

1987 VEGETATION TRANSECTS AND ANALYSIS

CRANBERRY POOL NORTH

DECEMBER 1987

John B. Gallegos, Assistant Refuge Manager

Juanita I. Blaskowski, Outdoor Recreation Planner

MISSISQUOI NATIONAL WILDLIFE REFUGE

Swanton, Vermont

1987 CRANBERRY POOL VEGETATION TRANSECTS

I. INTRODUCTION

During early 1987, refuge staff began assessing the feasibility of completing the remaining mile or so of diking along the western side of the Cranberry Pool and the eastern bank of the Missisquoi River. The assessment was prompted by the realization that the objectives of the Cranberry Pool were not being fully met, particularly during the high-water periods of each spring, and that the solution to meeting those objectives was completion of the dike system - to exclude river floodwaters. The refuge "Water Management Plan" deals with this matter in greater detail. Map #1 details the existing and proposed dike locations to complete the dike system.

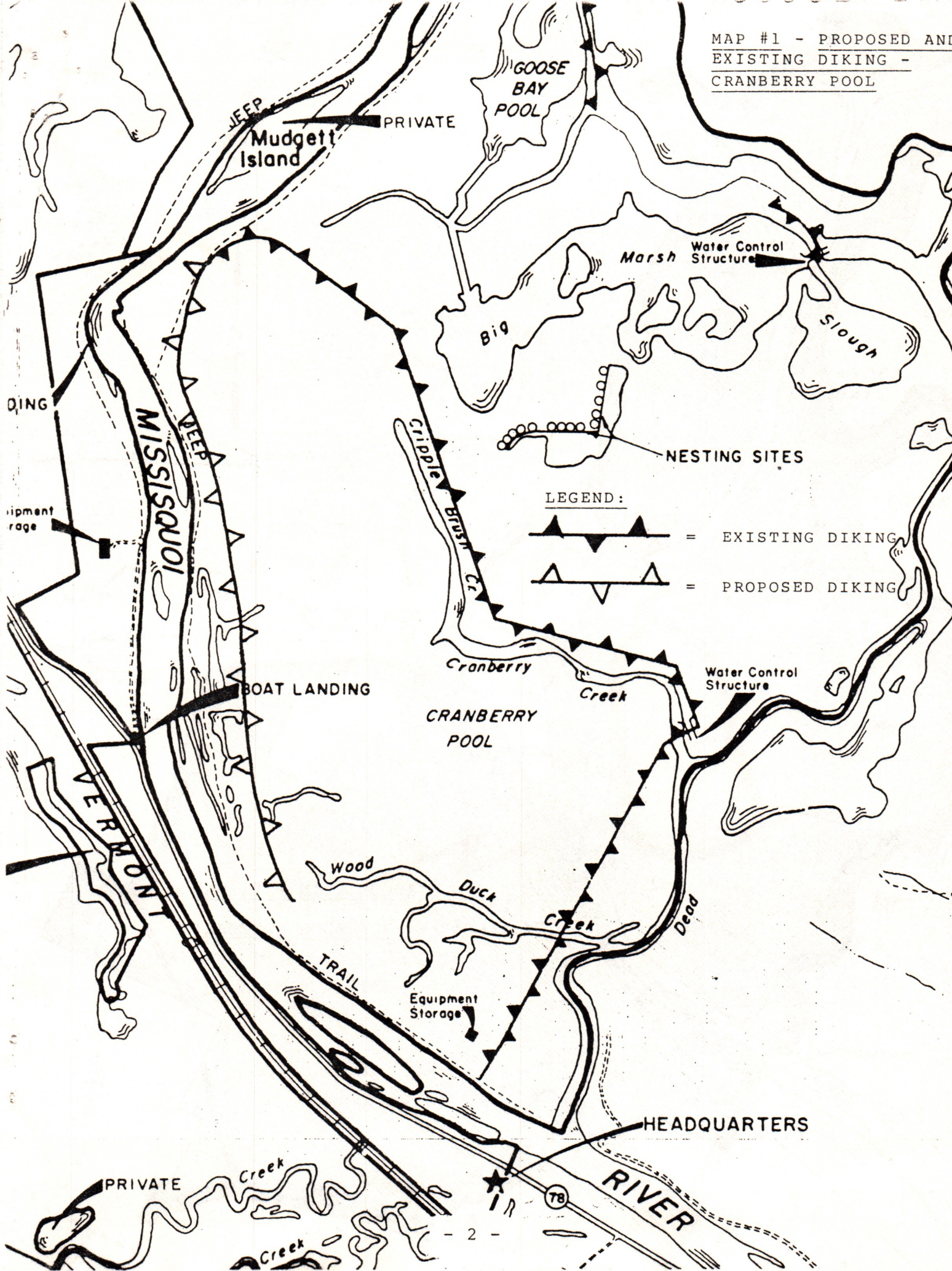
Since an original proposal to complete the dike system had been withdrawn during the 1970s in the face of objections from the Vermont Fish and Wildlife Department, and because of political ramifications at that time, it was decided that refuge staff would try to address the objections voiced by the Fish and Wildlife Department. A main concern had been potential negative impacts to refuge northern pike spawning habitats. Mr. Jon Anderson, the local Vermont Fisheries Biologist for this area, was contacted during the early summer of 1987. His concerns were recorded and forwarded to our Regional Office, together with his recommendations. Jon requested that we conduct several transects across the areas that will be affected by the proposed dike completion, to allow him a better assessment of potential pike spawning impacts.

Originally, four transects were proposed. However, because of time and manower constraints (each transect required 1 - 2 people for 4 - 5 full workdays), the number of transects completed was three.


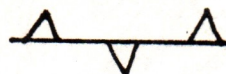
Personnel conducting the survey consisted of Assistant Manager Gallegos, Outdoor Recreation Planner Blaskowski, and, on one occasion, Zone Biologist Gerry Atwell.

The transect locations are shown on Map #2.

MAP #1 - PROPOSED AND
EXISTING DIKING -
CRANBERRY POOL



LEGEND:

-  = EXISTING DIKING
-  = PROPOSED DIKING

II. MATERIALS

Supplies and tools necessary to complete the transects included hip-boots or waders, insect repellent, a 13' aluminum canoe, stakes, hammer, nails (brads - to lengthen stakes by nailing them together for deeper water and dense low cover), blaze-orange flagging, blaze-orange spray paint, rope - for dragging canoe, binoculars, clipboard with field map and data sheets, pencils/pen, a good compass, machete, and plant identification guides. Identification guides used in the preparation of this report and the plant listings were: "A Manual of Aquatic Plants" - Norman C. Fassett, 1980, The University of Wisconsin Press; "A Field Guide to Wildflowers" - Roger T. Peterson and Margaret McKenny, 1968, Lancaster Press, Inc., Lancaster, Pennsylvania; and "Field Guide to the Grasses, Sedges and Rushes of the United States" - Edward Knobel, 1977, Dover Publications, Inc., New York City.

Each transect station was marked with a stake or existing plant (tree, bunch of wild rice, shrub, etc.) that was "flagged" with a strip of orange survey tape and spray-painted with the blaze-orange paint. The use of survey tape as directional guides for back-sighting, was frequent through dense shrubs and wild rice. The absence of spray paint at a "flag" indicates that it is only a directional marker.



Beginnings of Transect Nos. 1 & 2 on Cranberry Dike.

All supplies were loaded into the canoe, which was paddled over deeper water areas, or dragged with a tow-rope over shallow or densely vegetated terrain. Except along the higher ground of the western side of the pool, where - when the transect reached the dead tree or live tree zone and stopped for the day - entry was made from the Missisquoi River to avoid having to use the canoe. The terrain is rugged within the pool - frequently consisting of buttonbush stands, dense wild rice stands and soft bottoms - that can only be slowly walked through. Each transect took an average of 4-5 full workdays for two people to complete (in the field). Additional time must be allowed for draftings of the field data sheets and preparation of this report's text. The total time required for fieldwork and completion of this transect report was approximately 26 man-days (where 1 man-day = 8 hours by 1 person).



Start of Transect #3 on Cranberry Dike

III. PROCEDURES

The original procedure for conducting the transects was laid out by Vermont Fisheries Biologist Jon Anderson. Those criteria are laid out in Table 1 as received from Jon's office. However, it quickly became evident that because of the proximity of many stations to each other, to attempt to map them on the scale maps that are available to us would not be feasible. Many stations were within 25-75 feet of each other, as governed by the guidelines of Table 1. Transect #1 consisted of 32 stations, Transect #2 of 38 stations, and Transect #3 of 51

stations. Transect #1 was approximately one-half mile long. Transect #2 was just over one-half mile long. While Transect #3 was approximately three-quarters of a mile long.

The number listed next to the "Habitat Types" in Table 1, is the numerical code used on the transect field sheets, at the beginning of the Vegetation Type description. Since some stations consisted of a diverse mix of habitats, more than one number may appear per station. Species listings included all plant species within approximately a ten foot radius of the station marker. Density of plant species was not requested, nor thought necessary at this point, except where a relative predominance or scarcity of a species existed. In such cases, the word "dense" or "sparse/scattered" was used. In most other cases, there existed a fairly even mix of the species referred to at the station.

A compass bearing was shot at the start of each transect - from the northern Cranberry Dike, southwest to the Mississippi River. Compass checks were routinely made during the transects, which, when combined with back-sighting on prior stations and targetting upcoming landmarks, kept the transect lines relatively straight. Transect #3 is an exception. It was realized at about the halfway point of that transect, that sufficient time to perform a fourth transect did not exist. Mr. Anderson was contacted and advised of this and assented to the change. To take in some of the areas that would have been included in Transect #4 - particularly the Goose Pen Channel vicinity - the direction of Transect #3 was adjusted from approximately 258°, to approximately 242°, at mid-pool, in the vicinity of a large "buttonbush island" surrounded by wild rice (Ref. Map #3).



An elevated "Ridge" on the east side of interior borrow ditch, supports a mix of more upland-type plant species. J. Blaskowski brings up a station marker. (Transect #3)

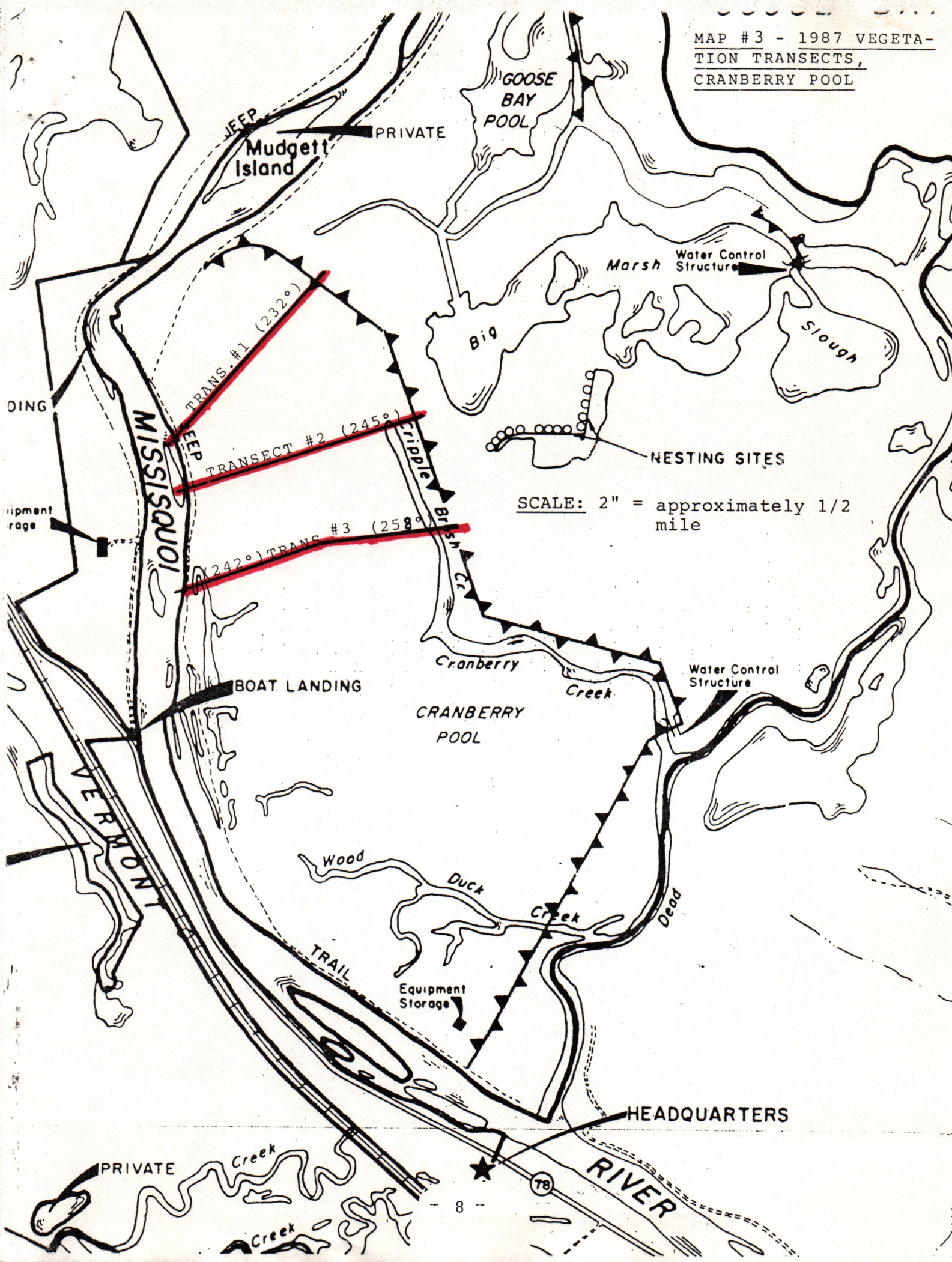
TABLE 1 - GUIDELINES FOR NORTHERN PIKE SPAWNING ASSESSMENT

1. Establish transect lines (could be done by compass as you are sampling).
2. Transects should start at highest level possible but no need to exceed 100' above sea level.
3. Sample every time there is a habitat change or a depth change of 6".
4. At each station (sample site), determine location on map, depth and habitat.
5. Utilize habitat types listed below. Try to identify aquatic vegetation whenever possible.

A. Habitat Types

1. Terrestrial short grasses (6" or less)
2. Terrestrial long grasses (6" or greater)
3. Brush with grass bottom
4. Brush with leaf bottom
5. Trees with grass bottom
6. Trees with leaf or no bottom cover
7. Aquatic vegetation - Emergent
8. Aquatic vegetation - Submergent
9. Mud or no vegetation

MAP #3 - 1987 VEGETATION
TRANSECTS,
CRANBERRY POOL



SCALE: 2" = approximately 1/2 mile

In areas where wild rice growth or (upland) shrubs obscured visibility, it was necessary to clear a trail and flag the direction traveled. In several cases, while one person continued through dense buttonbush or across "islets" of higher ground, the other would proceed around the obstacle with the canoe and meet at the other side. However, this was not always possible, due to the extent of some buttonbush stands, and involved having to drag the canoe up and over the shrubs. The distances between stakes was greatest in areas maintaining "monocultures" of wild rice, buttonbush or both, and similar bottom depths. All transects possessed Zones of this nature between mid-pool and the western "dead-tree zone." The three transects' field data sheets (after three drafts) follow, as part of this report, and provide the specifics for the "Results" and "Conclusions" discussions that follow this section. Map Nos. 4 and 5 provide the topography of the survey area.

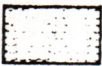
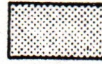
LEGEND

MAP #4 - General
topographical features
of the Cranberry Pool.

WETLAND SYSTEMS

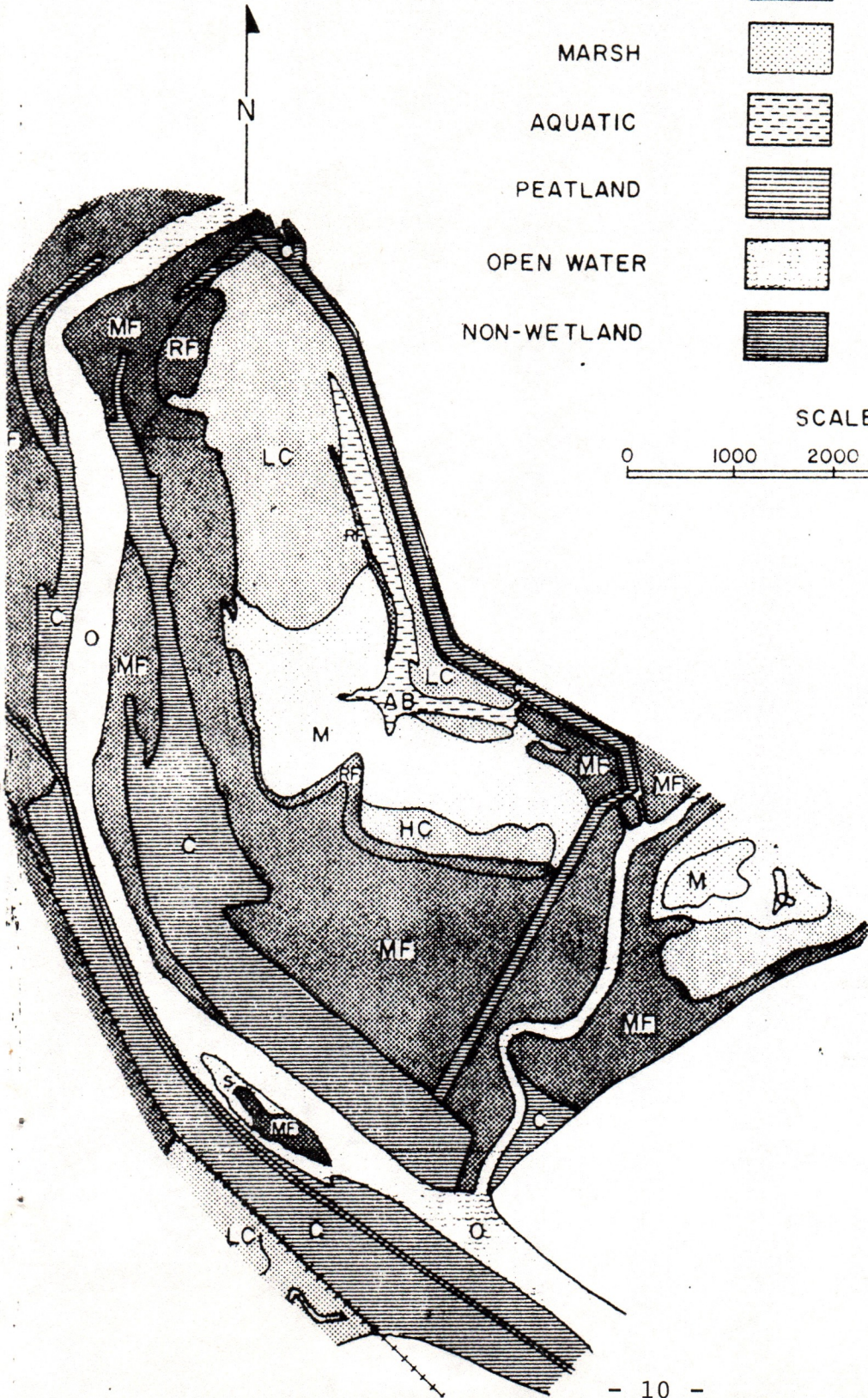
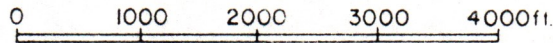
CANOPY ASSOCIATIONS

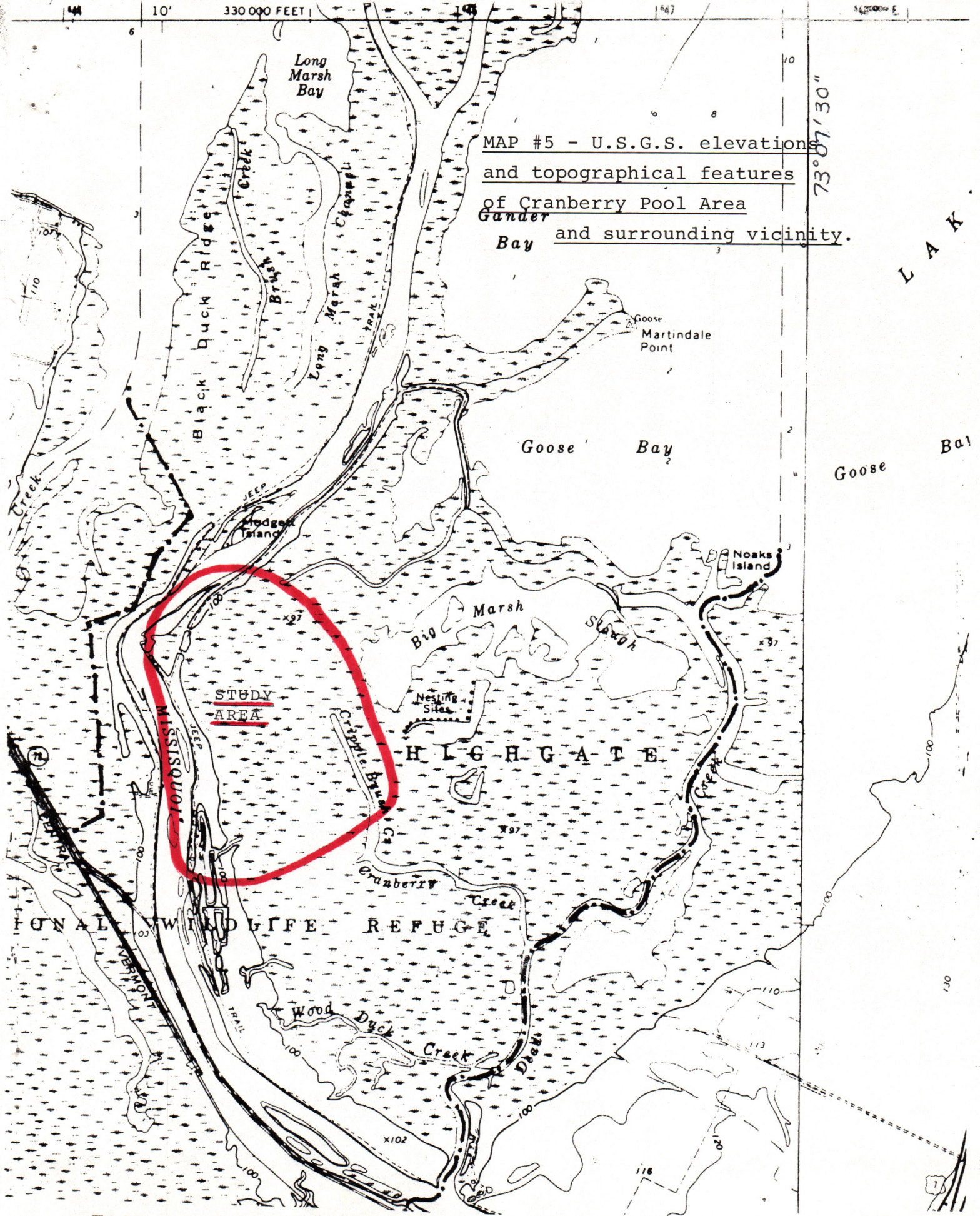
SWAMP
CARR
MARSH
AQUATIC
PEATLAND
OPEN WATER
NON-WETLAND



MF Mixed Levee Forest
RF Relic Forest
HC High Canopy Carr
LC Low Canopy Carr
S Sparganium Marsh
M Mixed Marsh
Z Zizania Marsh
AB Aquatics of Backwaters
AL Aquatics of Lake Shallows
P Peatland
O Open Water
U Upland Forest
C Cultural Features

SCALE





MAP #5 - U.S.G.S. elevations
 and topographical features
 of Cranberry Pool Area
 Goose Bay and surrounding vicinity.

73° 07' 30"

L A K E

Goose Bay

STUDY
 AREA

H I G H G A T E

NATIONAL WILDLIFE REFUGE

TRANSECT #1

SITE: Cranberry Pool North

TRANSECT LINE: #1

DIRECTION: 232°

DATE: July 7, 1987

PERSONNEL: John Gallegos, Juanita

WATER ELEVATION: 97.11' MSL

Blaskowski

ELEVATION: 96.11' above sea level
(1.0' of water)

VEG. TYPE: #7 - "Narrow-leaved" arrowhead, wild rice, white water lily, spikerush, 1 - 2 sp., marsh St. Johnswort

ELEVATION: 97.08' above sea level
(0.3' of water)

VEG. TYPE: #7 - Dense spikerush, wild rice, arrowhead 1 - 2 sp., white water lily

ELEVATION: 95.61' above sea level
(1.5' of water)

VEG. TYPE: #7 & #8 - Dense waterweed, wild rice, white water lily, button-bush

ELEVATION: 97.03' above sea level
(0.8' of water)

VEG. TYPE: #7 - Buttonbush stand

July 8, 1987 - Water Elevation: 97.11' MSL

ELEVATION: 96.16' above sea level
Some open water (0.95' of water)

VEG. TYPE: #7 & #8 - Wild rice, white water lily, marsh St. Johnswort, blunt spikerush, duckweed, waterweed, "thin-leaved" pondweed

COMMENTS: Most of these stations maintain 3" - 6" of silt on bottom, underwater.

SITE: Cranberry Pool North

TRANSECT LINE: #1 DIRECTION: 232°

DATE: July 7, 1987 PERSONNEL: John Gallegos, Juanita

WATER ELEVATION: 97.11' MSL Blaskowski

ELEVATION: <u>96.11'</u> above sea level (1.0' of water)	VEG. TYPE: #7 - "Narrow-leaved" arrowhead, wild rice, white water lily, spikerush, 1 - 2 sp., marsh St. Johnswort
ELEVATION: <u>97.08'</u> above sea level (0.3' of water)	VEG. TYPE: #7 - Dense spikerush, wild rice, arrowhead 1 - 2 sp., white water lily
ELEVATION: <u>95.61'</u> above sea level (1.5' of water)	VEG. TYPE: #7 & #8 - Dense waterweed, wild rice, white water lily, button-bush
ELEVATION: <u>97.03'</u> above sea level (0.8' of water)	VEG. TYPE: #7 - Buttonbush stand

July 8, 1987 - Water Elevation: 97.11' MSL

ELEVATION: <u>96.16'</u> above sea level Some open water (0.95' of water)	VEG. TYPE: #7 & #8 - Wild rice, white water lily, marsh St. Johnswort, blunt spikerush, duckweed, waterweed, "thin-leaved" pondweed
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COMMENTS: Most of these stations maintain 3" - 6" of silt on bottom, underwater.

SITE: Cranberry Pool North

TRANSECT LINE: #1

DIRECTION: WSW 232°

DATE: July 8, 1987

PERSONNEL: John Gallegos, Juanita
Blaskowski

WATER ELEVATION: 97.11' MSL

ELEVATION: 95.61' above sea level
(1.6' of water)

VEG. TYPE: #7 & #8 - Dense wild rice,
Massachusetts fern, smartweed,
buttonbush, coontail, beggar-
ticks

ELEVATION: 97.09' above sea level
(0.2' of water) Tree stump serves as
station marker

VEG. TYPE: #7 & #8 - Tree stump, white
water lily, burreed - 2 sp.,
wild rice, duckweed, marsh St.
Johnswort, upland grass,
smartweed, pickerelweed

ELEVATION: 95.61' above sea level
Approximately 6' from last station
(1.6' of water)

VEG. TYPE: #7 & #8 - Burreed, watershield,
white water lily, duckweed,
"floating-leaf" pondweed, fine
spikerush, wild rice

ELEVATION: 96.01' above sea level
(1.1' of water)

VEG. TYPE: #7 & #8 - Dense buttonbush,
beggar-ticks, duckweed, 2 - 3
stems of wild rice, waterweed

ELEVATION: 95.61' above sea level
(1.6' of water)

VEG. TYPE: #7 & #8 - "Thin-leaved" pond-
weed, marsh St. Johnswort,
duckweed, coontail, open pot-
hole, white water lily, button-
bush, waterweed

COMMENTS: Very silty bottoms, most stations maintain 3" - 6" of silt on bottoms under-
water.

GRAND ISLE
FRANKLIN CO
CO

LAKE
HAMPLAIN



SCALE



Donaldson Point

LANE ROAD
CAMPBELL ROAD

Sandy Point

Vermont Fish & Game
Camp and storage buildings

Vermont Fish & Game
Access

West Swanton

BOAT LANDING

Equipment Storage

PRIVATE

Mudgett Island

MISSISSOQUI

BOAT LANDING

FERRY POOL

HEATING SITES

MAP #2 - MISSISSOQUI N.W.P.

TRANSECT LOCATIONS.

PRIVATE

1" = 0.5 Mile

PRIVATE

HEADQUARTERS

RIVER

ROAD

SITE: Cranberry Pool North

TRANSECT LINE: #1

DIRECTION: WSW 232°

DATE: July 8, 1987

PERSONNEL: John Gallegos, Juanita Blaskowski

WATER ELEVATION: 97.11' MSL

ELEVATION: 95.91' above sea level
Approximately one-third pool width between this station and next. Habitat type, species composition and water depth the same. (Water depths between 1.2' - 1.6').

VEG. TYPE: #7 & #8 - Most of area is buttonbush, some open water with small potholes between buttonbush stands. Also, wild rice, white water lily, pondweed, duckweed, waterweed

ELEVATION: 96.07' above sea level
(1.0' of water)

VEG. TYPE: #7 & #8 - Open shallow pothole, some buttonbush, sedge sp., "floating-leaf" pondweed, waterweed, white water lily, duckweed

ELEVATION: 97.03' above sea level
(0.8' of water)

VEG. TYPE: #7 & #8 - Dense buttonbush, duckweed, dense waterweed

ELEVATION: 96.91' above sea level
(0.2' of water)

VEG. TYPE: #7 & #8 - Arrowhead, burreed, spikerush, dense waterweed, duckweed, water plantain, buttonbush, scattered wild rice

ELEVATION: 97.31' above sea level
(0.2' above water)

VEG. TYPE: #2 & #7 - Rice cutgrass, sedge sp., dense arrowhead, beggarticks, sensitive fern, buttonbush

COMMENTS: Most of these stations maintain 3" - 6" of silt on bottom, underwater.

SITE: Cranberry Pool North

TRANSECT LINE: #1

DIRECTION: WSW 232°

DATE: July 8, 1987

PERSONNEL: John Gallegos, Juanita

WATER ELEVATION: 97.11' MSL

Blaskowski

ELEVATION: 97.66' above sea level
(0.5' - 0.6' above water)

VEG. TYPE: #2 & #7 - Arrowhead, rice cut-grass, tearthumb, fine spike-rush, smartweed, maple seedlings, three-way sedge, water plantain, beggar-ticks, water horehound

ELEVATION: 97.11' above sea level

VEG. TYPE: #2 & #7 - Same as above, plus woolgrass, nettle, unknown shrub

At water level of pool. Wet upland edge with mixed vegetation mentioned in the last station, together with three species indicated here. Approximately 50 yards between this station and next.

ELEVATION: 97.31' above sea level

VEG. TYPE: #7 - Wild rice, rice cutgrass, arrowhead

Out of water, approximately 3" of mud.
(0.2' above water)

July 10, 1987 - Water elevation = 97.11' MSL

ELEVATION: 97.71' above sea level

VEG. TYPE: #2 - Arrowhead, groundnut, sedge, Massachusetts fern, rice, cutgrass, common three square, curled dock, maple seedlings, three-way sedge, St. Johnswort, beggar-ticks

Into dead tree zone.
Now becomes more upland, shrubs, leaf litter forest floor, maples
(0.5' - 0.7' above water)

ELEVATION: 97.21' above sea level

VEG. TYPE: #3 & #7 - jewelweed, arrowhead, unk. shrub (Mt. Holly ?), buttonbush, rice cut-grass, groundnut, nettle maples, tearthumb, beggar-ticks

(0.1' above water) Dense unknown (Mt. Holly ?) shrub "thicket."

Transect #1 Page 6

SITE: Cranberry Pool North

TRANSECT LINE: <u>#1</u>	DIRECTION: <u>WSW 232°</u>
DATE: <u>July 10, 1987</u>	PERSONNEL: <u>John Gallegos, Juanita</u> <u>Blaskowski</u>
WATER ELEVATION: <u>97.11' MSL</u>	
ELEVATION: <u>97.05'</u> above sea level (0.6' above water level) Low spot (muddy)	VEG. TYPE: #7 & #9 - Arrowhead, maple seedlings, water plantain, fine spikerush, burreed, rice cutgrass, Massachusetts fern, bare mud.
ELEVATION: <u>Approximately 98.36'</u> above sea level Leaving dead tree zone. Elevation rising gradually. (1.0' - 1.5' above water level)	VEG. TYPE: #4 - Dense unknown shrub, groundnut
ELEVATION: <u>Approximately 98.86'</u> above sea level Into live tree zone. (1.5' - 2.0' above water level)	VEG. TYPE: #6 - Large maple trees, (maple) leaf litter, tall meadow rue, nettle, unk. shrub, sensitive fern, groundnut, smartweed, jewelweed.
ELEVATION: <u>Approximately 99.36'</u> above sea level Forested. (2.0' - 2.5' above water level)	VEG. TYPE: #6 - Elm trees, sensitive fern, nettle, tall meadow rue, leaf litter, birch saplings, cinnamon fern, (forested)
ELEVATION: <u>Approximately 97.41'</u> above sea level Small low spot surrounded by trees, lots of birch, willow, aspen, alder, maple, bare mud. Not much ground cover. (Pothole - 0.3' above water level)	VEG. TYPE: #6 & #9 - Willow, arrowhead, bedstraw, sensitive fern, jewelweed, hog peanut, nettle, duckweed, smartweed

SITE: Cranberry Pool North

TRANSECT LINE: #1

DIRECTION: WSW 232°

DATE: July 10, 1987

PERSONNEL: John Gallegos, Juanita

Blaskowski

WATER ELEVATION: 97.11' MSL

ELEVATION: Approximately 99.36' above sea level

VEG. TYPE: #2 - Dense joe-pye-weed, dogbane, vetch, milkweed, tear-thumb, jewelweed, panic grasses, cinnamon fern, bindweed

Open field, heavy forbs.
Remainder of transect = old field, to edge of river, approx. 75 yds.

(2.0' - 2.5' above water level)

ELEVATION: Approximately 96.50' above sea level

VEG. TYPE: #2, #7 & #8 - Dogbane, jewelweed, Johnson grass, sedge, wild celery, white water lily, burreed, swamp milkweed, large-leaved pondweed, thin-leaved pondweed, waterweed, "floating-leaf" pondweed

Riverbank.

END OF TRANSECT

Transect #2 Page 1

SITE: Cranberry Pool North (Most, if not all, of the below stations maintain 3" - 6"
of silt (mud on bottom)

TRANSECT LINE: # 2

DIRECTION: WSW 245°

DATE: July 15, 1987

PERSONNEL: John Gallegos, Juanita
Blaskowski

WATER ELEVATION: 97.01' MSL

ELEVATION: 98.00' above sea level

VEG. TYPE: #2 - Tearthumb, swamp milkweed, water plaintain, ragweed, groundnut, arrowhead, jewelweed, unk. grasses

Near top of dike slope, inside Cranberry Pool.

ELEVATION: 97.02' above sea level

VEG. TYPE: #7 - Dense pickerelweed, wild rice, duckweed, tall spikerush

Approximately 15' from last station.

ELEVATION: 96.50' above sea level

VEG. TYPE: #7 and #8 - Wild rice, white water lily, pickerelweed, duckweed, pondweed

Dike edge of interior borrow ditch approximately 15' from last station.

ELEVATION: 93.01' above sea level

VEG. TYPE: #9 - Mud - no growth (mud, very deep)

(4.4' deep, edge of middle)

(4.1' middle)

Middle of interior borrow ditch (No stake placed - too deep).

ELEVATION: 96.50' above sea level

VEG. TYPE: #7 and #8 - White water lily, pondweed - 2 sp.

Edge of Borrow ditch.

COMMENTS:

Transect #2 Page 2

SITE: Cranberry Pool North (Most, if not all, of the below stations maintain 3" - 6"
of silt (mud on bottom)

TRANSECT LINE: # 2

DIRECTION: WSW 245°

DATE: July 15, 1987

PERSONNEL: John Gallegos, Juanita

Blaskowski

WATER ELEVATION: 97.01' MSL

ELEVATION: 97.49' above sea level

VEG. TYPE: #7 and #8 - Dense pickerelweed, pondweed, white water lily, duckweed, wild rice

Other side of interior borrow ditch

ELEVATION: 97.31' above sea level

VEG. TYPE: #7 and #8 - Wild rice, swamp milkweed, sparse pickerelweed, sparse arrowhead, sparse white water lily, duckweed, burreed

ELEVATION: 97.80' above sea level

VEG. TYPE: #2 - Swamp milkweed, rice cut-grass, fine spikerush, wild rice, arrowhead, sedge sp., groundnut, unk. grass, smartweed, pickerelweed

Elevated earthen mound.

ELEVATION: 97.45' above sea level

VEG. TYPE: #2 - Spikerush, 2 sp., arrowhead - 2 sp., marsh St. Johnswort, dwarf St. Johnswort, ditch stonecrop, smartweed, wild rice

July 16, 1987

ELEVATION: 96.21' above sea level

VEG. TYPE: #7 and #8 - Dense white water lily, coontail, burreed, pondweed, wild rice

Transect #2 Page 3

SITE: Cranberry Pool North

TRANSECT LINE: #2

DIRECTION: WSW 245°

DATE: July 16, 1987

PERSONNEL: John Gallegos, Juanita

Blaskowski

WATER ELEVATION: 97.01' MSL

ELEVATION: 96.61' above sea level

VEG. TYPE: #7 - White water lily, smartweed, beggar-ticks, dwarf St. Johnswort, fine spikerush, wild rice, arrowhead.

Floating spikerush mat
(0.4' of water).

ELEVATION: 96.41' above sea level
(0.6' of water).

VEG. TYPE: #7 and #8 - Dense wild rice burreedm white water lily, 3-way sedge, "needle-leaved" pondweed, coontail, fine spikerush, duckweed, beggar-ticks

ELEVATION: 94.61' above sea level

VEG. TYPE: #7 and #8 - Dense white water lily, pondweed, coontail, waterweed, unknown glassy, green pondweed

Open pothole
(2.4' of water).

ELEVATION: 95.59' above sea level

VEG. TYPE: #7 and #8 - Dense white water lily, bladderwort, coontail, waterweed, pondweed, wild rice, buttonbush

Edge of pothole.

ELEVATION: 95.92' above sea level

VEG. TYPE: #7 and #8 - Dwarf St. Johnswort, spikerushes, 3-way sedge, buttonbush, dense white water lily, arrowhead, wild rice, coontail, dense waterweed, green algae

(1.1' of water)
Floating spikerush mats.

COMMENT: _____

Transect #2 Page 4

SITE: Cranberry Pool North (Most, if not all, of the below stations maintain 3" - 6"
of silt (mud on bottom)

TRANSECT LINE: # 2

DIRECTION: WSW 245°

DATE: July 15, 1987

PERSONNEL: John Gallegos, Juanita
Blaskowski

WATER ELEVATION: 97.01' MSL

ELEVATION: 96.96' above sea level

VEG. TYPE: #7 - 3-way sedge, spikerushes, arrowhead - 2 sp., burreed, buttonbush, dwarf St. Johnswort

This station is a floating spikerush mat (0.5' of water).

ELEVATION: 96.85' above sea level

VEG. SIZE: #7 and #8 - Tall spikerush, wild rice, burreed, dwarf St. Johnswort, white water lily, woolgrass, dense waterweed, unknown green, glassy pondweed, coontail

30' from last station.
Edge of pothole
(1.6' of water) floating spikerush mats.

ELEVATION: 95.98' above sea level

VEG. TYPE: #7 and #8 - Dense buttonbush, 3-way sedge, duckweed, coontail, white water lily, wild rice, smartweed, waterweed, marsh cinque-foil.

Other side of pothole
(1.0' of water).

ELEVATION: 96.99' above sea level

VEG. TYPE: #7 - Tall spikerush, wild rice, smartweed, burreed, arrowhead - 2 sp., 3-way sedge, white water lily, Massachusetts fern

(0.02' of water).

ELEVATION: 95.98' above sea level

VEG. TYPE: #7, #8 and #9 - Waterweed, wild rice, smartweed, white water lily, buttonbush, bull-head lily, pondweed

Very muddy bottom, little submergent growth
(1.0' of water).

COMMENTS: _____

SITE: Cranberry Pool North (Most, if not all, of the below stations maintain 3" - 6"
of silt (mud on bottom)

TRANSECT LINE: _____ # 2 _____

DIRECTION: WSW 245°

DATE: July 16, 1987

PERSONNEL: John Gallegos, Juanita

Blaskowski

WATER ELEVATION: 97.01' MSL

ELEVATION: 95.71' above sea level

VEG. TYPE: #7 - Buttonbush, fine spike-rush, wild rice

Station in middle of small buttonbush stand
(1.3' of water)

ELEVATION: 95.61' above sea level

VEG. TYPE: #7 - Wild rice, white water lily

(1.4' of water).

ELEVATION: 96.61' above sea level

VEG. TYPE: #7 - White water lily, smart-weed, dwarf St. Johnswort, spikerush mats, wild rice, arrowhead, fine spikerush, beggar-ticks

(0.4' above water level).

ELEVATION: 96.41' above sea level

VEG. TYPE: #7 and #8 - Dense wild rice, burreed, white water lily, pondweed, coontail, fine spike-rush, beggar-ticks, a little duckweed

(0.6' above water level).

July 22, 1987 - Pool water level - 97.11' MSL

ELEVATION: 96.31' above sea level

VEG. TYPE: #7 and #8 - Dense wild rice, white water lily, pondweed, waterweed

No stations between this one and the next for approximately 300'. Average of 0.4' - 1.0' of water (97.07' MSL - 96.11 MSL). Habitat type and species composition are the same.

COMMENTS: _____

Transect #2 Page 7

SITE: Cranberry Pool North (Most, if not all, of the below stations maintain 3" - 6"
of silt (mud on bottom)

TRANSECT LINE: # 2

DIRECTION: WSW 245°

DATE: July 23, 1987

PERSONNEL: John Gallegos, Juanita
Blaskowski

WATER ELEVATION: 97.01' MSL

ELEVATION: 98.90' above sea level

VEG. TYPE: #5 and #6 - Dense nettle, jewelweed, tearthumb, sedge, 2 sp., groundnut, dodder

ELEVATION: 99.10' above sea level

VEG. TYPE: #5 and #6 - Dense stand of ashes, nettle, sensitive fern, leaf litter

ELEVATION: 99.30' above sea level

VEG. TYPE: #2 - Sensitive fern, joe-pye-weed, dense jewelweed, dense tearthumb

Old field edge.

ELEVATION: 99.50' above sea level

VEG. TYPE: #2 - Joe-pye-weed, panic grass, bindweed, vetch, jewelweed, cinnamon-fern, groundnut, tearthumb

Old field

ELEVATION: 99.80' above sea level

VEG. TYPE: #2 - Blue vervain, rice cut-grass, monkey flower, joe-pye-weed, common plantain, yellow clover, leaf litter, mullein, groundnut, evening primrose, cinnamon fern, lobelia, forget-me-not, jewelweed

Edge of jeep trail.

COMMENTS:

Transect #2 Page 8

SITE: Cranberry Pool North (Most, if not all, of the below stations maintain 3" - 6"
of silt (mud on bottom)

TRANSECT LINE: #2

DIRECTION: WSW 245°

DATE: July 23, 1987

PERSONNEL: John Gallegos, Juanita

Blaskowski

WATER ELEVATION: 97.11' MSL

ELEVATION: 100.0' above sea level

Orange paint on huge cottonwood tree - high bank of Missisquoi River.

VEG. TYPE: #2 and #5 - Dense cinnamon fern, leaf litter, grape vine, dogbane, sensitive fern, groundnut, gold-erod

ELEVATION: 98.0' above sea level

Edge of riverbank.

VEG. TYPE: #2, #5 and #7 - Dogbane, grass Massachusetts fern, nettle, jewelweed, groundnut, sensitive fern, bindweed, swamp milkweed, sedge.

ELEVATION: 95.6' above sea level

In water (no stake) of Missisquoi River. Last station on Transect #2.

VEG. TYPE: #8 - Wild celery, waterweed, coontail, sandy bottom with silt and mud.

COMMENTS:

Transect #3 Page 1

SITE: Cranberry Pool North

TRANSECT LINE: #3

DIRECTION: WSW 258°

DATE: August 14, 1987

PERSONNEL: John Gallegos, Juanita
Blaskowski

WATER ELEVATION: 96.93' MSL

ELEVATION: 99.00' above sea level
(Dike slope)

VEG. TYPE: #2 and #3 - Dense tearthumb, buttonbush, smartweed, groundnut, panic grass, jewelweed, maple and ash saplings, goldenrod, beggar-ticks

ELEVATION: 98.00' above sea level
(Dike slope)

VEG. TYPE: #2 and #3 - Same as above plus Japanese millet and sedge, (C. tribuloides)

ELEVATION: 97.00' above sea level
(Dike slope) wet edge

VEG. TYPE: #2 and #7 - Wild rice, nightshade, arrowhead, burreed, rice cutgrass, groundnut, nettle, smartweed

ELEVATION: 96.15' above sea level
Open water's edge - interior borrow ditch

VEG. TYPE: #7 and #8 - Burreed, wild rice, pickerelweed, arrowhead - 2 sp., white water lily, "floating-leaf" pondweed

ELEVATION: 94.63' above sea level
Open water's edge - further into borrow ditch.
(2.3' of water)

VEG. TYPE: #7 and #8 - White water lily, burreed, pickerelweed, wild celery, "floating-leaf" pondweed

Transect #3 Page 2

SITE: Cranberry Pool North

TRANSECT LINE: #3

DIRECTION: WSW 258°

DATE: August 14, 1987

PERSONNEL: John Gallegos, Juanita

WATER ELEVATION: 96.93' MSL

Blaskowski

ELEVATION: 91.00 - 91.50' above sea level
Middle two-thirds of (interior) borrow ditch
is 5.4' - 5.9' deep.

VEG. TYPE: #9 - Nothing retrievable, soft
silty bottom

Borrow ditch is approximately 20' wide.

ELEVATION: 93.73' above sea level
(3.2' deep)

VEG. TYPE: #7 and #8 - White water lily,
wild celery, burreed, some wild
rice

Opposite side of borrow ditch - edge of open
water

ELEVATION: 96.13' above sea level
(0.5' deep)

VEG. TYPE: #7 - Wild rice, burreed, arrow-
head, pickerelweed

Vegetated area - water's edge

DATE: August 20, 1987

PERSONNEL: John B. Gallegos, Gerry Atwell

WATER ELEVATION: 96.83' MSL

ELEVATION: 97.11' above sea level
"Islet" - almost dry - some mud and stumps

VEG. TYPE: #7 - Dense wild rice, some burreed,
arrowhead - 2 sp., fine spikerush,
pickerelweed

ELEVATION: 95.93' above sea level
(0.9' of water) small open water area

VEG. TYPE: #7 and #8 - Coontail, wild rice,
buttonbush, white water lily,
unk. arrowhead pulled up by
ducks, fine spikerush, pickerelweed,
burreed, "floating-leaf" pondweed

Transect #3 Page 3

*SITE: Cranberry Pool North

TRANSECT LINE: #3

DIRECTION: WSW 258°

DATE: August 20, 1987

PERSONNEL: John Gallegos, Juanita

WATER ELEVATION: 96.83' MSL

Blaskowski

ELEVATION: 95.17' above sea level
(1.6' of water) near Cripple Brush Creek edge

VEG. TYPE: #7 - Burreed, wild rice, unk. arrowhead, white water lily, slight duckweed, pickerelweed, no submergents, silty bottom

ELEVATION: 94.73' above sea level
(2.1' of water) silty bottom, edge of Cripple Brush Creek

VEG. TYPE: #7 and #9 - Mostly open water, wild rice, unk. arrowhead, burreed, white water lily, silty bottom

ELEVATION: 92.27' above sea level
Middle of Cripple Brush Creek - approximately 70' wide and 4.5' deep

VEG. TYPE: #9 - Open water, middle of creek, too deep for bottom sampling, silty-mucky bottom

ELEVATION: 93.63' above sea level
(3.2' of water) other side of Cripple Brush Creek

VEG. TYPE: #7 - "Floating leaf" pondweed, wild rice, white water lily

ELEVATION: 94.03' above sea level
Wild rice stand - (2.8' of water)

VEG. TYPE: #7 - Dense wild rice, "floating leaf" pondweed, white water lily

SITE: Cranberry Pool North

TRANSECT LINE: #3 DIRECTION: WSW 258°

DATE: August 20, 1987 PERSONNEL: John Gallegos, Juanita

Blaskowski

WATER ELEVATION: 96.83' MSL

ELEVATION: 94.73' above sea level VEG. TYPE: #7 and #8 - Dense wild rice, coontail, pickerelweed white water lily, unk. arrowhead sp., 1 - 2 sprigs of buttonbush; "floating leaf" pondweed
Wild rice stand - (2.1' of water)

ELEVATION: 96.21' above sea level VEG. TYPE: #7 - Dense wild rice and buttonbush stand. No submergents - silty bottom
(0.6' of water) mixed wild rice and buttonbush stand

ELEVATION: 95.13' above sea level VEG. TYPE: #7 and #8 - Dense wild rice, buttonbush, unk. arrowhead sp., white water lily, duckweed, waterweed, coontail
(1.7' of water) wild rice stand

ELEVATION: 96.80' above sea level VEG. TYPE: #7 - Dense tall spikerush, wild rice, arrowhead, burreed, smartweed, white water lily
(Floating spikerush mat on level w/water)

ELEVATION: 96.31' above sea level VEG. TYPE: #7 and #8 - Dense wild rice and buttonbush, waterweed, smartweed, duckweed
(Floating spikerush mat on level w/water)

Continuous wild rice at approximately 1.8' - 1.9' of water for approximately 125' to 150' Only directional flagging tied to wild arice used.

ELEVATION: 97.33' above sea level VEG. TYPE: #7 - Wild rice, smartweed, tall spikerush, burreed, arrowhead, rice cutgrass
(Spikerush and mixed veg. islet - above water level approximately 5" - 6")

ELEVATION: 95.51' above sea level VEG. TYPE: #7 and #8 - Dense wild rice, duckweed, waterweed
(Approx. 1.3' of water) wild rice stand - approx. 6' from last stake.

Continuous dense wild rice at 1.1' - 1.3' of water for approximately 200' to 225'. Only directional flagging used (tied to wild rice).

Transect #3 Page 5

SITE: Cranberry Pool North

TRANSECT LINE: #3 DIRECTION: WSW 258°
DATE: September 1, 1987 PERSONNEL: John Gallegos, Juanita
Blaskowski
WATER ELEVATION: 96.71' MSL
ELEVATION: 96.65' above sea level VEG. TYPE: #7 - Dense buttonbush, scattering
Small, thin dead tree = station marker of beggar-ticks, wild rice,
1/2 acre buttonbush stand - muddy, approx. arrowhead, duckweed
0.5' of water and silt
ELEVATION: 96.73' above sea level VEG. TYPE: #7 and #8 - Dense buttonbush,
Station marked by dead snag on edge of dense wild rice, small fine
buttonbush stand spikerush, "floating-leaf" pond-
weed

(Transect "bends" here)
DATE: September 15, 1987 DIRECTION: WSW 242°
WATER ELEVATION: 96.91' MSL PERSONNEL: John Gallegos, Juanita
Blaskowski
ELEVATION: 94.91' above sea level VEG. TYPE: #7 and #8 - Dense wild rice
Directional flagging used where long and buttonbush, "floating leaf"
distance w/o stations (same type habitats) pondweed, duckweed, white water
occur. No spray paint used in such situa- lily, coontail
tions - spray paint marks survey station on
transect only. Distance between this sta-
tion and the last one is approx. 50 yards.
Water depth is about 2.8'.
ELEVATION: 97.00' above sea level VEG. TYPE: #7 - Beggar-ticks, dense fine
WATER ELEVATION: 96.87' MSL spikerush, buttonbush, small
On edge of dead tree zone. Small buttonbush unk. fern, rice cutgrass, wild
island. Two flags on dead snags. Distance rice, marsh fern, small aster,
between this station and last is approx. 100 arrowhead, smartweed, 3-way
yards of same "wild rice and scattered button- sedge, skullcap
bush" habitat, with water depth of approx. 1.5'
to 2.0' (94.71' to 95.21' MSL). Directional
flagging used where long distance w/o stations
(same type habitats) occur. No spray paint
used in such situations. (Spray paint marks
survey station on transect only).
ELEVATION: 95.77' above sea level VEG. TYPE: #7 and #8 - Coontail, waterweed,
Dead Tree Zone "floating-leaf" pondweed, wild
(1.1' of water) Open water area - "Pondy" pot- rice, buttonbush, duckweed,
hole, interspersed by rice clumps and buttonbush water hemlock, beggar-ticks
(good duck area) silty bottom w/soft mud.

Transect #3 Page 6

SITE: Cranberry Pool North

TRANSECT LINE: #3 DIRECTION: WSW 242° (Transect line bends here)
DATE: September 15, 1987 PERSONNEL: John Gallegos, Juanita
Blaskowski

WATER ELEVATION: 96.87' MSL

ELEVATION: 95.87' - 96.80' above sea level VEG. TYPE: #7 - Dense buttonbush, beggar-ticks, fine spikerush, some wild rice sprinkled in, no submergents
Dead Tree Zone
Buttonbush stand w/good root network (supports).
Water depth from 1" to 1' depending on root presences.

ELEVATION: 97.00' above sea level VEG. TYPE: #7 & #2 - Marsh fern, beggar-ticks, arrowhead, wild rice, rice cutgrass, fine spikerush, buttonbush, cardinal flower, winter cress, pickerelweed
Dead Tree Zone
Eastern edge of narrow strip of wild rice.
Firmer ground. Above water level mostly, in vicinity of this station. Approx. 25' from last station.

ELEVATION: 97.00' above sea level VEG. TYPE: #7 - Dense wild rice, fine spikerush, water hemlock, arrowhead, winter cress
Middle of approx. 35' wide strip of wild rice.
No standing water anywhere. Wild rice stems tied together serves as station.

DATE: September 24, 1987 PERSONNEL: John Gallegos, Juanita
Blaskowski

ELEVATION: 97.30' above sea level VEG. TYPE: #2 & #7 - Dense rice cutgrass, beggar-ticks, wild rice, sedges - 2 sp., nettle, water hemlock, marsh fern, arrowhead, maple seedlings, peppergrass
Dead Tree Zone
"Old field" appearance, but w/wetland type plants. No standing water. Firm ground - logs hidden in dense cutgrass. Old snag serves as station.

ELEVATION: 97.50' above sea level VEG. TYPE: #2 & #5 - Arrowhead - 2 sp. rice cutgrass, knotweed, beggar-ticks, water horehound, skullcap, sedges - 3 sp., tearthumb, groundnut, silver maple saplings and mature trees, common 3-square, peppergrass
Dead Tree Zone on edge of live tree zone.
No standing water. Silver maple sapling thicket immediately west; flagged directional line through it.
(Approx. 30 yards from last station)

SITE: Cranberry Pool North

TRANSECT LINE: #3 DIRECTION: WSW 242°

DATE: September 24, 1987 PERSONNEL: John Gallegos, Juanita
Blaskowski

WATER ELEVATION: 96.87' MSL
ELEVATION: 97.50' above sea level VEG. TYPE: #2 & #5 - Skullcap, rice cutgrass,
Live Tree Zone beggar-ticks, unk. large holly-
Clearing surrounded w/shrubs, and maple saplings type shrub, nettle, maple seedlings,
and mature trees. Small sapling serves as station saplings, and mature trees, water
horehound, sedge, peppergrass

DATE: September 28, 1987 - Pool Water Level 96.84' MSL

ELEVATION: 97.50' above sea level PERSONNEL: John Gallegos
Live Tree Zone VEG. TYPE: #4 & #6 - Holly-type shrub, sensi-
Leaf litter floor - somewhat shady tive fern, nettle, elm saplings,
Dead snag serves as station silver maple, mosses
Edge of "holly-type shrub" stand

ELEVATION: 98.00' above sea level VEG. TYPE: #6 - Silver maple, ash, sensitive
Stand of saplings - little-to-no understory fern, sphagnum moss
Small ash serves as station

ELEVATION: 98.50' above sea level VEG. TYPE: #5 - Ash, elm, grapevines, nettle,
Dead sapling serves as station tearthumb, white birch, goldenrod,
Stand of saplings - edge of trees groundnut, sensitive fern, upland
Good ground cover panic grasses, jewelweed, cleavers,
marsh fern

ELEVATION: 99.00' above sea level VEG. TYPE: #2 - Tall panic grass, goldenrod,
In open, grassy, old field area (approx. groundnut, marsh fern, hog peanut,
15- 20' from last station) Marked by tearthumb, knotweed
stake and flag

SITE: Cranberry Pool North

TRANSECT LINE: #3 DIRECTION: WSW 242°

DATE: September 28, 1987 PERSONNEL: John Gallegos

WATER ELEVATION: 96.84' MSL

ELEVATION: 98.50' above sea level
 Approx. 15' - 20' from last station
 Grassy old field area - station marked by
 stake and flag

VEG. TYPE: #2 - Groundnut, Johnson grass,
 nettle, tearthumb, sedge sp.

ELEVATION: 97.85' above sea level
 East edge of Goose Pen Channel - between
 nest-can #3 and puddle duck box

VEG. TYPE: #2 & #7 - Fine spikerush, beggar-
 ticks, nettle, burreed, jewelweed,
 muddy, silty bottom to channel

ELEVATION: 96.00' above sea level
 Middle of Goose Pen Channel. Approx. 1.8'
 of water at middle
 Soft mud bottom

VEG. TYPE: #7 & #8 - "Floating leaf" pondweed,
 coontail, waterweed, 2 other species
 of pondweed, white water lily,
 wild celery

ELEVATION: 97.85' above sea level
 West edge of Goose Pen Channel - soft mud

VEG. TYPE: #2, #7 & #8 - Royal fern, fine
 spikerush, burreed, smartweed,
 groundnut, rice cutgrass, Johnson
 grass, sensitive fern, jewelweed,
 duckweed, waterweed, white water
 lily, "ribbon leaf" pondweed, coon-
 tail, silver maples, nettle

ELEVATION: 98.50' above sea level
 Stand of cinnamon ferns
 Approx. 25' from last station
 Station marked by stake and flag

VEG. TYPE: #5 - Dense cinnamon fern, nettle,
 sphagnum, ash, groundnut, hog
 peanut, jack-in-the-pulpit

SITE: Cranberry Pool North

TRANSECT LINE: #3 DIRECTION: WSW 242°

DATE: September 28, 1987 PERSONNEL: John Gallegos

WATER ELEVATION: 96.84' MSL

ELEVATION: 97.85' above sea level
Approximately 30' from last station
Edge of shallow ditch, station marked by
branch and flag sticking out of ground
Soft mud bottom near water

VEG. TYPE: #2 & #9 - Dense duckweed, marsh
fern, sedge, rice cutgrass, cinna-
mon fern, nettle, sensitive fern,
royal fern, skullcap

ELEVATION: 96.35' above sea level
Water depth - 1.5'
Middle of ditch - soft mud bottom

VEG. TYPE: #8 & #9 - Duckweed, coontail, algae

ELEVATION: 97.85' above sea level
West side of ditch - soft mud

VEG. TYPE: #5 & #9 - Duckweed, rice cutgrass,
ash, silver maple, royal fern,
sensitive fern

ELEVATION: 98.50' above sea level
Small ridge next to ditch (approx. 15' from
last station)

VEG. TYPE: #5 - Dense cinnamon fern, ground-
nut, nettle, silver maple, sensitive
fern

ELEVATION: 97.60' above sea level
Middle of small ditch - mud only
Approximately 20-25' from last station
Little ground cover, shaded

VEG. TYPE: #6 & #9 - Ashes (saplings), silver
maple, nettle, beggar-ticks

SITE: Cranberry Pool North

TRANSECT LINE: #3 DIRECTION: WSW 242°

DATE: September 28, 1987 PERSONNEL: John Gallegos

WATER ELEVATION: 96.84' MSL

ELEVATION: 99.00' above sea level VEG. TYPE: #6 - Dense cinnamon fern, ash, silver maple, sensitive fern
Top of ridge, near jeep trail,
Small ash serves as station
Approximately 35' from last station

ELEVATION: 98.80' above sea level VEG. TYPE: #2 - Upland grasses (panic grass) tearthumb, N.E. aster, cinnamon fern, bluets, beggar-ticks, stinging nettle, plantain, cottonwood trees (big), silver maple (big), groundnut, yellow clover
Edge of jeep trail
Approximately 25' from last station
Open, grassy field

ELEVATION: 99.00' above sea level VEG. TYPE: #5 - Dense groundnut, dense cinnamon fern, stinging nettle, silver maple, ash, aster (white)
West edge of jeep trail and edge of Missisquoi River

Upland forest
Dead snag serves as station
ELEVATION: 95.70' above sea level VEG. TYPE: #2, #7 & #8 - Panic grass, white water lily, sensitive fern, beggar-ticks, wild celery
Edge of Missisquoi River
Marked by stake-branch and flag

LAST STATION - END OF TRANSECT

IV. RESULTS

The previous three transects provide cross-sections of the various vegetative communities that exist within the northern Cranberry Pool vicinity. After closer analyses of the plant species within each station, certain associations became apparent that provided us with the general communities, or habitat types, listed in Table 2 and illustrated on Map #6. The greatest plant diversity was found within the "Dead Tree" and "Edge" zones (red and gray on Map #6) along the western part of the Cranberry Pool.

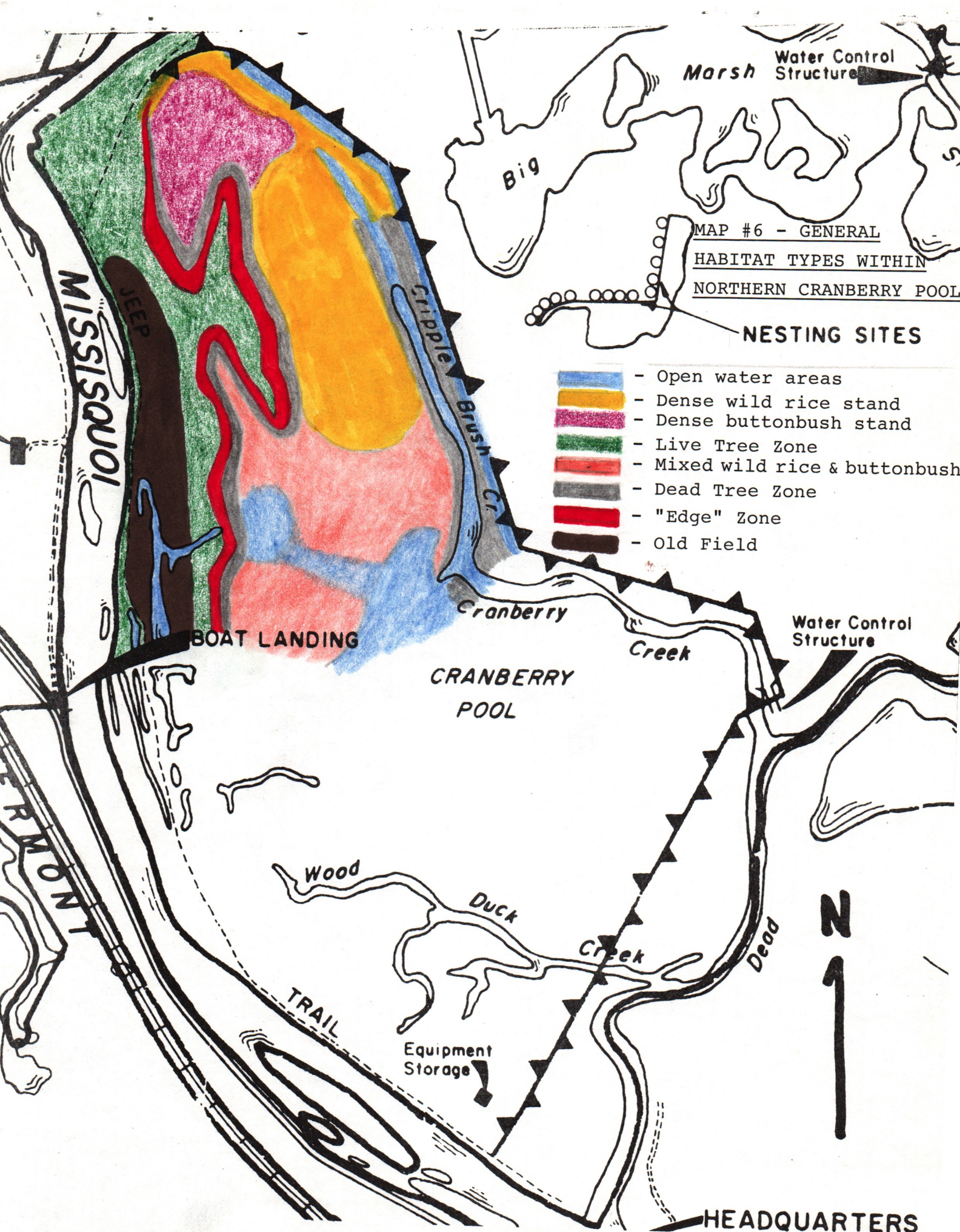
TABLE 2 - 1987 HABITAT TYPES WITHIN NORTHERN CRANBERRY POOL

1. Wild Rice Stands
 2. Mixed Wild Rice and Buttonbush
 3. Buttonbush Stands
 4. Shallow, Open-water Potholes
 5. Deeper, Open-water Creek or Borrow-Ditch
 6. Dead Tree Zone
 7. Live Tree Zone/Wooded Lowlands
 8. Edge Zone (between Dead Tree and Live Tree Zones)
 9. Old Field
-

The lowest plant diversity was found in the "Wild Rice Stand" Zone. A summary listing of all plant species encountered at the stations during the three transects is provided in Table #3.



Pickerelweed beds with scattered wild rice adjacent to dike borrow ditch.
(Transect #2)



Marsh Water Control Structure

Big

MAP #6 - GENERAL
 HABITAT TYPES WITHIN
 NORTHERN CRANBERRY POOL

NESTING SITES

- Open water areas
- Dense wild rice stand
- Dense buttonbush stand
- Live Tree Zone
- Mixed wild rice & buttonbush
- Dead Tree Zone
- "Edge" Zone
- Old Field

Water Control Structure

CRANBERRY POOL



HEADQUARTERS

TABLE 3

1987 CRANBERRY POOL TRANSECT - PLANT SPECIES

TERRESTRIAL PLANTS

Aster, New England - Aster novae-angliae
 Aster, small white - Aster vimineus
 Bedstraw, fragrant - Galium triflorum
 Beggar-ticks - Bidens frondosa
 Bindweed, hedge - Convolvulus sepium
 Bluets - Houstonia caerulea
 Cardinal flower - Lobelia cardinalis
 Cleavers - Galium aparine
 Clover, yellow sweet - Melilotus officinalis
 Ditch stonecrop - Penthorum sedoides
 Dock, curled - Rumex crispus
 Dodder - Cuscuta gronovii
 Dogbane, spreading - Apocynum androsaemifolium
 Forget-me-not, true - Myosotis scorpioides
 Goldenrod - Solidago sp.
 Groundnut - Apios americana
 Grape, fox - Vitis labrusca
 Hog peanut - Amphicarpa bracteata
 Jack-in-the-pulpit - Arisaema atrorubens
 Jewelweed - Impatiens capensis
 Joe-Pye-weed, spotted - Eupatorium maculatum
 Knotweed - Polygonum erectum
 Lobelia - Lobelia sp.
 Milkweed, common - Asclepias syriaca
 Milkweed, swamp - Asclepias incarnata
 Millet, Japanese - Echinochloa crusgalli
 Monkey-flower, square-stemmed - Mimulus ringens
 Mullein, moth - Verbascum blattaria
 Nettle, slender - Urtica gracilis
 Nettle, stinging - Urtica dioica
 Nightshade, common - Solanum dulcamara
 Peppergrass - Lepidium sp.
 Plantain, common - Plantago major
 Primrose, common evening - Oenothera biennis
 Ragweed, common - Ambrosia artemisiifolia
 Rue, tall meadow - Thalictrum polygamum
 Skullcap, common - Scutellaria epilobiifolia
 Smartweed, common - Polygonum hydropiper
 Smartweed, Pennsylvania - Polygonum pennsylvanicum
 St. Johnswort, dwarf - Hypericum mutilum
 St. Johnswort, marsh - Hypericum virginicum
 Tearthumb, arrow-leaved - Polygonum sagittatum
 Vervain, blue - Verbena hastata
 Vetch, cow - Vicia cracca
 Water hemlock - Cicuta maculata
 Winter cress - Barbarea vulgaris
 Water horehound - Lycopus sp.

TABLE 3

(Page 2)

AQUATIC PLANTS

Arrowhead, broad-leaved - Sagittaria latifolia varieties
Arrowhead, sessile-fruited - Sagittaria rigida
Algae, green
Bladderwort, greater - Utricularia vulgaris
Burreed, unknown sp. - Sparganium sp.
Burreed, Big - Sparganium eurycarpum
Celery, wild - Vallisneria americana
Cinquefoil, marsh - Potentilla palustris
Common three-square - Scirpus americanus
Coontail - Ceratophyllum demersum
Duckweed - Lemna minor
Lily, bullhead - Nuphar variegatum
Lily, fragrant white - Nymphaea odorata
Milfoil, Eurasian water - Myriophyllum spicatum
Pickerelweed - Pontederia cordata
Plantain, water - Valisnia Plantago-aquatica
Pondweed - Potamogeton pusillus
Pondweed, floating-leaf - Potamogeton natans
Pondweed, large-leaved - Potamogeton amplifolius
Pondweed, ribbon-leaf - Potamogeton epihydrus
Rice, wild - Zizania aquatica
Sedge - Carex crinita
Carex retrorsa
Carex tribuloides
Sedge, three-way - Dulichium arundinaceum
Spikerush, blunt - Eleocharis obtusa
Spikerush, unknown sp. - Eleocharis sp.
Watershield - Brasenia schreberi
Waterweed - Elodea canadensis
Woolgrass - Scirpus cyperinus

FERNS

Cinnamon fern - Osmunda cinnamomea
Marsh fern - Thelypteris palustris
Massachusetts fern - Thelypteris simulata
New York fern - Thelypteris noveboracensis
Sensitive fern - Onoclea sensibilis
Royal fern - Osmunda regalis

GRASSES

Johnson grass - Sorghum halepense
Millet - Panicum miliaceum
Panicgrass - Panicum sp.
Rice cutgrass - Leersia oryzoides

TABLE 3

(Page 3)

TREES

Ash, white - Fraxinus americana
Birch, American white - Betula papyrifera
Cottonwood, common - Populus deltoides
Elm, American - Ulmus americana
Maple, silver - Acer saccharinum
Willow, black - Salix niger

SHRUBS

Alder, speckled - Alnus rugosa
Buttonbush - Cephalanthus occidentalis
Unknown shrub - (Mountain Holly - Nemopanthus mucronata ?)

MOSS

Sphagnum moss - Sphagnum sp.

Table Nos. 4 and 5 list the common and least common plant species encountered during each transect. Plants not shown on either table, but shown on Table 3, were present in most or all of the transects in moderate amounts ("scatterings"). In a few cases, especially where aquatic plants are concerned, a species (such as water hemlock and Carex crinita) may have been seen only a couple of times on one transect (#3), but were observed more often in the other two transects (Nos. 1 & 2). However, Table #5 can be generally interpreted to mean that the plants listed therein are relatively uncommon within the northern Cranberry Pool vicinity.

The average station water depths within the Cranberry Pool interior wetlands, for the three transects, were as follows: Transect #1 - 1.3'; Transect #2 - 1.0'; Transect #3 - 1.6'. The deep water was located in Cripple Brush Creek and borrow ditch adjacent to the Cranberry Pool dike. Transect #1 provided a maximum depth of 6.3' at the deepest part of the Cranberry borrow ditch; Transect #2 - 4.4' deep in the borrow ditch, and Transect #3 - 5.9' deep, also in the borrow ditch.

TABLE 4 - MOST COMMON PLANT SPECIES PER TRANSECT

TRANSECT NOS.	COMMON PLANTS
1, 2, 3	wild rice - <u>Zizania aquatica</u>
1, 2, 3	buttonbush - <u>Cephalanthus occidentalis</u>
1, 2, 3	white water lily - <u>Nymphaea odorata</u>
1, 2, 3	broad-leaved arrowhead - <u>Sagittaria latifolia</u> var.
1, 2, 3	floating-leaf pondweed - <u>Potamogeton natans</u>
1, 3	duckweed - <u>Lemna minor</u>
1	waterweed - <u>Elodea canadensis</u>
2	"fine" (blunt) spikerush - <u>Eleocharis obtusa</u>
1	beggar-ticks - <u>Bidens frondosa</u>
3	burreed - <u>Sparganium</u> sp.
3	coontail - <u>Ceratophyllum demersum</u>
3	rice cutgrass - <u>Leersia oryzoides</u>



"Pothole" within Transect #2, showing predominance of white water lily at that time of year.

TABLE 5 - PLANT SPECIES OBSERVED AT 3 STATIONS PER TRANSECT

TRANSECT NOS.	LEAST COMMON PLANTS
2	swamp milkweed - <u>Asclepias incarnata</u>
2	marsh St. Johnswort - <u>Hypericum virginicum</u>
2	ditch Stonecrop - <u>Penthorum sedoides</u>
2	bladderwort - <u>Utricularia vulgaris</u>
2	bullhead lily - <u>Nuphar variegatum</u>
2	bedstraw - <u>Galium triflorum</u>
2	dodder - <u>Cuscuta gronovii</u>
2	bindweed - <u>Convolvulus sepium</u>
1, 2	cow vetch - <u>Vicia cracca</u>
2	blue vervain - <u>Verbena hastata</u>
2	monkey-flower - <u>Mimulus ringens</u>
2, 3	common plantain - <u>Plantago major</u>
2, 3	jack-in-the-pulpit - <u>Arisaema atrorubens</u>
2, 3	yellow clover - <u>Melilotus officinalis</u>
2	moth mullein - <u>Verbascum blattaria</u>
2	evening primrose - <u>Oenothera biennis</u>
2	lobelia - <u>Lobelia sp.</u>
2	forget-me-not - <u>Myosotis scorpioidis</u>
2	grape - <u>Vitis labrusca</u>
2	dogbane - <u>Apocynum androsarmifolium</u>
1, 2	Massachusetts fern - <u>Thelypteris simulata</u>
2	goldenrod - <u>Solidago sp.</u>
2	upland panicgrasses - <u>Panicum sp.</u>
2, 3	wild celery - <u>Vallisneria americana</u>
2, 3	skullcap - <u>Scutellaria epilobilifolia</u>
2	pondweed - <u>Potamogeton pusillus</u>
1, 2	woolgrass - <u>Scirpus cyperinus</u>
1	water milfoil - <u>Myriophyllum spicatum</u>
1	large-leaved pondweed - <u>Potamogeton amplifolius</u>
1	curled dock - <u>Rumex crispus</u>
1, 3	hog peanut - <u>Amphicarpa bracteata</u>
1	Joe-Pye-weed - <u>Eupatorium maculatum</u>
1, 3	Johnson grass - <u>Sorghum halepense</u>
3	cardinal flower - <u>Lobelia cardinalis</u>

TABLE 5 - PLANT SPECIES OBSERVED AT \bar{y} 3 STATIONS PER TRANSECT
(Page 2 of 2)

TRANSECT NOS.	LEAST COMMON PLANTS
3	common three-square - <u>Scirpus americanus</u>
3	a sedge - <u>Carex crinita</u>
3	water hemlock - <u>Cicuta maculata</u>
3	water horehound - <u>Lycopus sp.</u>
3	winter cress - <u>Barbarea vulgaris</u>
3	stinging nettle - <u>Urtica dioica</u>
3	peppergrass - <u>Lepidium sp.</u>
3	New England aster - <u>Aster novae-angliae</u>
3	knotweed - <u>Polygonum erectum</u>
3	white birch - <u>Betula papyrifera</u>
3	cleavers - <u>Galium aparine</u>
3	elm (tree) - <u>Ulmus americana</u>
3	ribbon-leaf pondweed - <u>Potamogeton epihydrus</u>
3	blueets - <u>Houstonia caerulea</u>
3	cottonwood (tree) - <u>Populus deltoides</u>
3	small white aster - <u>Aster vimineus</u>

IV. CONCLUSIONS

One of the most interesting conclusions drawn from the transects was the existence of plant zonations along the northwestern side of the Cranberry Pool. As the elevations rise gradually there, an edge area varying from 25-to-100 yards in width becomes apparent. This "band" consists of a "dead tree zone" and the edge of the live tree zone, and maintains the highest plant diversity of the Cranberry Pool vicinity. Map #6 illustrates this observation.



Some of the plant diversity that typifies the western side of the Cranberry Pool - particularly within the "Dead Tree" edge of the "Live Tree" zones. Carex tribuloides (center), Sagittaria latifolia var., Sparganium eurycarpum, Pontedaria cordata and Apocynum androsaemifolium (right of center) appear in the photograph.

Such waterfowl foods as arrowhead tubers, wild rice, pondweeds, spikerushes, duckweed and beggar-ticks are readily available throughout the Cranberry Pool areas surveyed.

As far as suitable pike-spawning areas are concerned, we suspect that only the deeper-water areas within the eastern parts of the Cranberry Pool (ie. - Cripple Brush Creek and the borrow ditches adjacent to the dike), and immediately adjacent areas, will provide the necessary habitats. However, we will not venture any further opinions on that subject, and prefer to leave it to our local fisheries expert, Jon Anderson.

The transects did provide refuge staff with a better picture of the actual amount of small potholes and water edges available throughout the pool interior. Areas appearing to be "solid" wild rice and/or buttonbush, from the dike, actually maintain small openings scattered about, that probably make those habitats more desirable to waterfowl than earlier thought.

Additional analysis by the reader may be done through studies of the information herein. Periodic comparisons (every 5-10 years) should be conducted by refuge staff, to ascertain whether changes are taking place, particularly if the dike system is extended as proposed.

Should it become important to have the individual stations plotted on a map, each transect station could be revisited and measured during this winter, when ice conditions make access by snowmobile very easy.