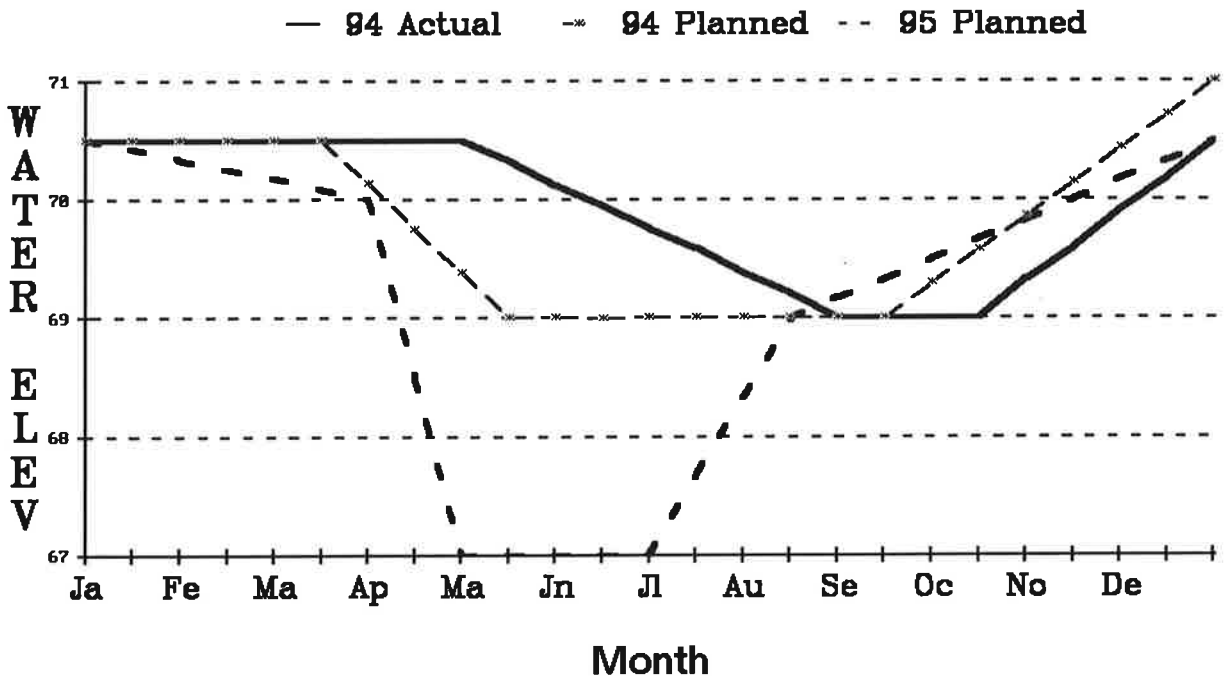
Expected Results:

Moist soil plant production will probably be fair. Emergent vegetation will still persist and provide wildlife use through the entire year.

Potential Problems:

None foreseen

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 (percent):

	1991	1992	1993	1994
Open Water			12	30
Moist Soil			60	5
Submergents				
Emergents			18	50
Woody Veg.				5
Undesirables			10	10

8. Wildlife Use (Use Days):

Ducks	28,670	203,986	225,000	102,890
Geese	10,560	46,280	32,200	33,940
GBH	2,980			

9. Purple Loosestrife:

Darby - Pool 4

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were maintained through early-summer and then evaporation brought the water levels down slightly. Water levels increased during the fall, mostly from precipitation but some pumping was conducted.

Results:

The emergent marsh conditions were maintained. The emergent vegetation consists mainly of cattail and bulrush, with other vegetation such as pickerel weed and arrowhead present. Waterfowl use occurred through the year.

Facilities:

A water gauge needs to be added to accurately record water level changes.

Costs:

Pumping costs totalled $501.00, which includes pools 2 and 4.

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

In the past, this unit was managed as a permanent marsh, since no pumping facilities were available. With the installation of the 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 and permanent marsh stages. As the unit enters later-successional stages and/or wetland emergent plants develop, then switch the management over to a permanent marsh until significant open water occurs. Then unit is drained to start the cycle again.

Planned Management Actions:

Water will be drawn off in April through May. Possibly, some water will be maintained in the middle. Cottonwood saplings that established themselves in 1993 will be controlled by mowing them. Water will then be added to the unit in mid-summer to cover the mowed cottonwoods. Moist soil plants should reach a stage of growth to survive flooding. Water levels will then be allowed to increase in fall from precipitation.

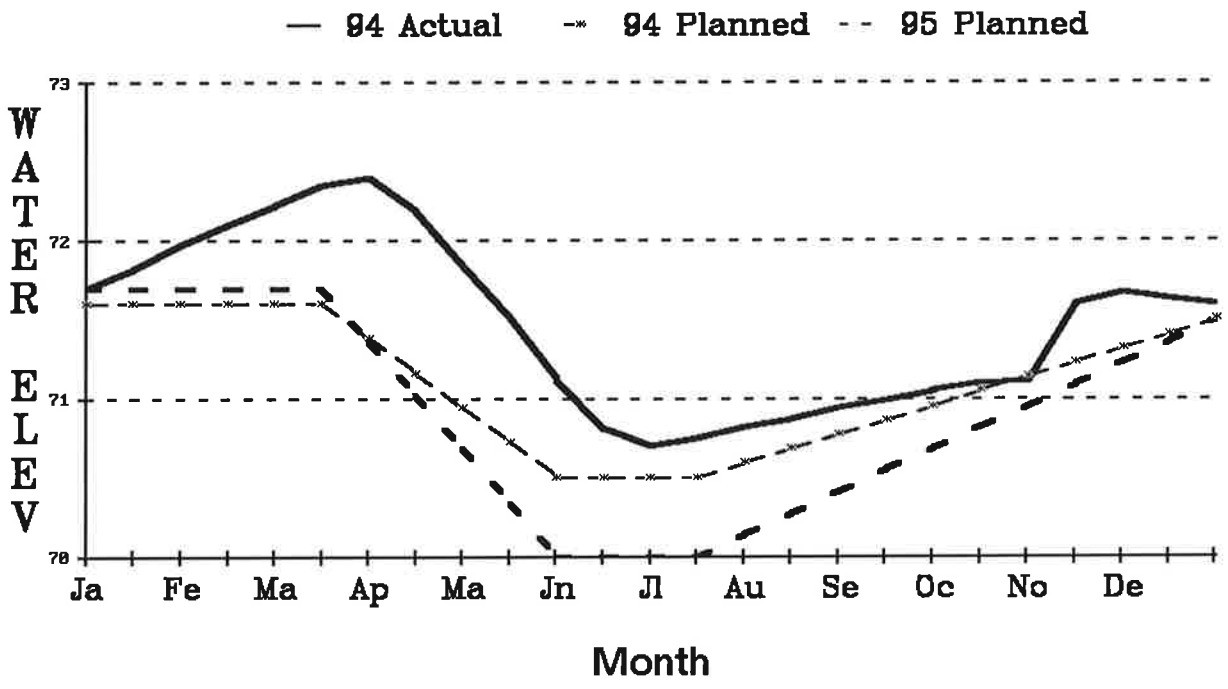
Expected Results:

Moist soil plant germination should be excellent on the exposed mudflats. Seed production from moist soil plants should be good if water levels do not over top the plant. The added water in July should kill the cottonwoods but allow moist soil plants to mature. Emergent vegetation is expected to expand further. Shorebird use should be excellent during the drawdown and during summer. Waterfowl use is anticipated to be good during the spring and fall.

Potential Problems:

Purple loosestrife along the north edge of unit needs to be watched closely.

1. Unit Navarre - Pool 1
2. Acres 130
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569.5
5. Water Elev. with 50% bottom exposed - 568.5
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			30	30
Moist Soil			5	
Submergents				
Emergents			30	35
Woody Veg.			25	25
Undesirables			10	10

8. Wildlife Use (Use Days):

Ducks	46,820	43,300	44,500	71,150
Geese	32,606	16,000	31,300	48,157
GBH	1,800			

9. Purple Loosestrife: None observed.

Navarre - Pool 1

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were higher than the planned throughout the year.

Results:

Emergent vegetation has decreased and undesirables have increased. The high water level during the growing season was detrimental to the emergents.

Facilities:

All facilities are taken care of by Davis-Besse personnel.

Costs:

All management requirements are provided for by the Davis-Besse Nuclear Power Station.

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

This unit is managed as a permanent marsh. The area provides year round habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed at providing a well balanced hemi-marsh.

Planned Management Actions:

Water levels will be decreased starting in March and slowly drained through June. Higher elevated areas will be exposed producing moist soil plants. Water will then be added gradually in the fall.

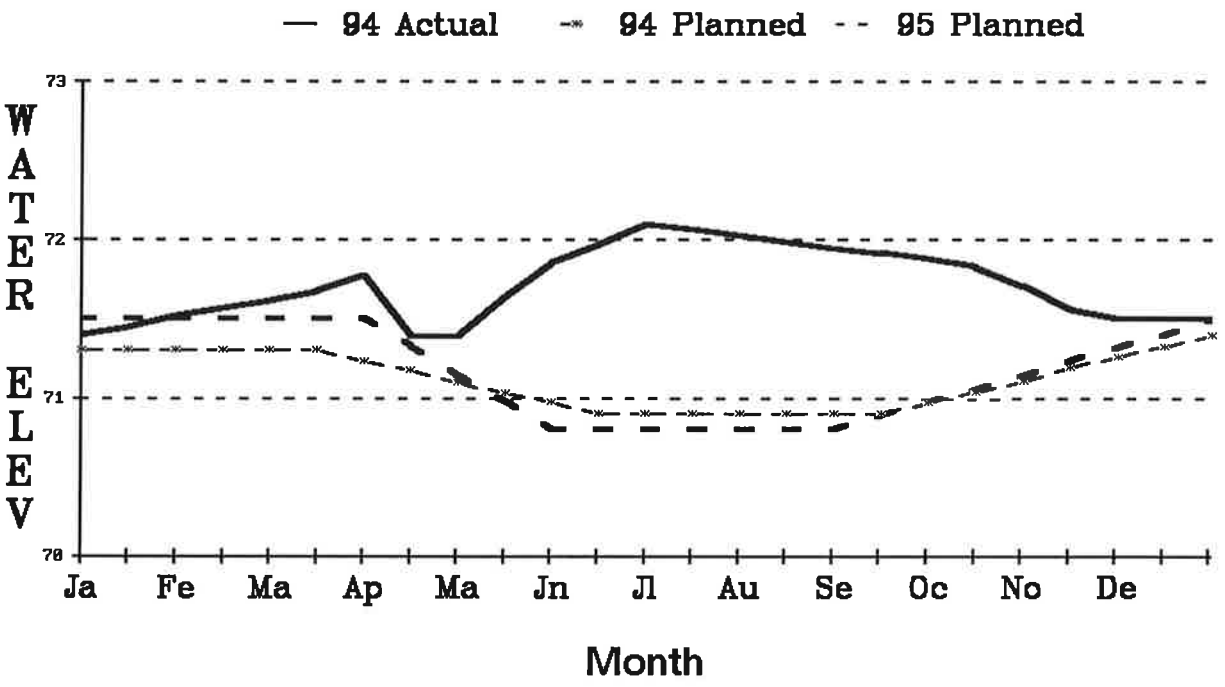
Expected Results:

Emergent vegetation should be maintained and sprouts from exposed mudflats will increase vegetation composition. Waterfowl use should be average with the bulk of use coming during the winter. Marsh and water bird use should remain constant.

Potential Problems:

None foreseen.

1. Unit Navarre - Pool 2
2. Acres 340
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 569.5
5. Water Elev. with 50% bottom exposed - 569.5
   90% bottom exposed - _____



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			40	30
Moist Soil			10	10
Submergents				
Emergents			30	40
Woody Veg.			10	10
Undesirables			10	10

8. Wildlife Use (Use Days):

Ducks	54,870	108,200	111,300	403,900
Geese	18,560	40,030	78,300	64,350
GBH	1,120			

9. Purple Loosestrife: None observed.

Navarre - Pool 2

A.2 Effects of Past Year's Water Levels

Levels:

Water levels raised significantly during the spring and were not pumped down. Evaporation dropped the water level slightly during the summer.

Results:

Vegetation composition remained virtually unchanged from prior years with emergent vegetation, primarily cattail, dominating. Waterfowl use still tends to be during the fall and winter months. Some moist soil production occurred on higher ground.

Facilities:

All facilities are maintained by the Davis-Besse Nuclear Power Station personnel.

Costs:

All costs are covered by the Davis-Besse Nuclear Power Station.

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

This unit is managed as a permanent marsh. The area provides year round habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed at providing a well balanced hemi-marsh.

Planned Management Actions:

Water levels will be decreased starting in March and slowly drained through June. Higher elevated areas will be exposed producing moist soil plants. Water will then be added gradually in the fall.

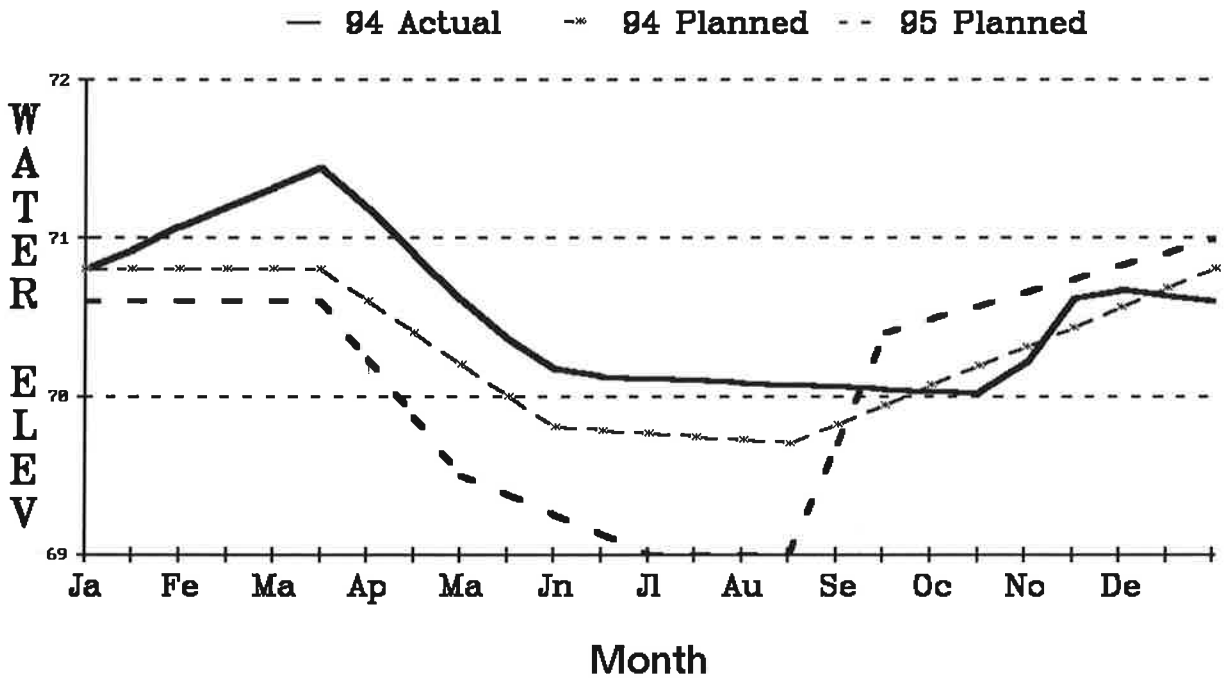
Expected Results:

Emergent vegetation should be maintained and sprouts from exposed mudflats will increase vegetation composition. Waterfowl use should be average with the bulk of use coming during the winter. Marsh and water bird use should remain constant.

Potential Problems:

None foreseen.

1. Unit Navarre - Pool 3
2. Acres 188
3. Maximum elevation permissible unknown
4. Flowline elevation of lowest structure unknown
5. Water Elev. with 50% bottom exposed - " "
   90% bottom exposed -



7. Vegetation (percent):

	1991	1992	1993	1994
Open Water			65	80
Moist Soil			10	5
Submergents				
Emergents			20	10
Woody Veg.			5	5
Undesirables				

8. Wildlife Use (Use Days):

Ducks	2,650	14,470	15,400	261,850
Geese	1,150	5,550	10,840	34,650
GBH	150			

9. Purple Loosestrife: None observed.

Navarre - Pool 3

A.2 Effects of Past Year's Water Levels

Levels:

Water levels were attempted to be brought down during the spring, however, water levels were not brought down enough to stimulate very much vegetation growth. Water was raised slightly in the fall for migrating birds.

Results:

The elevated water levels during the growing season severely hindered the emergent vegetation. Thus, mostly open water was prevalent by the years end. A large population of muskrats in this unit also contributed to the lack of vegetative cover. Waterfowl use was excellent, especially from green-winged teal.

Facilities:

All facilities are maintained by the Davis-Besse Nuclear Power Station personnel.

Costs:

All costs are covered by Davis-Besse Nuclear Power Station.

B.2 Objectives of 1995 Proposed Water Levels

Objectives:

This unit is managed as a permanent marsh. The area provides year round habitat for waterfowl, marsh and water birds, raptors, etc. Management is directed at providing a well balanced hemi-marsh.

Planned Management Actions:

Water levels will be decreased starting in March and slowly drained through April. Higher elevated areas will be exposed producing moist soil plants. Other areas should be moist through the summer allowing emergent plants to germinate. Water will then be added gradually in the fall.

Expected Results:

With the elevated water levels in 1994, sufficient mudflats should be exposed in early spring and moist soil plant germination should be excellent. Maintaining some water throughout the summer should retain moisture for the moist soil plants and help produce some emergents. Waterfowl use should again be excellent.

Potential Problems:

None foreseen.

Appendix A

Appendix A shows Ottawa Division's water management program mapped to visually illustrate the year's water program and ensure a complex of well managed units that still provide habitat needed. Only monthly maps were made to describe the primary activity performed during that month. No maps were made for January or February because water movement usually does not occur. The following is a brief description of activity categories.

LEGEND:

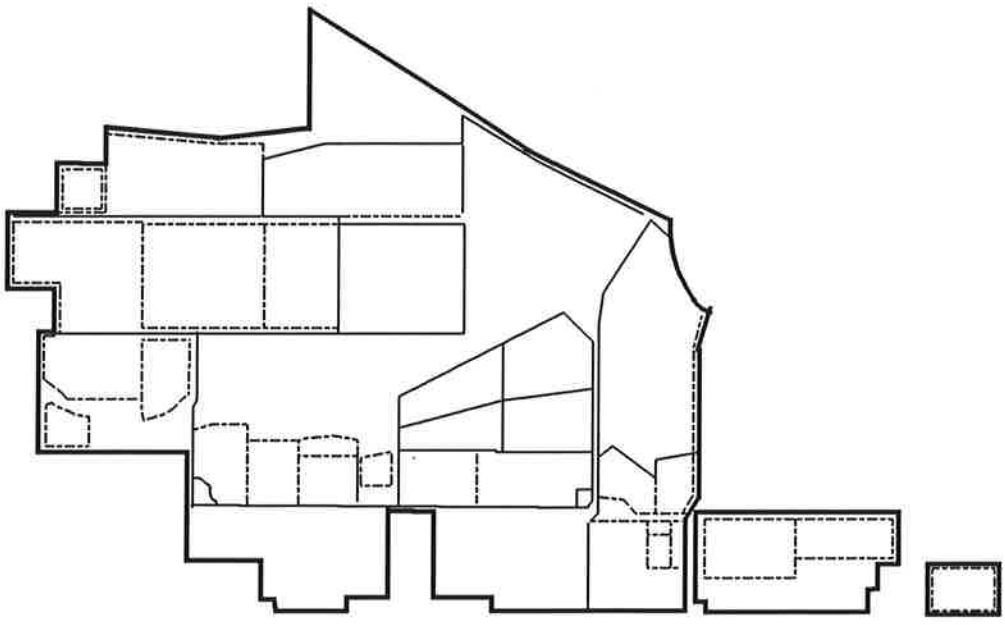
Flooded Optimum Pool - Majority of the pool is inundated to desired levels with increases associated with precipitation and decreases associated with evaporation.

Partial Drawdown - Unit is intentionally lowered to facilitate moist soil and emergent vegetation growth while maintaining submergent plant communities. The majority of the unit still retains water in the lower areas and the water is maintained through the growing season.

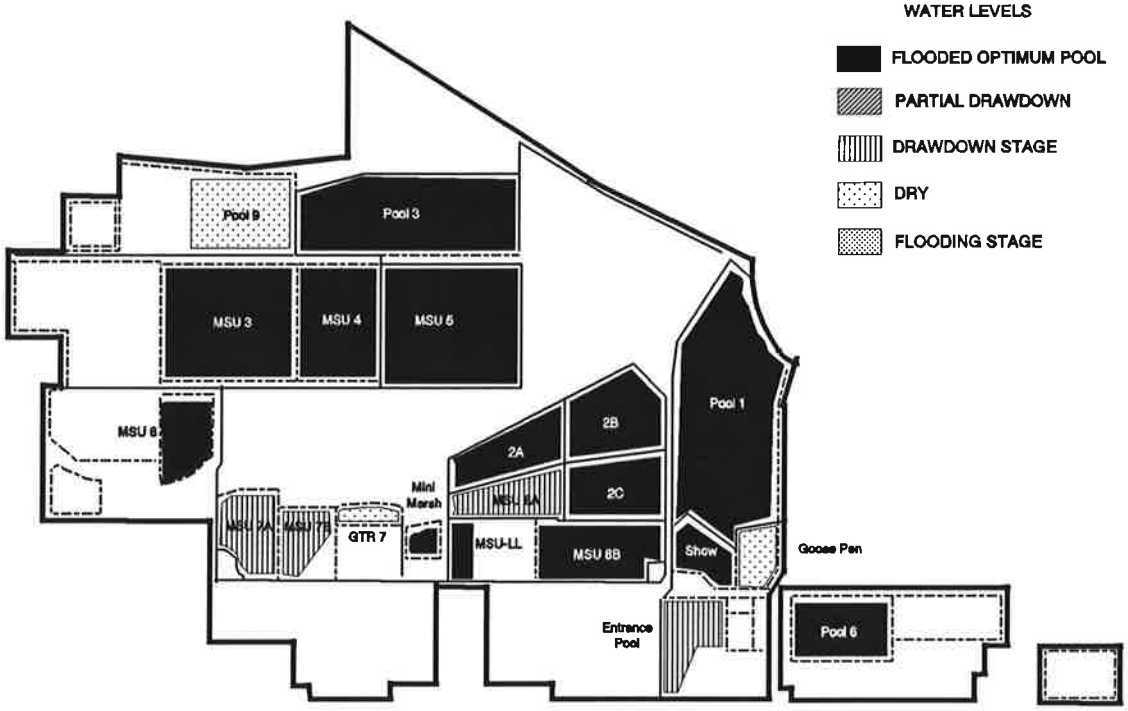
Drawdown Stage - Unit is intentionally lowered to stimulate germination of moist soil vegetation and at the peak of the drawdown, substrate will start to dry out.

Dry - Unit is intentionally lowered to assist in rehabilitation or mechanical manipulations of vegetation or the facilities. Usually these units are in a drought condition for a long period of time.

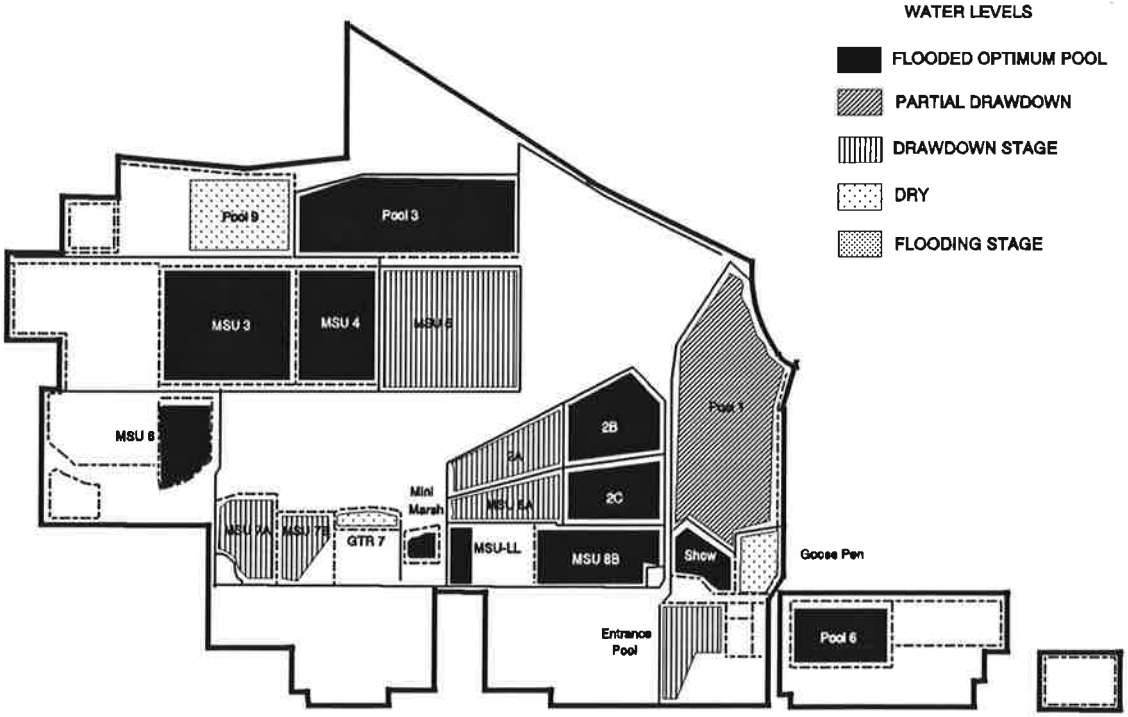
Flooding - Water is actively moving into the unit, usually at a slow rate.



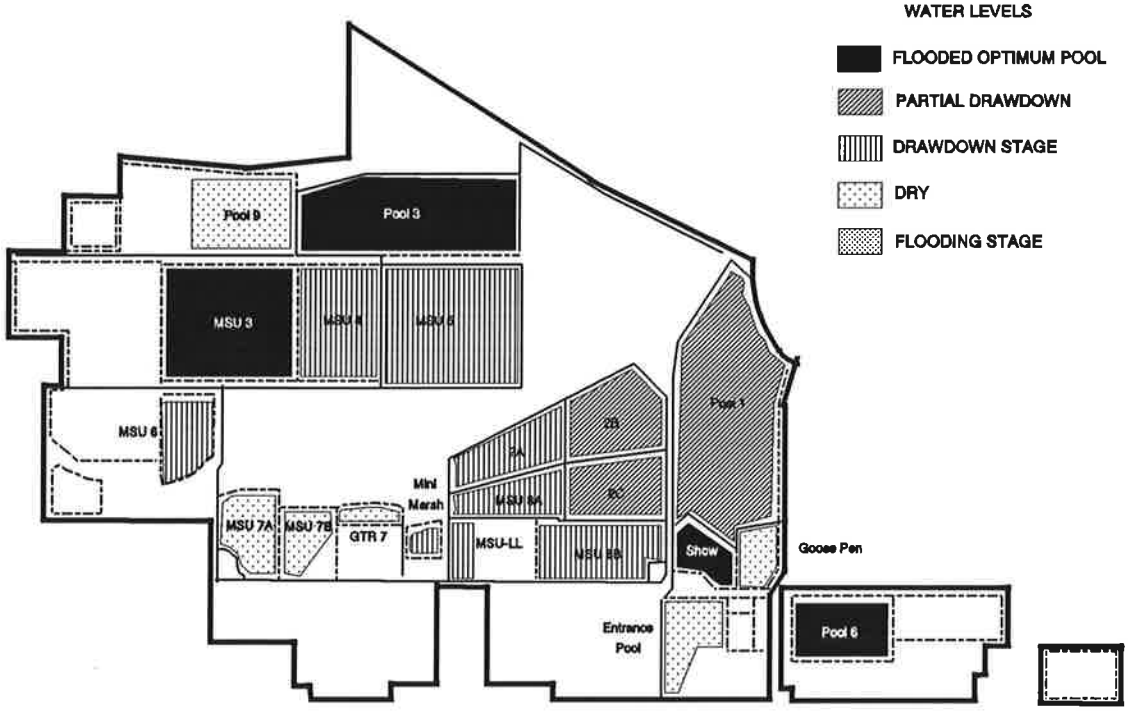
WATER ACTIVITIES - MARCH



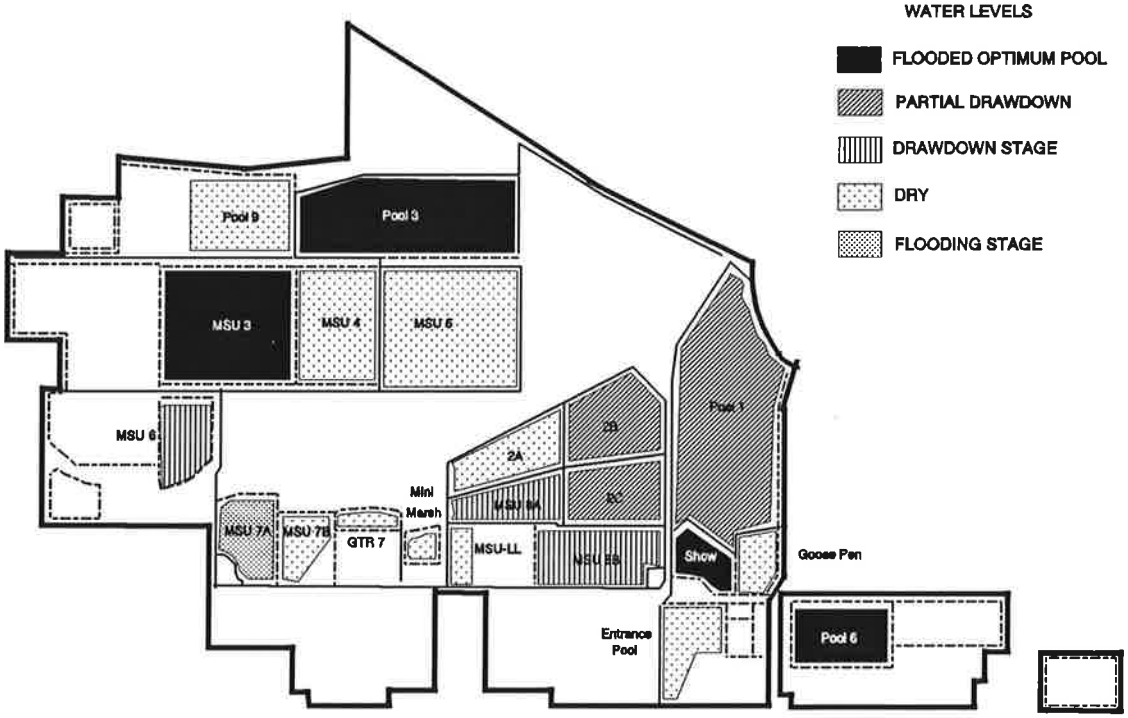
WATER ACTIVITIES - APRIL



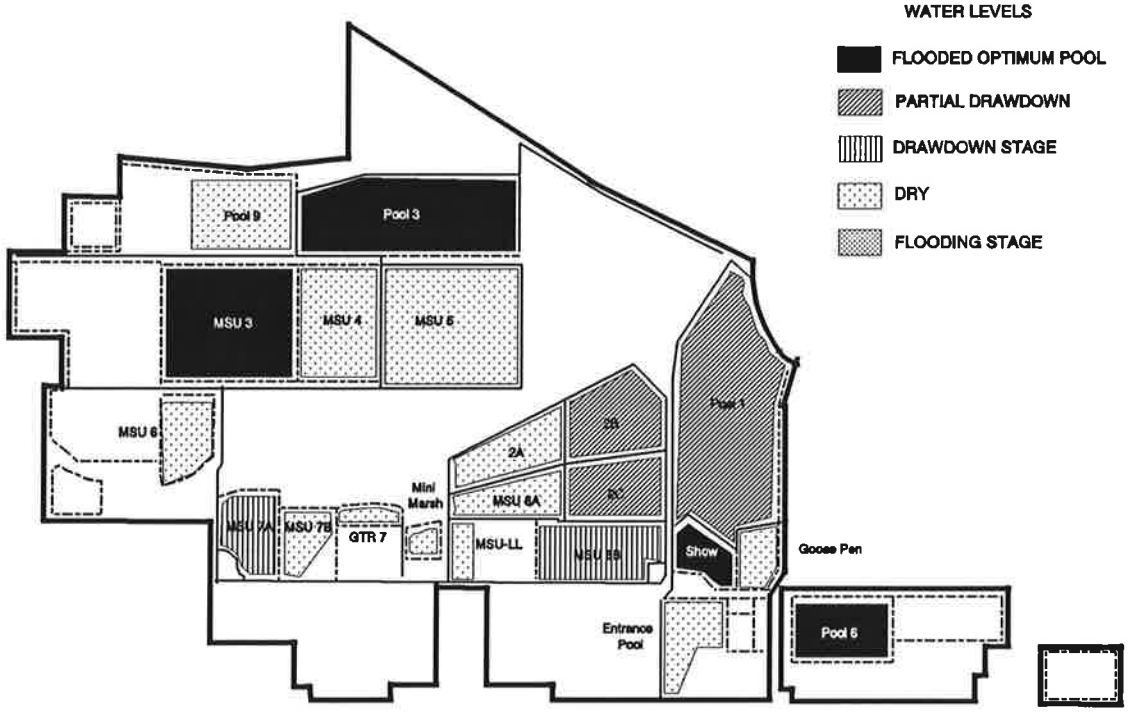
WATER ACTIVITIES - MAY



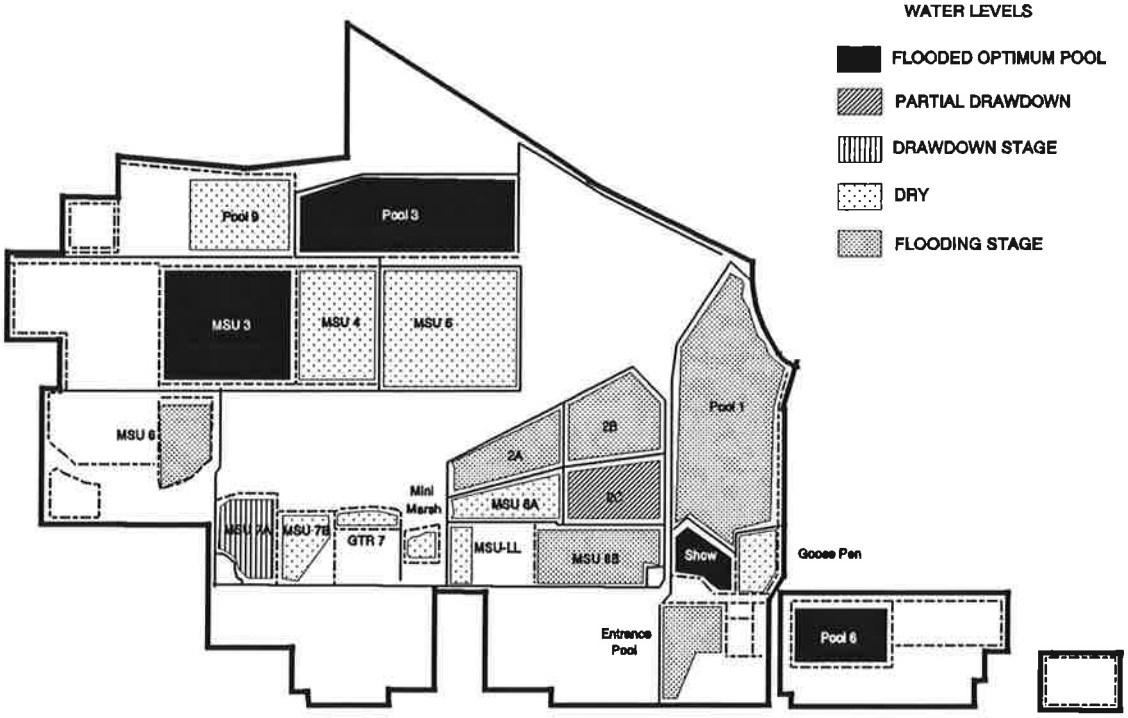
WATER ACTIVITIES - JUNE



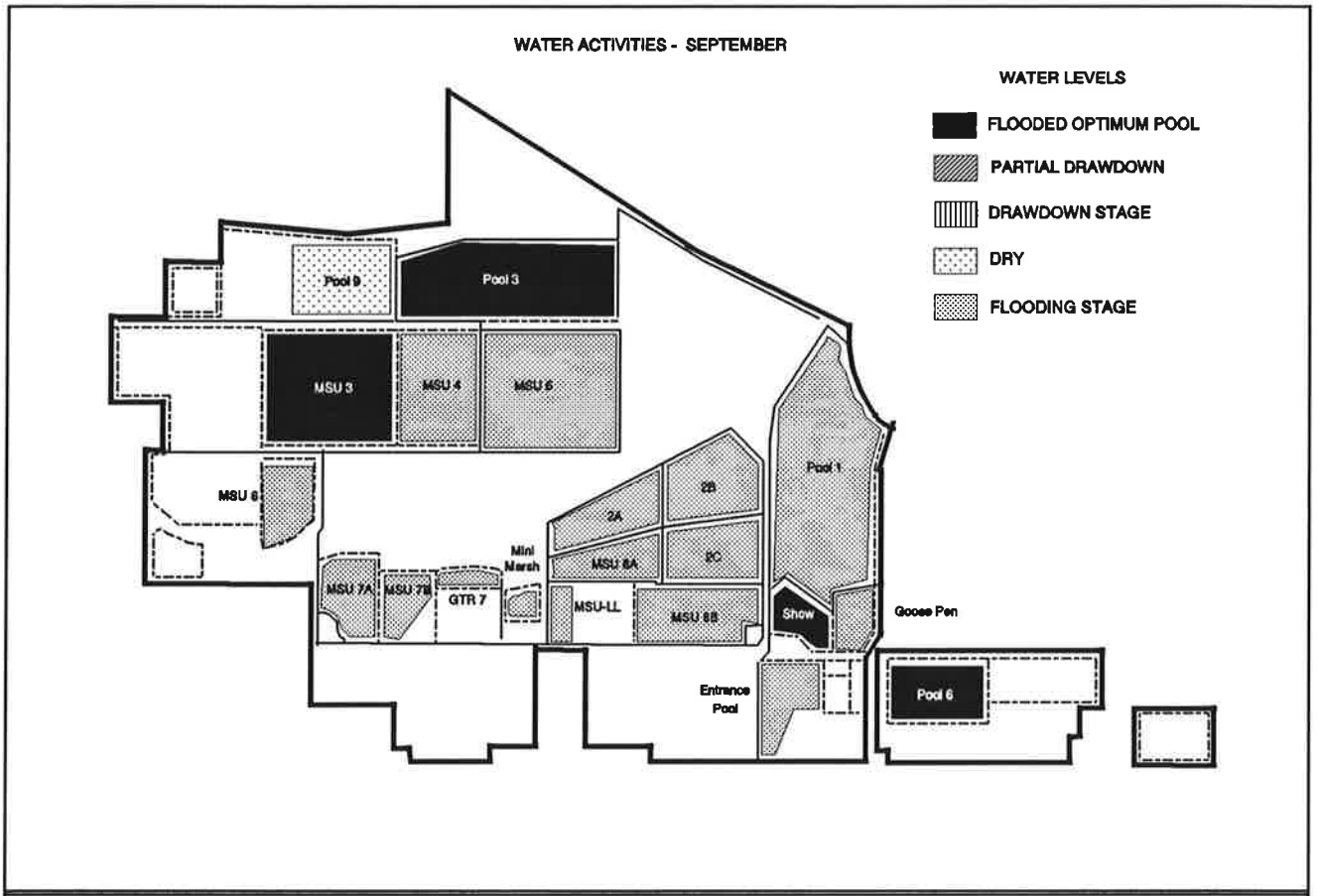
WATER ACTIVITIES - JULY



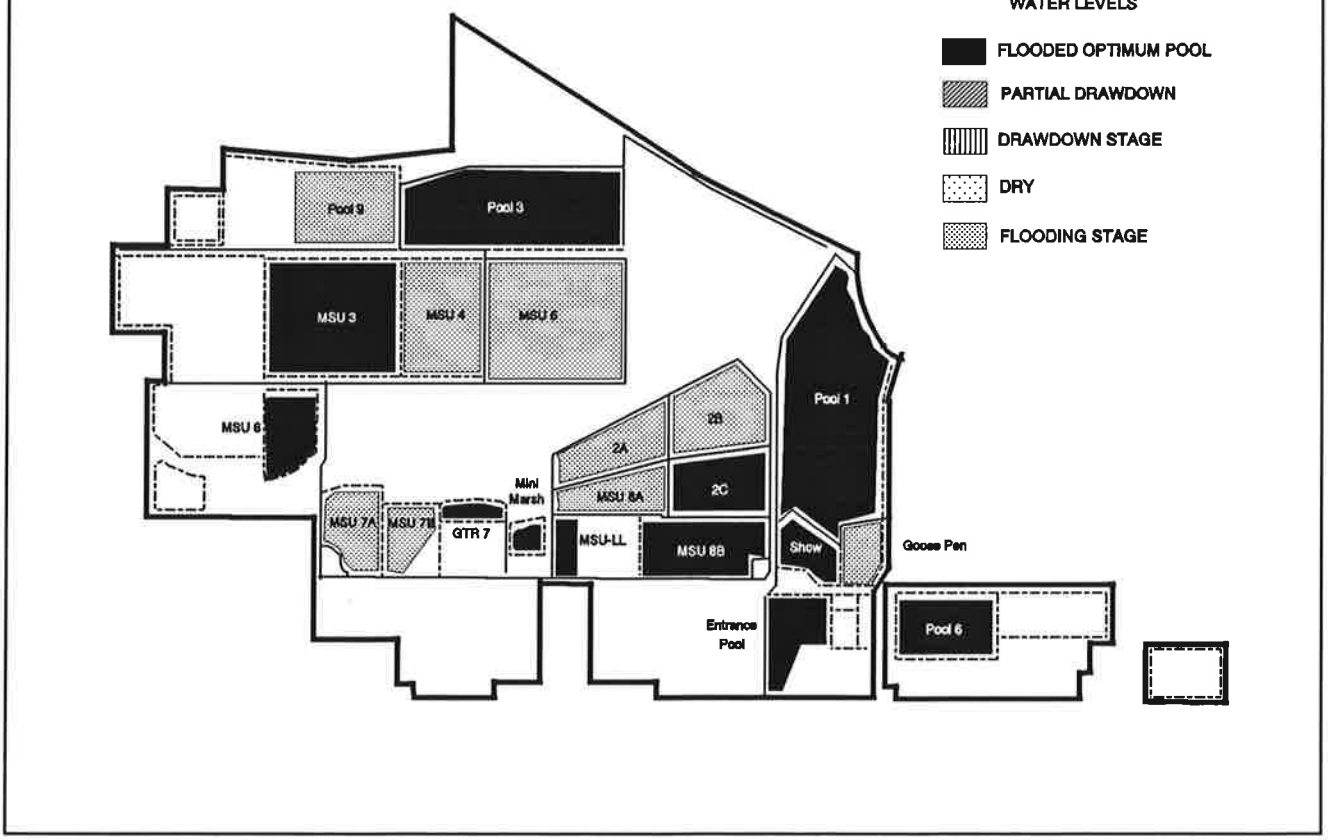
WATER ACTIVITIES - AUGUST



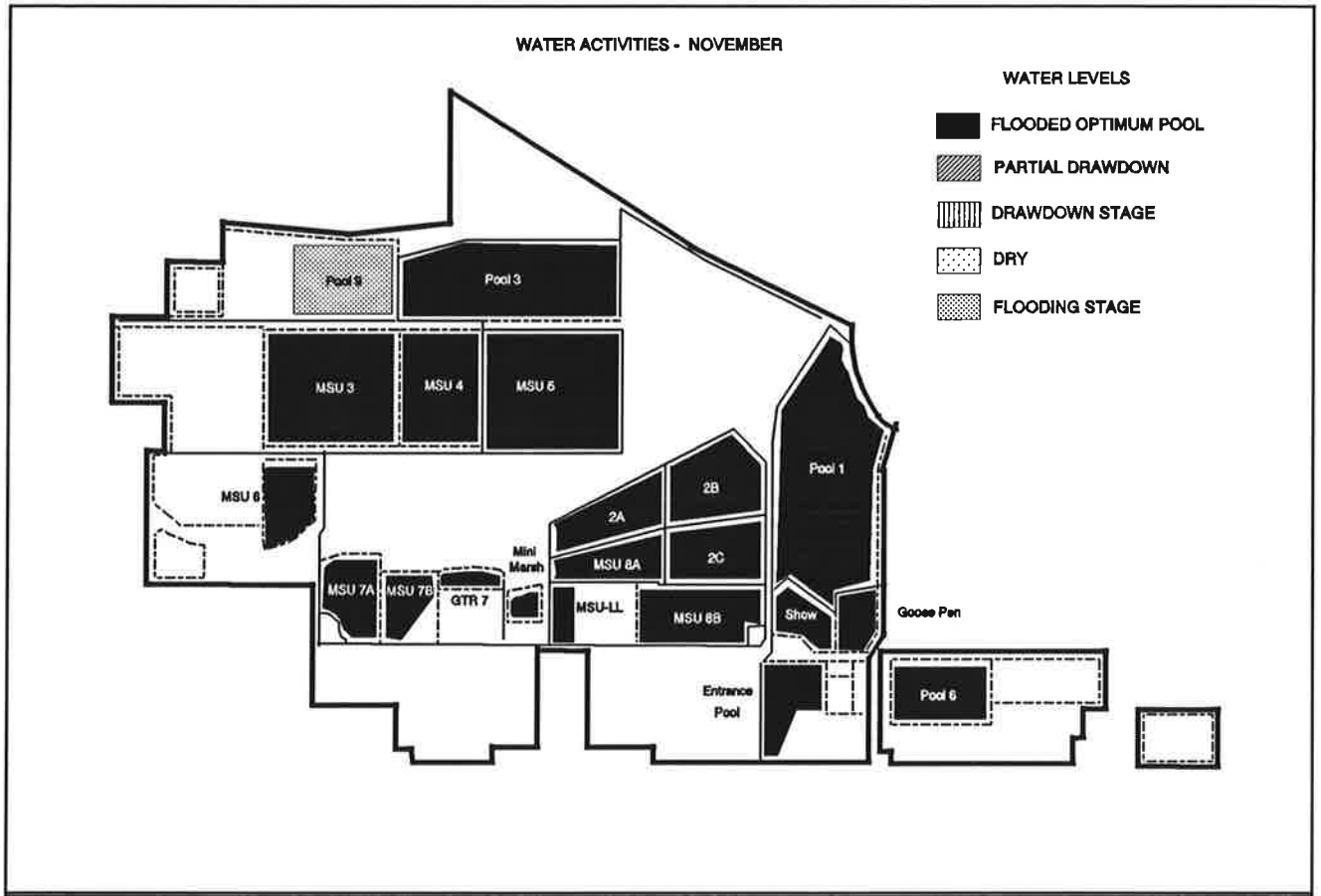
WATER ACTIVITIES - SEPTEMBER



WATER ACTIVITIES - OCTOBER



WATER ACTIVITIES - NOVEMBER



WATER ACTIVITIES - DECEMBER