US Army Corps
of Engineers
St. Paul District

UPPER MISSISSIPPI RIVER SYSTEM ENVIRONMENTAL MANAGEMENT PROGRAM

POST CONSTRUCTION

PERFORMANCE EVALUATION REPORT

ISLAND 42

HABITAT REHABILITATION AND ENHANCEMENT PROJECT

UPPER MISSISSIPPI RIVER
WABASHA COUNTY, MINNESOTA

AUGUST 1995

UPPER MISSISSIPPI RIVER SYSTEM - ENVIRONMENTAL MANAGEMENT PROGRAM
POST CONSTRUCTION PERFORMANCE EVALUATION

ISLAND 42 HABITAT REHABILITATION AND ENHANCEMENT PROJECT
POOL 5, UPPER MISSISSIPPI RIVER
WABASHA COUNTY, MINNESOTA

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UPPER MISSISSIPPI RIVER SYSTEM - ENVIRONMENTAL MANAGEMENT PROGRAM
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1. INTRODUCTION

PURPOSE

The purpose of this post construction performance evaluation is to:

a. Document the post construction monitoring activities for the Island 42 project.

b. Evaluate the performance of the Island 42 project based on the project goals and objectives.

c. Evaluate the Island 42 project relative to other concerns such as operability, maintenance, and design.

e. Make recommendations concerning future performance evaluation for the Island 42 project.

f. Make recommendations concerning the planning and design of future habitat projects.

SCOPE

This report summarizes all available monitoring data, operation and maintenance information, and project observations made by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the Minnesota Department of Natural Resources (DNR) for the period from August 1987 through July 1995.

2. PROJECT HISTORY

LOCATION

The Island 42 project area lies on the Minnesota side of the main channel of the Mississippi River between river miles 747.7 and 749.6 (plates 1 and 2). The project area consists of a mixture of bottomland forest and backwater sloughs and lakes lying between the main channel and West Newton Chute.

PROJECT GOALS AND OBJECTIVES

Island 42 was one of the earliest habitat projects developed under the UMRS-EMP. As such, formal project goals and objectives were not developed to the degree that has occurred with projects developed later in the program.

Dissolved Oxygen - The project planning document identified dissolved oxygen depletion in the backwater sloughs and lakes of Island 42 as the major habitat problem. Late summer and winter were identified as the times of the year when dissolved oxygen depletion (<3 mg/L) occurred. Lack of flow and shallow water depths were factors contributing to the problem. Alleviation of the dissolved oxygen depletion problems was a primary objective of the Island 42 project. The goal/objective for dissolved oxygen was to maintain concentrations above 5 mg/L during all times of the year. The project planning document indicated that an estimated 95 acres of backwater habitat would be benefited by the project. The report did not specifically delineate which areas would be benefited, however, it could be assumed that those areas that would receive the introduced flows were the target areas.

Water Depths - The lack of adequate water depths to provide suitable overwintering habitat for backwater species, primarily Centrarchids, was identified as a habitat deficiency in the Island 42 area. The goal/objective of creating 5 acres of water 5 feet deep or greater with adequate dissolved oxygen content was developed to provide suitable overwintering habitat.

Waterfowl Nesting Cover - A lack of nesting cover for ground nesting waterfowl was also identified as a habitat deficiency in the Island 42 area. Most potential nesting sites in the area were too low such that flooding hindered successful completion of nesting. The higher dredged material deposits were too sparsely vegetated to provide adequate nesting cover. Providing nesting cover for ground nesting waterfowl was an objective of the Island 42 project. The goal/objective for nesting cover was to create 2 acres of this type of habitat.

PROJECT FEATURES

The following project features were constructed to address the Island 42 habitat problems.

a. A 900-foot long, 50-foot wide channel was excavated near the upstream end of the island to provide flows to the Island 42 backwater sloughs. The design flow for this channel was 15-25 cfs.

b. The excavated material was sidecast on the upstream side of the channel to create a berm to protect the channel for the 10-year flood event. This berm was seeded by the Minnesota DNR to provide nesting cover for waterfowl.

c. Two 48-inch gated culverts were installed at the inlet of the excavated channel to regulate flows. Three H-piles were driven in front of the structure to serve as a barrier for large debris.

d. Approximately 36,000 cubic yards of sediments were dredged from a 7-acre backwater lake within the island, deepening the area from about 2 feet to 5 feet.

Sketches depicting project features are contained in plates 3-8. It was originally planned to use the fine material dredged from the backwater area to revegetate portions of an existing dredged material containment dike to create waterfowl nesting cover. However, during dredging, it was found that the dredged material included a high percentage of sand and it was impractical to separate the fine material from the sand material. Thus, the establishment of nesting cover on the containment dike was not accomplished.

CONSTRUCTION HISTORY

The Island 42 project was constructed by the St. Paul District, Corps of Engineers, hired labor crew out of Fountain City, Wisconsin.

Excavation of the 900 foot channel began in August 1986 and was discontinued in the fall due to abnormally high water. Excavation recommenced in May 1987. The gated culverts were placed following completion of the channel excavations. This work was completed in May 1987.

The berm on the upstream side of the channel was broadcast seeded by Minnesota DNR in June 1987 at a rate of 100 lbs/acre with the following seed mixture: Kentucky bluegrass (33.4%), smooth brome (22.2%), sand dropseed (13.3%), perennial ryegrass (13.3%), timothy (11.1%), and birdsfoot trefoil

(6.7%). The seed was provided by the Minnesota Waterfowl Association.

The 12-inch hydraulic dredge DUBUQUE was used to dredge the backwater lake in October 1986. The dredging took approximately 3 weeks to complete. The dredged material was placed in the St. Paul District channel maintenance containment site located on the right bank of the river at mile 748.0. The project design called for the dredging of a 5-acre area with the approximate dimensions of 150' x 1,400'. When dredged in a linear fashion, the dredging would require two 75-foot wide, 1,450-foot long dredge cuts. The DUBUQUE operates most efficiently with a 100-foot wide dredge cut. To take advantage of the efficiencies of this particular dredge, the dredge cuts were widened to 100 feet, resulting in a 200' x 1,400' area being dredged, about 6.5 acres.

PERFORMANCE EVALUATION PLAN

Because the Island 42 project was one of the earliest habitat projects developed, no formal performance evaluation plan was developed during project planning. At that time it was believed that all project performance monitoring would be accomplished by the Long Term Resource Monitoring Program (LTRM). The project planning document identified that monitoring of dissolved oxygen, fish populations, and sediments would be accomplished by the LTRM. Subsequent to project construction, it was determined that performance evaluation would be the responsibility of the Habitat Rehabilitation and Enhancement Projects (HREP) component of the program. For this particular project, the Minnesota DNR assumed the responsibility for post-project performance monitoring.

OPERATION AND MAINTENANCE HISTORY

Normal project operation has been to close the culvert gates after spring ice break-up (March 15) and to re-open them following spring high water (May 15). The gates are also closed during other flood events.

To date, the only maintenance that has been required is the removal of woody debris from the gates prior to their operation. The U.S. Fish and Wildlife Service estimates this requires 2-3 hours per effort for a two-person crew.

3. PERFORMANCE MONITORING

Post construction performance monitoring at Island 42 has been accomplished primarily by the Minnesota Department of Natural Resources. Table 3-1 summarizes the performance monitoring data collection efforts.

Table 3-1
Island 42 Performance Monitoring

Date	Agency	Description
Aug 87	MDNR	Bathymetry of dredged area
Aug 88	COE/FWS	Vegetation monitoring
Dec 88 thru Mar 89	MDNR	D.O; 5 dates, 16 stations
Aug 89	MDNR	Diurnal D.O.; 1 date, 14 stations
Aug 89	COE/FWS	Vegetation monitoring
Various 90	MDNR	Fish Survey
Mar 93	MDNR	D.O., temp; 1 date, 10 stations
Jun 93	MDNR	temp, Secchi disk, aq veg, substrate; 1 date, 5 stations
Aug 93	MDNR	D.O., temp, Secchi disk, aq veg, substrate; 1 date, 5 stations
Jun 94	MDNR	temp, Secchi disk, aq veg, substrate; 1 date, 5 stations
Aug 94	COE/FWS	Vegetation monitoring
Jan 95	MDNR	D.O., temp, pH, cond; 1 date, 1 station

4. PERFORMANCE EVALUATION

MAINTAIN DISSOLVED OXYGEN LEVELS > 5 MG/L

Pre-project dissolved oxygen data is too limited to make a comparative analysis of pre- and post-project conditions in any specific location or portion of the Island 42 backwater complex. Sampling in September 1976 by the Minnesota DNR showed dissolved oxygen levels below 5 mg/l at 6 of the 8 sampling locations. Sampling in early January 1977 at 13 different locations shows dissolved oxygen levels ranging from 0.7 mg/l to 11.2 mg/l, with 9 of the sites having levels below 1.7 mg/l. A 1977 Minnesota DNR Section of Fisheries survey report for the Island 42 area indicates that dissolved oxygen sags were a problem during both summer and winter.

The post-project monitoring data collected by the Minnesota DNR indicates that generally dissolved oxygen levels above 5 mg/L are being maintained during both winter and summer. While not verifiable because of the limited pre-project data, it is assumed that the introduced flows are responsible for what appears to be an improvement over pre-project conditions.

There have been stations where post-project late summer and winter dissolved oxygen levels have been below 5 mg/L. The Minnesota DNR post-project survey (appendix 4) indicates that "A large portion of the island's interior presently remains unsuitable to fish during these periods." This backwater complex contains a large number of isolated and/or dead-end sloughs and lobes. Though not documented in the project report, it is unlikely that project planners expected the introduced flows to aerate all of the aquatic habitat in the Island 42 complex.

It has been observed by field personnel from the Minnesota DNR and the U.S. Fish and Wildlife Service that, on occasion, beaver activity in the natural channels below the dredged channel have reduced flows into the Island 42 backwaters.

In summary, it appears that the introduced flows have improved dissolved oxygen levels in portions of the Island 42 backwater complex. The lack of comprehensive pre-project data and the fact that the project report did not specifically delineate the areas to be improved makes it impossible to determine if this project objective was met.

CREATE 5 ACRES BACKWATER HABITAT > 5 FEET DEEP

This goal/objective was exceeded during construction when a larger area than planned was dredged to accomodate the efficiencies of the particular

dredging equipment used for this project. Approximately 6.5 acres of habitat greater than 5 feet was created.

The dredged area was surveyed by the Minnesota DNR in September 1987, approximately one year following dredging. This survey indicated little or no change from the immediate post dredging condition. This would not be unexpected because the area that was dredged is a isolated backwater lake that receives little direct inflow during normal water stages. During high water period, this area is relatively protected from flows other than sheet flows across the Island 42 area. Thus, the rate of sand (bed load) sedimentation in this area is very low. Fine material deposition will occur from floodwaters inundating this area.

Anecdotal information taken from a 1990 Minnesota DNR fisheries survey indicates no noticeable sedimentation had taken place in this area at that time. No surveys of the dredged area have been conducted since 1987. This is not considered a significant data gap because of the low sedimentation potential in this area.

The Minnesota DNR fisheries survey report (appendix 4) also indicates high fisherman use of the dredged area, which would indicate that the area is being used by fish.

CREATE 2 ACRES WATERFOWL NESTING COVER

The goal/objective of creating 2 acres of waterfowl nesting cover on the containment dikes of the existing dredged material placement site was not met because, as stated earlier, it was not possible to recover adequate fine materials from the dredging operation to use in the revegetation efforts.

Approximately 1 acre of waterfowl nesting cover was established on the berm located on the upstream side of the excavated channel. Vegetation monitoring has shown that the area has maintained good overall percent cover (77%) after 7 years with a Robel reading of 2.7. The Robel reading for cover density exceeds the cover requirements (Robel = 2.5) that have been set for other UMRS-EMP habitat projects.

It should be noted that this area was subjected to an accidental burn of unknown origins in May 1990. This burn appears to not have adversely effected the vegetative cover.

5. PROJECT DESIGN EVALUATION

The purpose of this section is to evaluate the project design from the "lessons learned" perspective. How could the design have been improved while still meeting the habitat goals and objectives? What worked and what did not? This information will be of use when planning and designing future habitat projects that may involve similar features.

INLET CHANNEL

One of the criteria in selecting the inlet channel width of 50 feet was to discourage beaver from blocking the channel. This channel width has been successful in this respect. As noted earlier, beaver activity downstream of the channel have restricted flows to the Island 42 backwaters. This points out the need to consider natural changes outside the immediate project area that may eventually affect the ability of the project to function as designed.

CONTROL STRUCTURE

The control structure is only accessible by water. The gates have to be closed at spring breakup when water access can be difficult and dangerous. The planning for water control structures on the Upper Mississippi River needs to take into account when the structures need to be operated and if they will be accessible or operable at those times. This access concern has been a consideration in the planning and design of control structures for HREP within the St. Paul District since the completion of the Island 42 project.

The gates are hand operated which can be tedious and time consumming. Locating water control structures where there is land access would allow for the use of power assisted gate operators supplied with power provided by a portable generator on a pick-up truck.

This project experienced loss of one of the gate operating wheels due to vandalism. The U.S. Fish and Wildlife Service has removed the remaining wheels and takes it out to the site whenever the gates have to operated. The lesson learned is that structures out on the open river are highly vulnerable to vandalism.

The three H-piles driven in front of the water control structure have been very effective in deflecting or keeping large floating wooden debris from damaging the structures and/or causing maintenance problems. The use of piles or similar devices to keep large floating debris from structures exposed to the open river is highly recommended.

BACKWATER DREDGING

The original project design was to dredge a 150-foot wide area (two 75-foot wide dredge cuts). For the particular dredge used for this project it was more efficient to dredge a 100-foot wide dredge cut. Thus, a 200-foot wide area was dredged. This points out the need to consider the limitations and capabilities of the available dredging equipment when planning and designing habitat projects that involve dredging. In this particular instance no problems arose from dredging the larger area because there was additional area in the backwater that would benefit from the dredging, and the placement site had more than adequate capacity for the additional material.

The project was dredged to a design depth of 5 feet. While sedimentation in this particular area is slow, it is likely that the design depth will not be maintained for 50 years. While the U.S. Fish and Wildlife Service is responsible for operation and maintenance of this project, it is recognized that in the future funds may not be available to perform maintenance dredging. In future planning of other backwater dredging projects, an analyis should be made of the cost effectiveness of overdepth dredging to offset the need for future maintenance dredging. In many instances, it may be cost effective to overdepth dredge when compared to the cost of mobilizing a dredging plant for maintenance dredging.

COVER ESTABLISHMENT

The seeding rate used on the channel berm would be considered exceedingly high for most applications. This high seeding rate contributed to the higher seedling density and percent cover that was evident in the first few years following construction. However, over the long term, similar results probably could have been achieved with a seeding rate of about 1/2 (50 lbs/acre) of what was used.

6. CONCLUSIONS

This project was planned and designed in the early stages of the UMRS-EMP before post-project evaluation was a project requirement. Therefore, the pre-project data and the project objectives do not lend themselves to definitive conclusions concerning project performance. However, the following conclusions have been drawn from the review of the project history and available post-construction monitoring data.

a. Despite the obstruction of flow due to beaver activity, the project is contributing to the maintenance of adequate levels of dissolved oxygen in portions of the Island 42 backwaters.

b. The dredging appears to have been successful in providing deep water habitat for Centrarchids and other species. Due to low sedimentation rates, it is too early to draw any conclusions concerning the longevity of the dredged area.

c. Due to unexpected problems encountered during construction with separation of the fine dredged material from the sand, the goal/objective of creating 2 acres of waterfowl nesting cover on the dredged material containment dike was not met.

d. The revegetation efforts on the berm adjacent to the channel were successful and good nesting cover was established. A portion of this early success may be attributable to the very high seeding rates at the site.

7. RECOMMENDATIONS

The following recommendations are made concerning the Island 42 project.

a. Dissolved oxygen and associated water quality parameter monitoring can be discontinued, other than what may occur as part of routine resource management activities on the part of the Minnesota DNR and/or the U.S. Fish and Wildlife Service.

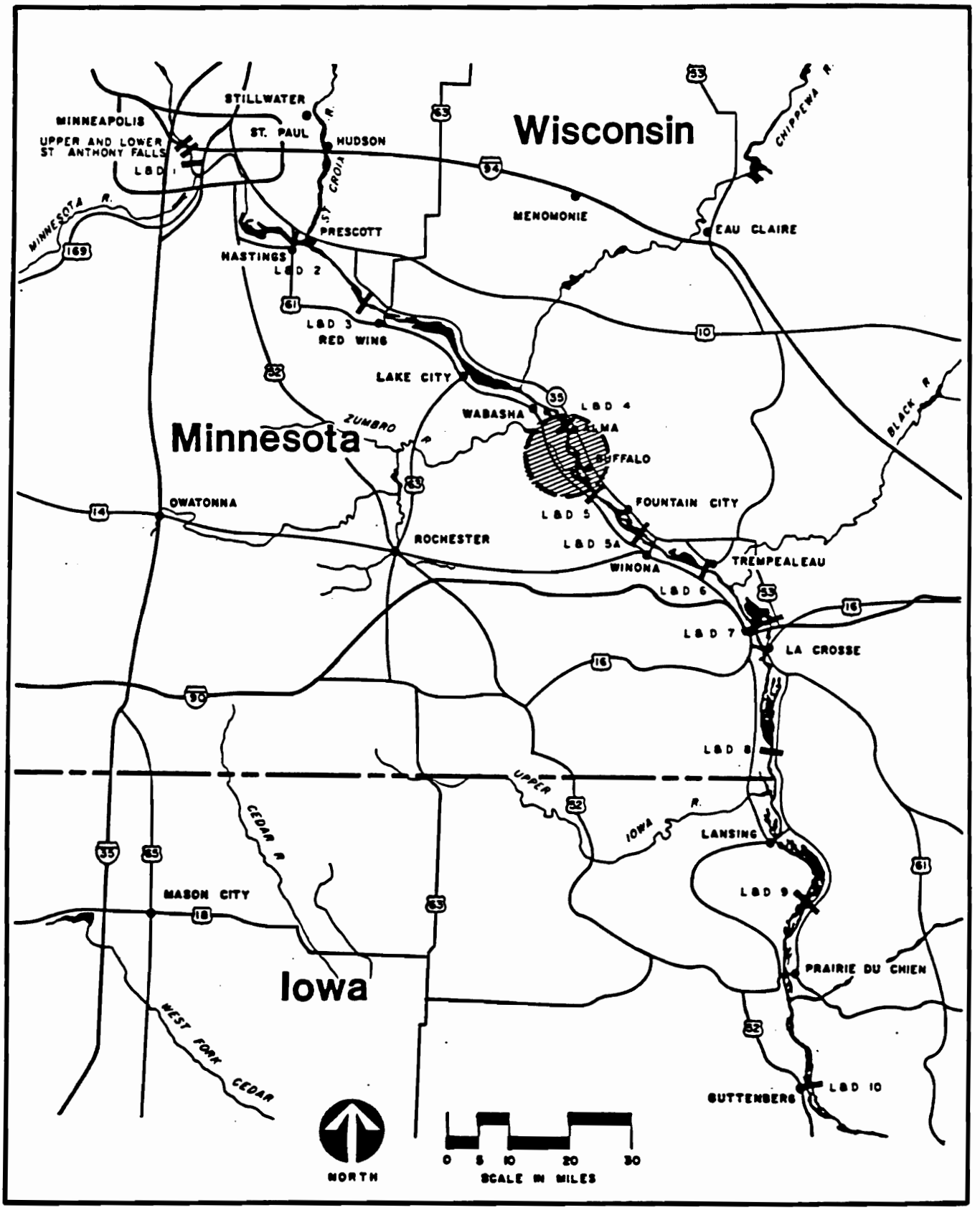
b. A bathymetric survey of the dredged area should be conducted approximately 20 years post-dredging (2006). Given the expected low sedimentation rates in this area, it will take some time for sufficient sediment to accumulate to make an accurate evaluation of the projected life expectency of the dredged area.

c. The Minnesota DNR and/or the U.S. Fish and Wildlife Service should conduct surveys on the channel berm to determine if this area is being used by waterfowl for nesting, and to determine nesting success.

d. The Minnesota DNR fishery report (appendix 4) makes a number of recommendations concerning the Island 42 area. The Minnesota DNR and/or the U.S. Fish and Wildlife Service should review these recommendations to determine the need for any further habitat rehabilitation or enhancement efforts in this area. If further work is determined to be needed, it can be submitted for consideration under the UMRS-EMP.

Appendix 1

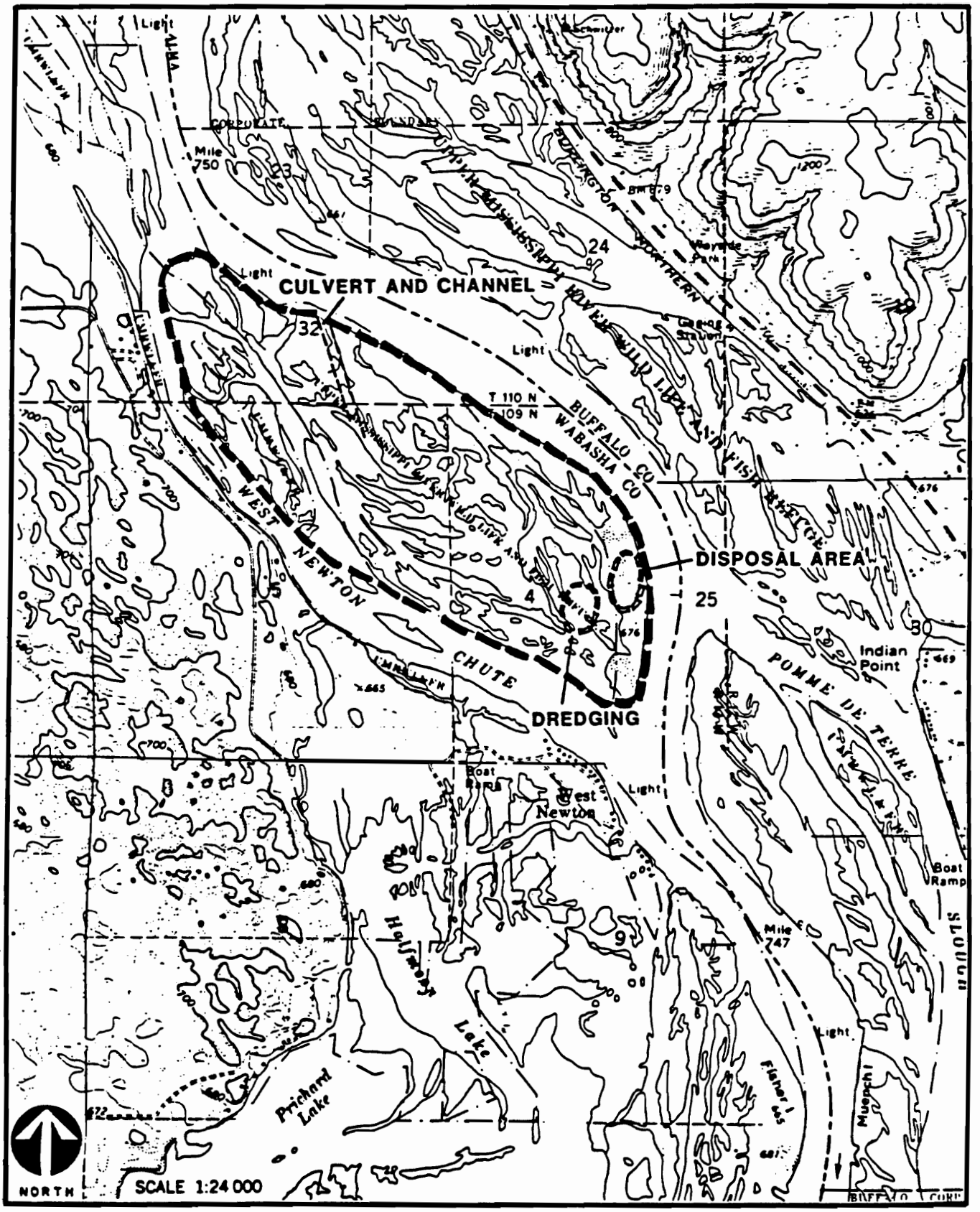
Plates



Upper Mississippi River System
Environmental Management Program

Project Area Map
Island 42

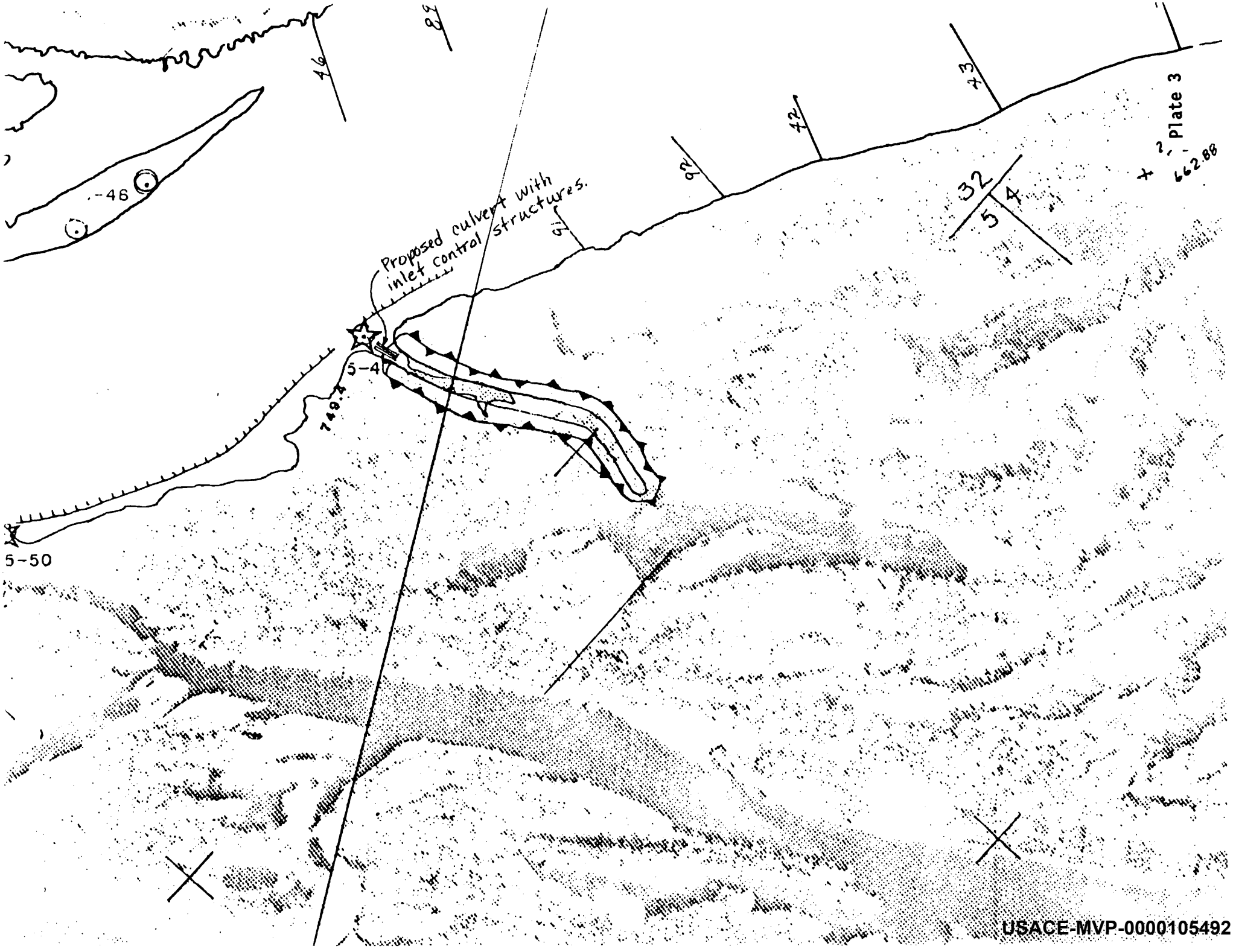
Pool 5 Mile 749 Plate 1



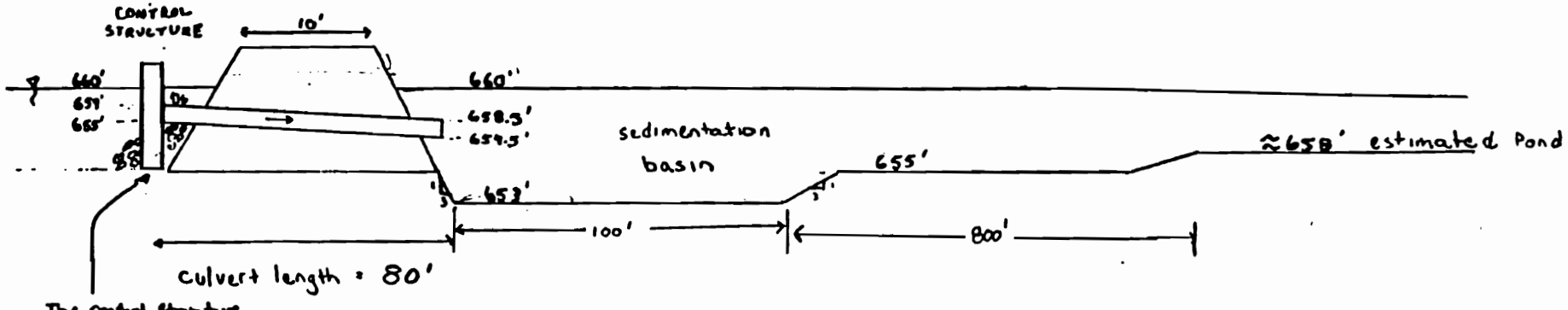
Upper Mississippi River System
Environmental Management Program

Project Area Map
Island 42

Pool 5 **Mile 749** Plate 2



PROFILE

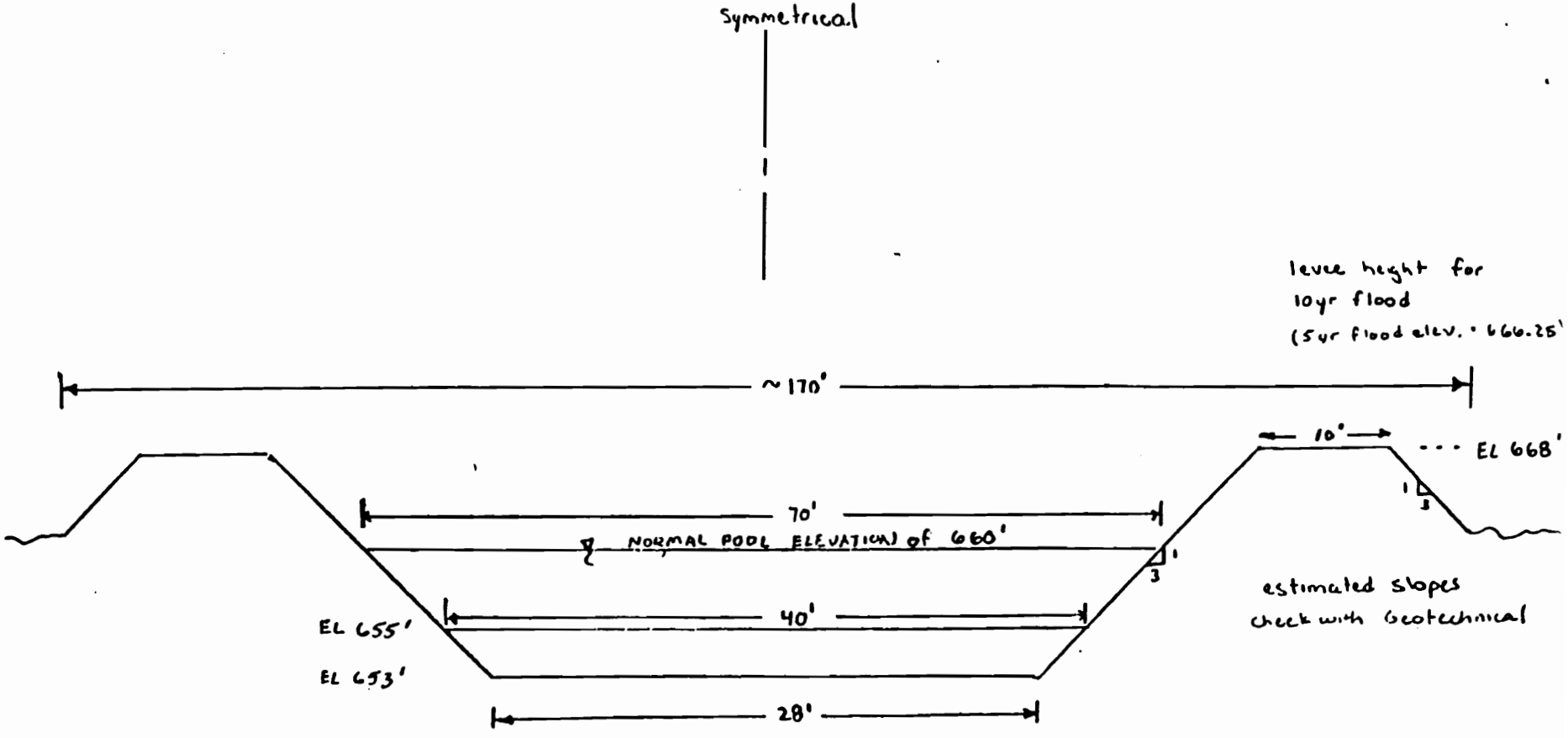


NOT TO SCALE

* NOTE PROJECT LENGTH IS ESTIMATED AT 1000'

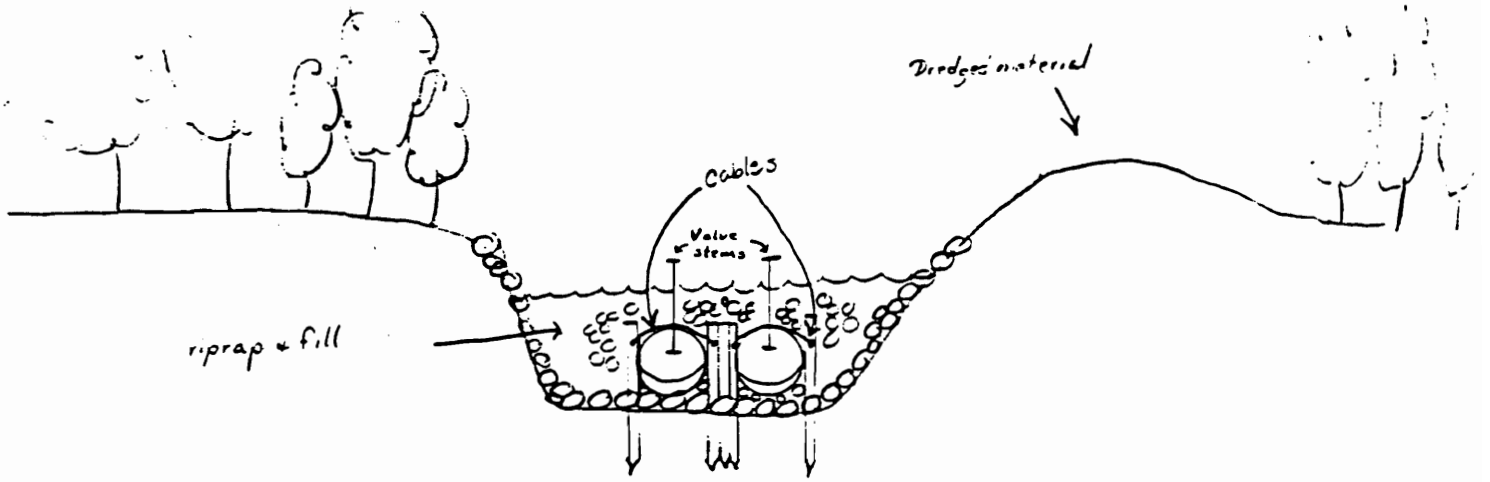
Plate 4

CROSS SECTION



NOT TO SCALE

Plate 5


Dredged material
Cables
Valve stems
riprap + fill

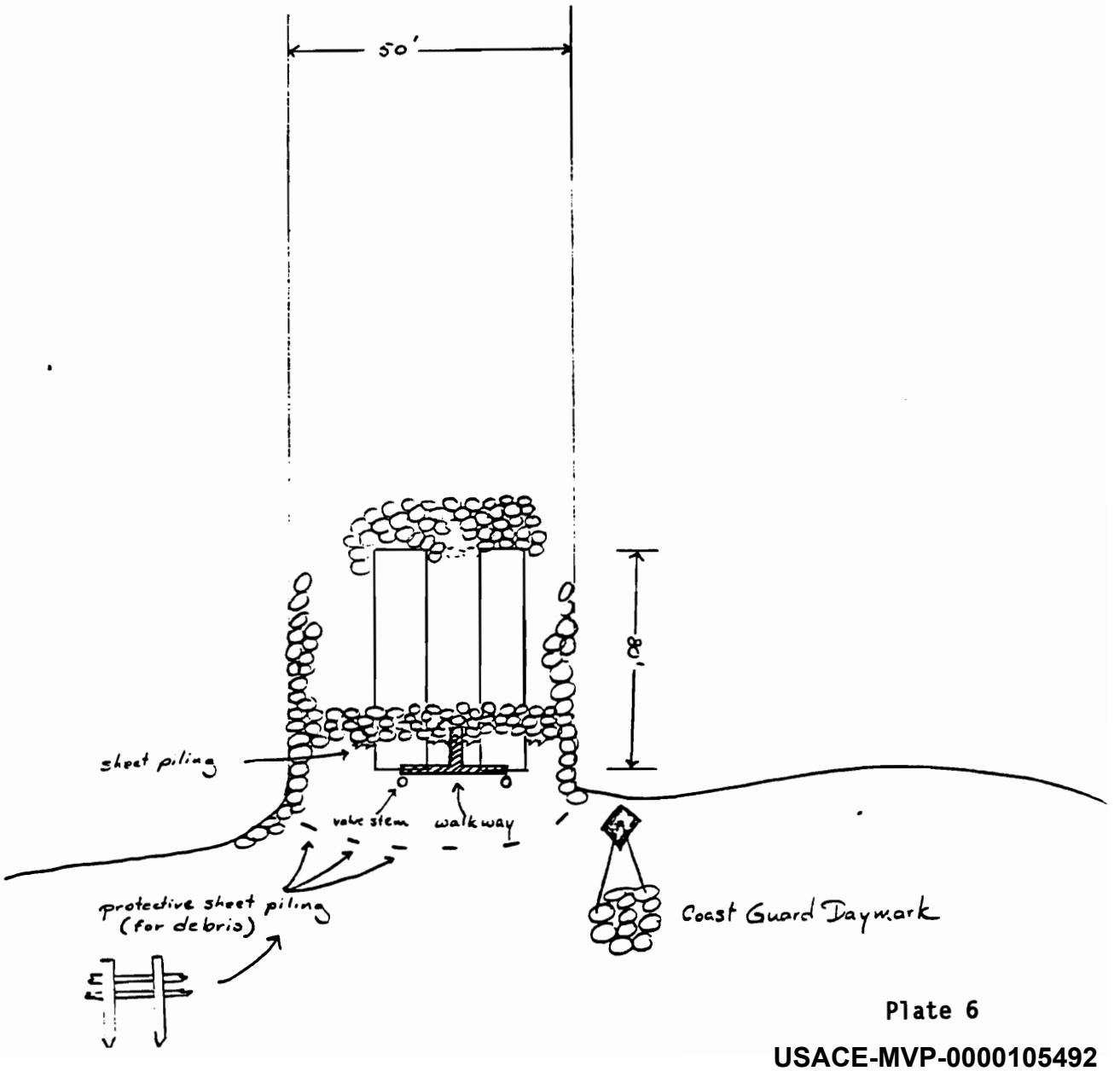

50'
80'
sheet piling
valve stem
walkway
protective sheet piling (for debris)
Coast Guard Daymark

Plate 6

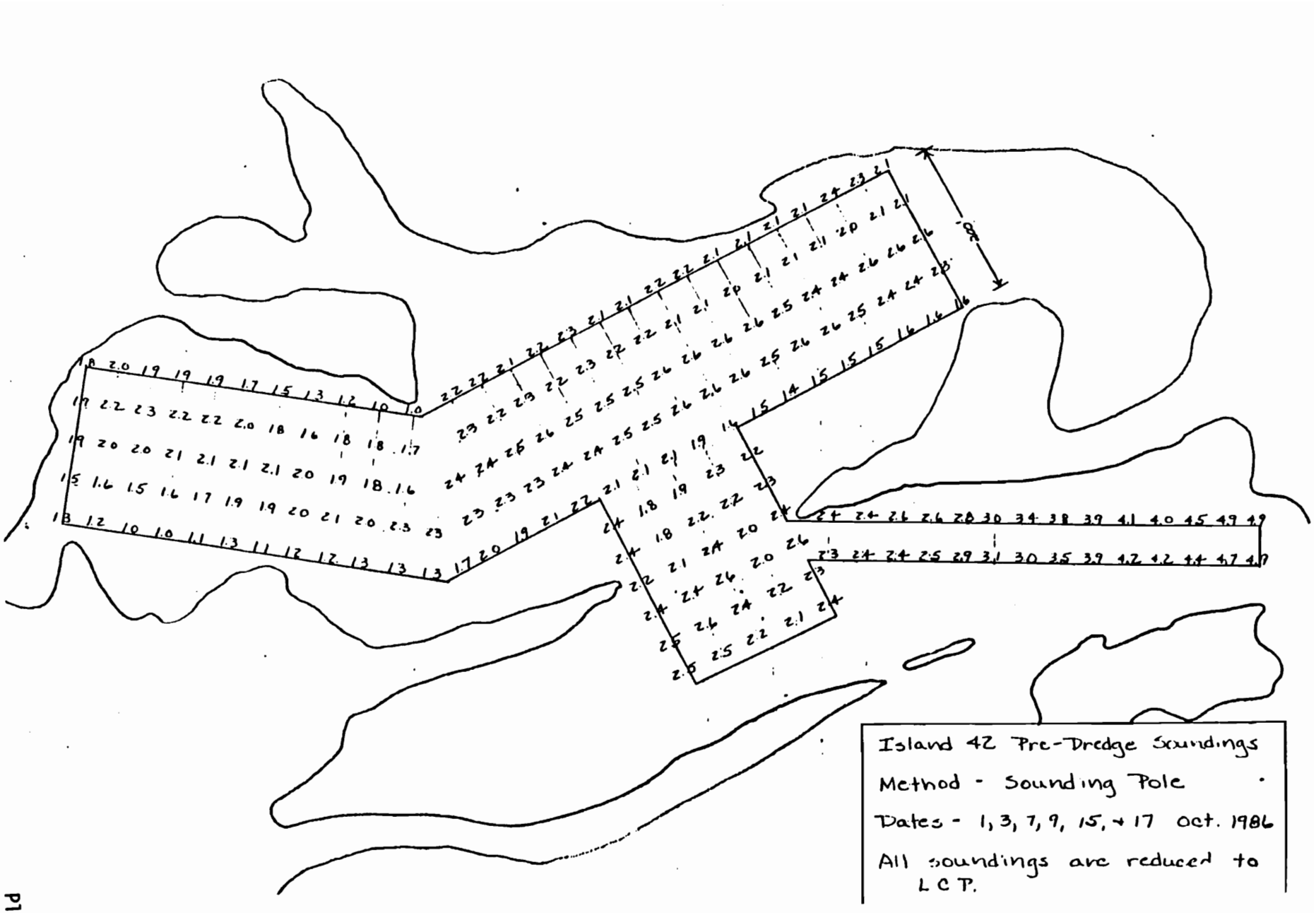


Plate 7

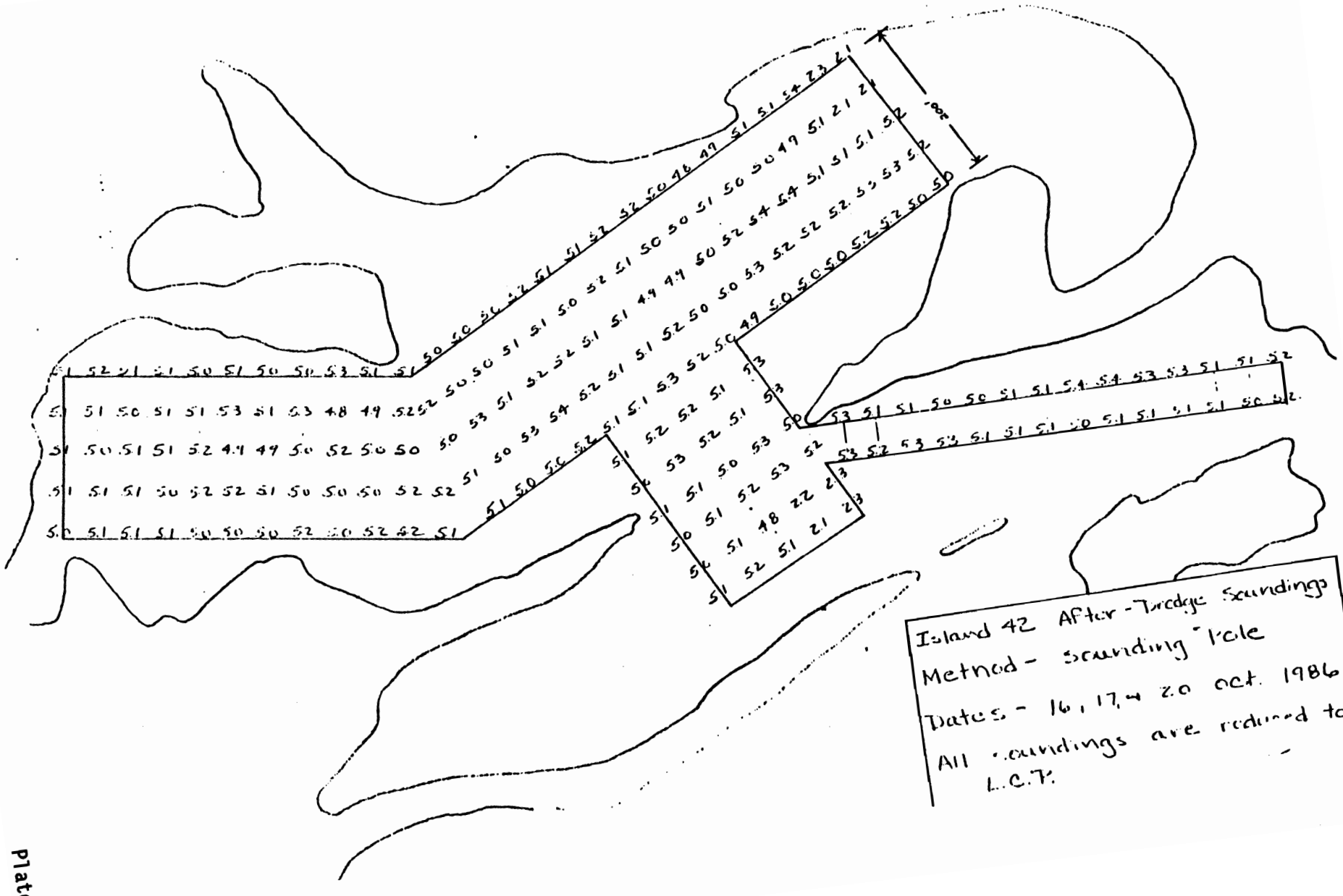
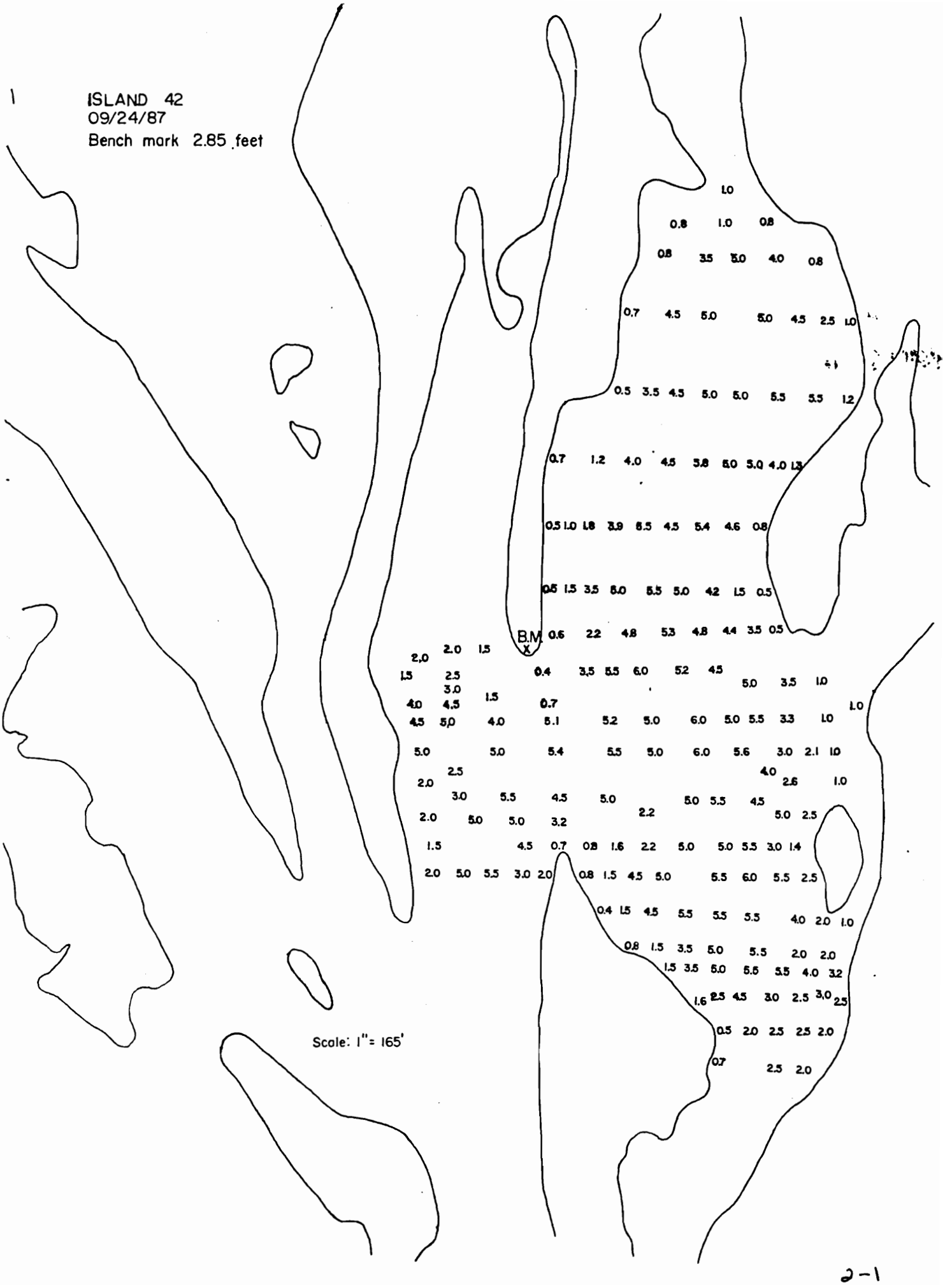
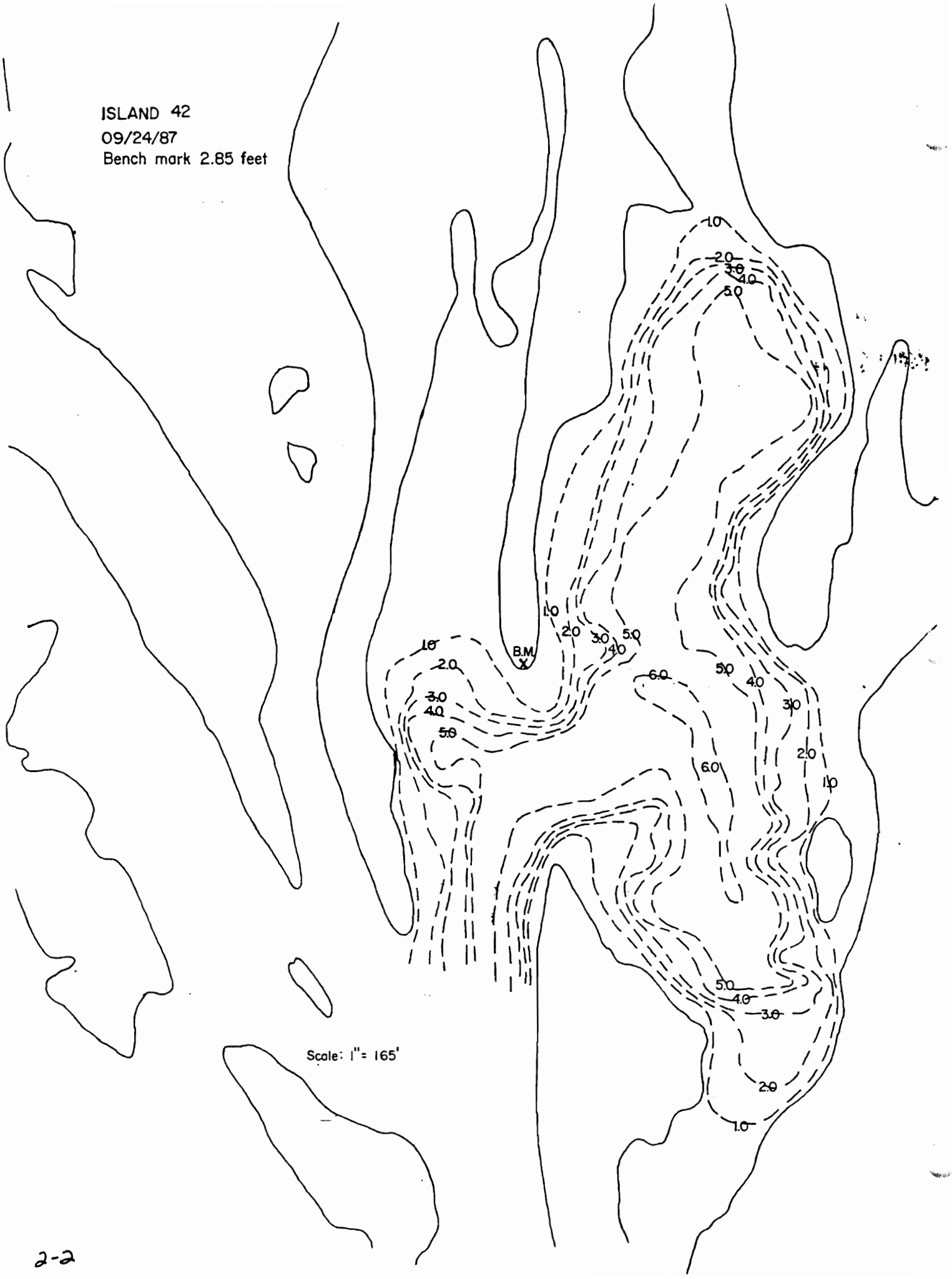


Plate 8

Appendix 2

Bathymetric Data





2-2

Appendix 3

Dissolved Oxygen Monitoring Data

NA-01567-01
8/80

DEPARTMENT OF NATURAL RESOURCES

DISSOLVED OXYGEN SUMMARY

Region: 5

Area: Lake City

INSTRUCTIONS: 1. Please Print or Type when completing this report.

2. Compile all information from NA-01485-01 (GF-22) Dissolved Oxygen Reports.

Lake/Stream	County	D.O.W. or I.D. No.	FW-1-R	Study	Job
Island 42	Wabasha	Pool 5 UMR	8	4	

Observer(s): Larry D Watson and Mike Davis — Date: 121988

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
A 1	2.0	4.7	12.8	10.0	0.5
B 1	1.0	1.7	8.8	8.0	1.0
B 3	1.5	2.7	10.0	8.0	1.0
C 1	1.0	1.4	10.7	8.5	1.0
C 3	1.0	1.7	6.9	7.25	1.0
D 1	1.0	1.3	10.8	8.5	0.8
D 1A	3.0	3.3	13.1	10.0	0.5

Observer(s): Larry D Watson and Mike Davis — Date: 121988

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
D 2	1.0	1.3	14.2	7.0	0.8
D 3	1.0	1.6	13.8	8.0	0.8
D 4	1.0	1.8	12.8	8.2	1.0
E 1	4.0	5.8	13.6	9.4	0.5
E 2	1.0	1.7	7.7	7.5	0.8
E 3	4.5	5.1	12.8	10.0	0.5
E 4	2.0	3.5	13.6	8.0	0.8

Observer(s): Larry D Watson and Mike Davis — Date: 121988

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
E 5	5.0	5.8	12.2	10.0	0
E 6	1.5	2.5	13.4	10.0	1.0

Observer(s): Larry D Watson and Dale Sogla — Date: 011789

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
A 1	3.0	5.0	12.6	15.0	3.0
B 1	1.2	1.45	7.2	12.0	3.0
B 3	2.0	3.0	1.6	13.0	2.0
C 1	1.2	1.45	0.5	12.0	3.0
C 3	1.5	2.0	0.6	13.0	2.0
D 1A	4.0	6.5	9.9	14.5	2.5
D 3	1.5	2.0	10.6	14.0	2.5

Was Lake or Stream opened to promiscuous fishing during survey period? ☒ No ☐ Yes (if yes, give date) _____

Area Fisheries Manager Signature	Date	Regional Fisheries Supervisor Signature	Date
	050589		

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3-1

NA-01567-01
8/80

DEPARTMENT OF NATURAL RESOURCES

DISSOLVED OXYGEN SUMMARY

Region: 5

Area: Lake City

INSTRUCTIONS: 1. Please Print or Type when completing this report.

2. Compile all information from NA-01485-01 (GF-22) Dissolved Oxygen Reports.

Lake/Stream	County	D.O.W. or I.D. No.	FW-1-R	Study	Job
Island 42	Wabasha	Pools UMR	8	4	

Observer(s): Larry D Watson and Dale Sogla — Date: 011789

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
D4	1.5	2.5	12.1	14.5	2.5
E1	6.0	7.0	9.9	13.0	3.0
E2	1.5	2.0	0.4	12.0	2.5
E3	3.0	5.5	5.0	14.0	2.5
E4	3.0	4.5	4.3	13.0	3.0
E5	2.0	5.8	8.6	16.0	1.0
E6	3.0	5.5	6.0	15.0	2.0

Observer(s): Larry D Watson and Dan Dieterman — Date: 013089

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
A1	3.0	5.0	13.2	17.0	2.5
B1	1.5	2.0	7.2	12.5	2.5
B3	2.0	3.0	1.3	14.0	2.5
C1	1.5	2.0	0.7	12.0	2.5
1A	3.0	6.5	11.0	16.0	2.5
D1B	2.0	4.0	8.6	16.0	2.5
D3	1.5	2.5	10.8	16.5	2.5

Observer(s): Larry D Watson and Dan Dieterman — Date: 013089

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
D4	1.5	2.5	12.2	13.5	2.5
E1	3.0	6.0	11.2	15.0	2.5
E2	1.5	2.5	1.1	14.0	2.5
E3	3.0	5.5	10.7	17.0	2.5
E4	3.0	5.0	11.0	17.0	2.5
E5	3.0	5.8	10.4	16.0	2.5
E6	3.0	5.0	10.6	17.5	2.5

Observer(s): Larry D Watson and Dale Sogla — Date: 021589

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
A1	3.0	5.0	12.5	18.0	6.0
B1	1.5	2.0	7.0	14.0	5.0
B3	2.0	3.0	1.6	15.0	5.0
D1B	3.0	4.0	6.0	19.5	4.0
3	2.0	2.5	8.3	17.0	5.0
D4	2.0	3.5	10.6	15.0	6.0
E1	3.0	6.0	11.4	17.5	4.0

Was Lake or Stream opened to promiscuous fishing during survey period? ☒ No ☐ Yes (if yes, give date) _____

Area Fisheries Manager Signature	Date	Regional Fisheries Supervisor Signature	Date
[signature]	050589		

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NA-01567-01
8/80

DEPARTMENT OF NATURAL RESOURCES

DISSOLVED OXYGEN SUMMARY

Region: 5
Area: Lake City

INSTRUCTIONS: 1. Please Print or Type when completing this report.
2. Compile all information from NA-01485-01 (GF-22) Dissolved Oxygen Reports.

Lake/Stream	County	D.O.W. or I.D. No.	FW-1-R	Study	Job
Island 42	Wabasha	Pool 5 UMR	8	4	

Observer(s): Larry D. Watson and Dale Sogla — Date: 021589

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
E 3	3.0	5.5	10.3	21.0	4.0
E 4	3.0	4.5	10.2	19.0	4.0
E 6	3.0	4.5	10.8	20.0	4.0

Observer(s): Dale Sogla and Dan Dieterman — Date: 030989

Station	Depth of Sample (ft)	Lake Depth (ft)	D.O. (ppm)	Ice Depth (in)	Snow Depth (in)
A 1	3.5	5.5	14.1	22.0	8.0
E1	4.0	6.0	10.3	18.0	5.0
E4	3.0	5.0	5.0	23.0	7.0
E6	3.0	5.0	6.7	23.0	8.0

Observer(s): — Date:

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth

Observer(s): — Date:

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth

Was Lake or Stream opened to promiscuous fishing during survey period? ☒ No ☐ Yes (if yes, give date)

Area Fisheries Manager Signature	Date	Regional Fisheries Supervisor Signature	Date
	050589		

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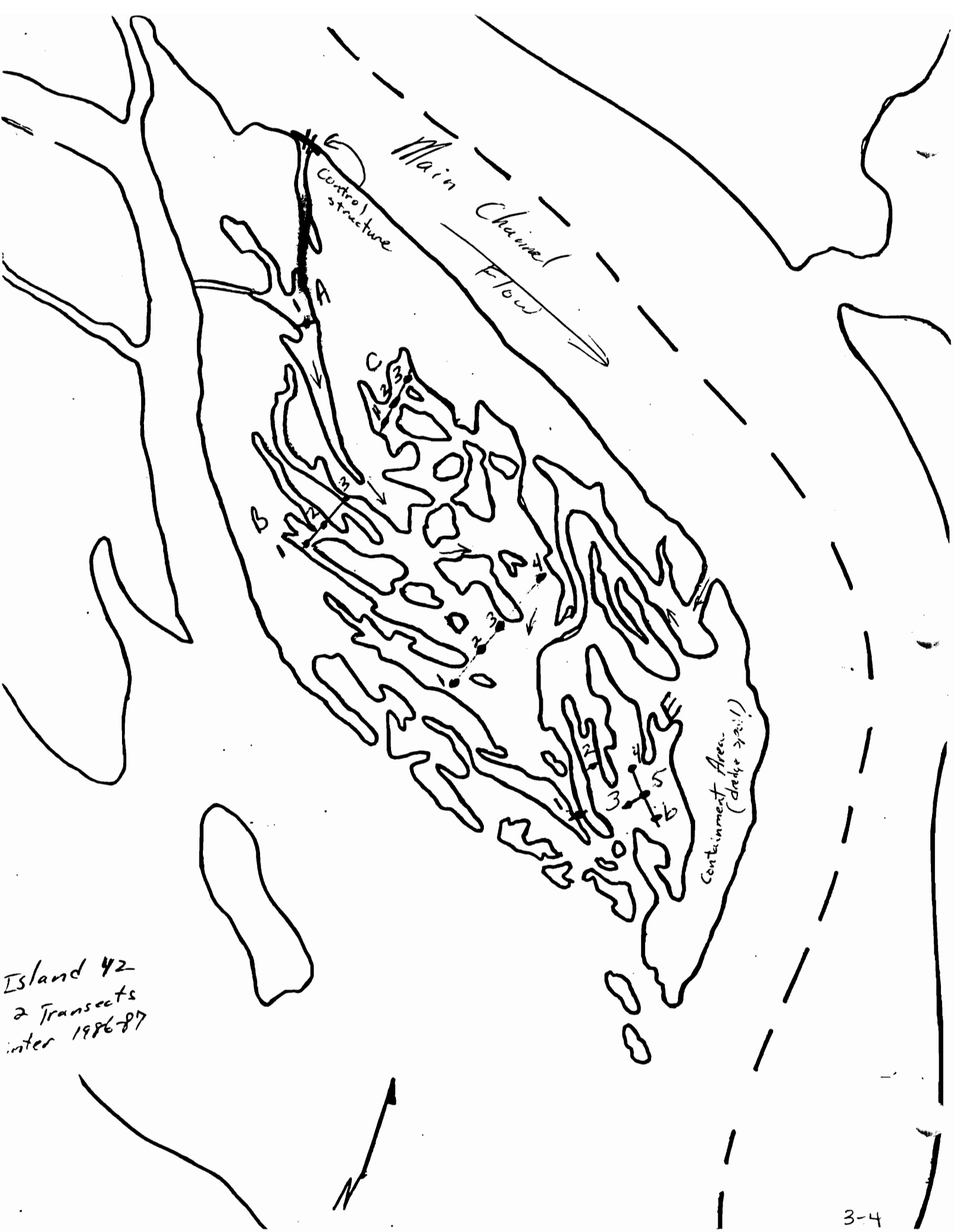

NA-01567-01
8/80

DEPARTMENT OF NATURAL RESOURCES

DISSOLVED OXYGEN SUMMARY

Region: 5
Area: LAKE CITY

INSTRUCTIONS: 1. Please Print or Type when completing this report.
2. Compile all information from NA-01485-01 (GF-22) Dissolved Oxygen Reports.

Lake/Stream	County	D.O.W. or I.D. No.	FW-1-R	Study	Job
Island 42	WABASHA	POOL 5 UMR	8	4	

Observer(s): DAN DIETERMAN
Date: 08/27/89 1800 hrs

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth
A1	3.0'	6.0'	8.4		
B2	2.5'	2.7'	2.2		
B2A	0.5'	2.7'	12.8		
C2	1.0'	1.5'	14.6		
D2	1.0'	2.3'	4.5		
D4	1.0'	2.5'	6.4		
E1	3.0'	6.0'	2.3		

Observer(s):
Date:

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth
E1A	0.5'	6.0'	8.6		
E3	3.0'	5.0'	0.8		
E3A	0.5'	5.0'	9.3		
E4	3.0	5.8'	5.8		
E5	3.0'	6.0'	0.8		
E5A	0.5'	6.0'	12.6		
E6	3.0'	5.5'	3.7		

Observer(s):
Date:

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth

Observer(s):
Date:

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth

Was Lake or Stream opened to promiscuous fishing during survey period? ☐ No ☐ Yes (if yes, give date)_____

Area Fisheries Manager Signature	Date	Regional Fisheries Supervisor Signature	Date

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NA-01567-01
8/80

DEPARTMENT OF NATURAL RESOURCES

DISSOLVED OXYGEN SUMMARY

Region: 5
Area: LAKE CITY

INSTRUCTIONS: 1. Please Print or Type when completing this report.
2. Compile all information from NA-01485-01 (GF-22) Dissolved Oxygen Reports.

Lake/Stream	County	D.O.W. or I.D. No.	FW-1-R	Study	Job
Island 42	WABASHA	POOL SUMR	8	4	

Observer(s): DAN DIETERMAN
Date: 08/28/89 0700 hrs

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth
A1	3.0'	6.0'	6.1		
B2	2.5'	2.7'	0.8		
B2A	0.5'	2.7'	1.4		
C2	1.0'	1.5'	0.6		
D2	1.0'	2.3'	1.8		
D4	1.0'	2.5'	2.5		
E1	3.0'	6.0'	0.8		

Observer(s):
Date:

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth
E1A	0.5'	6.0'	0.8		
E3	3.0'	5.0'	3.4		
E3A	0.5'	5.0'	3.4		
E4	3.0'	5.8'	5.0		
E5	3.0'	6.0'	2.6		
E5A	0.5'	6.0'	2.2		
E6	3.0'	5.5'	2.6		

Observer(s):
Date:

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth

Observer(s):
Date:

Station	Depth of Sample	Lake Depth	D.O. (ppm)	Ice Depth	Snow Depth

Was Lake or Stream opened to promiscuous fishing during survey period? ☐ No ☐ Yes (if yes, give date)_____

Area Fisheries Manager Signature	Date	Regional Fisheries Supervisor Signature	Date

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ISLAND 42 COMPLEX - Mar. 4, 1993

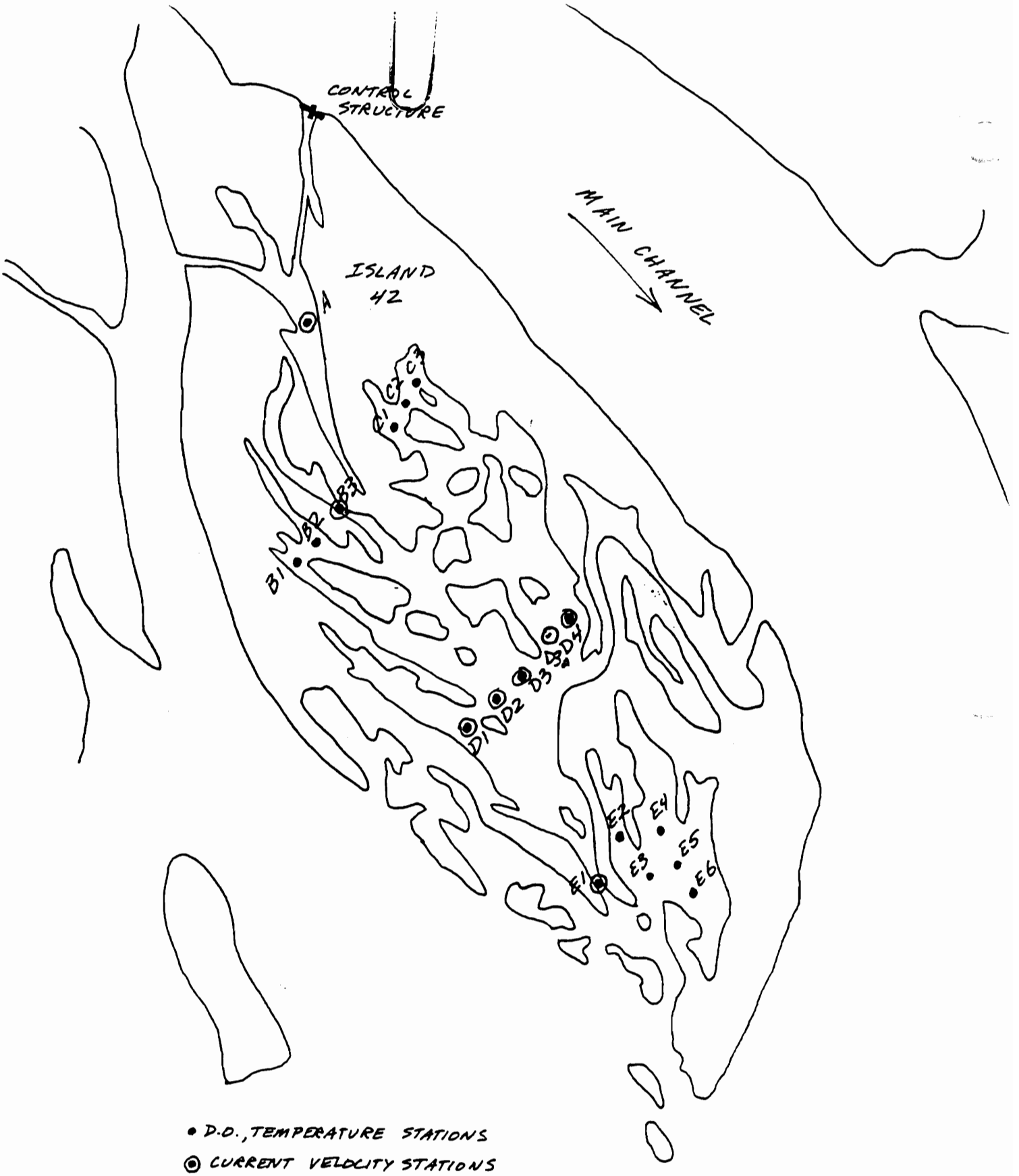
Site	Time	Ice (in)	Snow (in)	Snow (%)	Water Depth(ft)	Sample Depth(ft)	D.O. mg/l	Temp. C
D1	1130	20	5	100	3.1	1.6	8.8	0
D1	1130	"	"	"	"	2.9	4.8	0.3
D2	1145	16	"	"	No Water			
D3	1150	"	"	"	No Water			
D4	1200	13	"	"	1.5	1.3	3.7	0
E1	1115	20	4	"	6.0	1.6	10.6	0
E1	1115	"	"	"	"	3.2	10.8	0
E1	1115	"	"	"	"	5.8	10.0	0
E2	1110	17	"	"	No Water			
E3	1100	20	"	"	4.2	2.0	10.0	0
E3	1100	"	"	"	"	4.0	7.2	1.0
E4	1050	19	"	"	4.7	2.0	9.5	0
E4	1050	"	"	"	"	4.5	7.8	1.0
E5	1040	20	"	"	"	1.8	9.8	0
E5	1040	"	"	"	"	4.5	6.5	1.0
E6	1030	18	"	"	4.3	1.7	10.6	0
E6	1030	"	"	"	"	4.0	8.1	1.0

KRUGER SLOUGH - Feb. 26, 1993

Site	Time	Ice (in)	Snow (in)	Snow (%)	Water Depth(ft)	Sample Depth(ft)	D.O. mg/l	Temp. C
A	1015	18	5	100	2.8	2.0	0.6	1.0
B	1030	"	"	"	2.4	1.8	0.5	1.0
C	1045	"	6	"	2.3	1.8	0.9	0.5
D	1100	"	7	"	2.9	1.5	3.3	0.5
D	1100	"	"	"	"	2.7	3.3	1.0
E	1115	20	6	"	4.0	1.5	9.7	0
E	1115	"	"	"	"	2.4	5.7	0.9
E	1115	"	"	"	"	3.8	2.5	1.3

FISCHER ISLAND COMPLEX - Feb. 26, 1993

Site	Time	Ice (in)	Snow (in)	Snow (%)	Water Depth(ft)	Sample Depth(ft)	D.O. mg/l	Temp. C
A	1130	12	6	100	1.9	1.5	0.6	0.3
B	1140	"	7	"	Not Enough Water			
C	1045	18	6	"	Not Enough Water			
D	1215	17	6	"	4.0	1.5	11.0	0
D	1215	"	"	"	"	2.3	10.0	0.2
D	1215	"	"	"	"	3.8	6.4	0.9
E	1230	18	5	"	2.9	1.5	10.8	0.1
F	1245	16	"	"	6.1	1.5	11.2	0
F	1245	"	"	"	"	5.9	4.5	1.5



Pool 5 Isl. 42 1-20-95

Site E4

Sample depth (m)	Temp °C	D.O. mg/l	pH	Cond.
0.2	1.0	13.9	7.8	477
1.4	1.9	12.3	7.6	494

Appendix 4

Minnesota DNR Fisheries Survey

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
SECTION OF FISHERIES

Mississippi River Survey

Location: Island No. 42 - River Mile 749.0, Pool 5 - Wabasha County, Minnesota

Federal Aid Project: Statewide Fish and Wildlife Surveys

Type of Survey: Mississippi River Bottoms Re-Survey (initial survey 1977-78)

Dates of Survey, Map, and Photo Numbers:
Dates of Survey Field Work - Various 1990
Date of aerial photography used in mapping - Flown August 27, 1973 - Sheet Numbers 449-5-13, 450-5-18, 455-5-19 - U.S. Army Corps of Engineers Environmental Study Maps. The 1977-78 maps are referred to and should be reviewed for this survey.

Field Crew: Gary Grunwald, Dave McCormack, Jerry Wiechman, Dale Sogla, Randy Binder

Area Name: Island 42

Area Identification: Township 109-110N, Range 9W, Sections 4, 5; 32. The area surveyed is located at Mississippi River Mile 749.0 D.O.W. No. 79-1. (River Mile indicates distance above the mouth of the Ohio River.)

Land Ownership: Island 42 is included in the Upper Mississippi River Wildlife and Fish Refuge - U.S. Fish and Wildlife Service (Area office, Winona, Minnesota).

County: Wabasha County, Minnesota

Nearest Town: The area surveyed is located 4 miles southwest of Kellogg, Minnesota.

Nearest Public Access: Half Moon Lake Landing (Minnesota), River Mile 745.5, Ownership - U.S. Fish and Wildlife Service.

Other Access Areas: The area is also accessible from the main navigation channel of the Mississippi River.

Reason for Survey: The island is being re-surveyed after a 13-year period to record changes in habitat from natural events (e.g. flooding) and from specific habitat enhancement projects (see Record of Past Management).

Survey Request: Lake City Area Fisheries Manager

Previous Investigations:

a. Upper Mississippi River Habitat Classification Survey - March 1971, Sternberg, Minnesota D.N.R.
b. Phase III Report - Environmental Impact Study of Pool 5 of the Northern Section of the Upper Mississippi River Valley - Fremling, Winona State University (1973).
c. Island #42 River Bottoms Survey - Minnesota D.N.R. 1977. (The original survey should be reviewed in conjunction with this 1990 re-survey.)
d. Fremling, C.R., D.N. Nielson, D.R. McConville, R.N. Vose, and R.A. Faber. 1980. The Feasibility and Environmental Effects of Opening Side Channels in Five Areas of the Mississippi River (West Newton Chute, Fountain City Bay, Sam Gordy's Slough, Kruger Slough, and Island 42). Winona State University and St. Mary's College, Winona, Minnesota.
e. Experimental Bank Stabilization Project - June 1990, U.S. Army Corps of Engineers.

Water Area: Water area of the island's interior is 115 acres at normal pool level. The island is about 231 acres of land and water combined.

Depths: A 5-acre area in the island's interior was dredged to a depth of 5-6 feet in September of 1986 (Maps 1A-1B). Previously, depths were 3 feet and less, and did not provide year around habitat for fish due to low dissolved oxygen concentrations in winter. Dredging provided a suitable habitat during all seasons. Approximately 30,000 cubic yards of fine organic sediment was hydraulically placed within the dredge-spoil containment area on the southeast side of the island. The dredged area will be monitored at 5-year intervals to record the rate of filling. No measurable filling has been noted since dredging.

Soundings taken in 1990 of the island's interior revealed very little change when compared to the original 1977 survey. These few changes and some additional depths taken in 1990 are the only ones recorded on the 1990 survey map. Some filling has occurred in the inlet channels (dredged in 1974 and 1978) and in the large channel on the west side of the island.

Length of Shoreline:

Interior of Island - 72,300 ft. (13.7 mi.)
Perimeter of Island - 27,000 ft. (5.1 mi.)
(feet of shoreline at normal pool level)

Inlets and Outlets: In October of 1974 an inlet 55 feet wide, 6 feet deep, and 300 feet in length was dredged from the main navigation channel into the island's interior to provide fresh water. Annual high water events eroded the shoreline of dredge spoil deposits upriver of the inlet. Eroded material was then deposited in the inlet channel and adjacent bays. Several redredgings to maintain the original inlet depth failed to stop sedimentation. In June of 1990 this shoreline was treated with a variety of experimental bank stabilization methods to prevent further erosion.

Historically, several small channels on the upriver end of the island have provided fresh flow to the island's interior. However, erosion at the head of the island blocked these channels with sediments, and during normal pool levels, no flow has been present in recent years.

In 1978, a channel 6 feet wide, 5 feet deep, and 450 feet long was constructed on the northwest side of the island. Permanent flow could not be maintained due to beaver activity and large sediment deposits during periods of high water, and was closed by heavy equipment in 1985.

A new inlet location was selected in 1987 by the Minnesota DNR and a new channel was installed in 1988 with a gated culvert at the inlet. This culvert should decrease sediment flow into the channel because it is 4 feet above the river bed (where most sediment transport occurs), and the gate allows the inlet to be closed during periods of high turbid flow.

This new inlet channel is 900 X 50 foot with a 100 X 4 foot culvert. The larger channel width was designed to decrease closures from beaver activity. Material excavated for channel construction was used to develop a berm on the upriver side of the channel and prevents overtopping during high water events. The berm was then seeded to provide waterfowl nesting cover. This new culvert and channel provides a fresh water flow from 6 to 20 c.f.s. to the island's interior and alleviates some stagnation. Source of funding for this project is Public Law 99-88. This law provides authorization and appropriations for a 10-year environmental program on the Upper Mississippi River that includes fish and wildlife rehabilitation and enhancement.

A similar culvert-channel inlet is to be installed in 1991 in the inlet channel created in 1974.

Water Level Controls: U.S. Army Corps of Engineers Lock and Dam #4 located at River Mile 752.8 is 3.8 miles upriver from Island 42. Lock and Dam #5 is located at River Mile 738.1, 10.9 miles downriver.

Benchmark: Two benchmarks were established during the original survey in July of 1976 using steel fence posts. Only benchmark #1 was present during this survey. An additional benchmark (BM-2) was placed adjacent to the dredged area on the lower end of the island. Benchmark elevations at normal river pool level are: B.M. #1 - 42 inches
B.M. #2 - 35 inches
Benchmark locations are shown on map #1A.

Nature and Use of the Immediate Watershed: See Upper Mississippi River Habitat Classification Survey.

Topography: Flat, floodplain forest and wetlands, except where large deposits of dredged material have been placed on the island during maintenance of the navigation channel.

Land use: Floodplain forest

Nature and Use of Shoreline: Island 42 is wooded, with silver maple, willow, river birch, American elm, ash, and cottonwood as the dominant species. The understory is generally dominated by poison ivy. Soil types vary from loam to 100% sand. Old dredge spoil deposits border the main navigation channel and are extensively utilized during summer for camping, swimming, etc.

Shoreline Developments: In 1977 the Army Corps of Engineers constructed a large containment area on the lower portion of Island 42 bordering the main channel for future placement of dredged material from the main navigation channel.

During June of 1990, various experimental bank-stabilization techniques were implemented along the old spoil deposits bordering the main channel of the island. These highly unstable, predominantly sand shorelines eroded annually during high water levels. Treatments were a combination of rock groins, bank reshaping, willow bundles, riparian vegetation plantings, and whole tree revetments on the northerly spoil deposits. The bankline adjacent to the dredge spoil containment area was treated with rock groins only.

Prior to bank stabilization efforts, the upriver (north) side was surveyed and benchmarks established to allow for post-project evaluation. Two adjacent areas were left as controls. Evaluation will continue for several years.

The gated culvert installed in 1988 (described under Inlets and Outlets) is the only other shoreline development present on the island.

Evidence and Extent of Erosion and Pollution: The upstream portion of Island 42 erodes severely during periods of high water. This erosion has eroded behind the original riprap bank protection and can be expected to continue during subsequent high water events.

Erosion of dredge spoil deposits bordering the main navigation channel is discussed under Shoreline Development.

Water Turbidity and Color: Secchi readings on July 18, 1990 were consistently 24 inches at various locations within the island's interior. Several small areas of high turbidity were noted due to carp activity.

Bottom Soil Types: Bottom soil types were not recorded. However, pole soundings indicated little or no change in bottom types from the 1977-78 survey.

Bottom Soil Type Percent Occurrence: See Bottom Soil Types.

Water Quality: No water samples were taken. Conductivity was 470 umhos and pH was 8.2 on July 18, 1990 during electrofishing.

Emergent Vegetation: Record drought during 1987-89 resulted in a dense growth of emergent vegetation throughout the riparian zone of the island's interior. Sagittaria spp. was dominant with lesser stands of Typhus spp., Scirpus spp., and Sparganium spp. Small areas of purple loosestrife, Lythrum salicaria, were noted throughout the island's interior. A small bed of lotus (Nelumbo lutea) was noted southeast of benchmark #2. Lotus was not present during the initial survey.

Submerged Vegetation: Ten stations sampled in 1977-78 were re-sampled during this survey. Results are shown in Table I. Sampling stations are shown on map #3 of the 1977-78 survey.

Algae: Filamentous algae was scattered throughout the island's interior.

Invertebrates: No sampling was done.

Waterfowl Habitat: Good to excellent habitat is present for puddle ducks. Wood ducks (many with broods of young) were commonly noted during the survey.

Aquatic furbearer Habitat: Raccoon, red fox, muskrat, mink, skunk, and opossum are known to inhabit the island. Five active beaver colonies were noted within the island's interior during this survey period.

Other Wildlife: The following species were noted during the survey period: white-tailed deer, belted kingfisher, great egret, green heron, great blue heron, wood duck, mallard, blue-winged teal, osprey, pileated woodpecker, and numerous songbirds.

Fishery:

a. Species Composition - Table II
b. Natural Reproduction of Fish - Table III
c. Fish and Turtle Abundance - Tables III, IV, V, and VI
d. Fish and Turtle Sizes - Table IV, V, and VI
e. Fish Age - No scale samples were taken (see length frequency data)

Fish Spawning Conditions: The island's interior provides excellent spawning habitat for largemouth bass, bluegill, crappie spp., channel and flathead catfish, and yellow perch. Fish were not sampled during spring high water, but other species undoubtedly utilize the area. Border areas of riparian vegetation provide excellent spawning conditions for northern pike when flooded. Scattered submerged stumps, large beds of submerged aquatics, and numerous fallen trees provide ideal spawning habitat for largemouth bass, panfish, and catfish.

Fish Diseases and Parasites: None noted; all fish sampled appeared to be in excellent condition.

Clam Beds: Not sampled and no species were observed during the survey.

Lake Conditions and Fishing: The 5-acre dredged area, the new culvert/inlet structure, and the rock groins installed on the main channel are used extensively by anglers. A majority of anglers observed were fishing within this dredged backwater. The dredged area provides ice-fishing and open water fishing opportunities. Anglers reported good fishing for largemouth bass, northern pike, bluegills, and black crappie.

No commercial fishing activity was observed during this survey, however, most commercial efforts usually occur during spring-early summer as setlining for catfish.

Special Problems: The 1977 survey reported dredge spoil placed directly on wing dams bordering the main channel during Corps of Engineers (COE) channel maintenance. This material has since been removed by the COE to restore original depths.

Dissolved oxygen (DO) concentrations were measured throughout the island's interior on August 10, 1990 from 0500-0700 hours to evaluate the contribution of fresh water flow from the inlet channel. Approximately 12 acres of interior backwaters (which historically had DO concentrations < 2.0 ppm during evening hours) had DO concentrations near 5.0 ppm. The inlet currently provides flows at 6-8 C.F.S. during normal pool and flow could be significantly increased by the removal of a "high" spot in the delta area (map). Access by heavy equipment to deepen this area is not possible; however, a small hydraulic dredge could gain access, but disposal of the material would be difficult. Blasting with ammonia nitrate to deepen a portion of the delta in 1987 was partially successful. To realize the full potential of the channel, the delta should be widened to prevent damming by beaver, which can effectively block all flow from the inlet culvert.

The inlet channel that was dredged in 1974 is scheduled to be re-dredged by the Corps of Engineers in 1991. Depending on available funding, a culvert-gate structure may be added to this inlet to better regulate flow. Sedimentation of this channel has been a problem in the past due to upriver bank erosion of unstable dredge spoil. The 1990 experimental techniques to stabilize banks should reduce sedimentation of the inlet channel. This channel is currently providing only a very small flow of fresh water (estimated at 1-2 C.F.S. at normal pool) to the island interior.

Both inlet channels currently need increased flow capabilities to reduce stagnation conditions during summer and winter. A large portion of the island's interior presently remains unusable to fish during these periods.

The five-acre backwater dredging project has greatly enhanced the fisheries habitat. Stagnation problems recorded in past years no longer occur in this area.

Submerged and emergent vegetation in the island interior responded to the 1987-89 drought. Beds of submerged vegetation increased, and undoubtedly increased stagnation during summer and winter. High plant densities are expected to subside as 1990 returned to a more "normal" year regarding precipitation and water levels.

The upstream end of Island 42 continues to erode during high water events. Major bank stabilization is needed (probably with riprap armoring) to halt this erosion. The upstream end of Island 42 remains a high priority for future bank stabilization projects under Public Law 99-88.

Present Fish Population Status: The area surveyed supports a diverse fish population. No major changes in species composition were noted since the 1977 survey. The following species continue to utilize the area for rearing and dwelling: northern pike, walleye, sauger, largemouth bass, smallmouth bass, sunfish spp., crappie spp., catfish spp., sucker spp., carp and various shiners and minnows.

During high water periods, Island 42 is accessible to all species of fish present in the Mississippi River.

Fish were sampled during summer and fall seasons; however, these samples do not represent all species that may utilize the area.

Various turtle species inhabit the area sampled. Wintering areas for snapping turtle (Chelydra serpentina) reported in the 1977 survey, were not sampled for utilization during this survey; however, little or no change in interior habitat was recorded and I suspect the sites are still being used.

Record of Past Management: Freshwater flow was restored to a portion of the island by dredging an inlet channel in October of 1974. An attempt to provide additional flow from a small channel created by a backhoe on the west side of the island was completed in 1978. This channel was closed in 1985 due to large amounts of coarse sediment entering the island interior.

A gated culvert and inlet channel was constructed in 1988 to provide fresh water flow to the interior. This control structure is currently functioning well. The gate is closed during periods of high turbidity in the main channel. A contour map of the backwater area dredged to provide year-around fish habitat (Map 1B) was completed in 1987. This map will be updated every five years to examine sedimentation rates. Depths were examined during this survey and no measurable changes from 1987 were found.

Ecological Classification: Cosmopolitan

Summary Discussion and Additional Notes: The channel inlet constructed in 1974 continues to be plagued by sedimentation and is currently contributing only a small amount of flow to the island's interior. This channel is scheduled for cleanout and a possible gate-culvert control system in 1991. The bank stabilization project upriver of this channel completed in 1990 should reduce the sedimentation of this

inlet.

Erosion of the upriver end of Island 42 continues to occur with each high water event. A bank stabilization project to protect this area is currently pending under P.L. 99-88.

Spoil deposits from past maintenance dredging by the U.S. Army Corps of Engineers have encroached into the interior water area and covered previously unspoiled flood plain forest with sand. Such spoil placement is no longer utilized by the COE and much of the sand area is beginning to develop vegetative growth.

Wing dams adjacent to the main channel which historically were covered with dredge spoil have been restored by the COE.

A shallow 5-acre backwater site was dredged to a depth of 5-6 feet in the fall of 1986. This area presently provides excellent year-around fish habitat. Sedimentation rates will be monitored at 5-year intervals beginning in 1992.

Island 42 continues to provide valuable habitat for various sport and commercial fish species. The island also provides diverse habitat for many species of wildlife.

Record drought conditions present during 1987, 1988, and 1989 increased vegetation throughout the island's interior which hampered fish sampling efforts. (Two electrofishing stations and one shoreline seining station initially sampled in 1977-78 could not be repeated due to dense vegetation growth.)

All management recommendations from the 1977-78 survey have been implemented or are pending.

Map #1A included in this survey illustrates physical changes to the island since the initial survey of 1977-78.

Types of Sampling Gear Used:

a. Electrofishing: with a boom type shocker, using a Kohler 230 volt A.C. generator, 3 phase current and controlled with a rheostat to provide 5 to 6 amps of output.

b. Trapnetting: 24 hour sets with standard lake survey single pot nets, mesh size 1/2 inch bar measure.

c. Shoreline seine: 25 ft. seine with a 4 ft. depth and 1/4 inch mesh.

d. Conductivity and pH levels were measured with a Presto-Tek DSPH-1 meter.

e. Dissolved oxygen levels were measured with a Yellow Springs instruments oxygen meter - Model No. 54.

Credits and Signatures:
Preliminary report done by Gary Grunwald
Classifications and recommendations by Gary Grunwald

Approved by: Wm. Thom
Area Fisheries Manager

Mark Heywood
Regional Fisheries Supervisor

Federal Aid Project: F-29-R

Management Recommendations: Continue to evaluate experimental bank stabilization techniques implemented in 1990.

Maintain constant fresh water flow through the 1974 inlet channel by working with the COE on channel cleanout and additional gate-culvert control.

Deepen the delta area of the 1988 inlet channel to provide increased fresh water flow at normal pool levels.

Allow no indiscriminate dredge spoil placement on Island 42 during channel maintenance activities, other than the containment area constructed in 1977.

If increased flow is provided to the island interior, dissolved oxygen monitoring during summer and winter should document effect on existing stagnant areas.

Re-sound the 1986 backwater dredging site in 1992 to monitor the rate of sedimentation and thereafter at five-year intervals.

Table I

Island 42

Submerged Vegetation Types

Species	Station Number[1] 1	2	3	4	5	6	8	13	14[2]	15
Filamentous Algae Chlorophyceae	X	X			X	X	X			
Coontail Ceratophyllum demersum	X	X	X	X	X	X	X	X		
Greater Duckweed Spirodela polyrhiza	X	X		X	X	X	X			
Lesser Duckweed Lemna minor	X	X		X	X	X	X			
Canada Waterweed Elodea canadensis	X	X	X		X	X	X			
White Waterlily Nymphaea tuberosa	X		X		X	X	X			
Curled Ponddweed Potamogeton crispus	X	X		X	X	X	X	X		
Watermeal Wolffia columbiana	X	X		X	X	X	X			
River Pondweed Potamogeton nodosus			X							
Mud Plantain Heteranthera dubia	X	X	X		X	X	X			
Narrowleaf pondweed Potamogeton strictifolius	X	X	X	X	X	X	X			
Wild Celery Vallisneria americana			X							
Sago Pondweed Potamogeton pectinatus			X							
Floating Leaf Pondweed Potamogeton natans										

[1]Benthos sampling stations from 1977-78 initial survey - map #3.
[2]Station 14 is now dry land.

Table II

Island 42

Fish and Turtle Species

Common Name	Scientific Name
Shortnose Gar	Lepisosteus platostomus
Bowfin	Amia calva
Gizzard Shad	Dorosoma cepedianum
Northern Pike	Esox lucius
Carp	Cyprinus carpio
Golden Shiner	Notemigonus crysoleucas
Emerald Shiner	Notropis atherinoides
River Shiner	Notropis blennius
Spottail Shiner	Notropis hudsonius
Bluntnose Minnow	Pimephales notatus
River Carpsucker	Carpiodes carpio
Quillback	Carpiodes cyprinus
White Sucker	Catostomus commersoni
Smallmouth Buffalo	Ictiobus bubalus
Spotted Sucker	Minytrema melanops
Silver Redhorse	Moxostoma anisurum
Shorthead Redhorse	Moxostoma macrolepidotum
Channel Catfish	Ictalurus punctatus
Flathead Catfish	Pylodictis olivaris
Green Sunfish	Lepomis cyanellus
Pumpkinseed	Lepomis gibbosus
Bluegill	Lepomis macrochirus
Largemouth Bass	Micropterus salmoides
White Crappie	Pomoxis annularis
Black Crappie	Pomoxis nigromaculatus
Yellow Perch	Perca flavescens
Logperch	Percina caprodes
Sauger	Stizostedion canadense
Walleye	Stizostedion vitreum vitreum
Freshwater Drum	Aplodinotus grunniens
Brown Softshell Turtle	Trionyx mutica
Spiny Softshell Turtle	Trionyx ferox
Snapping Turtle	Cheldra serpentina
Western Painted Turtle	Chrysemys picta bell
False Map Turtle	Chrysemys pseudogeographica
Map Turtle	Graptemys geographica

Table III

Natural Reproduction of Fish Shoal Water Seining

Lake Island 42
County(ies) Wabasha
Date sampled September 5, 1990

Seine Measurements: Length 25 feet, Depth 4 feet, Mesh Size 1/4 -inch square

Station Number in ( )* show number of seine hauls made at each station

	1 (1)	2 (2)	3 (4)	4 (5)	5 ( )	6 ( )	Totals
Total linear distance-Ft.	75 X 12	50 X 12	100 X 12	100 X 12			325 Linear Ft.
Greatest Water Depth-Ft.	1.5	1.5	2.5	2.5			
Bottom Soil Type Vegetation++	sand-silt moderate	sand-silt moderate	sand-silt none	sand-silt light			0.09 Acre(s)
Water Temp. (F.)	76	76	75	75			
Wind Intensity and Direction +	moderate south	moderate south	calm	light south			
Time(Military)	1135	1155	1000	1030			
Location on Lake**							

SIZE AND NUMBERS — TOTALS

SPECIES[1]	YY[2]	O[3]	YY	O	YY	O	YY	O	YY	O	YY	O	YY	O	ALL
River shiner		2				28		9						39	39
Spottail shiner		19		82		7		10						118	118
Bluntnose minnow		7						6						13	13
Shorthead redhorse				1	2								2	1	3
Green sunfish							2						2		2
Pumpkinseed						1								1	1
Bluegill	72		61	10	34	10	142	12					309	32	341
Largemouth bass	1		1				7						9		9
Logperch						2								2	2

++ Heavy, Moderate, Light, None, etc. +Strong, Moderate, Light, Calm.

[1] Group separately minnows and darters without identifying them, unless readily identifiable in field. Preserve sample for later identification in laboratory.

[2] YY - Young of Year or fingerlings.

[3] O - Others, Includes yearlings and adults, minnows and darters.

* Station 3 could not be sampled due to dense vegetation.

** See fish sampling locations from 1977-78 initial survey - map #4.

Table IV

Lake Island 42
County(ies) Wabasha

Trapnetting
August 1-2 1990

Length - Frequency Distributions
Species and Numbers of Fish in Length Groups

Total Length in Inches	CCF	BLG	LMB	WHC	BLC	YEP	SAR
3.0 - 3.4		3					
3.5 -3.9		1					
4.0 - 4.4		1			1		
4.5 - 4.9		1			6		
5.0 - 5.4		10			5		
5.5 - 5.9		6					
6.0 - 6.4		11				1	
6.5 - 6.9		3			1		
7.0 - 7.4		5			3	2	
7.5 - 7.9		1			5		
8.0 - 8.4					9		
8.5 - 8.9					6		
9.0 - 9.4					1		
9.5 - 9.9					1		
10.0-10.4				1	1		
10.5-10.9					1		1
11.0-11.4					1		
11.5-11.9							
12.0-12.9							
13.0-13.9							
14.0-14.9							
15.0-15.9							
16.0-16.9			1				
17.0-17.9							
18.0-18.9							
19.0-19.9	1						
20.0-20.9							
21.0-21.9							
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9							
31.0-31.9							
32.0-32.9							
33.0-33.9							
34.0-34.9							
35.0-35.9							
36.0-36.9							
TOTALS	1	42	1	1	41	3	1

Table IV (continued)

Lake Island 42
County(ies) Wabasha
Trapnetting
August 1-2 1990

Length - Frequency Distributions

Species and Numbers of Fish in Length Groups

Total Length in Inches	WAE	FWD	SNT				
3.0 - 3.4							
3.5 -3.9							
4.0 - 4.4							
4.5 - 4.9							
5.0 - 5.4							
5.5 - 5.9							
6.0 - 6.4							
6.5 - 6.9							
7.0 - 7.4			1				
7.5 - 7.9							
8.0 - 8.4							
8.5 - 8.9							
9.0 - 9.4			1				
9.5 - 9.9							
10.0-10.4							
10.5-10.9							
11.0-11.4							
11.5-11.9			1				
12.0-12.9			2				
13.0-13.9							
14.0-14.9		1	3				
15.0-15.9	1	2					
16.0-16.9		4					
17.0-17.9							
18.0-18.9							
19.0-19.9							
20.0-20.9							
21.0-21.9							
22.0-22.9							
23.0-23.9							
24.0-24.9	1						
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9	-						
31.0-31.9							
32.0-32.9							
33.0-33.9							
34.0-34.9							
35.0-35.9							
36.0-36.9							
TOTALS	2	7	8				

Table IV (continued)

Lake Island 42
County(ies) Wabasha

A.C. Electrofishing
July 18, 1990

Length - Frequency Distributions

Species and Numbers of Fish in Length Groups

Total Length in Inches	LMB	WAE	SAR	BLG	BLC	FCF	SPS
3.0 - 3.4				6			
3.5 - 3.9							
4.0 - 4.4				2			
4.5 - 4.9	1			2			
5.0 - 5.4				3			
5.5 - 5.9	1			1			1
6.0 - 6.4	1			2			
6.5 - 6.9							
7.0 - 7.4							
7.5 - 7.9					1		
8.0 - 8.4	1		1				
8.5 - 8.9							
9.0 - 9.4		1					
9.5 - 9.9	1						
10.0-10.4	2	1			1		
10.5-10.9	1						
11.0-11.4			1				
11.5-11.9							
12.0-12.9	1						
13.0-13.9	1						
14.0-14.9							1
15.0-15.9	1	1					
16.0-16.9	1						
17.0-17.9							
18.0-18.9	1						
19.0-19.9						1	
20.0-20.9							
21.0-21.9		1					
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9							
31.0-31.9							
32.0-32.9							
33.0-33.9							
34.0-34.9							
35.0-35.9							
36.0-36.9							
TOTALS	13	4	2	16	2	1	2

Table IV (continued)

Lake Island 42
County(ies) Wabasha
A.C. Electrofishing
July 18, 1990

Length - Frequency Distributions

Species and Numbers of Fish in Length Groups

Total Length in Inches	QBS	RCS	SLR	FRD	SAB	SHR	CAP
3.0 - 3.4							
3.5 -3.9							
4.0 - 4.4							
4.5 - 4.9							
5.0 - 5.4						2	
5.5 - 5.9							
6.0 - 6.4							
6.5 - 6.9			1				
7.0 - 7.4							
7.5 - 7.9							
8.0 - 8.4							
8.5 - 8.9							
9.0 - 9.4							
9.5 - 9.9							
10.0-10.4						2	
10.5-10.9						1	
11.0-11.4						1	
11.5-11.9							
12.0-12.9				1		1	
13.0-13.9	4		1			1	
14.0-14.9			1				
15.0-15.9					1		1
16.0-16.9				1			
17.0-17.9		1					
18.0-18.9							
19.0-19.9							
20.0-20.9			1				
21.0-21.9			2				
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9							
31.0-31.9							
32.0-32.9							
33.0-33.9							
34.0-34.9							
35.0-35.9							
36.0-36.9							
TOTALS	4	1	6	2	1	8	1

Table IV (continued)

Lake Island 42
County(ies) Wabasha

A.C. Electrofishing
July 18, 1990

Length - Frequency Distributions

Species and Numbers of Fish in Length Groups

Total Length in Inches	GIS						
3.0 - 3.4	1						
3.5 - 3.9							
4.0 - 4.4							
4.5 - 4.9							
5.0 - 5.4							
5.5 - 5.9							
6.0 - 6.4							
6.5 - 6.9							
7.0 - 7.4							
7.5 - 7.9							
8.0 - 8.4							
8.5 - 8.9							
9.0 - 9.4							
9.5 - 9.9							
10.0-10.4							
10.5-10.9							
11.0-11.4							
11.5-11.9							
12.0-12.9							
13.0-13.9							
14.0-14.9							
15.0-15.9							
16.0-16.9							
17.0-17.9							
18.0-18.9							
19.0-19.9							
20.0-20.9							
21.0-21.9							
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9						-	
31.0-31.9							
32.0-32.9							
33.0-33.9							
34.0-34.9							
35.0-35.9							
36.0-36.9							
TOTALS	1						

Table IV (continued)

Lake Island 42
County Wabasha

A.C. Electrofishing
Sept. 25, 1990
Length - Frequency Distributions
Species and Numbers of Fish in Length Groups

Total Length in Inches	GIS	WTS	SPS	SLR	BLG	LMB	BLC
< 3.0					1		1
3.0 - 3.4					4		
3.5 - 3.9			1		3	2	
4.0 - 4.4			1		3		
4.5 - 4.9	1		1		2		
5.0 - 5.4					6		
5.5 - 5.9	2				15		1
6.0 - 6.4	1	1		1	8		1
6.5 - 6.9					4	1	
7.0 - 7.4					6		
7.5 - 7.9			1		1		
8.0 - 8.4						2	6
8.5 - 8.9							17
9.0 - 9.4							10
9.5 - 9.9						1	2
10.0-10.4							2
10.5-10.9						1	
11.0-11.4						2	1
11.5-11.9							
12.0-12.9						1	
13.0-13.9							
14.0-14.9			1			2	
15.0-15.9			1			1	
16.0-16.9							
17.0-17.9							
18.0-18.9							
19.0-19.9							
20.0-20.9							
21.0-21.9							
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9							
31.0-31.9							
TOTALS	4	1	6	1	53	13	41

Table IV (continued)

Lake Island 42
County Wabasha

A.C. Electrofishing
Sept. 25, 1990
Length - Frequency Distributions
Species and Numbers of Fish in Length Groups

Total Length in Inches	YEP	WAE	FRD				
3.0 - 3.4							
3.5 - 3.9							
4.0 - 4.4							
4.5 - 4.9							
5.0 - 5.4							
5.5 - 5.9	1						
6.0 - 6.4							
6.5 - 6.9	1						
7.0 - 7.4							
7.5 - 7.9							
8.0 - 8.4							
8.5 - 8.9							
9.0 - 9.4							
9.5 - 9.9							
10.0-10.4							
10.5-10.9							
11.0-11.4							
11.5-11.9							
12.0-12.9							
13.0-13.9							
14.0-14.9							
15.0-15.9			1				
16.0-16.9							
17.0-17.9		1					
18.0-18.9							
19.0-19.9							
20.0-20.9							
21.0-21.9							
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9							
31.0-31.9							
32.0-32.9							
33.0-33.9							
TOTALS	2	1	1				

Table IV (continued)

Lake Island 42
County Wabasha

A.C. Electrofishing
July and September combined
Length - Frequency Distributions
Species and Numbers of Fish in Length Groups

Total Length in Inches	GIS	CAP	RCS	QBS	WTS	SAB	SPS
3.0 - 3.4	1						
3.5 - 3.9							1
4.0 - 4.4							1
4.5 - 4.9	1						1
5.0 - 5.4							
5.5 - 5.9	2						1
6.0 - 6.4	1				1		
6.5 - 6.9							
7.0 - 7.4							
7.5 - 7.9							1
8.0 - 8.4							
8.5 - 8.9							
9.0 - 9.4							
9.5 - 9.9							
10.0-10.4							
10.5-10.9							
11.0-11.4							
11.5-11.9							
12.0-12.9							
13.0-13.9				4			
14.0-14.9							2
15.0-15.9		1				1	1
16.0-16.9							
17.0-17.9			1				
18.0-18.9							
19.0-19.9							
20.0-20.9							
21.0-21.9							
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9							
31.0-31.9							
32.0-32.9							
33.0-33.9							
34.0-34.9							
35.0-35.9							
36.0-36.9							
TOTALS	5	1	1	4	1	1	8

Table IV (continued)

Lake Island 42
County Wabasha

A.C. Electrofishing
July and September combined
Length - Frequency Distributions
Species and Numbers of Fish in Length Groups

Total Length in Inches	SLR	SHR	FCF	BLG	LMB	BLC	YEP
< 3.0				1		1	
3.0 - 3.4				10			
3.5 - 3.9				3	2		
4.0 - 4.4				5			
4.5 - 4.9				4	1		
5.0 - 5.4		2		9			
5.5 - 5.9				16	1	1	1
6.0 - 6.4	1			10	1	1	
6.5 - 6.9	1			4	1		1
7.0 - 7.4				6			
7.5 - 7.9				1		1	
8.0 - 8.4					3	6	
8.5 - 8.9						17	
9.0 - 9.4						10	
9.5 - 9.9					2	2	
10.0-10.4		2			2	3	
10.5-10.9		1			2		
11.0-11.4		1			2	1	
11.5-11.9							
12.0-12.9		1			2		
13.0-13.9	1	1			1		
14.0-14.9	1				2		
15.0-15.9					2		
16.0-16.9					1		
17.0-17.9							
18.0-18.9					1		
19.0-19.9			1				
20.0-20.9	1						
21.0-21.9	2						
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9							
31.0-31.9							
32.0-32.9							
TOTALS	7	8	1	69	26	43	2

Table IV (continued)

Lake Island 42
County Wabasha

A.C. Electrofishing
July and September combined
Length - Frequency Distributions
Species and Numbers of Fish in Length Groups

Total Length in Inches	SAR	WAE	FRD				
3.0 - 3.4							
3.5 - 3.9							
4.0 - 4.4							
4.5 - 4.9							
5.0 - 5.4							
5.5 - 5.9							
6.0 - 6.4							
6.5 - 6.9							
7.0 - 7.4							
7.5 - 7.9							
8.0 - 8.4	1						
8.5 - 8.9							
9.0 - 9.4		1					
9.5 - 9.9							
10.0-10.4		1					
10.5-10.9							
11.0-11.4	1						
11.5-11.9							
12.0-12.9			1				
13.0-13.9							
14.0-14.9							
15.0-15.9		1	1				
16.0-16.9			1				
17.0-17.9		1					
18.0-18.9							
19.0-19.9							
20.0-20.9							
21.0-21.9		1					
22.0-22.9							
23.0-23.9							
24.0-24.9							
25.0-25.9							
26.0-26.9							
27.0-27.9							
28.0-28.9							
29.0-29.9							
30.0-30.9							
31.0-31.9							
32.0-32.9							
33.0-33.9							
TOTALS	2	5	3				

Table V-A

LAKE ELECTROFISHING REPORT

Lake Name Island 42 River mile 749.0 County Wabasha
Date 7-18-90 Time of Day 0930 Target Species All
Boat Type 16' Semi-V Current Output 230 volts at 6 amperes
Current Type: AC X DC __ Pulsed? __ Duty Cycle _____ Pulse Rate _____
Electrodes
Anode -- Number 3 Type: Cable X Hoop ___ Other _____
Cathode- Number ___ Type: Cable ___ Hoop ___ Other _____

Water Temperature 78 F Secchi Disk 24" Conductivity 470
Wind Direction(from) _____ Intensity: Strong __ Mod. __ Light __ Calm X

Crew Leader Gary Grunwald Crew Members Randy Binder

	Station No. 2	Station No. 3
Location	inlet channel - east shore	dredge cut perimeter - southeast corner
Duration-min	20	20
Length-0.1 mi	0.3	0.3
Vegetation		
% Occurrence	0 25 50 X75 100	0 X25 50 75 100
Density	X Dense Mod Sparse None	Dense Mod X Sparse None
Bottom Types	silt	sand-silt
Avg. Depth Worked	2 feet	2.5 feet

Species	Number Caught	Total Wt.	Catch / Hr	Catch /Mile	Number Caught	Tot. Wt.	Catch / Hr	Catch /Mile
Largemouth bass	6	10.2	18	18	4	2.6	12	12
Sauger	1	2.5	3	3				
Bluegill	3	0.3	9	9	7	0.1	21	21
Flathead cat.	1	2.5	3	3				
Spotted sucker	1	0.1	3	3	1	1.3	3	3
Walleye					3	4.8	9	9
Black crappie					2	0.8	6	6
Quillback					4	4.6	12	12
River carpsckr.					1	2.5	3	3
Silver redhorse					3	4.6	3	3
TOTALS	12	15.6	36	36	Continued on next page			

Remarks At station 2, fish were sighted and positively identified as follows: 7 adult largemouth bass, 17 adult carp, 4 silver redhorse, 2 freshwater drum, 1 shortnose gar, and very abundant yearling to adult bluegill. Station 3: 9 adult bluegill, 3 adult black crappie, 34 adult carp, 7 adult carpsucker spp., and 3 adult spotted sucker. Yearling bluegill, young-of-year largemouth bass, and young-of-year gizzard shad were very abundant. Stations 1 and 5 could not be sampled due to submerged vegetation and floating duckweed.

Attach Length - Frequency Distribution Sheet for all Stations combined.

Station Number 3 (continued) Station Number ____

Location		
Duration-min		
Length-0.1 mi		
Vegetation		
% Occurrence	0 25 50 75 100	0 25 50 75 100
Density	Dense Mod. Sparse None	Dense Mod. Sparse None
Bottom Types		
Avg. Depth Worked		

Species	Number Caught	Total Wt.	Catch / Hr	Catch /Mile
Freshwater drum	1	0.7	3	3
Smallmouth buffalo	1	1.6	3	3
Shorthead redhorse	6	1.9	18	18
Carp	1	2.1	3	3
Gizzard shad	7	0.1	21	21
TOTALS	41	27.7	117	117

Station Number 4 Station Number ____

Location	center of island interior	
Duration-Min	20	
Length-0.1 mi	0.3	
Vegetation		
% Occurrence	0 25 50 X75 100	0 25 50 75 100
Density	XDense Mod. Sparse None	Dense Mod Sparse None
Bottom Types	silt	
Avg. Depth Worked	2 feet	

Species	Number Caught	Total Wt.	Catch / Hr	Catch /Mile	Number Caught	Tot. Wt.	Cat /Hr	Cat /Mi
Walleye	1	0.3	3	3				
Largemouth bass	3	0.4	9	9				
Bluegill	8	0.4	24	24				
Freshwater drum	1	1.5	3	3				
Shorthead redhorse	2	1.3	6	6				
Silver redhorse	3	7.4	9	9				
TOTALS	18	11.3	54	54				

Remarks Fish sightings for station 4 were: 4 adult largemouth bass, 19 adult carp, 7 adult shorthead redhorse, 2 adult silver redhorse, and 1 adult bowfin. Yearling to adult bluegill were very abundant.

Table V-B LAKE ELECTROFISHING REPORT

Lake Name Island 42 River mile 749.0 County Wabasha
Date 9-25-90 Time of Day 0900-1300 Target Species All
Boat Type 16' Semi-V Current Output 230 volts at 6.25 amperes
Current Type: AC X DC Pulsed? Duty Cycle Pulse Rate
Electrodes
Anode -- Number 3 Type: Cable X Hoop Other
Cathode- Number Type: Cable Hoop Other

Water Temperature 60 F Secchi Disk 20" Conductivity
Wind Direction(from) South Intensity: Strong Mod. Light X Calm

Crew Leader Gary Grunwald Crew Members Dave McCormack

	Station No. 2	Station No. 3
Location	inlet channel - east shore	dredge cut perimeter - southeast shore
Duration-min	20	20
Length-0.1 mi	0.3	0.3
Vegetation		
% Occurrence	0 X25 50 75 100	0 25 X50 75 100
Density	Dense Mod XSparse None	Dense XMod Sparse None
Bottom Types	silt-sand	silt
Avg. Depth Worked	1.5 feet	2 feet

Species	Number Caught	Total Wt.	Catch / Hr	Catch /Mile	Number Caught	Tot. Wt.	Catch / Hr	Catch /Mile
Gizzard shad	4		12	12				
Spotted sucker	5	1.8	15	15	1	1.8	3	3
Silver redhorse	1		3	3				
Bluegill	19	3.2	57	57	21	4.3	63	63
Largemouth bass	6	4.1	18	18	3	3.3	9	9
Black crappie	3	1.1	9	9	37	17.1	111	111
Yellow perch	1	0.2	3	3	1	0.1	3	3
Walleye					1	1.6	3	3
Freshwater drum	1	1.8	3	3				
TOTALS	40	12.1	120	120	64	28.3	192	192

Remarks Fish sighted and positively identified are as follows: Station 2: 12 adult carp, 3 adult black crappie, and 2 adult freshwater drum; the following species were common: young-of-year to adult spotted sucker, young-of-year to adult bluegill, young-of-year redhorse spp., brook silversides and emerald shiner. Young-of-year largemouth bass were seen occasionally. Station 3: 2 adult carp, 12 adult spotted sucker, and 11 adult northern pike. Young-of-year gizzard shad and young-of-year bluegill were common.

-Attach Length - Frequency Distribution Sheet for all Stations combined.

Lake Name Island 42 River Mile 49.0 Date 7-18-90 Pg 2

Station Number 4	Station Number
Location center of island	
Duration-min 20	
Length-0.1 mi 0.3	
Vegetation	
% Occurrence 0 25 X50 75 100	0 25 50 75 100
Density Dense XMod. Sparse None	Dense Mod. Sparse None
Bottom Types silt	
Avg. Depth Worked 1.5 feet	

Species	Number Caught	Total Wt.	Catch / Hr	Catch /Mile
White sucker	1	0.1	3	3
Bluegill	12	1.9	36	36
Largemouth bass	4	3.3	12	12
Black crappie	1	0.3	3	3
TOTALS	18	5.6	54	54

Station Number	Station Number
Location	
Duration-Min	
Length-0.1 mi	
Vegetation	
% Occurrence 0 25 50 75 100	0 25 50 75 100
Density Dense Mod. Sparse None	Dense Mod Sparse None
Bottom Types	
Avg. Depth Worked	

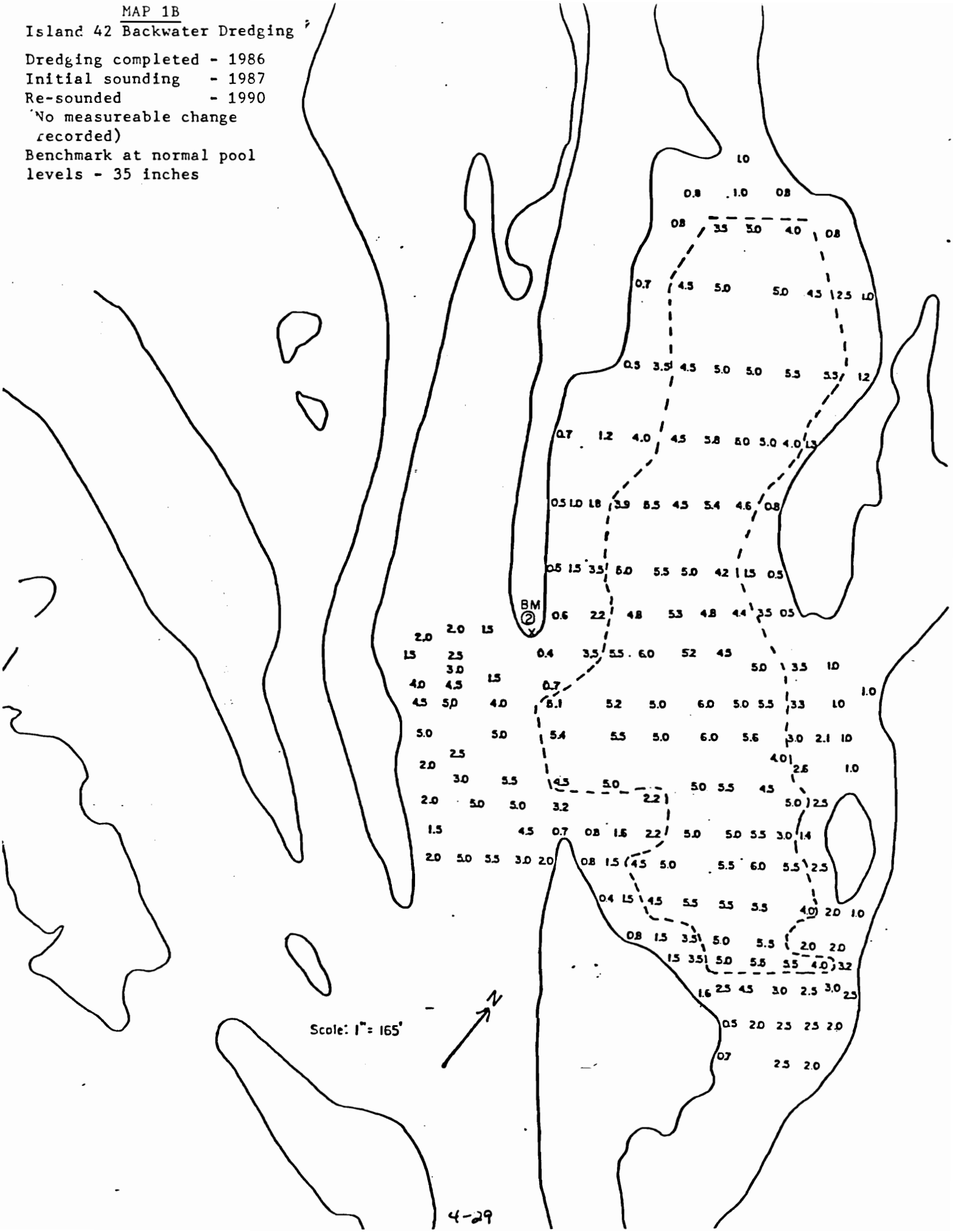
Species	Number Caught	Total Wt.	Catch / Hr	Catch /Mile	Number Caught	Tot. Wt.	Cat /Hr	Cat /Mi
TOTALS								

Remarks Fish sightings for station 4 were: 2 adult bowfin. Adult carp were very abundant. The following were common: young-of-year gizzard shad, brook silversides, and yearling to adult bluegill. Stations 1 and 5 could not be done due to solid beds of submerged vegetation and floating duckweed.

MAP 1B

Island 42 Backwater Dredging

Dredging completed - 1986
Initial sounding - 1987
Re-sounded - 1990
(No measureable change recorded)
Benchmark at normal pool levels - 35 inches



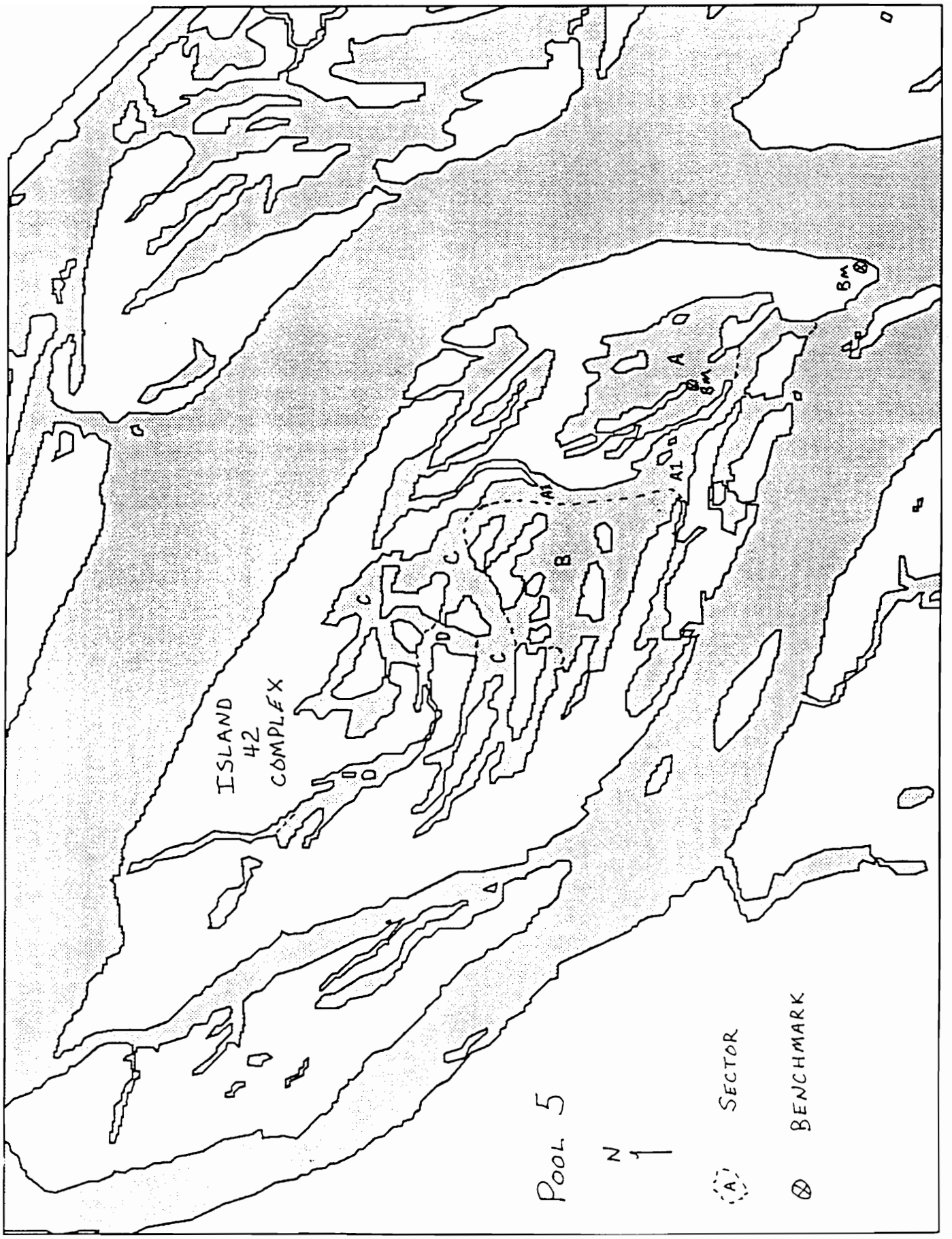
4-29

Appendix 5

Minnesota DNR Habitat Evaluation Report

HABITAT EVALUATION - POOL 5 - ISLAND 42 COMPLEX

SECTOR	DATE	% OF SECTOR WITH SUBMERGED VEGETATION	VEGETATION DENSITY	SPECIES & % RELATIVE COMPOSITION	% OF SECTOR COVERED BY FLOATING LEAF VEGETATION	SURFICIAL SUBSTRATE % RELATIVE COMPOSITION	SECCHI (FT)	WATER DEPTH (FT)	POOL ELEVATION (FT)	WATER TEMP (°F)	DISSOLVED OXYGEN MG/L
A	6-17-93	55	S	POPE - 70 POCR - 10 CEDE - 15 PONO - 5 ELCA - Tr. POZO - Tr.	50	sand - 20 sand/silt - 30 silt/sand - 20 silt - 30	2.0	3-8	663.16 AMAW3 DCP	70	--
	8-23-93	<5	S	CEDE - Tr.	35	sand/silt - 10 silt/clay - 20 silt - 70	1.9	3-7.5	662.59	74	6.5
A_1	6-17-93	15	S	CEDE - 40 PONO - 25 POCR - 35	10	sand - 25 sand/silt - 45 silt/sand - 20 silt - 10	2.0	variable 3-9	663.16	70	--
	8-23-93	<5	S	CEDE - Tr. PONO - Tr.	20	sand/silt - 40 silt/sand - 30 silt - 30	1.8	variable 4-9.5	662.59	73	6.6
B	6-17-93	85	M	POPE - 55 CEDE - 10 POCR - 15 PONO - 10 MYSP - Tr.	85	sand/silt - 10 silt/sand - 30 silt - 60	2.0	3-7	663.16	70	--
	8-23-93	<5	S	CEDE - Tr. MYSP - Tr.	75	sand/silt - 15 silt/sand - 30 silt/muck - 55	1.8	3.5-5.5(4)	662.59	73	6.3
C	6-17-93	100	M	PONO - 10 POPE - 40 CEDE - 30 POCR - 15 ELCA - 5	60	sand - 5 sand/silt - 10 silt/sand - 20 silt/muck - 65	2.5	2.5-6.5(3.5)	663.16	70	--
	8-23-93	<5	S	CEDE - 100 PONO - Tr.	65	silt/sand - 25 silt/detritus - 75	1.7	2.5-5.5(3.5)	662.59	74	6.8
D	6-17-93	40	M	PONO - 35 POPE - 20 CEDE - 15 POCR - 25 MYSP - 5	15	sand/silt - 45 silt/sand - 20 silt - 35	2.5	variable 3-8	663.16	68	--
	8-23-93	<5	S	MYSP - 60 PONO - 40 CEDE - Tr.	15	sand - 30 sand/silt - 40 silt/sand - 20 silt - 10	1.0	variable 3-6.5	662.59	75	6.5



Field Notes:

6-17-93 The control structure at the northwest end of this complex was closed, but flows were entering the complex through two overflow channels connecting a side channel on the west side of Island 42 with Sector D. A heavy bedload and suspended solids were being transported by these flows. Flows also entered the Island 42 complex from the main channel via two openings at the northeast corner flowing through Sector A, and across a low area on the north side of Sector A into Sector A. Some flow also entered from West Newton Chute on the south side and flowed through sectors B and A_1. All flows through this complex basically follow a northwest to southeast pattern. Diversity and abundance of submerged vegetation during the summers of 1990-92 was very low (Personal observations). Diversity and abundance of submerged vegetation on this date was markedly better. The water level is 3.0 feet below the benchmark.

8-23-93 All sectors have experienced a drastic decline in the diversity and abundance of submerged vegetation since this summer's flood. Substrates and depths in some sectors have changed considerably, especially in Sector D. Even though the control structure is still closed, very turbid water from the Zumbro continues to enter this complex through two overflow channels connecting a side channel on the west side of the complex to Sector D. The water level is 2.6 feet below the benchmark. This water level measurement is very interesting when compared to the measurement for 6-17-93 and in overall comparison to readings from a COE gauge located .5 mile above the benchmark.

HABITAT EVALUATION - POOL 5 - Island 42

SECTOR	DATE	% OF SECTOR WITH SUBMERGED VEGETATION	VEGETATION DENSITY	SPECIES & % RELATIVE COMPOSITION	% OF SECTOR COVERED BY FLOATING LEAF VEGETATION	SURFICIAL SUBSTRATE % RELATIVE COMPOSITION	SECCHI (FT)	WATER DEPTH (FT)	POOL ELEVATION (FT)	WATER TEMP (°F)
A	6-06-94	35	S/M	POPE - 85 POCR - 15	20	sand/silt - 15 silt/clay - 20 silt - 65	0.3	1.5 - 6	660.93	75
A1	6-06-94	20	S	POPE - 55 POCR - 45 CEDE - tr.	5	sand/silt - 30 silt/sand - 40 silt - 30	0.5	2 - 8 variable	660.93	74
B, C	6-06-94	80	M	POPE - 45 POCR - 40 CEDE - 15 PONO - tr.	40	sand/silt - 10 silt/sand - 25 silt - 45 muck - 20	0.6	1 - 4 (3)	660.93	74
D	6-06-94	25	S	POPE - 45 POCR - 20 PONO - 20 MYSP - 15	10	sand - 30 sand/silt - 40 silt/sand - 10 silt - 20	0.9	1.5 - 5 variable	660.93	73

5-4

Field Notes:

6-06-94 Water levels and flows are relatively stable. Flow from the culvert located in the northern part of the Island 42 complex is providing relatively cooler and less turbid water to this area through Sector D. Submerged vegetation is mostly scattered and sparse throughout this complex. The water level is 4.7 feet below the benchmark located in Sector A.

Appendix 6

COE/FWS Vegetation Monitoring

MEMORANDUM FOR RECORD

From: Robert Anfang, PE-P-ER 3 October 1994

Subject: Revegetation Monitoring, Island 42 EMP, August 1994.

1. On 18 August 1994, Gary Wege (Twin Cities Field Office, U.S. Fish and Wildlife Service) and Bob Anfang (PE-P) monitored the Island 42 Environmental Management Program project site. This memorandum summarizes the results of the monitoring.

2. Island 42 is an Environmental Management Program project. The project consisted of a dredged channel to provide flow and oxygen to the backwater area. The dredged material was sidecast and seeded in June 1987. The area was broadcast seeded at a rate of about 100 lbs./acre with the following mixture.

blue grass (*Poa sp.*)
brome (*Bromus sp.*)
timothy (*Phleum pratense*)
sand dropseed (*Sporobolus cryptandrus*)
ryegrass
birdsfoot trefoil (*Lotus corniculatus*)

3. The purpose of the monitoring is to determine the success of the plantings and to evaluate the suitability of species for future sites. Percent cover estimates have been recorded for three years since the area was seeded. Early monitoring only recorded overall percent cover. In 1994 percent cover was estimated for the entire plot and for individual species on each of the plots. In addition, Robel readings were taken at each of the cover plots. Robel readings are an indication of the height-density relationship of grassland vegetation. A Robel reading of 1.5 decimeters after two years has been identified as a goal of other EMP projects. A species list, including plants identified while walking through the site, was also prepared. This is not a major portion of the monitoring, but does give an indication of other species present.

4. An average Robel reading of 2.7 was recorded in 1994. This was the first year Robel measurements were taken. It is expected that Robel readings will fluctuate from year to year. See summary table attached to this memorandum.

5. Total percent cover was estimated on each of the quarter-square meter plots. The cover percentages for the years of monitoring are presented below.

	Percent Cover		
Area	1988	1989	1994
Island 42	68	92	77

6. In 1994 the percent cover was also estimated for each species on the plot.

The frequency, relative frequency, dominance, relative dominance, and importance value was also calculated for each species. Based on Importance Value the dominant species are brome and birdsfoot trefoil. These species seem to have always been the dominant species. Switchgrass, sand dropseed, and clover are present to varying degrees. In any particular year some of these species will probably always be seen. Summary tables for the frequency, dominance, and importance values are attached to this memorandum.

7. A list of species observed while walking through the area is attached to this memorandum. A few weedy species are present and woody species are starting to invade the area.

8. A soil sample was taken on the island to determine the percentage of fine material. The area is basically a dense cover of vegetation so the sample reflects that type of site. The results show that 13.5 percent of the surface soil consists of fine material.

9. In summary, the seeded area is well established and continues to be dominated by seeded species 7 years after seeding. There is a dominance of seeded species, sparsity of weedy species, good overall percent cover, and a Robel reading of 2.7 that exceeds EMP project goals.

Robert Anfang
Forester,
Corps of Engineers

Gary Wege
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service

cf: Dan Wilcox PE-P
Don Powell PE-P
Dan Krumholz CO-M Fountain City

FORMULAE FOR VEGETATION ANALYSIS

1. Frequency relates to the number of times a species occurs in a given number of repeatedly placed small plots or sample points. It is expressed as a fraction of the total, usually in percent.

Relative frequency is a measure of a species frequency in relation to the frequency of all species. It is usually expressed in percent.

$$\text{Frequency} = \frac{\text{Number of points of occurrence of the species}}{\text{Total points taken}} \times 100$$

$$\text{Relative frequency} = \frac{\text{Frequency of the species}}{\text{Sum of frequency of all species}} \times 100$$

2. Dominance relates to the percent cover of a species on a given number of plots or sample points. It is expressed as an average percent cover.

Relative dominance is a measure of the species percent cover in relation to the cover of all species. It is usually expressed in percent.

$$\text{Dominance} = \frac{\text{Total \% cover of the species}}{\text{Total points taken}}$$

$$\text{Relative dominance} = \frac{\text{Total \% cover of the species}}{\text{Total \% cover of all species}} \times 100$$

3. Importance value is an overall measure of a species role in the area based on its frequency of occurrence and percent cover. Relative values of frequency and dominance are averaged to determine the importance value of a species. The importance value of a species reaches a maximum of 100 in stands consisting of only one species.

$$\text{Importance Value} = \frac{\text{Relative dominance} + \text{Relative Frequency}}{2}$$

4. The Jaccard Index is a mathematical expression for the similarity of plant communities. It is based on the presence-absence relationship between the number of species common between the areas and the total number of species.

Jaccard's Index of Species Similarity

$$IS_J = \frac{\text{Number of species common to both areas}}{\text{Number of species found on both areas}} \times 100$$

TABLE OF ROBEL HEIGHT/DENSITY READINGS

	1994
ISLAND 42 – Adjacent to Channel	2.7

TABLE OF FREQUENCY AND RELATIVE FREQUENCY DATA

		Frequency				Relative Frequency			
		1994				1994			
	ISLAND 42 – Adjacent to Channel								
*	brome	100				38			
*	birdsfoot trefoil	90				35			
*	Poa sp.	60				23			
	reed canary grass	10				4			
*	rye								
*	timothy								
*	sand dropseed								

NOTES:

* Denotes seeded species

TABLE OF DOMINANCE AND RELATIVE DOMINANCE DATA

ISLAND 42 – Adjacent to Channel

		Dominance				Relative Dominance			
		1994				1994			
*	brome	50				65			
*	birdsfoot trefoil	18				23			
*	Poa sp.	9				12			
	reed canary grass	1				1			
*	rye								
*	timothy								
*	sand dropseed								

NOTES:

* Denotes seeded species

TABLE OF IMPORTANCE VALUES

1994

ISLAND 42 – Adjacent to Channel

*	brome	52		
*	birdsfoot trefoil	29		
*	Poa sp.	17		
	reed canary grass	2		
*	rye			
*	timothy			
*	sand dropseed			

NOTES:

* Denotes seeded species

LIST OF SPECIES OBSERVED AT PROJECT SITE

1994

ISLAND 42 – Adjacent to Channel

*	brome	x		
*	birdsfoot trefoil	x		
*	Poa sp.	x		
	reed canary grass	x		
*	rye			
*	timothy			
*	sand dropseed			
	mullein	x		
	thistle	x		
	goosefoot	x		
	marestail	x		
	milkweed	x		
	Virginia creeper	x		
	evening primrose	x		
	cottonwood	x		
	maple	x		
	blue stickseed	x		
	switchgrass	x		
	oak	x		

NOTES:

* Denotes seeded species

RESULTS OF SOIL ANALYSIS

In 1994 soil samples were taken to determine the amount of fine material peresent. The samples were primarily taken using a soil probe, which samples approximately the surface 8 to 12 inches. The percentages show the amount of material passing the indicated sieve.

Sample Location	Dry Weight of Sample (grams)	Percent Passing Sieve		Soil Type
		#4	#200	
Cold Springs				
dense cover	289	97.3	66.2	sandy lean clay with trace of gravel (CL)
sparse cover	320	98.3	68.1	sandy lean clay with trace of gravel (CL/CL–ML)
no cover (depression)	505	99.1	58.3	sandy lean clay (CL)
dense cover	324	99.4	71.4	lean clay with sand (CL)
Pool 8 Islands				
Horseshoe Island				
dense cover	284	98.8	42.4	clayey sand with trace of gravel (SC)
Long Island				
sparse cover	477	99.9	29.1	clayey sand (SC)
dense cover	334	99.8	43.9	clayey sand (SC/SC–SM)
Onalaska Islands				
Broken Gun				
dense cover	276	100.0	37.0	clayey sand (SC)
Cormorant				
dense cover	323	97.9	37.7	clayey sand with trace of gravel (SC)
Arrowhead				
dense cover	259	99.9	51.4	sandy lean clay (CL/SC)
Island 42				
dense cover	392	99.8	13.5	silty sand (SM/SP–SM)
Weaver Bottoms				
Swan Island				
dense cover	332	99.5	27.2	clayey sand (SC)
Mallard Island				
sparse cover	449	99.7	32.2	clayey sand (SC)

ROBEL POLE READING FIELD SHEET

LOCATION: Island 42 DATE: 8/18/94

NOTES:

Plot No.	Reading No. 1	2	3	4	Average
1	3.0	2.0	2.0	1.5	
2	2.5	5.0	4.0	4.0	
3	3.0	2.0	3.5	1.5	
4	3.0	3.0	4.0	3.0	
5	4.0	3.5	2.5	2.0	
6	2.0	3.0	3.0	2.0	
7	2.0	2.5	3.5	4.0	
8	2.0	1.5	3.0	6.0	
9	1.5	2.0	2.0	2.5	
10	2.0	1.5	2.0	2.0	
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
Total					
Average					

$109/40 = 2.7$

6-10

REVEGETATION MONITORING

DATE: 8/16/94		LOCATION: Island 42	
PLOT NO.	% COVER	SPECIES	SPECIES LIST AND NOTES
1	70	50 brome 20 birdsfoot	birdsfoot brome
2	80	70 brome 10 birdsfoot	mullein
3	80	50 brome 25 POA 5	thistle groundsel
4.	75	10	mullein
5	75	65 brome 10 POA 5	
6	80	35 brome 10 POA	
7	90	40 birdsfoot	
8	60	30 brome 15 POA 5 P Grass 30 brome	oak cottonwood maple
9	80	30 birdsfoot 60 brome 20 POA	
10.	80	50 brome 20 birdsfoot 10 POA	

ISLAND 42 Aug. 16, 1994

PLOT NUMBER

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
brome															
Present	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
Cover	50.00	70.00	50.00	65.00	60.00	35.00	30.00	30.00	60.00	50.00					
birdsfoot trefoil															
Present	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00					
Cover	20.00	10.00	5.00	10.00	5.00	35.00	40.00	30.00	0.00	20.00					
Poa sp.															
Present	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00					
Cover	0.00	0.00	25.00	0.00	10.00	10.00	15.00	0.00	20.00	10.00					
reed canary grass															
Present	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00					
Cover	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00					
Present	0.00														
Cover	0.00														
Present	0.00														
Cover	0.00														
Present	0.00														
Cover	0.00														
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Present	0.00														
Cover	0.00														
Present	0.00														
Cover	0.00														
Present	0.00														
Cover	0.00														
% Cover															
Total Cover	70.00	80.00	80.00	75.00	75.00	80.00	90.00	60.00	80.00	80.00					

NOTES: 1. ENTER 1 FOR PRESENT AND 0 FOR NOT PRESENT.
2. ENTER 0's FOR NO DATA FOR SPECIES ON THAT PLOT.
3. 0's must be entered for program to calculate correctly
4. Total Cover is total plot cover from field sheets
5. ENTER PRESENCE AND % COVER BY SPECIES FOR EACH PLOT AND % COVER ON EACH PLOT. Other numbers are automatically calculated.
6. Copy species names from column A to column AL to make it easier to read results.
7. Copy this data sheet to another file after entering data.

6-12

6-13

% Cover	Freq.	Rel. Freq.	Dom.	Rel. Dom.	I.V.	SPECIES
		SUMMARY				Page 3 of 3
% cover by species 500.00	100.00	38.46	50.00	64.94	51.70	brome
175.00	90.00	34.62	17.50	22.73	28.67	birdsfoot trefoil
90.00	60.00	23.08	9.00	11.69	17.38	Poa sp.
5.00	10.00	3.85	0.50	0.65	2.25	reed canary grass
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	
0.00	0.00	0.00	0.00	0.00	0.00	

770.00 Total cover off ALL species on ALL plots (Total of AF 1 – 58). May be higher than % cover on all plots (AF 61). Used in Rel. Dom. calculation.

770.00 Total % cover on all plots (Sum of row 62). Used in Ave. Percent Cover calculation.

Ave. % Cover	Freq.	Rel. Freq.	Rel. Dom.	
77.00	260.00	100.00	100.00	Totals for Freq., Rel.Freq., and Rel.Dom.

AVERAGE PERCENT COVER (Ave. of Cell AF 61).

Rel. Freq. and Rel. Dom. should total 100

Freq. total is used in calc. for rel. freq.

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