VOLUME V

A BASE LINE SURVEY AND MODIFIED EUTROPHICATION INDEX FOR FORTY-ONE PONDS IN PLYMOUTH, MASSACHUSETTS

RUSSELL MILL (Russell Pond)

SANDY (Big Sandy)

SAVERY

SCOKES (Scoux)

SHIP

SPRING

WALL

BIG WEST

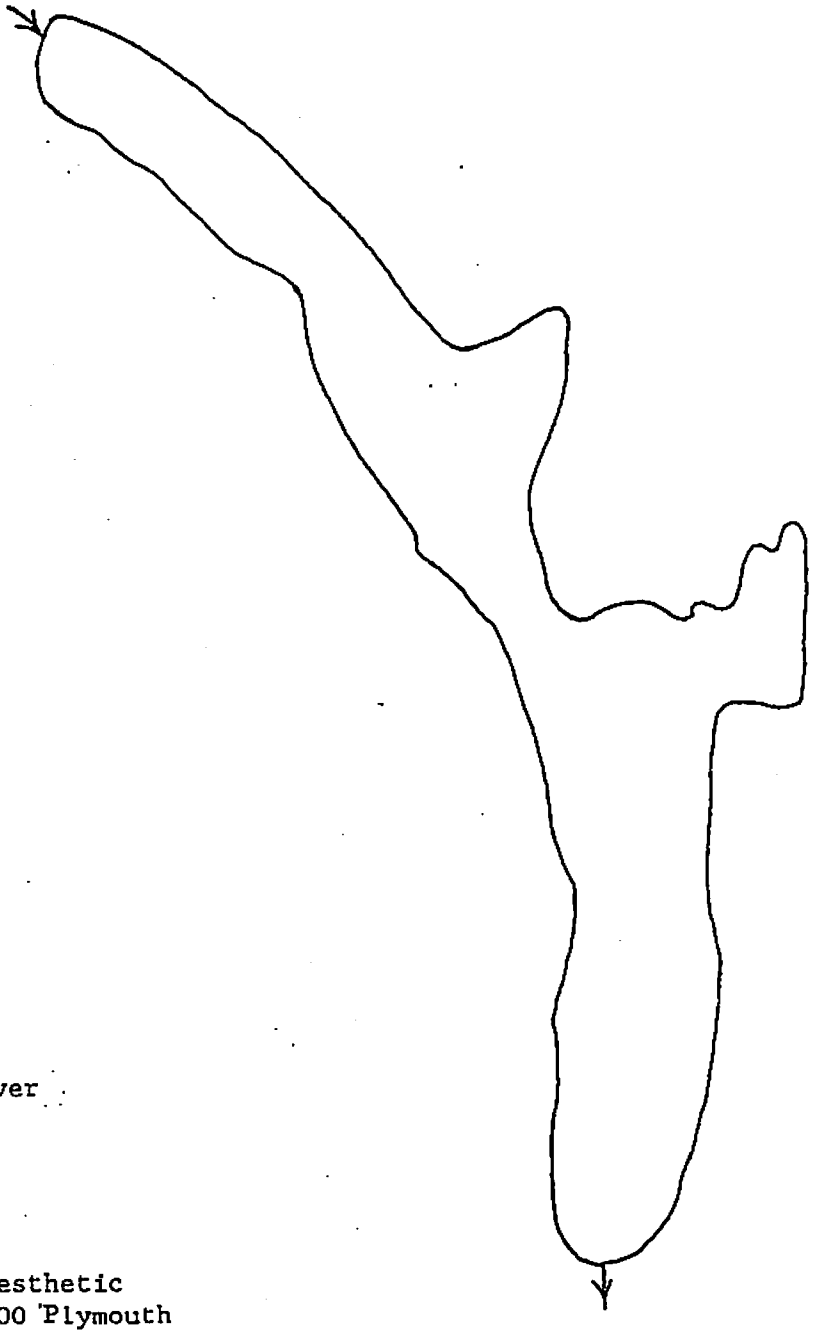
WHITE ISLAND

By

Lyons - Skwarto Associates
147 Whitewood Road
Westwood, Massachusetts 02090

RUSSELL MILL POND

RUSSELL POND



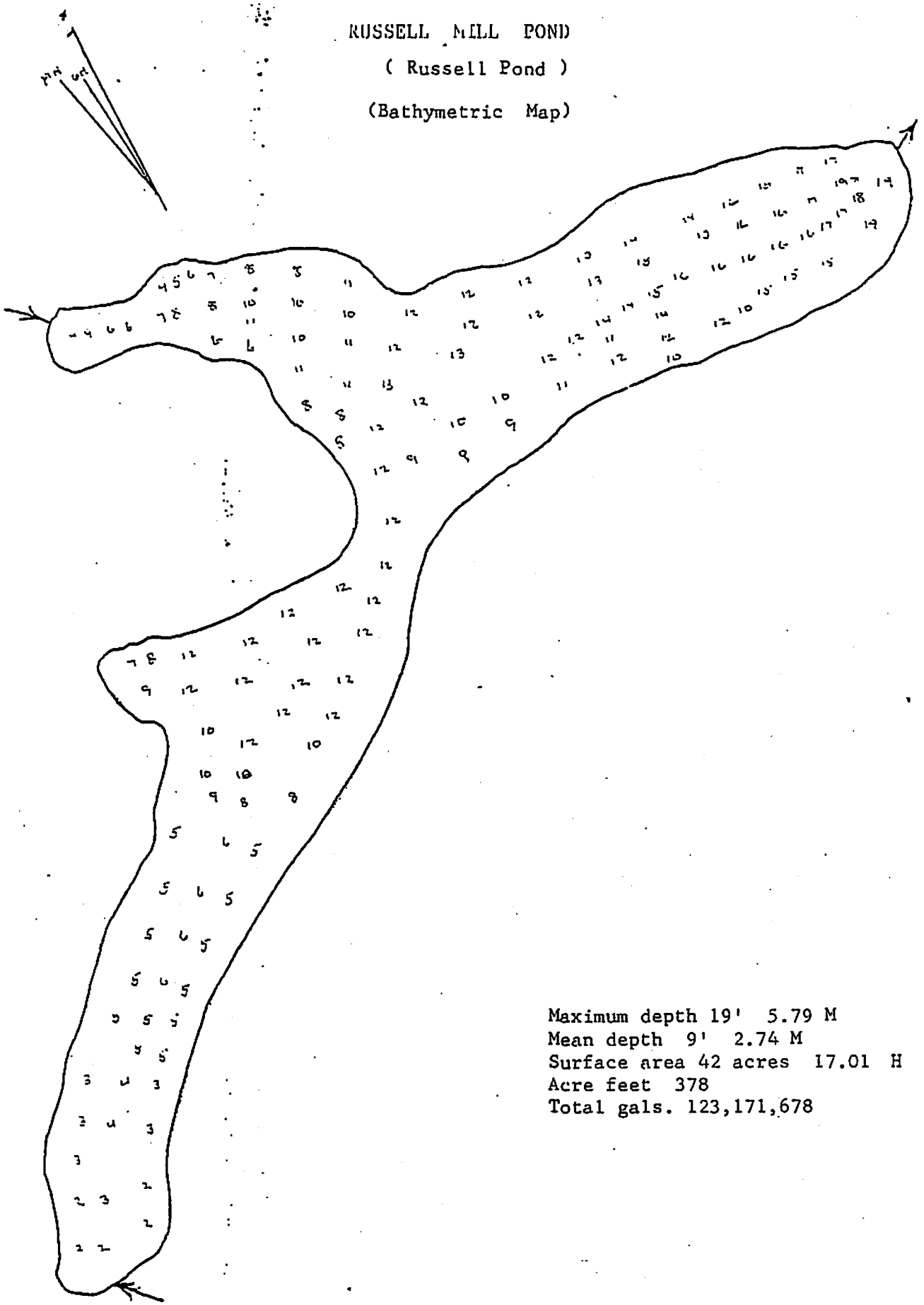
ssell Mill Pond
ymouth, Mass.
tershed type: Eel River
res: 42
titude: 055
ter type: warm-cold
nd type: artificial
ratified: no
nd use: recreation, esthetic
po sheet: USGS 1:24000 Plymouth
sition Topo sheet: up 7.7 right 15.0
oreline distance 1.8 miles 9.504'

Scale 1:570

RUSSELL MILL POND

(Russell Pond)

(Bathymetric Map)

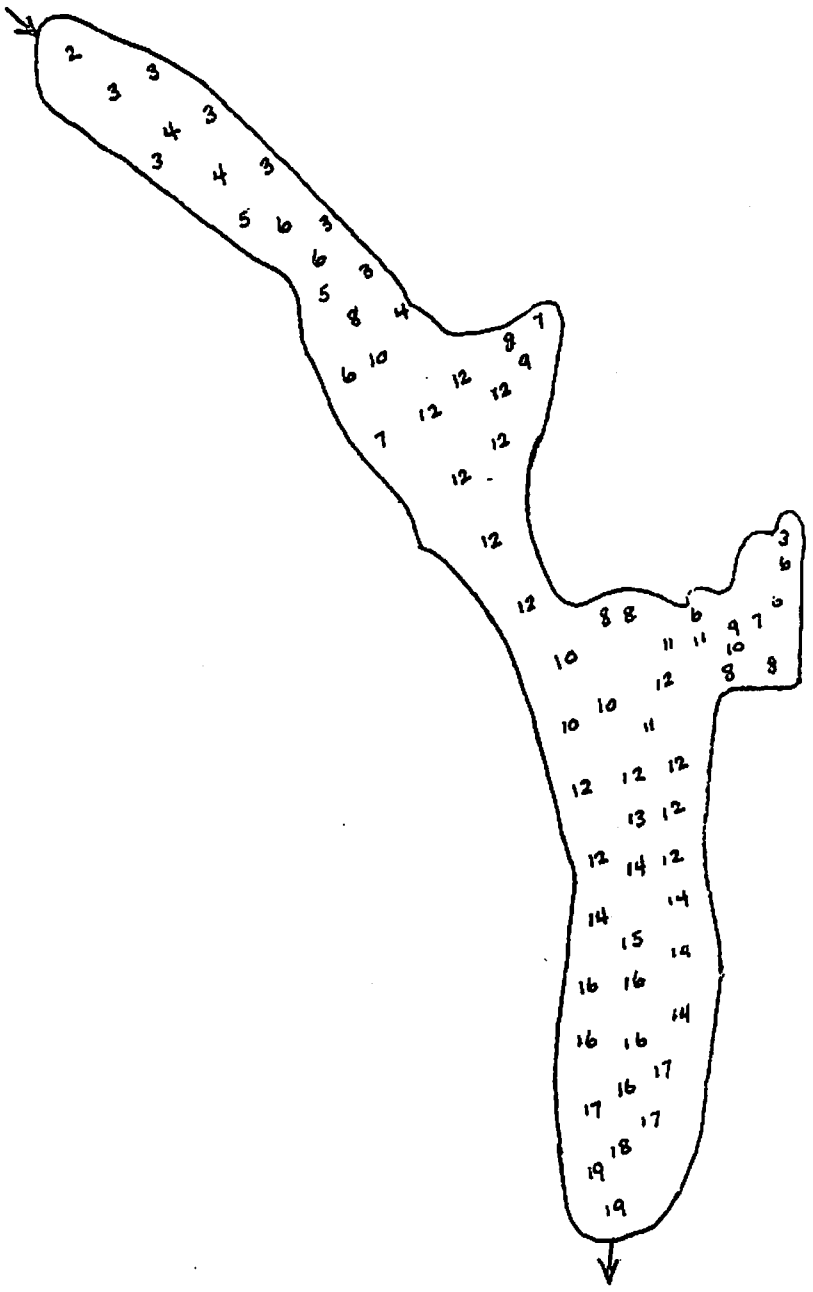


Maximum depth 19' 5.79 M
Mean depth 9' 2.74 M
Surface area 42 acres 17.01 H
Acre feet 378
Total gals. 123,171,678

Scale 1:400'

RUSSELL MILL POND

RUSSELL POND

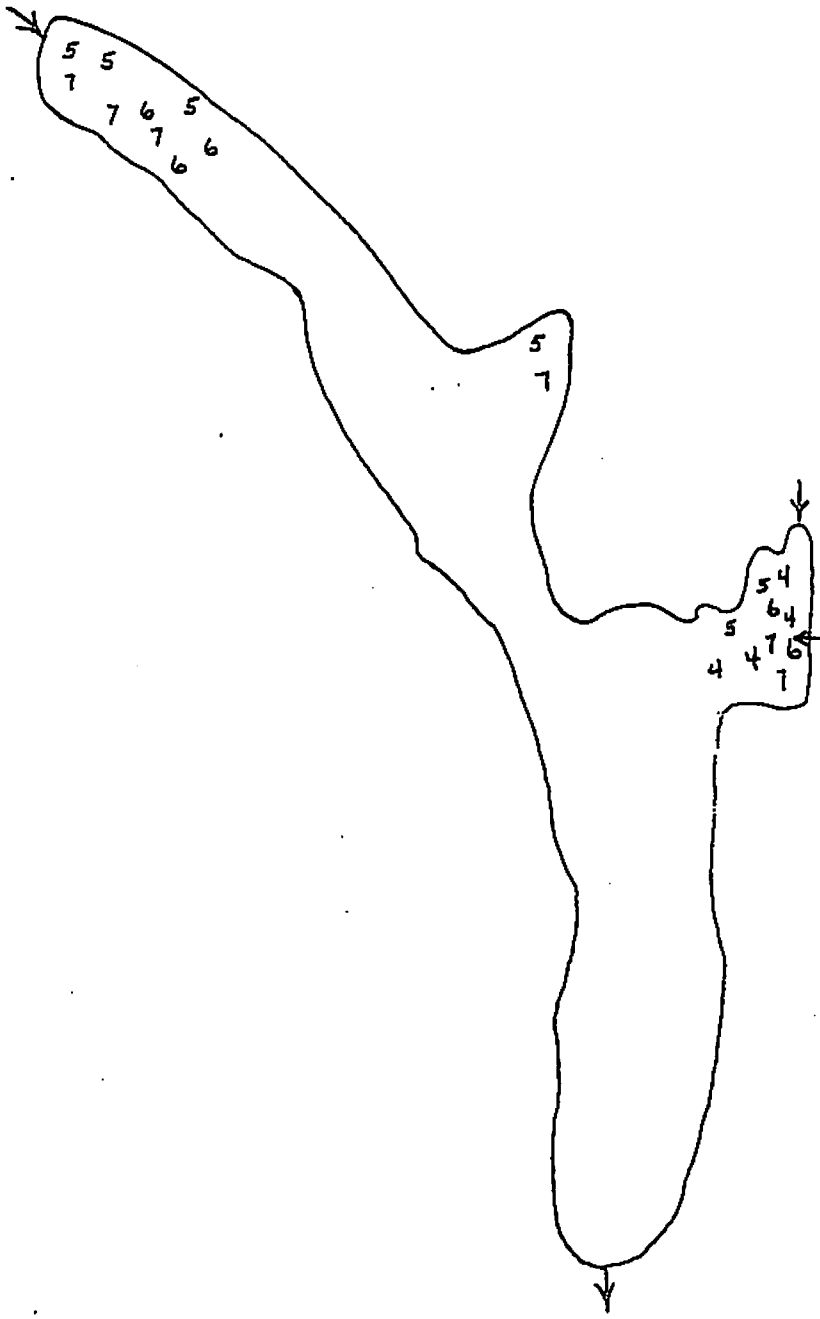


Scale 1:570

RUSSELL MILL POND

RUSSELL POND

Floating Aquatic Plant Map with Key



Scale 1:570

FLOATING AQUATIC PLANTS ATTACHED

LATIN	COMMON	MAP NUMBER
Nuphar	Cow Lily, Yellow Water Lily, Spatterdock	5
Nymphaea	Water Lily, White Water Lily	6
Brasenia	Watershield	7
	Addenda	

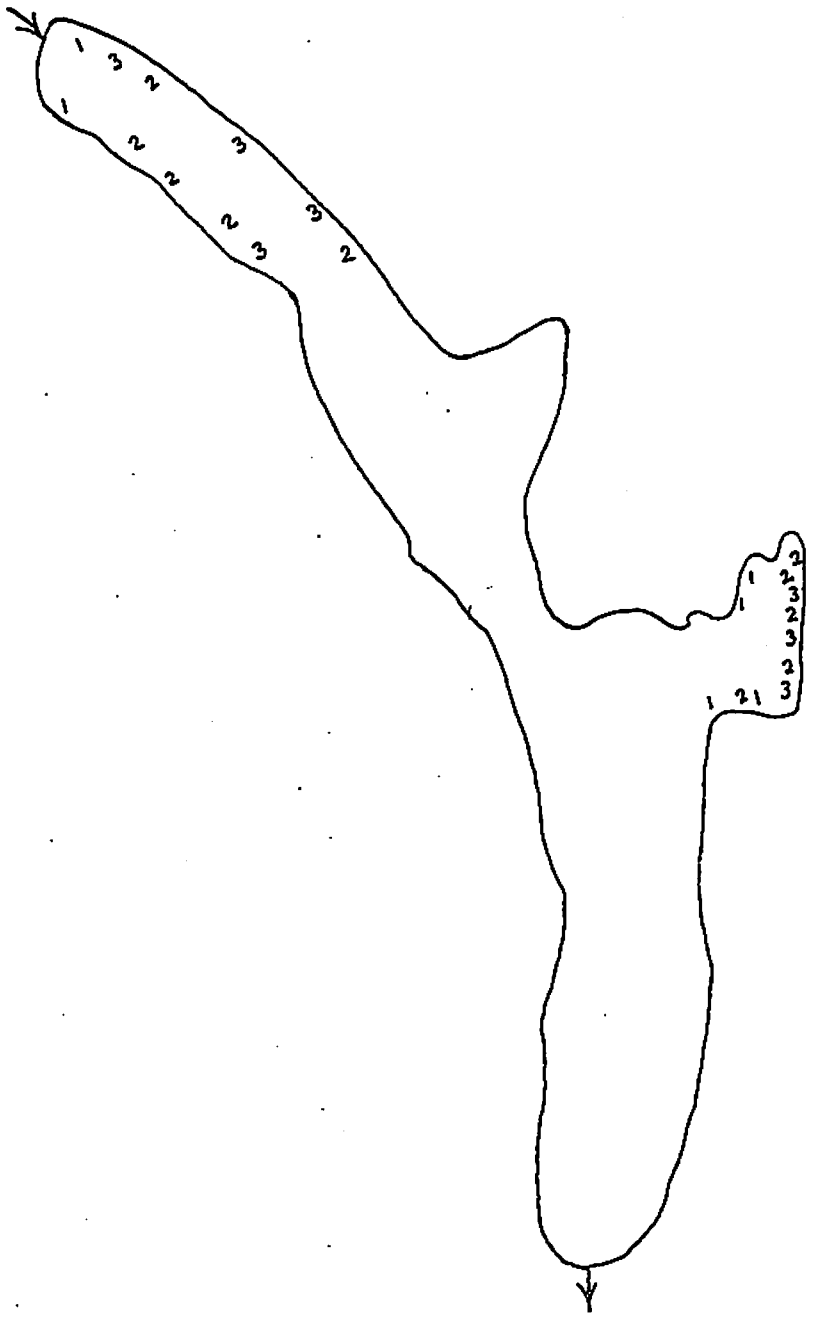
FLOATING AQUATIC PLANTS - UNATTACHED

LATIN	COMMON	MAP NUMBER
Lemna	Duckweed	4
Spirodelia	Big Duckweed	
Wolffia	Watermeal	
	Addenda	

RUSSELL MILL POND

RUSSELL POND

Emersed Aquatic Plant Map with Key

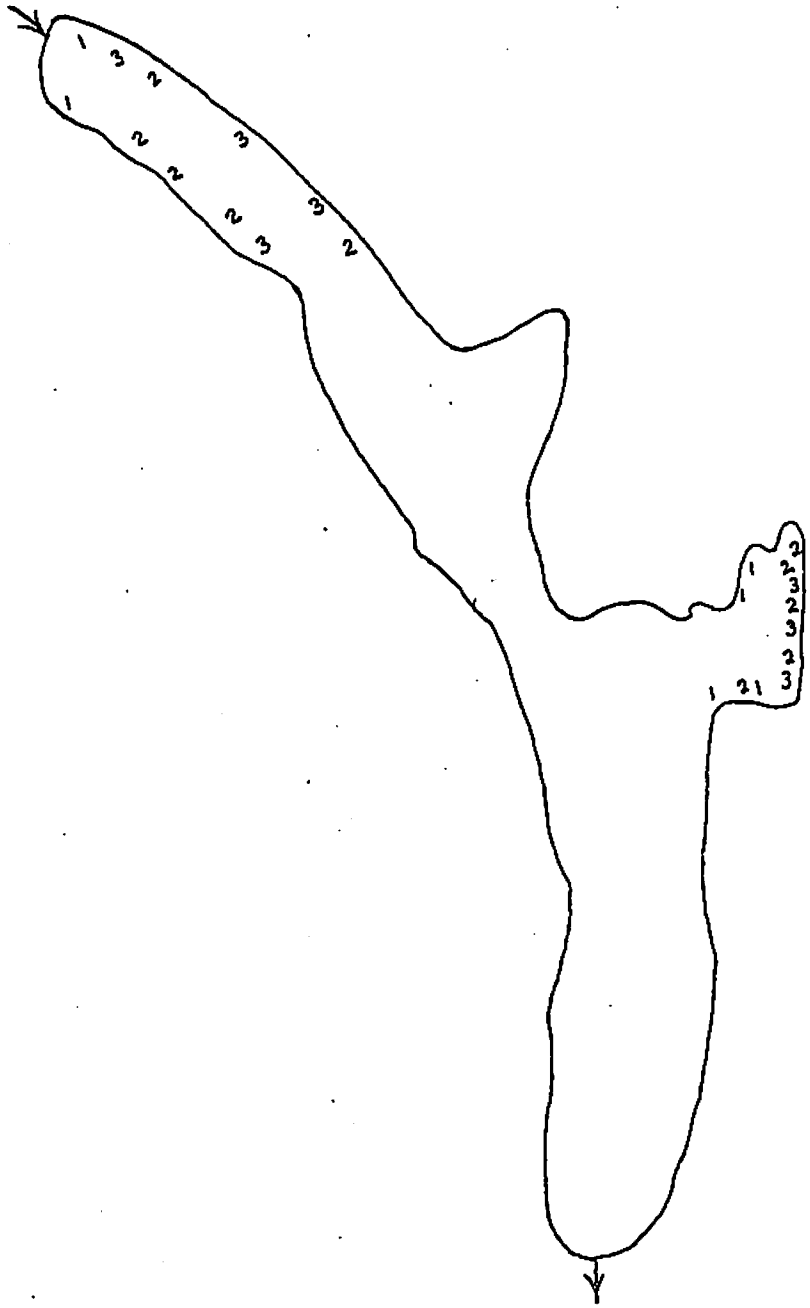


Scale 1:570

RUSSELL MILL POND

RUSSELL POND

Emersed Aquatic Plant Map with Key



Scale 1:570

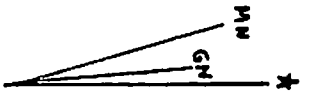
EMERSED AQUATIC PLANTS

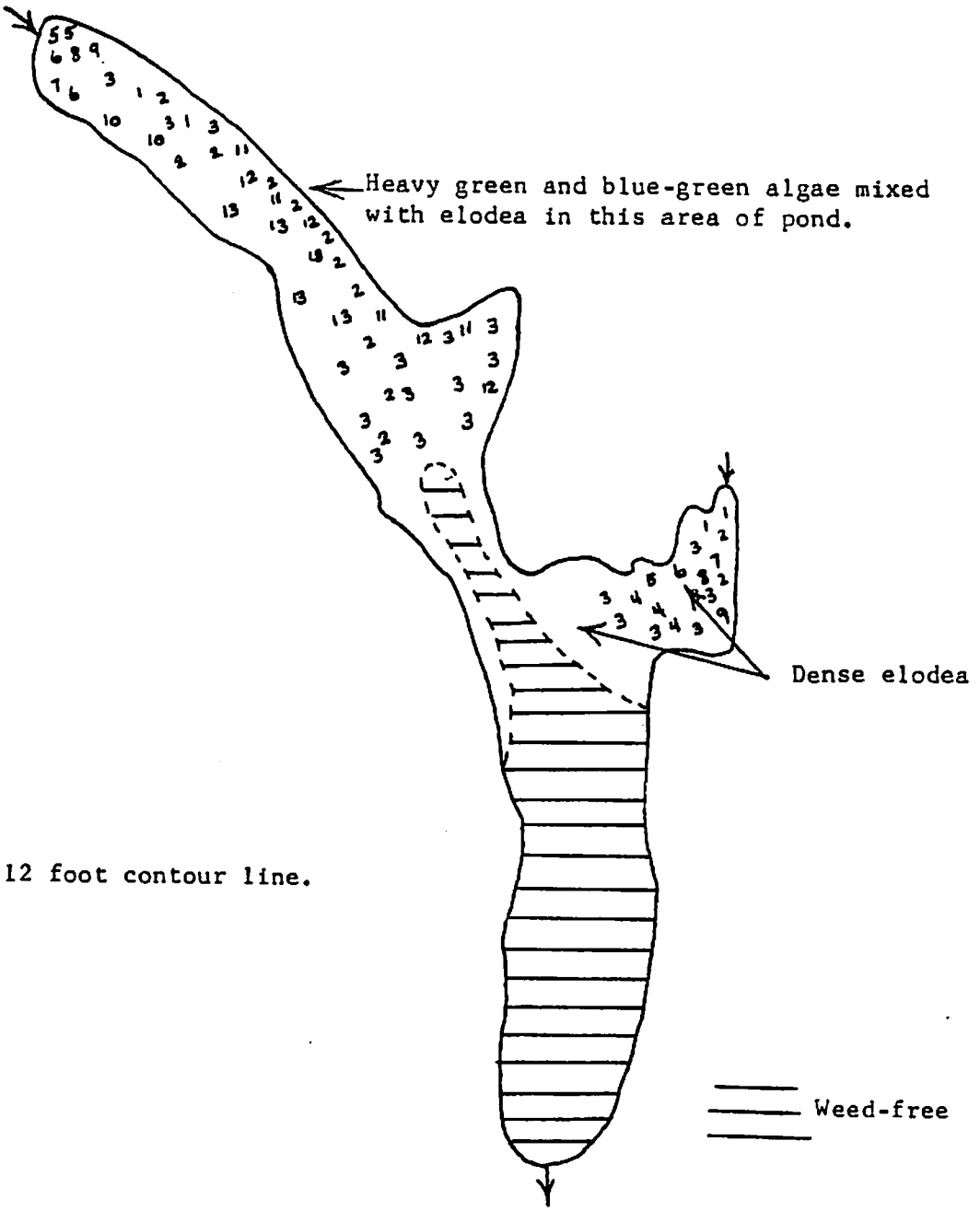
LATIN	COMMON	MAP NUMBER
Peltandra	Arrow Arum	
Pontederia	Pickerel Weed	1
Sagittaria	Arrowhead; Duck Potatoe	
Polygonum	Watersmart Weed	
Typha	Cattail	
Eleocharis	Spike Rush Sedge	2
Scirpus	Bulrush Sedge	
Juncaceae	Juncus Rush	
	Addenda	
Sparganium	Bur Reed	3

RUSSELL [illegible] POND

RUSSELL POND

Submersed Aquatic Plant Map with Key





Elodea heavy out to 12 foot contour line.

Scale 1:570

SUBMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	5
Potamogeton Crispus	Curly Leaf Pondweed	6
Potamogeton Diversifolius	Waterthread Pondweed	
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	7
Potamogeton Gramineus	Variable Pondweed	
Potamogeton Natans	Floating Brown Leaf	8
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	9
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	
Zannichellia	Horned Pondweed	
Elodea	Waterweed	3
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	10
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	1
Utricularia	Bladderwort	2
Vallisneria	Wild Celery	

Addenda

Algae

green

Chlorophyceae
unicellular
filamentous ——— 11

Cyanophyceae — Blue-green
unicallular
filamentous ——— 12

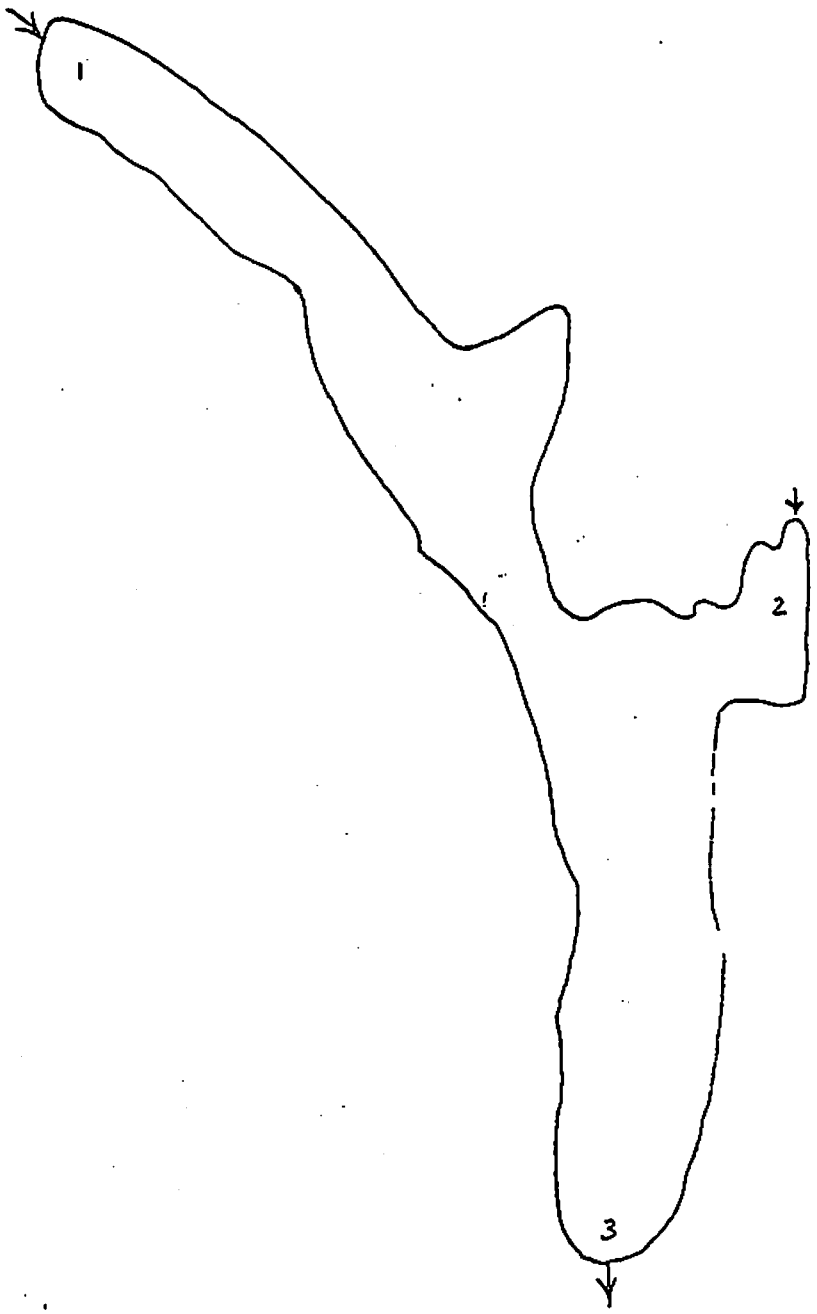
Cabomba ——— 13

Nitella — Algae — 4

RUSSELL MILL POND

RUSSELL POND

Chemical Sample Stations



Scale 1:570

Russell Mill

	IN LAKE STATION			OUTFALL			SOURCES		
	1	2	3	1	2	3	1	2	3
Total P				.03			.02	.10	
Nitrate (N)				.08			.10	.05	
Free Acid	0								
Total Acidity	0								
Alkalinity	0								
DO	10								
Total Hardness	18								
CO_2	8								
Pn	7.0								
Temp (C+F) 1' Levels	10° C								
Secchi	7 ft.								

Heavy Metals

Zn	.004
CD	.001
Sn	.006
Au	.001
Fe	.035
pD	.011
AL	.008
Cu	.009
Ni	.006
AG	.001

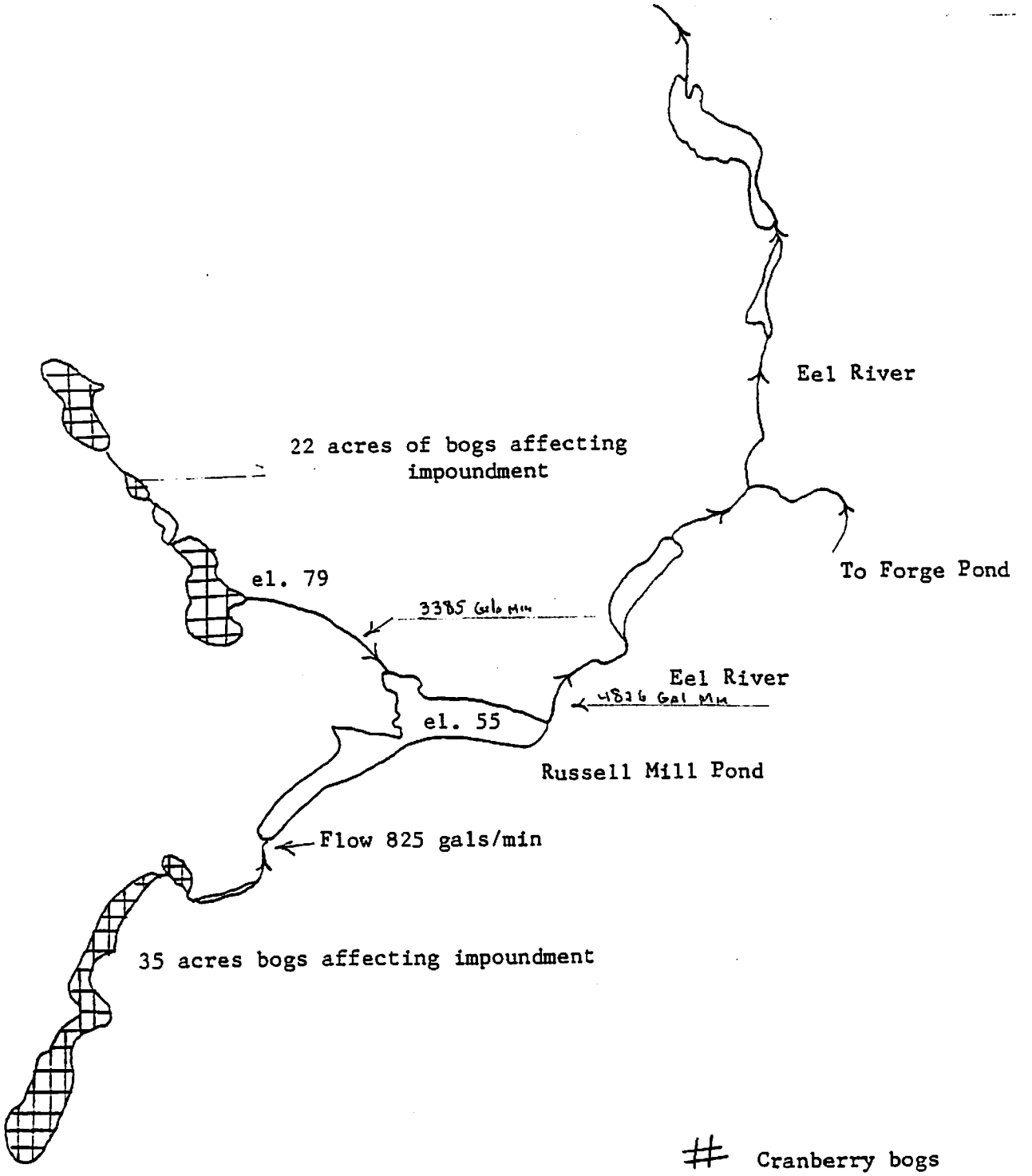
Benthos

Total P	323
Total Nitrogen	71
Percent solids	5.1
Total volatile solids	.11%

All figures in mg/l unless otherwise noted.

RUSSELL MILL POND

Impoundment Map



Scale 1:2000'

RUSSELL MILL POND

Using a modified trophic level index Russell Mill Pond ranks 21st.

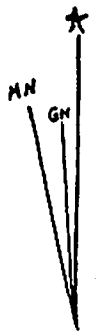
Russell Mill Pond is an artificial, warm water, tributary fed, non-stratified pond with a maximum depth of 19 feet. Macrophyte population is dense in about 50% of the pond. Floating aquatic plants cover about 8 acres with medium population, all species represented. Emersed aquatic plants are heavy on some shores. Submersed aquatic plant growth is dense on 23 acres with all species represented including cabomba, if there is a dominant species it would be elodea. Heavy infestations of filamentous green and blue-green algae is present in some areas. It ranked 17th on the plant trophic list. Secchi disc reading of 7 feet ranked it 28th for this parameter. Of three phosphate samplings one was critical, the second was high, the third one acceptable. Of three nitrate readings one was marginal while the other two were within permissible limits.

Number of houses affecting pond: approximately 5

Cranberry bogs affecting pond: approximately 60 acres

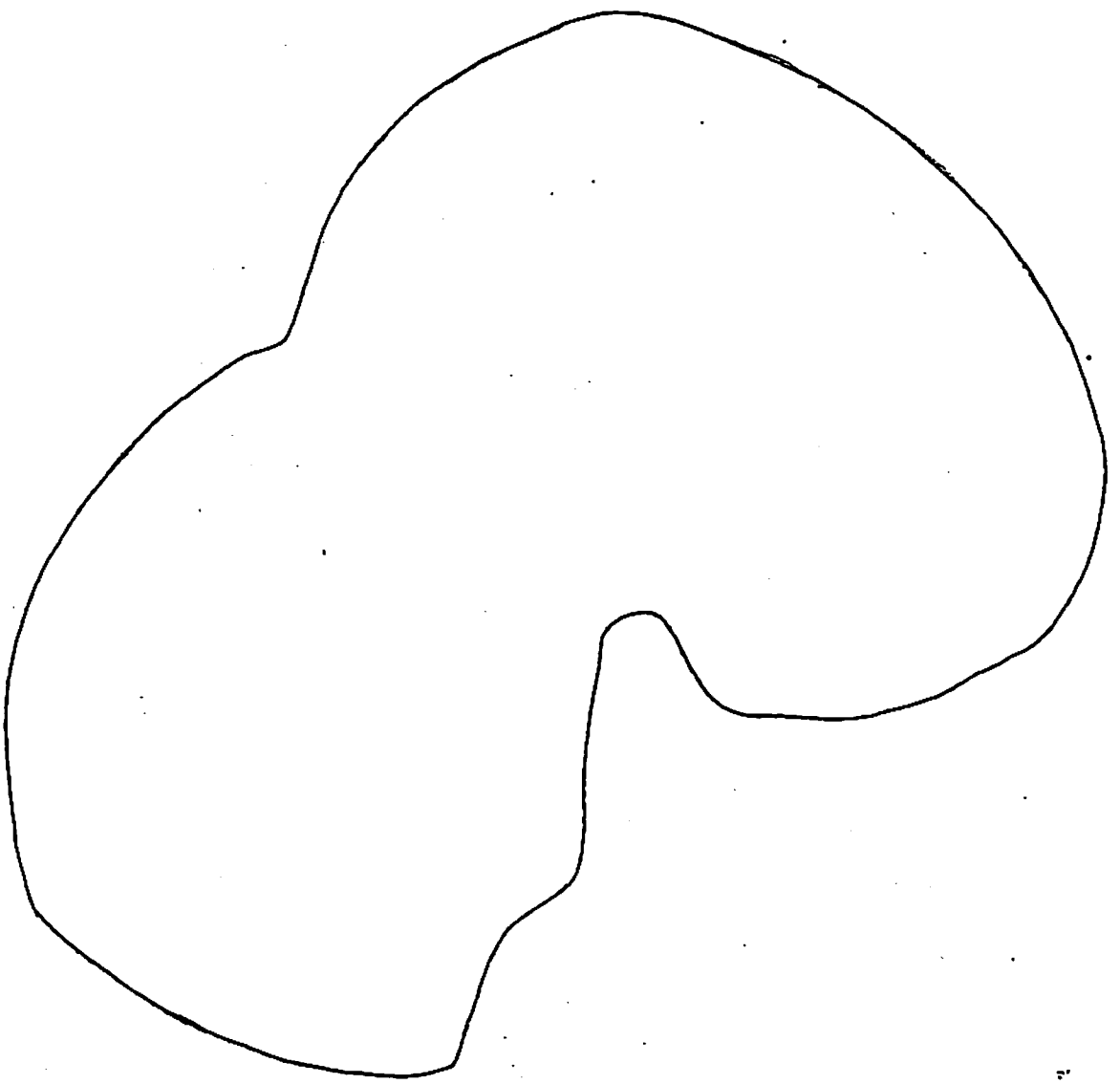
This pond is rated eutrophic

Problem: The Eel River impoundment is greatly affected by agriculture.



SANDY POND

BIG SANDY POND

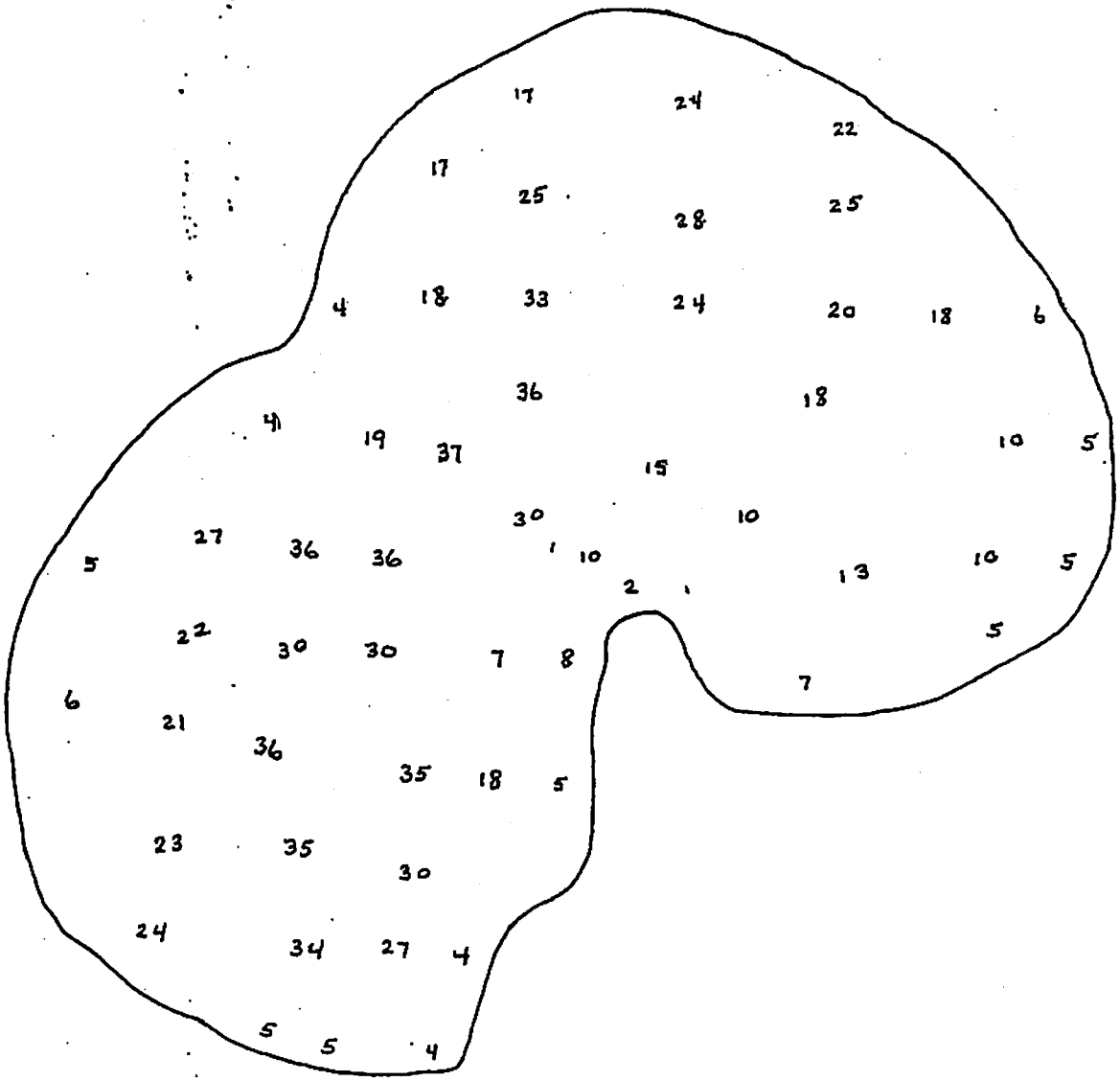


ıdy Pond
/mouth, Mass
:ershed: coastal
:es: 135
:itude: 048
:er type: cold
ıd type: natural
:atified: no
ıd use: recreation, esthetics
)o sheet: USGS 1:24000 Sagamore
;ition Topo sheet up 11.2 R 2.9
·reline distance: 1.9 M (10032 ft.)

Scale 1:550'

SANDY POND

BIG SANDY POND



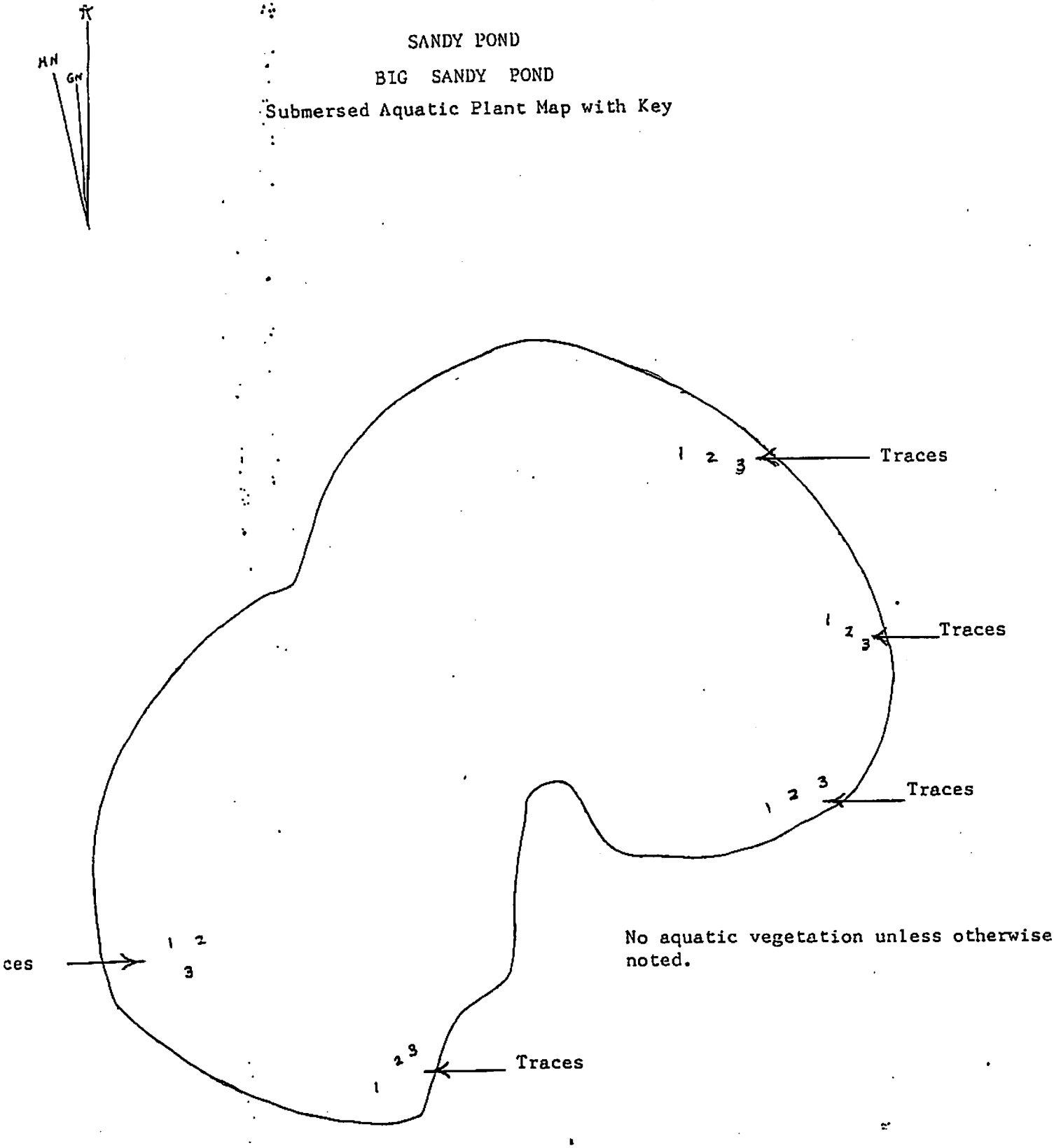
Maximum depth 37' 7.57 M
Mean depth 19' 5.8 M
Surface area 135 acres 54.68 H
Acre feet 2565
Total gals. 835,807,515

Scale 1:550'

SANDY POND

BIG SANDY POND

Submersed Aquatic Plant Map with Key



No aquatic vegetation unless otherwise noted.

Scale 1:550'

SUBMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	
Potamogeton Crispus	Curly Leaf Pondweed	
Potamogeton Diversifolius	Waterthread Pondweed	
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	
Potamogeton Gramineus	Variable Pondweed	
Potamogeton Natans	Floating Brown Leaf	
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	1
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	
Zannichellia	Horned Pondweed	
Elodea	Waterweed	
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	
Utricularia	Bladderwort	2
Vallisneria	Wild Celery	

Addenda

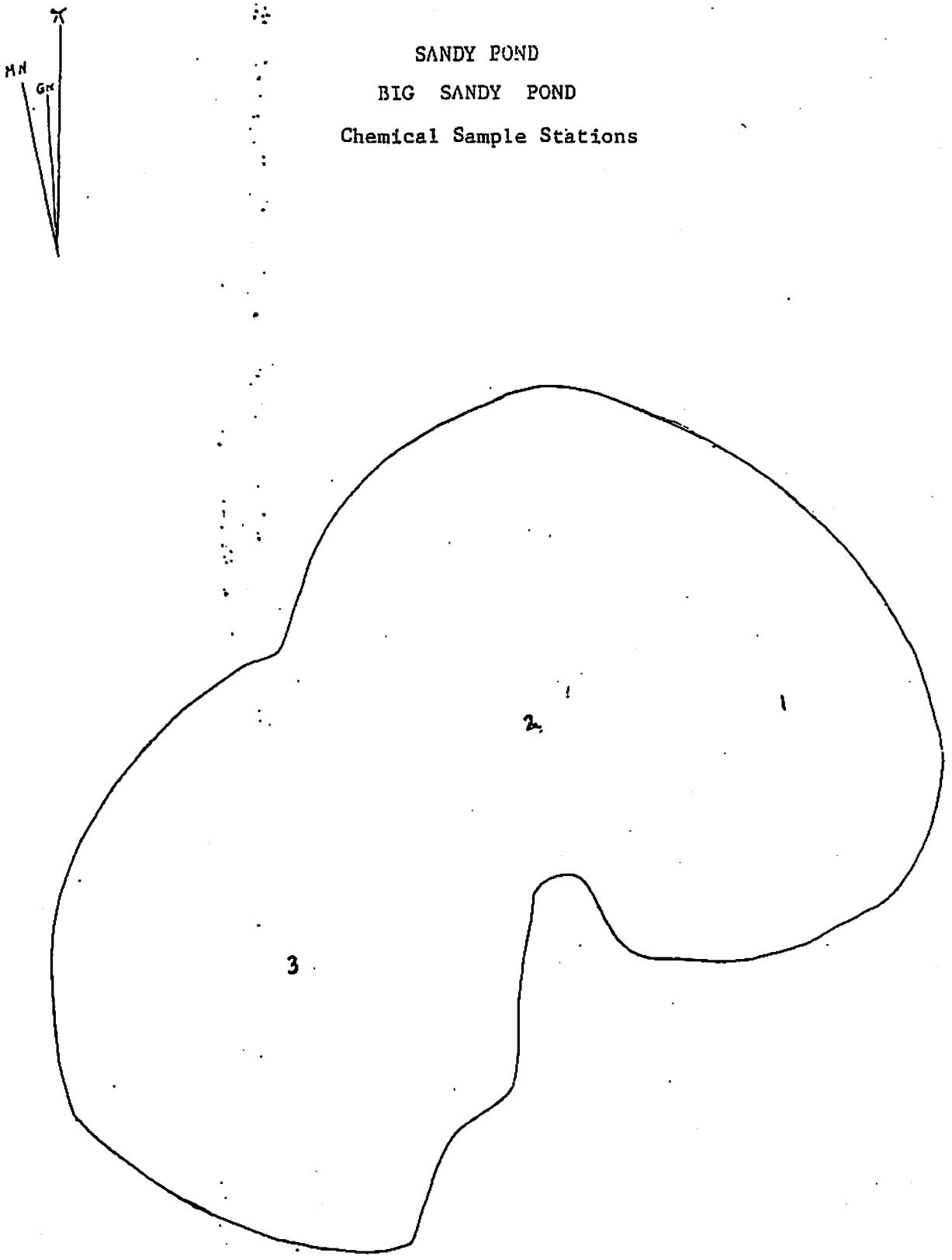
Green algae

Chlorophyceae filamentous		3

SANDY POND

BIG SANDY POND

Chemical Sample Stations



Scale 1:550'

	Sandy IN LAKE STATION			OUTFALL			SOURCES		
	1	2	3	1	2	3	1	2	3
Total P	.03	.03	.03						
Nitrate (N)	.03	.05	.03						
Free Acid	0								
Total Acidity	0								
Alkalinity	0								
DO	9								
Total Hardness	17								
CO_2	9								
Pn	7.4								
Temp (C+F) 1' Levels	22° C								
Secchi	13 ft.								

Heavy Metals

Zn	.009
CD	.001
Sn	.004
Au	.001
Fe	.045
P	.004
AL	.004
Cu	.070
Ni	.010
AG	.009

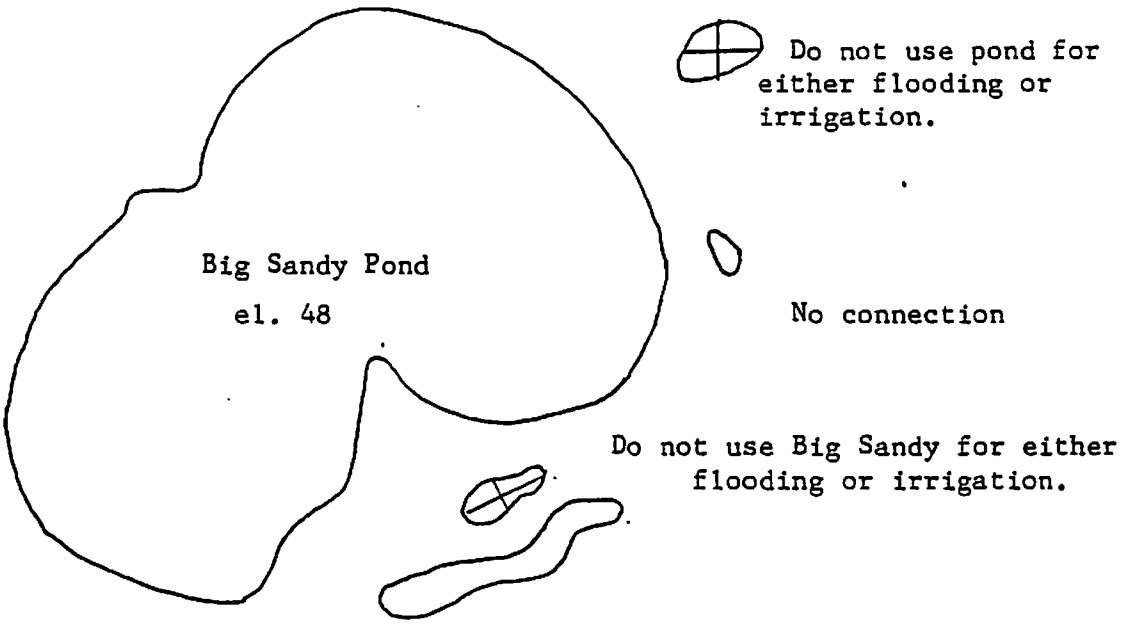
Benthos

Total P	52
Total Nitrogen	18.4
Total volatile solids	.05%
Percent solids	2.04

All figures in mg/l unless otherwise noted.

BIG SANDY POND

Impoundment Map



Pond type: Kettlehole
Tributary: none
Outfall: none
Overland flow: none
Ground water and underground aquifers primary source
Rainfall secondary source
Surface run-off secondary source
Agriculture practices directly affecting impoundment none
Industrial practices directly affecting impoundment none
Possible sources of nutrient influx - Public ramp area
The many homes, permanent & seasonal around perimeter of pond

Scale 1:960'

SANDY POND

Using a modified trophic level index Sandy Pond ranks 9th.

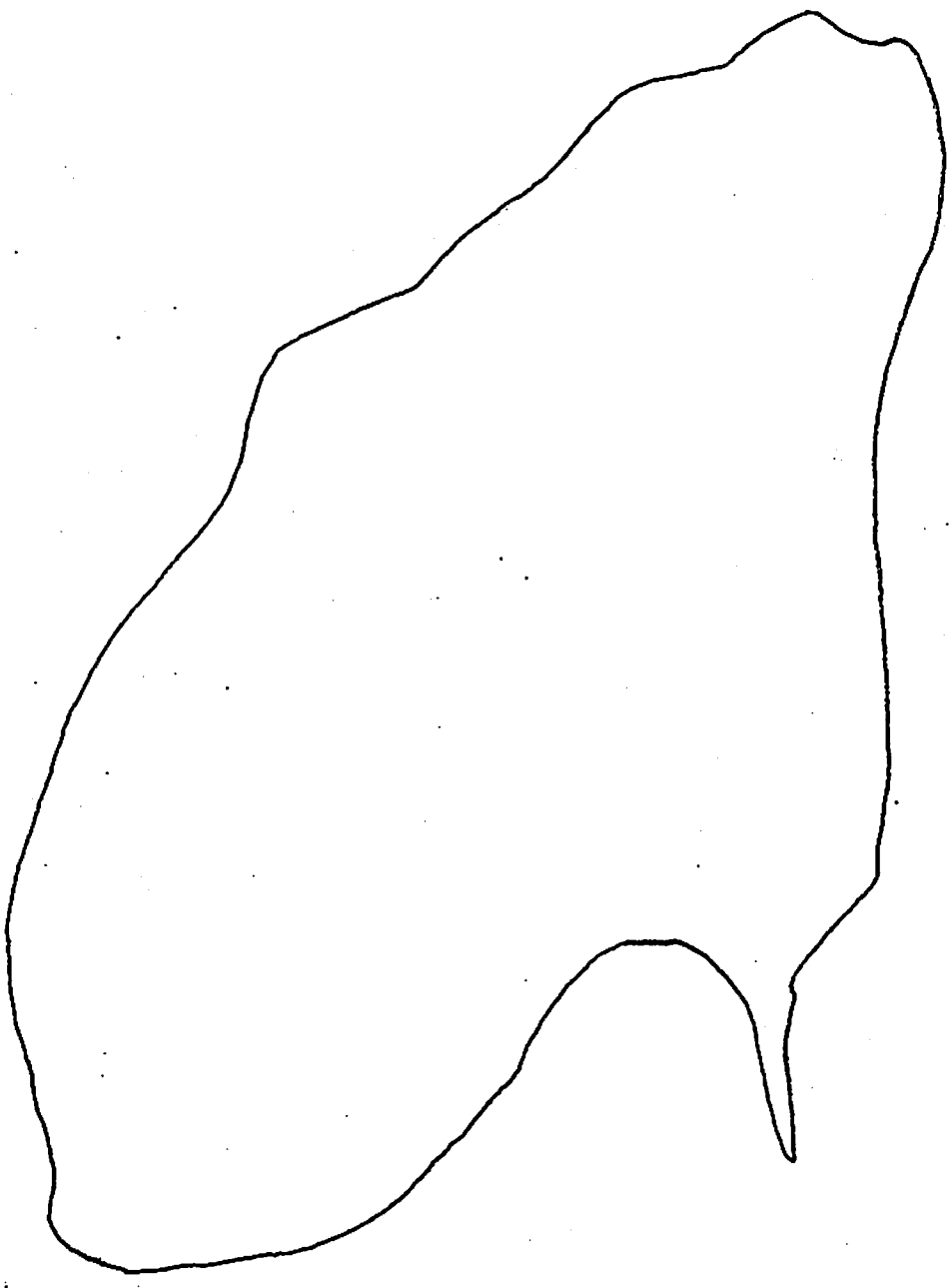
Sandy Pond is a natural cold water, spring fed pond with a maximum depth of 37 feet. Macrophyte population is sparse with no emergent or floating plants noted. Submersed aquatic vegetation is sparse with traces of potamogetons and bladderwort; on the plant trophic list it ranks 9th. Secchi disc reading was 13 feet and ranked 12th in this parameter. Phosphate readings were above the permissable level with nitrate readings acceptable.

Number of houses affecting pond: very populous area

Cranberry bogs affecting pond: none

Problem: Phosphate readings point to a number of faulty septic systems around the pond. Pond is classified as mesotrophic but high phosphate levels will accelerate the eutrophication process.

SAVERY POND

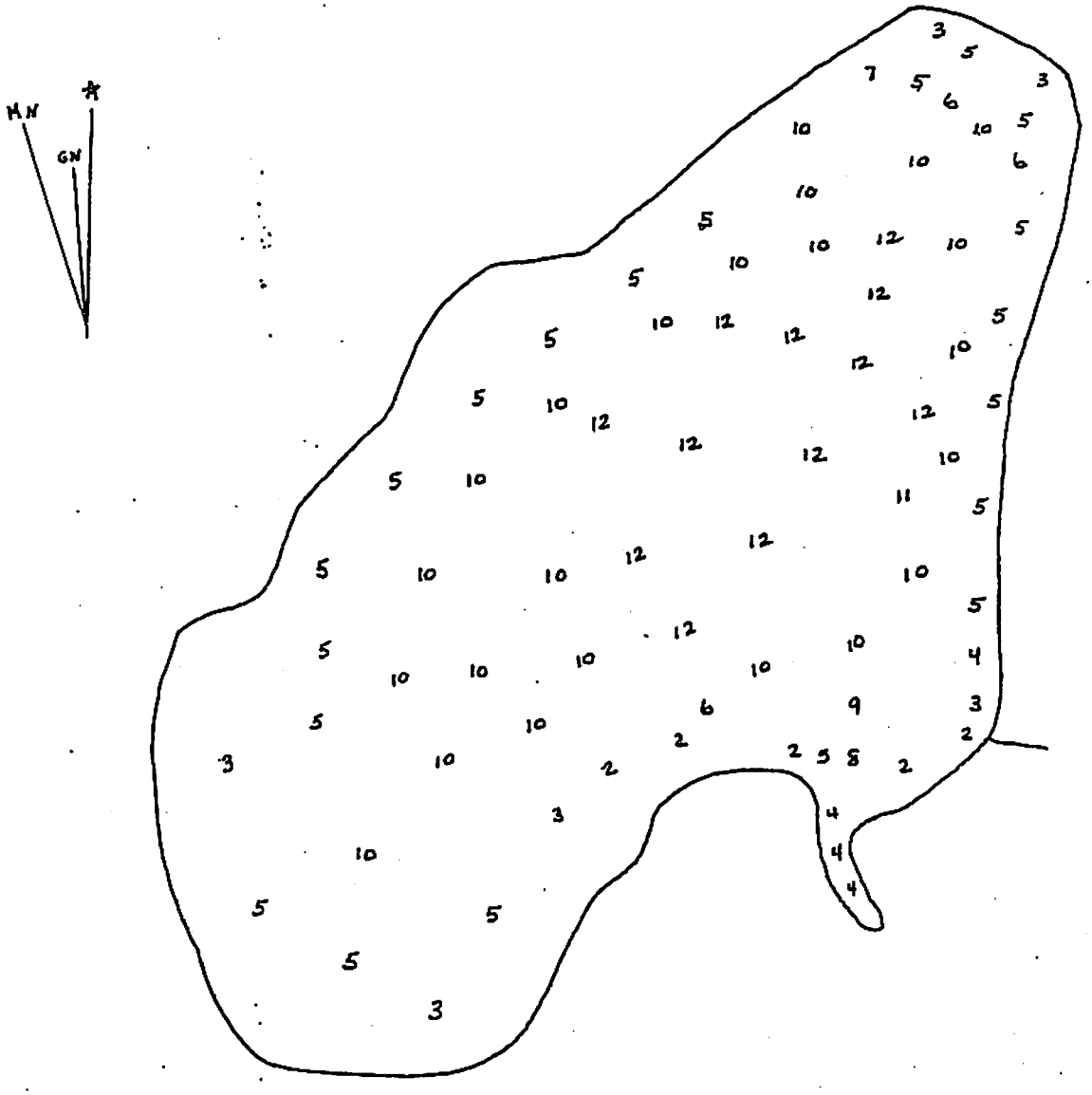


ery Pond
mouth, Mass.
ershed type: coastal
es: 33
itude: 028'
er type: warm
d type: natural
atified: no
d use: recreation, esthetic
o sheet: USGS 1:24000 Sagamore
ition Topo sheet: up 17.7 right 10.3
reline distance: .9 miles 4752'

Scale 1:257'

SAVERY POND

(Bathymetric Map)

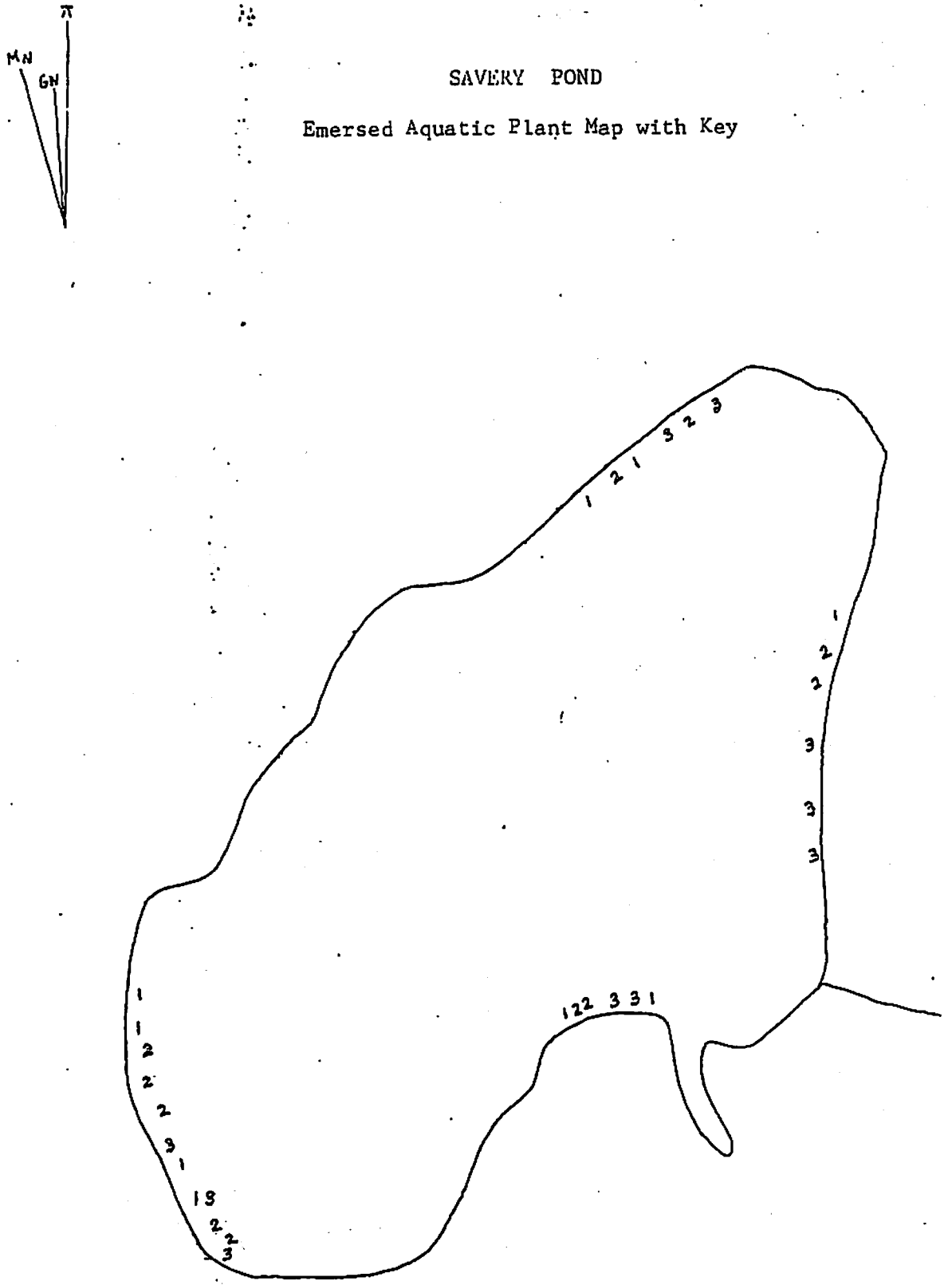


Maximum depth 12' 3.66 M
Mean depth 7' 2.13 M
Surface area 33 acres 13.37 H
Acre feet 231
Total gals. 75,271,581

Scale 1:280'

SAVERY POND

Emersed Aquatic Plant Map with Key



Scale 1:280'

EMERSED AQUATIC PLANTS

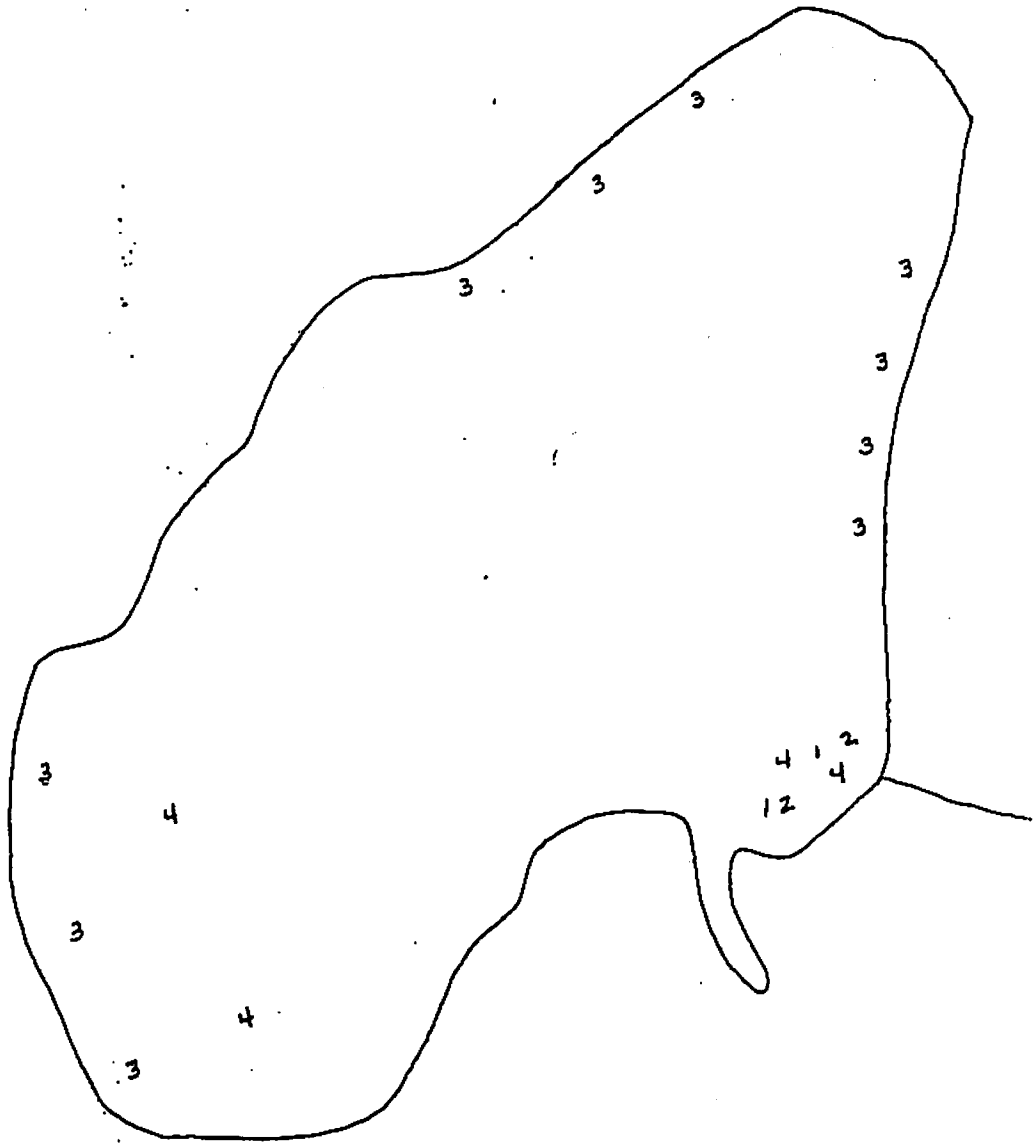
LATIN	COMMON	MAP NUMBER
Peltandra	Arrow Arum	
Pontederia	Pickerel Weed	
Sagittaria	Arrowhead; Duck Potatoe	
Polygonum	Watersmart Weed	
Typha	Cattail	
Eleocharis	Spike Rush Sedge	3
Scirpus	Bulrush Sedge	1
Juncaceae	Juncus Rush	2

Addenda

MN
GN

SAVERY POND

Submersed Aquatic Plant Map with Key



Scale 1:280'

SUBMERSED AQUATIC PLANTS

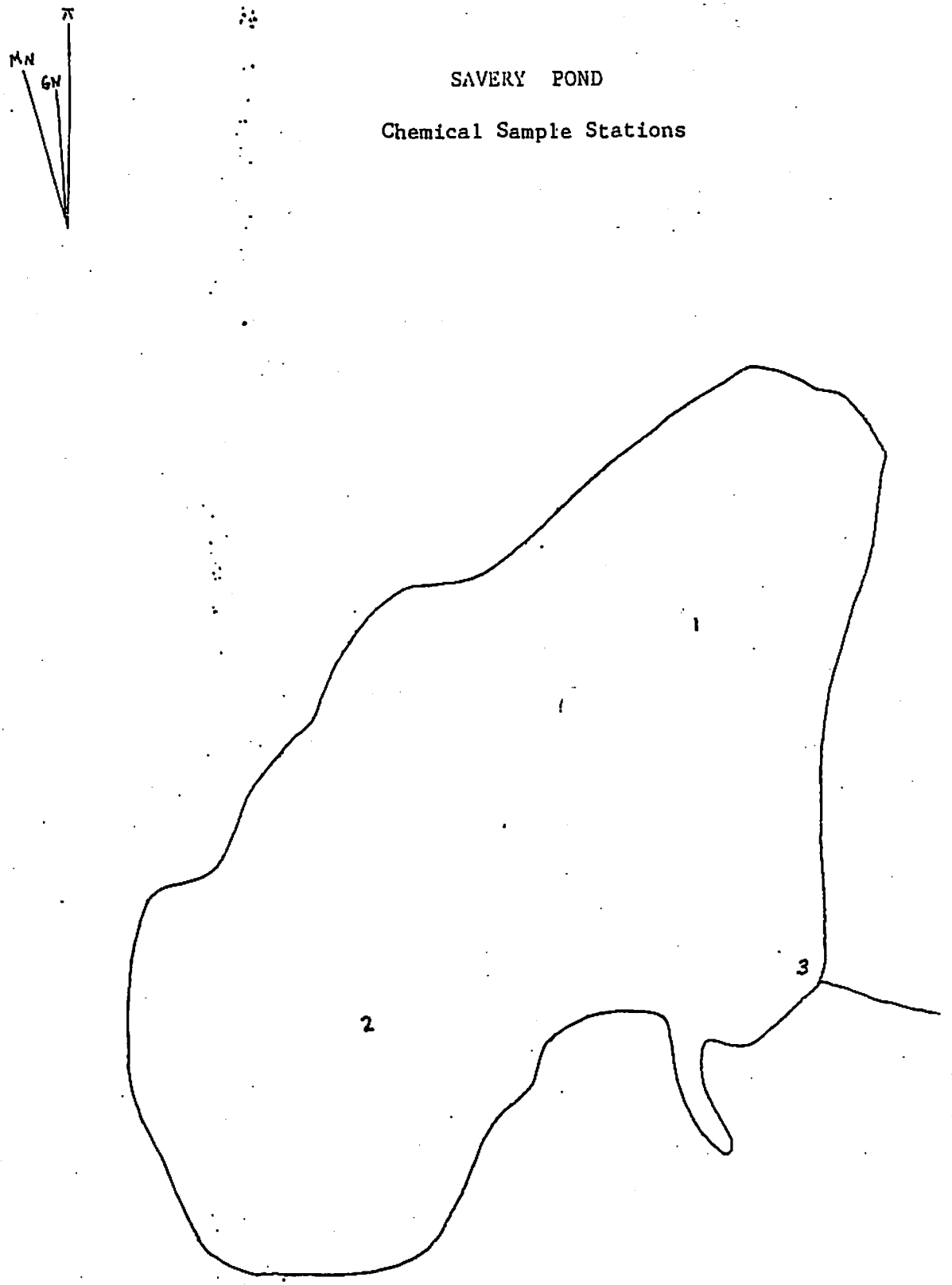
LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	
Potamogeton Crispus	Curly Leaf Pondweed	
Potamogeton Diversifolius	Waterthread Pondweed	
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	
Potamogeton Gramineus	Variable Pondweed	
Potamogeton Natans	Floating Brown Leaf	1
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	2
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	
Zannichellia	Horned Pondweed	
Elodea	Waterweed	
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	
Utricularia	Bladderwort	3
Vallisneria	Wild Celery	

Addenda

CHLOROPHYCEAE FILAMENTOUS — GREEN ALGAE — 4

SAVERY POND

Chemical Sample Stations



Scale 1:280'

	Savery IN LAKE STATION			OUTFALL			SOURCES		
	1	2	3	1	2	3	1	2	3
Total P	.02	.02		.02					
Nitrate (N)	.1	.1		.05					
Free Acid	0								
Total Acidity	0								
Alkalinity	0								
DO	11								
Total Hardness	16								
CO_2	15								
Pn	7.0								
Temp (C+F) 1' Levels	18° C								
Secchi	4 ft.								

Heavy Metals

Zn	.005
CD	.001
Sn	.010
Au	.001
Fe	.253
P D	.01
AL	.053
Cu	.008
Ni	.017
AG	.008

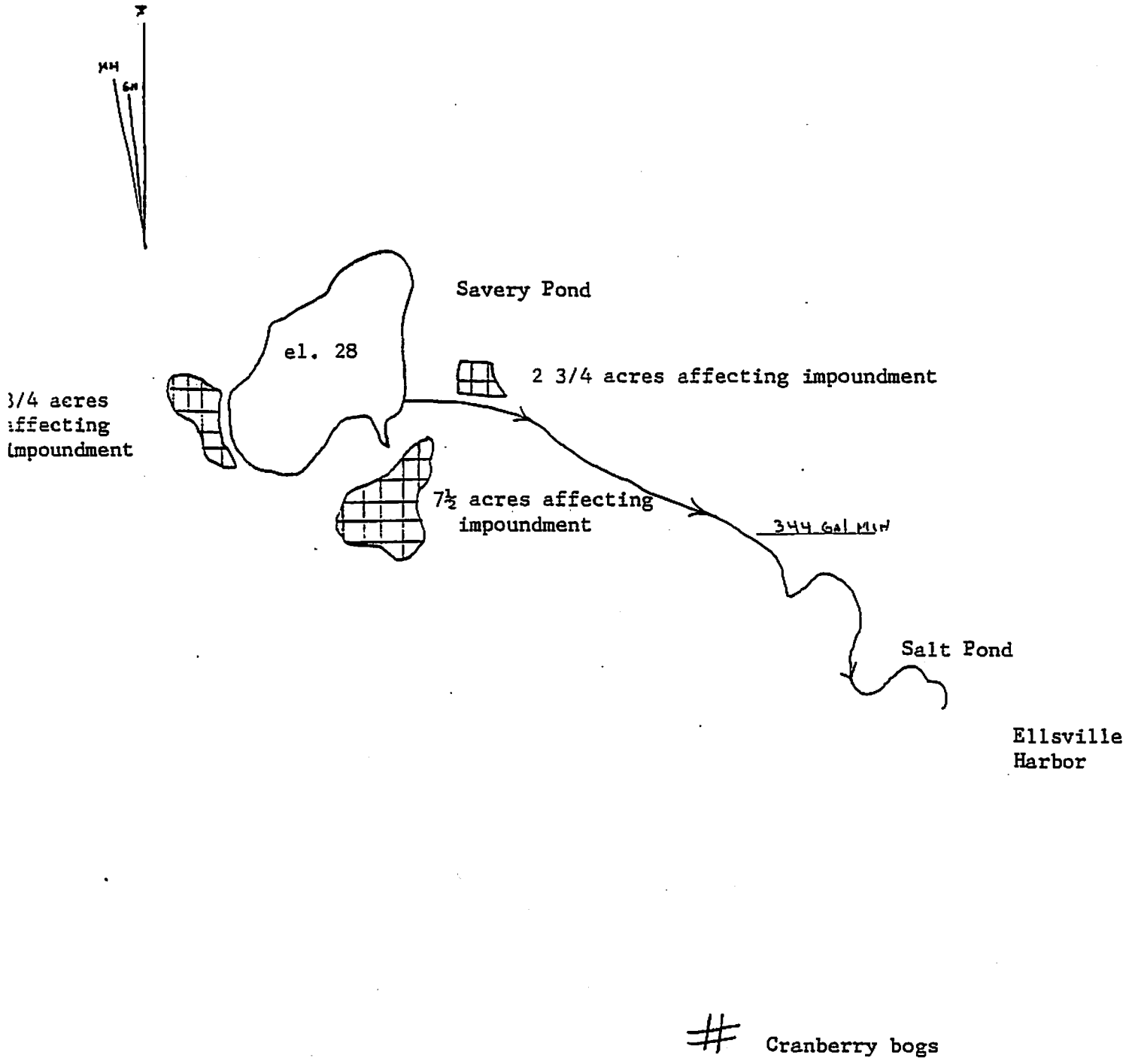
Benthos

Total P	546
Total Nitrogen	3.7
Percent solids	6.5
Total volatile solids	.38

All figures in mg/l unless otherwise noted.

SAVERY POND

Impoundment Map



Scale 1:1090'

SAVERY POND

Using a modified trophic level index Savery ranks 32nd.

Savery Pond is a natural, warm water, spring fed, non-stratified pond with maximum depth of 12 feet. Macrophyte population is classified as medium. Floating and emersed populations are sparse. Submersed populations are medium throughout 35% of the total area, the dominant species are potamogetons. Blue-green filamentous algae covered about 5 acres on plants. On the plant trophic level list it ranked 15th. Unicellular algae is present. Secchi disc reading was 4 feet placing it 38th on the list in this parameter. Phosphate readings were permissable and nitrate readings were marginal.

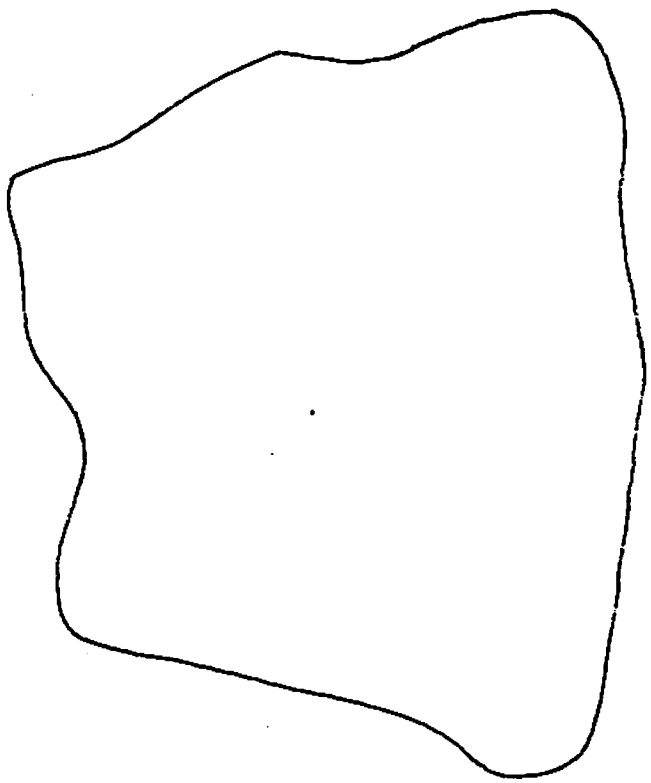
Number of houses affecting pond: approximately 10

Cranberry bogs affecting pond: approximately 15 acres

Problem: Nitrate readings indicate large agricultural influence. This pond is rated eutrophic.

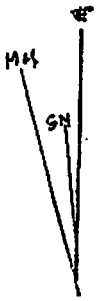
SCOKES POND

SCOUX POND



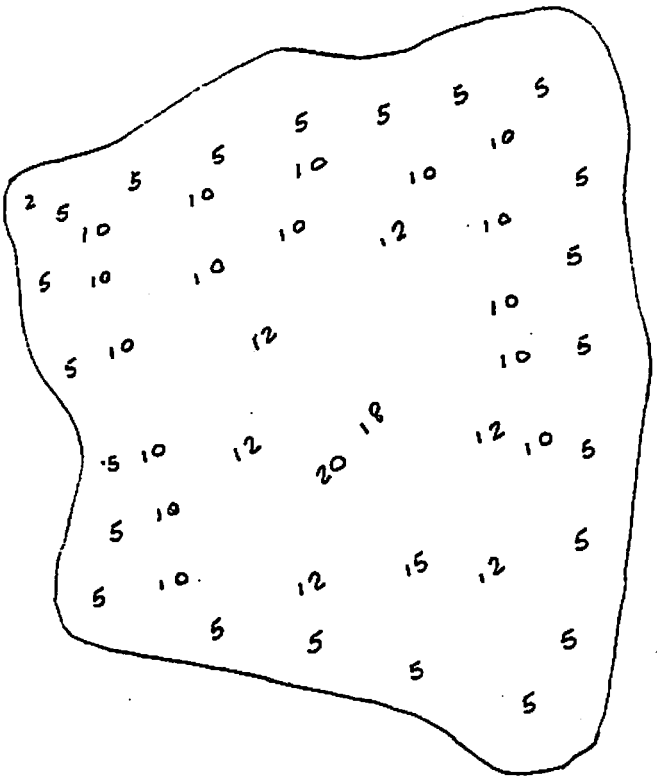
Scokes Pond
Plymouth, Mass.
Watershed: coastal
Acres: 6
Altitude: 08
Water type: warm
Pond type: kettlehole
Stratified: no
Pond use: recreation, aesthetic
Topo sheet USGS 1:24000 Manomet .
Position Topo sheet up 8.5 R 11.0
Shoreline distance .5 M (2640 ft.)

Scale 1:170



SCOKES POND

Bathymetric Map

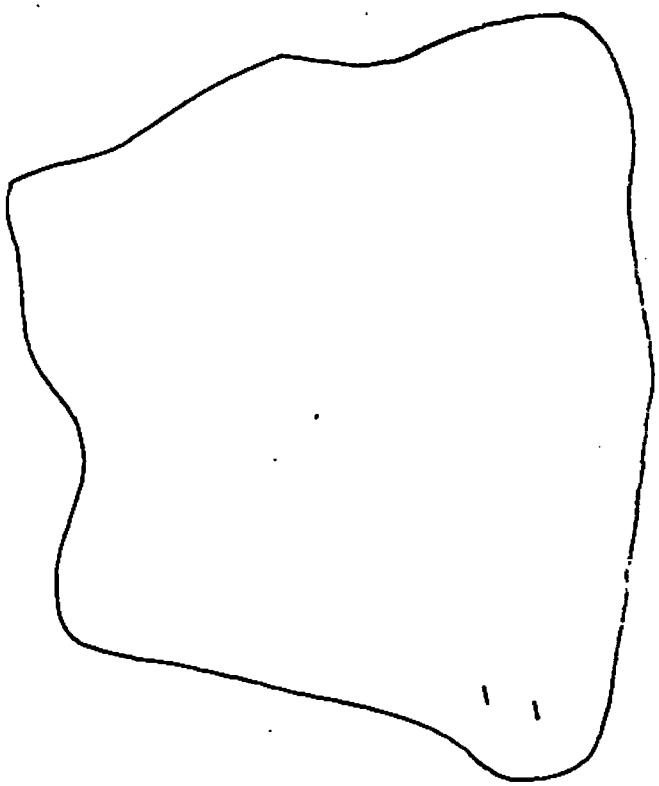


Maximum Depth 20 feet 6.1 m
Mean Depth 11 feet 3.4 m
Surface Area 6 A. 2.4 H.
Acre Feet 66
Total Gallons 21,506,166

SCOKES POND

SCOUX POND

Floating Aquatic Plant Map with Key



Scale 1:170

FLOATING AQUATIC PLANTS ATTACHED

LATIN	COMMON	MAP NUMBER
Nuphar	Cow Lily, Yellow Water Lily, Spatterdock	
Nymphaea	Water Lily, White Water Lily	
Brasenia	Watershield	
	Addenda	

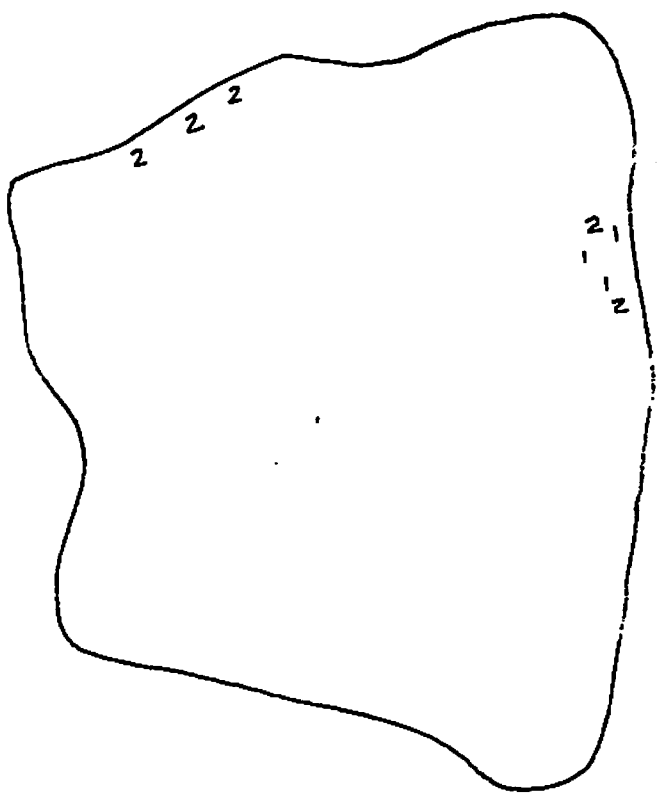
FLOATING AQUATIC PLANTS - UNATTACHED

LATIN	COMMON	MAP NUMBER
Lemna	Duckweed	
Spirodelia	Big Duckweed	
Wolffia	Watermeal	
	Addenda	

SCOKES POND

SCOUX POND

Emersed Aquatic Plant Map with Key



Scale 1:170

EMERSED AQUATIC PLANTS

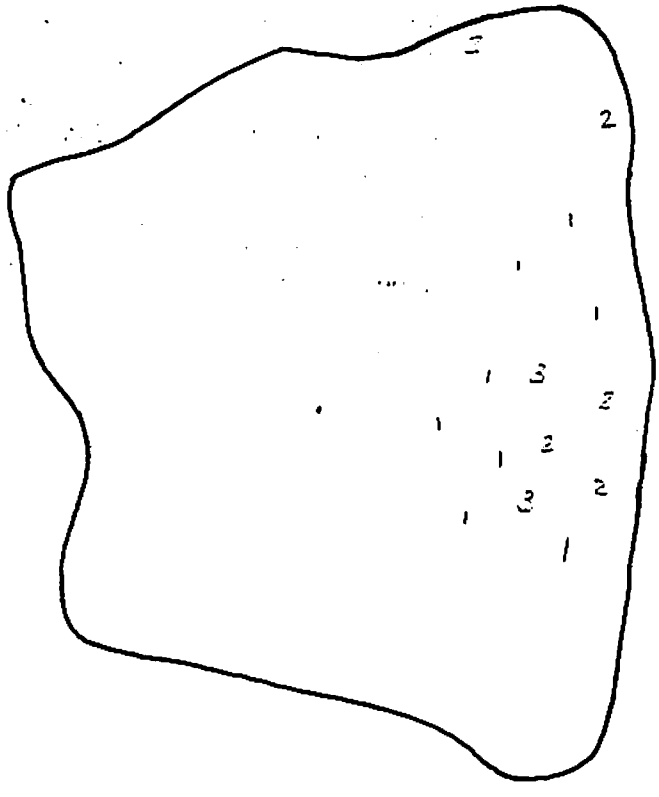
LATIN	COMMON	MAP NUMBER
Peltandra	Arrow Arum	
Pontederia	Pickerel Weed	1
Sagittaria	Arrowhead; Duck Potatoe	
Polygonum	Watersmart Weed	
Typha	Cattail	
Eleocharis	Spike Rush Sedge	
Scirpus	Bulrush Sedge	2
Juncaceae	Juncus Rush	

Addenda

SCOKES POND

SCOUX POND

Submersed Aquatic Plant Map with Key



Scale 1:170

SUBMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	
Potamogeton Crispus	Curly Leaf Pondweed	
Potamogeton Diversifolius	Waterthread Pondweed	
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	
Potamogeton Gramineus	Variable Pondweed	
Potamogeton Natans	Floating Brown Leaf	
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	
Zannichellia	Horned Pondweed	
Elodea	Waterweed	
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	3
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	
Utricularia	Bladderwort	1
Vallisneria	Wild Celery	

Addenda

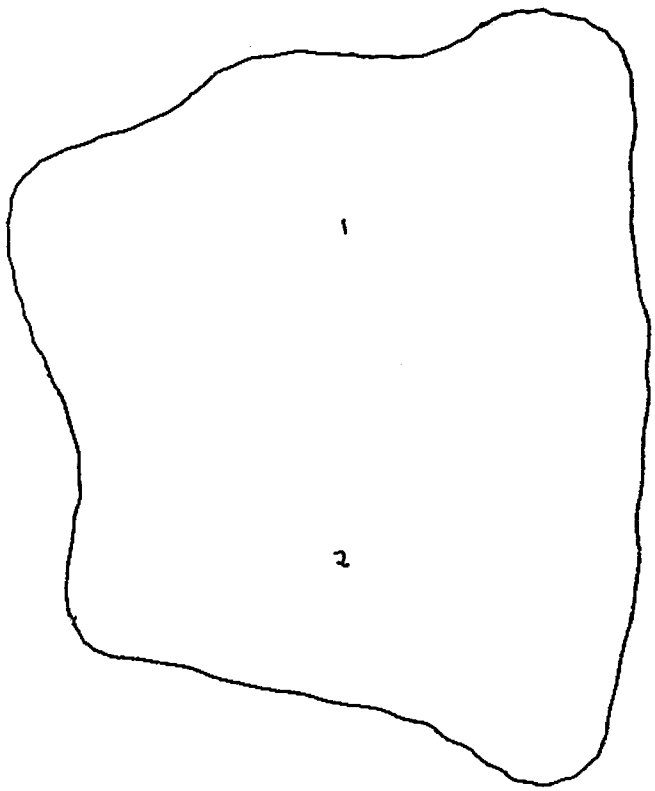
CHLOROPHYCEAE

GREEN ALGAE

FILAMENTOUS - 2

SCOKES POND
(SCOUX)

Chemical Stations



Scokes

	IN LAKE STATION			OUTFALL			SOURCES		
	1	2	3	1	2	3	1	2	3
Total P	.02	.02							
Nitrate (N)	.08	.07							
Free Acid	0								
Total Acidity	0								
Alkalinity	0								
DO	10								
Total Hardness	20								
CO_2	14								
Pn	6.4								
Temp (C+F) 1' Levels	14° C								
Secchi	7 ft.								

Heavy Metals

Zn	.003
CD	.001
Sn	.010
Au	.001
Fe	.320
P D	.013
AL	.050
Cu	.009
Ni	.011
AG	.003

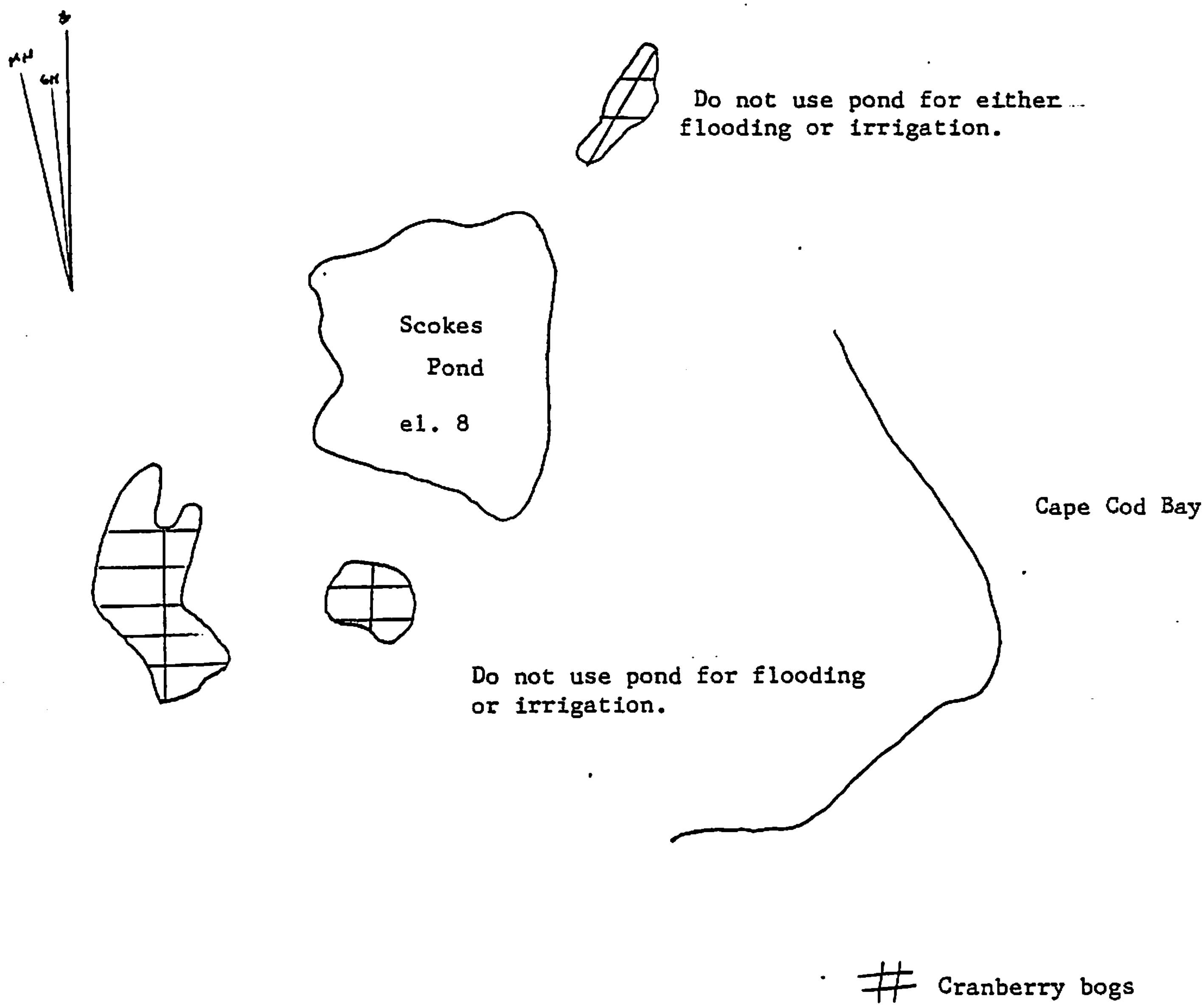
Benthos

Total P	20.6
Total Nitrogen	1.3
Percent solids	4.5
Total volatile solids	.51

All figures in mg/l unless otherwise noted.

SCOKES POND

Impoundment Map



Pond type: kettlehole
Tributary: none
Outfall: none
Overland flow: none
Groundwater and underground aquifers primary source
Rainfall secondary source
Surface run-off secondary source
Agriculture practices directly affecting impoundment none
Industrial practices directly affecting impoundment none
Possible sources of nutrient influx. Houses permanent & seasonal around perimeter of pond.

Scale 1:420

Using a relative trophic level index Scokes ranks 30th.

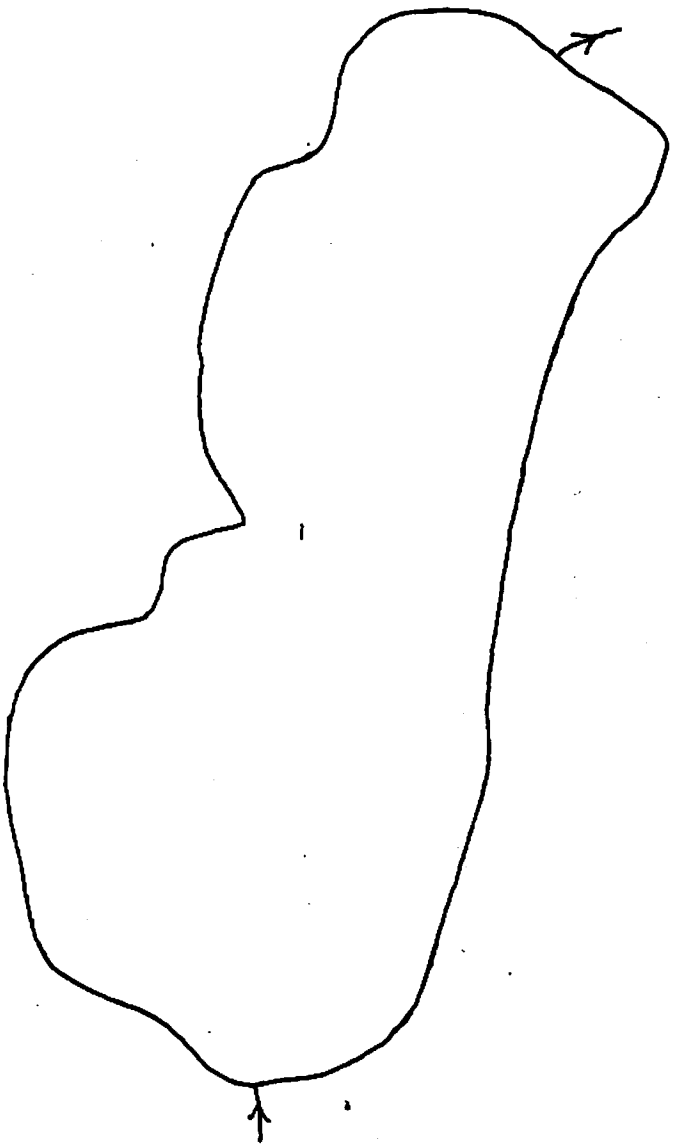
Scokes is a warm water, spring fed, non-stratified kettle hole. The Secchi disc reading was 5 feet which ranked it 36th. On the plant trophic index it ranked 24th. The macrophyte population was relatively low. Phosphate and nitrate readings were permissible, however any new building near this lake should proceed cautiously with a careful eye on septic waste handling.

Number of houses affecting impoundment: approximately 4

Cranberry bogs affecting impoundment: none

This pond is rated as eutrophic.

SHIP POND

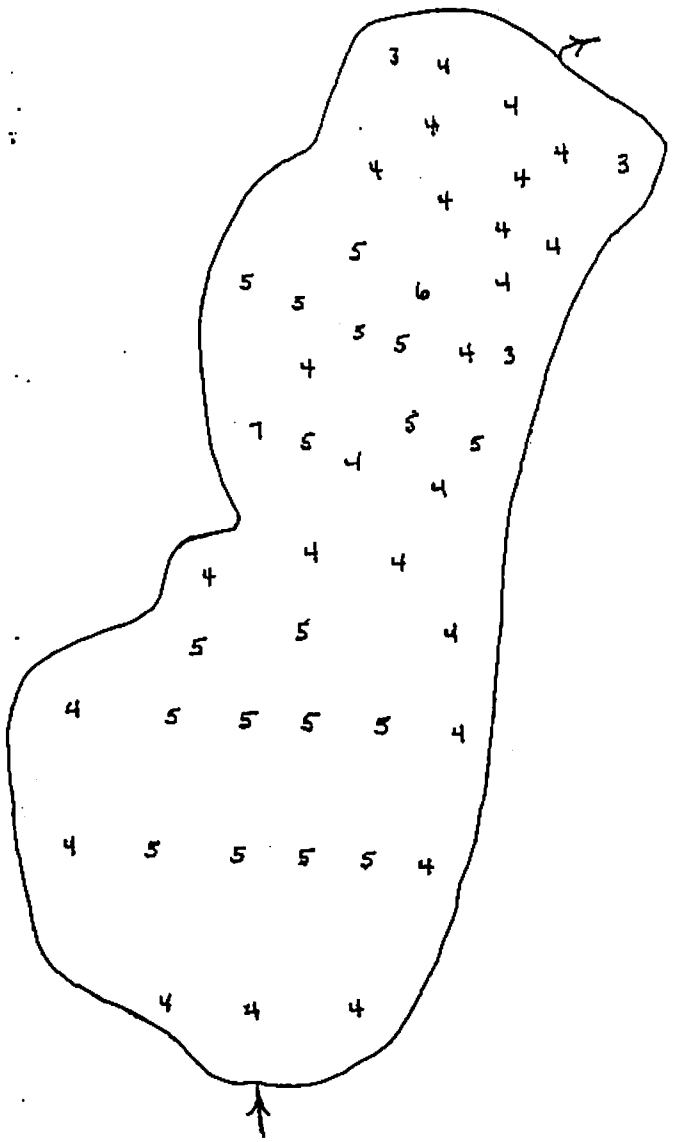


Ship Pond
Plymouth, Mass.
Watershed: coastal
Acres: 10
Altitude: 05
Water type: warm
Pond type: natural
Stratified: no
Pond use: fishing
Topo sheet: USGS 1:24000
Position Topo sheet Sagamore
Shoreline distance: .8 (4224 ft.)

Scale 1:230'

MN GN

SHIP POND

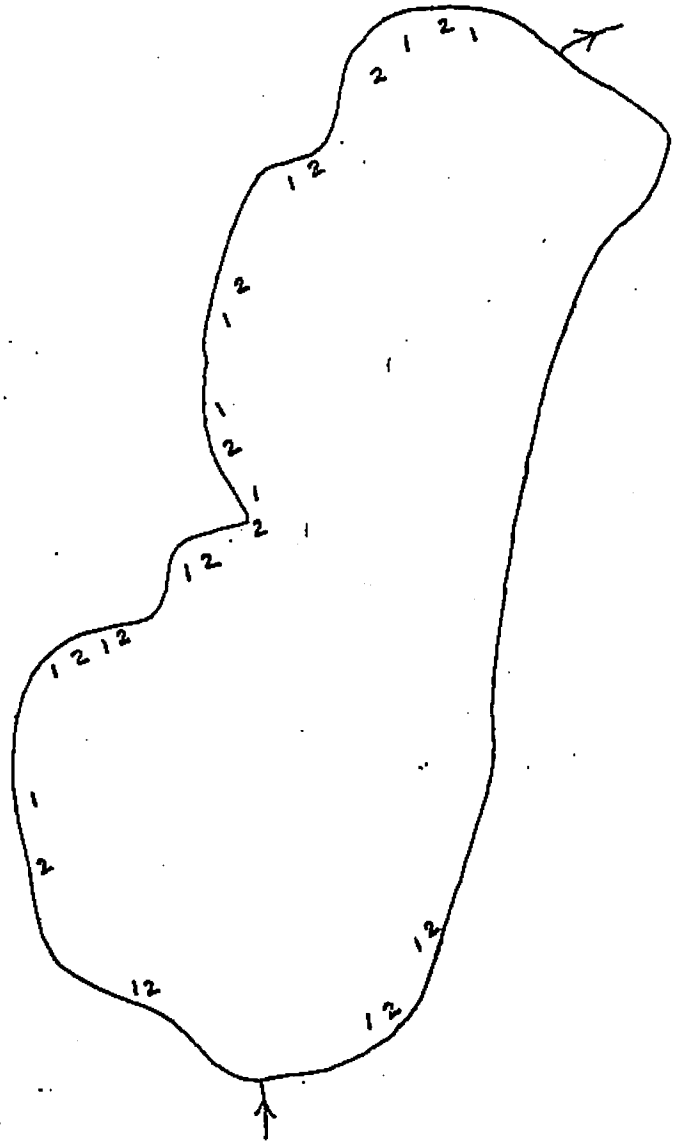


Maximum depth 6' 1.83 M
Mean depth 4' 1.22 M
Surface Area 10 acres 4.05 H
Acre feet 40
Total gals. 13,034,040

Scale 1:230'

SHIP POND

Floating Aquatic Plant Map with Key



Scale 1:230'

FLOATING AQUATIC PLANTS ATTACHED

LATIN	COMMON	MAP NUMBER
Nuphar	Cow Lily, Yellow Water Lily, Spatterdock	
Nymphaea	Water Lily, White Water Lily	2
Brasenia	Watershield	1
	Addenda	

FLOATING AQUATIC PLANTS - UNATTACHED

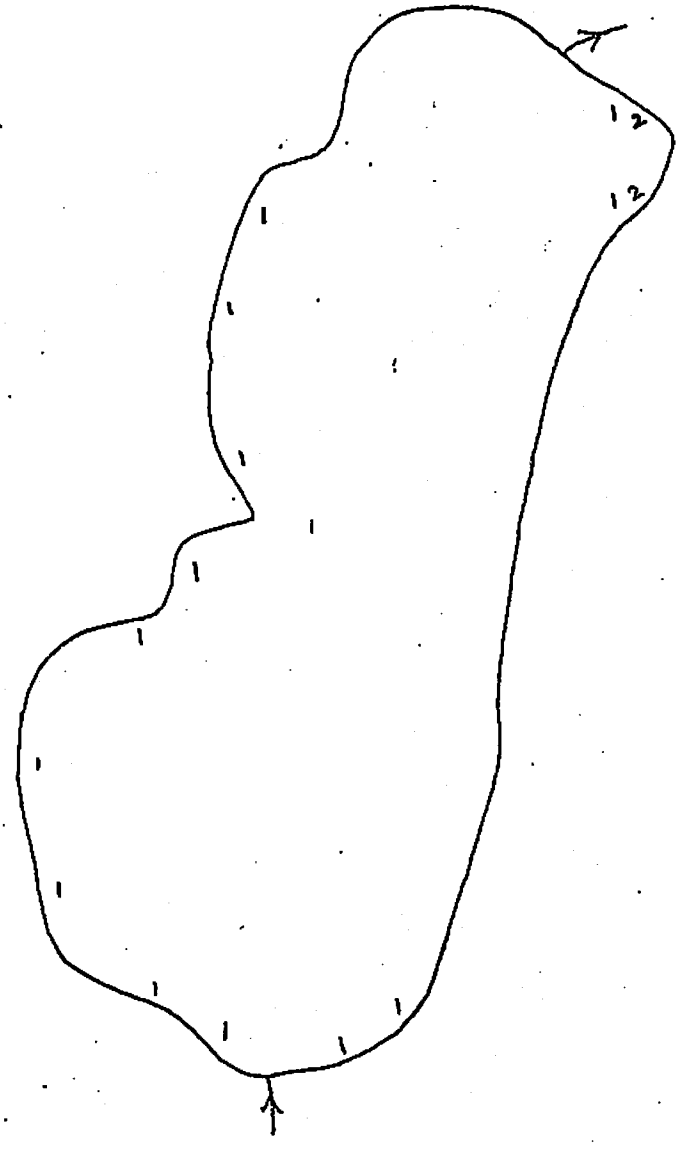
LATIN	COMMON	MAP NUMBER
Lemna	Duckweed	
Spirodelia	Big Duckweed	
Wolffia	Watermeal	
	Addenda	

MN

GN

SHIP POND

Emersed Aquatic Plant Map with Key



Scale 1:230'

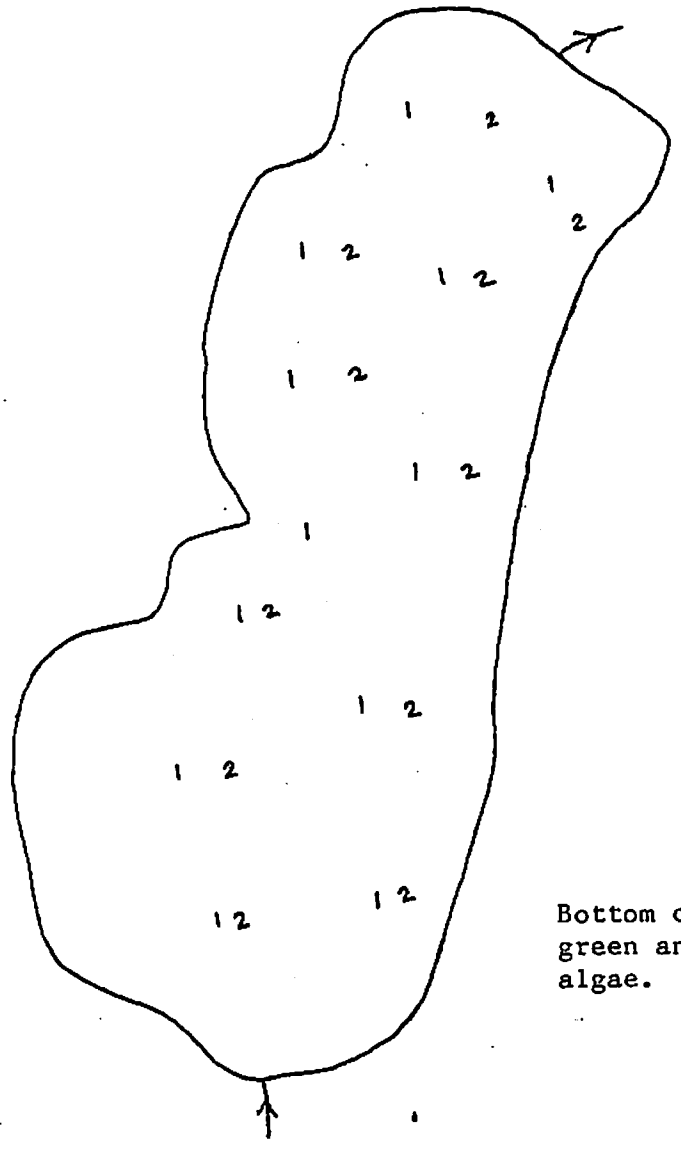
EMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Peltandra	Arrow Arum	
Pontederia	Pickerel Weed	
Sagittaria	Arrowhead; Duck Potatoe	
Polygonum	Watersmart Weed	
Typha	Cattail	
Eleocharis	Spike Rush Sedge	1
Scirpus	Bulrush Sedge	
Juncaceae	Juncus Rush	
	Addenda	
PHRAGMITES		2

MN GN

SHIP POND

Submersed Aquatic Plant Map with Key



Bottom completely covered with green and blue-green filamentous algae.

Scale 1:230'

SUBMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	
Potamogeton Crispus	Curly Leaf Pondweed	
Potamogeton Diversifolius	Waterthread Pondweed	
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	
Potamogeton Gramineus	Variable Pondweed	
Potamogeton Natans	Floating Brown Leaf	
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	
Zannichellia	Horned Pondweed	
Elodea	Waterweed	
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	
Utricularia	Bladderwort	
Vallisneria	Wild Celery	

Addenda

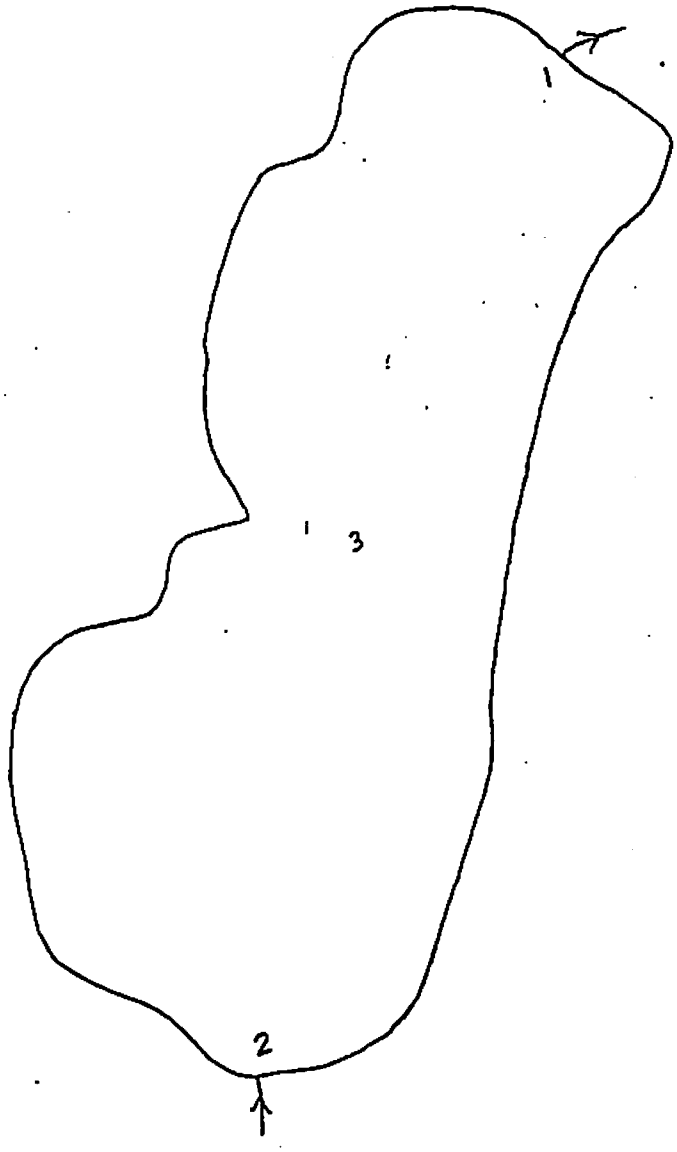
Algae

Chlorophyceae filamentous	green	1
Cyanophyceae filamentous	blue-green	2

MN GN

SHIP POND

Chemical Sample Stations



Scale 1:230'

	Ship IN LAKE STATION			OUTFALL			SOURCES		
	1	2	3	1	2	3	1	2	3
Total P	.03			.03			.03		
Nitrate (N)	.01			.01			.01		
Free Acid	0								
Total Acidity	0								
Alkalinity	0								
DO	7								
Total Hardness	239								
CO_2	20								
Pn	7.0								
Temp (C+F) 1' Levels	17° C								
Secchi	3.5 ft.								

Heavy Metals

Zn	.003
CD	.001
Sn	.003
Au	.001
Fe	.095
P D	.006
AL	.035
Cu	.007
Ni	.018
AG	.001

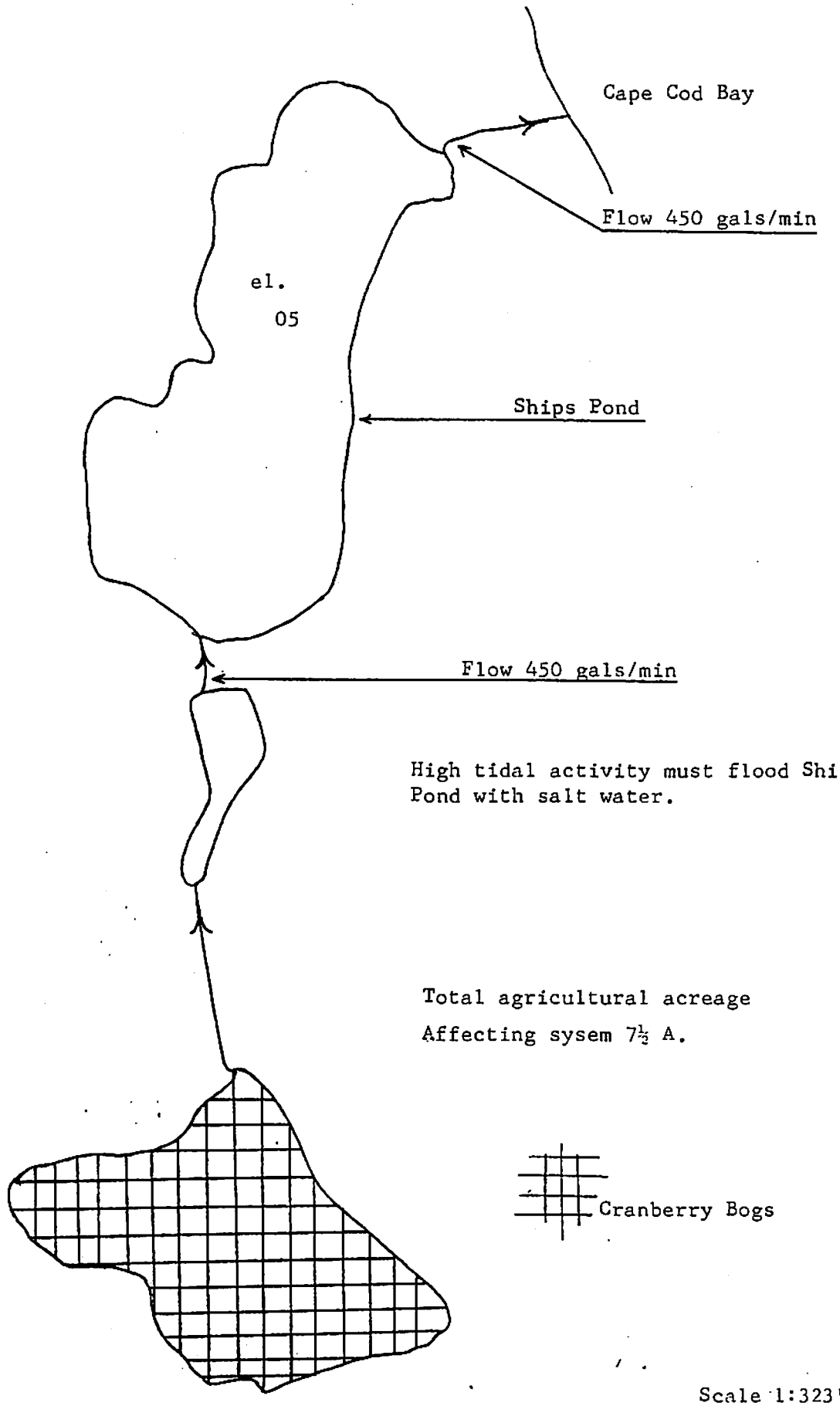
Benthos

Total P	28.6
Total Nitrogen	31.3
Percent solids	4.4
Total volatile solids	.71%

All figures in mg/l unless otherwise noted.

SHIPS POND

Impoundment Map



Scale 1:323'

Ship Pond

Using a modified trophic level index Ship Pond ranks 33 rd.

Ship Pond is a shallow pond with littoral zone throughout. Macrophyte population was rather sparse, with floating weeds predominant among the vascular variety. Filamentous green and blue-green algae covered the bottom. Secchi disc readings of 3.5 feet ranked it 39th in this parameter. In the overall macrophyte count it ranked 31st. Two extraordinary features of this pond are its ultra high hardness reading, and the lack of aquatic vegetation normally found in lakes and ponds; these phenomenon can be explained by its proximity to the ocean (300 feet at most) and its elevation of 5 feet - which subjects this pond to periodic ocean flooding.

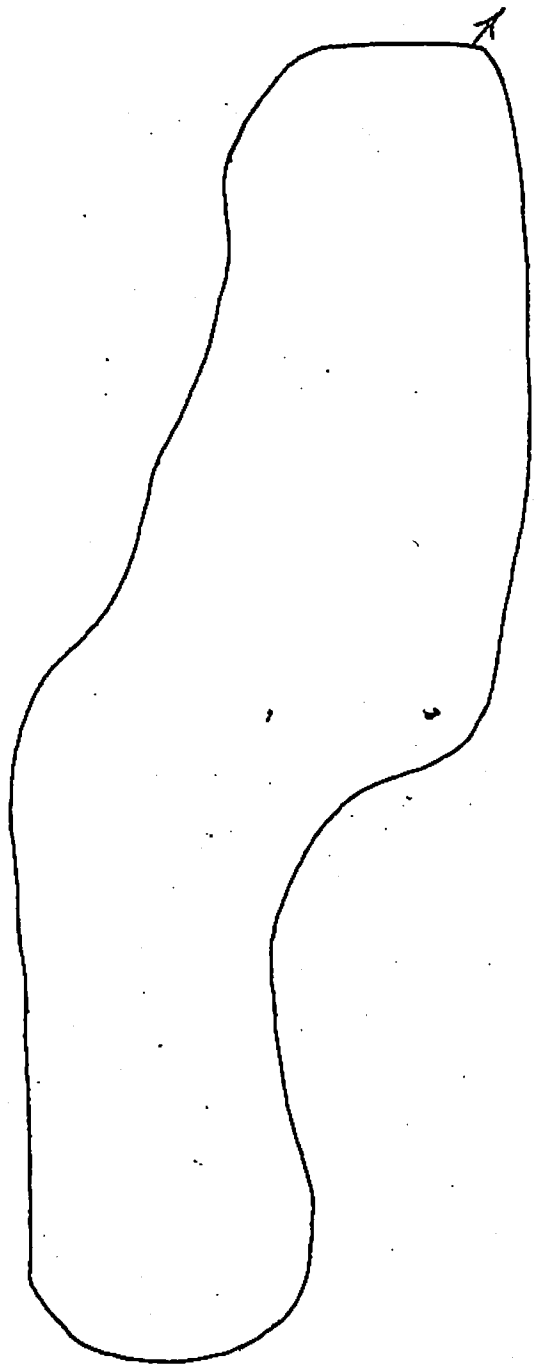
The phosphate readings were critical and the nitrate readings were acceptable.

Number of houses affecting ecosystem: about 16

Cranberry bogs affecting impoundment: approximately 10 acres

This pond in classified as eutrophic.

SPRING POND

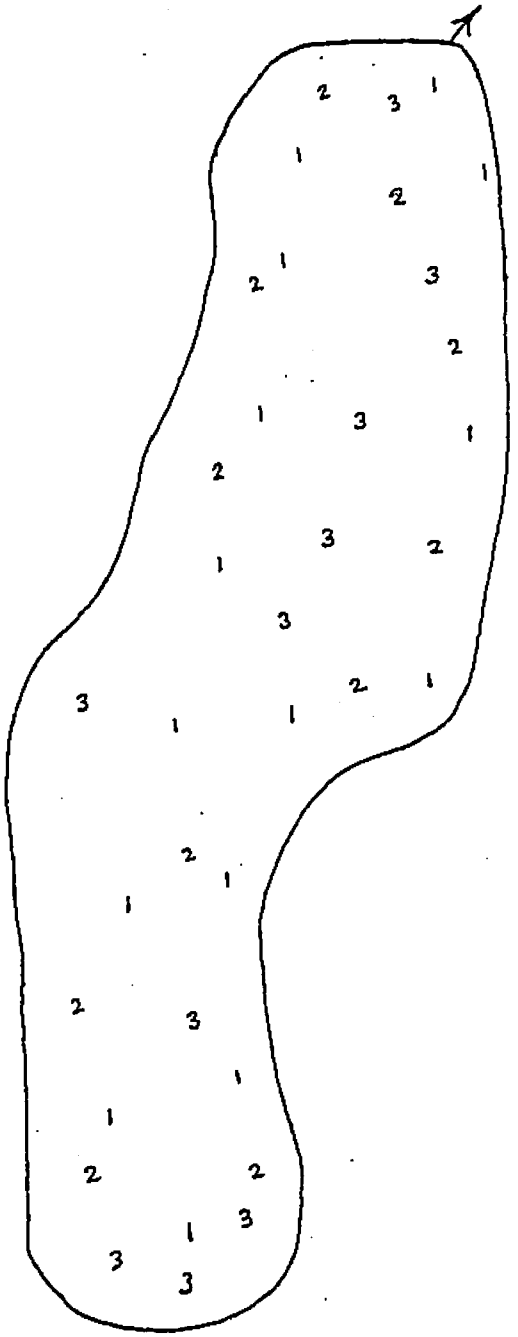


pring Pond
lymouth, Mass.
atershed type: coastal
cres: 5
ltitude: 0118'
ater type: warm
ond type: natural
tratified: no
ond use: esthetic, recreation
opo sheet: USGS 1:24000 Plymouth
osition Topo sheet: up 7.1 right 4.0"
horeline distance .4 miles 2112'

Scale 1:145

SPRING POND

Floating Aquatic Plant Map with Key



Pond surface completely covered with floating aquatic plants.

White lilies	50%
Yellow lilies	30%
Watersheild	20%

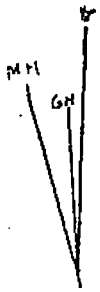
Scale 1:145

FLOATING AQUATIC PLANTS ATTACHED

LATIN	COMMON	MAP NUMBER
Nuphar	Cow Lily, Yellow Water Lily, Spatterdock	1
Nymphaea	Water Lily, White Water Lily	2
Brasenia	Watershield	3
	Addenda	

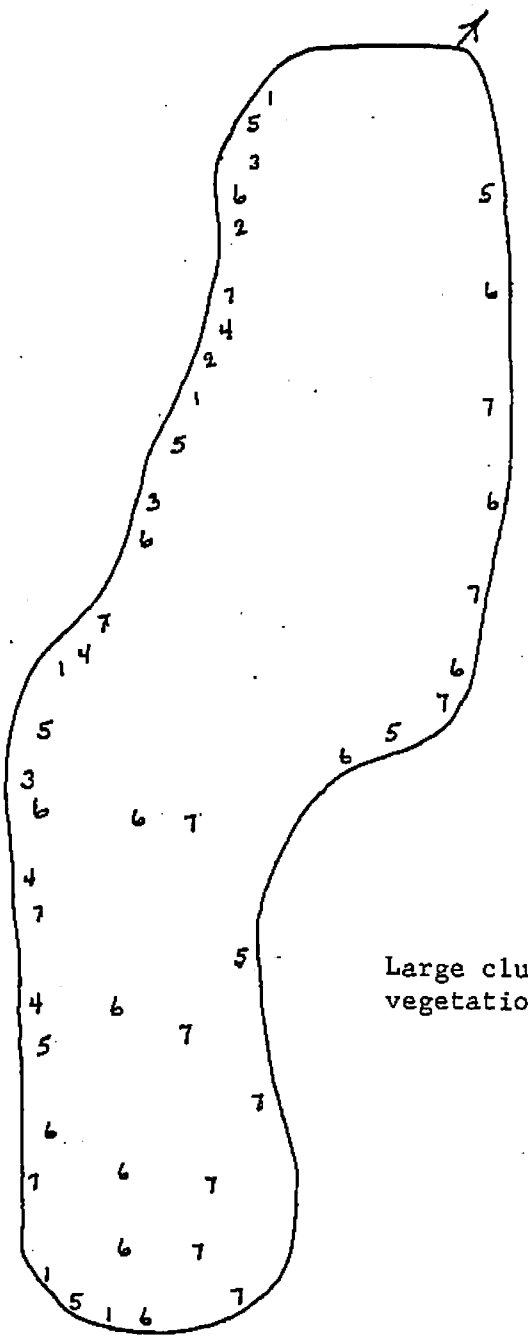
FLOATING AQUATIC PLANTS - UNATTACHED

LATIN	COMMON	MAP NUMBER
Lemna	Duckweed	
Spirodelia	Big Duckweed	
Wolffia	Watermeal	
	Addenda	



SPRING POND

Emersed Aquatic Plant Map with Key



Large clumps of emersed vegetation at this end of pond.

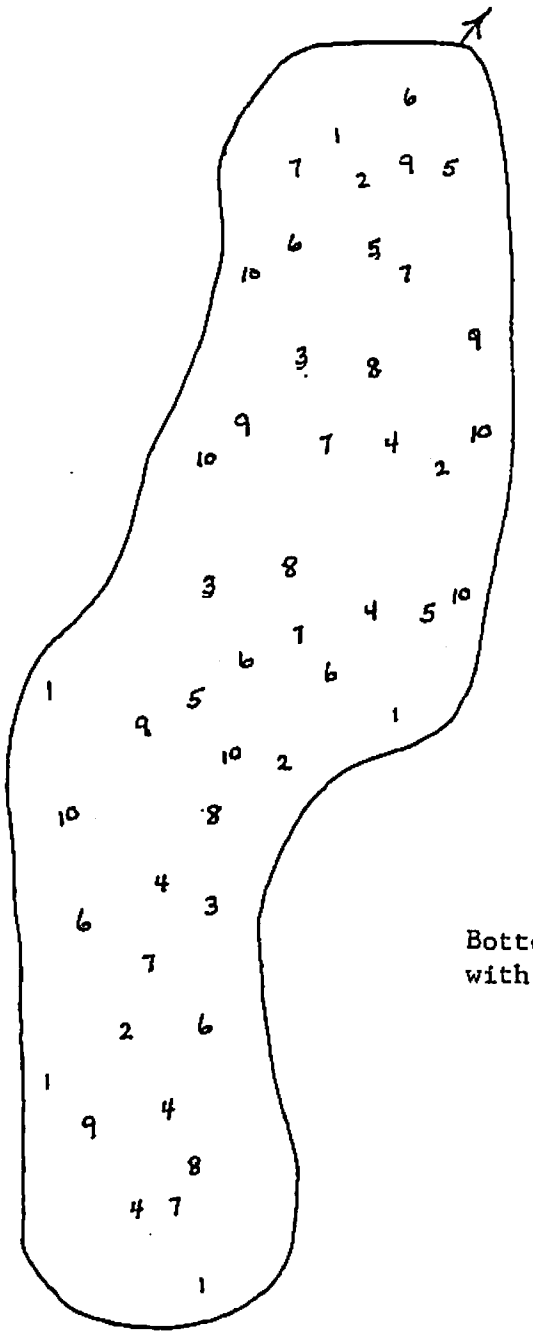
Scale 1:145

EMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Peltandra	Arrow Arum	
Pontederia	Pickerel Weed	1
Sagittaria	Arrowhead; Duck Potatoe	2
Polygonum	Watersmart Weed	3
Typha	Cattail	4
Eleocharis	Spike Rush Sedge	5
Scirpus	Bulrush Sedge	6
Juncaceae	Juncus Rush	7
	Addenda	

SPRING POND

Submersed Aquatic Plant Map with Key



Bottom of entire pond covered with submersed aquatic plants.

Scale 1:145

SUBMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	1
Potamogeton Crispus	Curly Leaf Pondweed	
Potamogeton Diversifolius	Waterthread Pondweed	2
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	3
Potamogeton Gramineus	Variable Pondweed	
Potamogeton Natans	Floating Brown Leaf	4
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	5
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	
Zannichellia	Horned Pondweed	
Elodea	Waterweed	6
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	7
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	
Utricularia	Bladderwort	8
Vallisneria	Wild Celery	

Addenda

Algae

Cyanophyceae — Blue Green

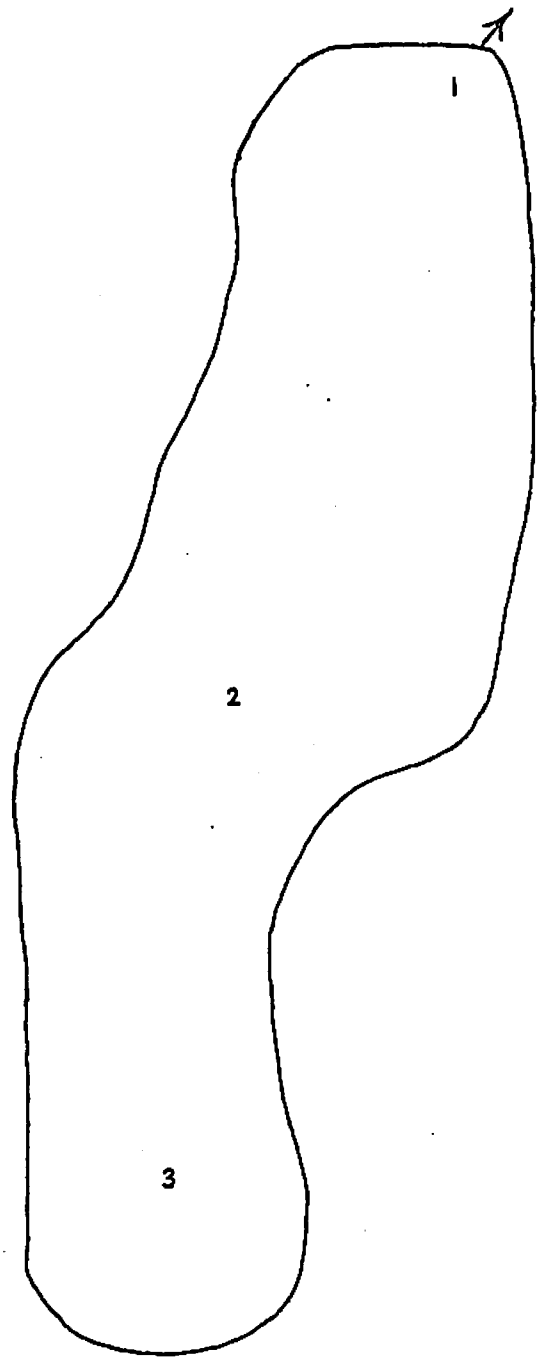
Filamentous

Chlorophyceae — Green — 9

Filamentous — 10

SPRING POND

Chemical Sample Station



Scale 1:145

	Spring IN LAKE STATION			OUTFALL			SOURCES		
	1	2	3	1	2	3	1	2	3
Total P	.03	.03		.03					
Nitrate (N)	.05	.05		.06					
Free Acid	0								
Total Acidity	0								
Alkalinity	0								
DO	7								
Total Hardness	32								
CO_2	15								
Pn	6.5								
Temp (C+F) 1' Levels	14° C								
Secchi	5 ft.								

Heavy Metals

Zn	.010
CD	.001
Sn	.004
Au	.001
Fe	.253
P D	.003
AL	.042
Cu	.007
Ni	,021
AG	.001

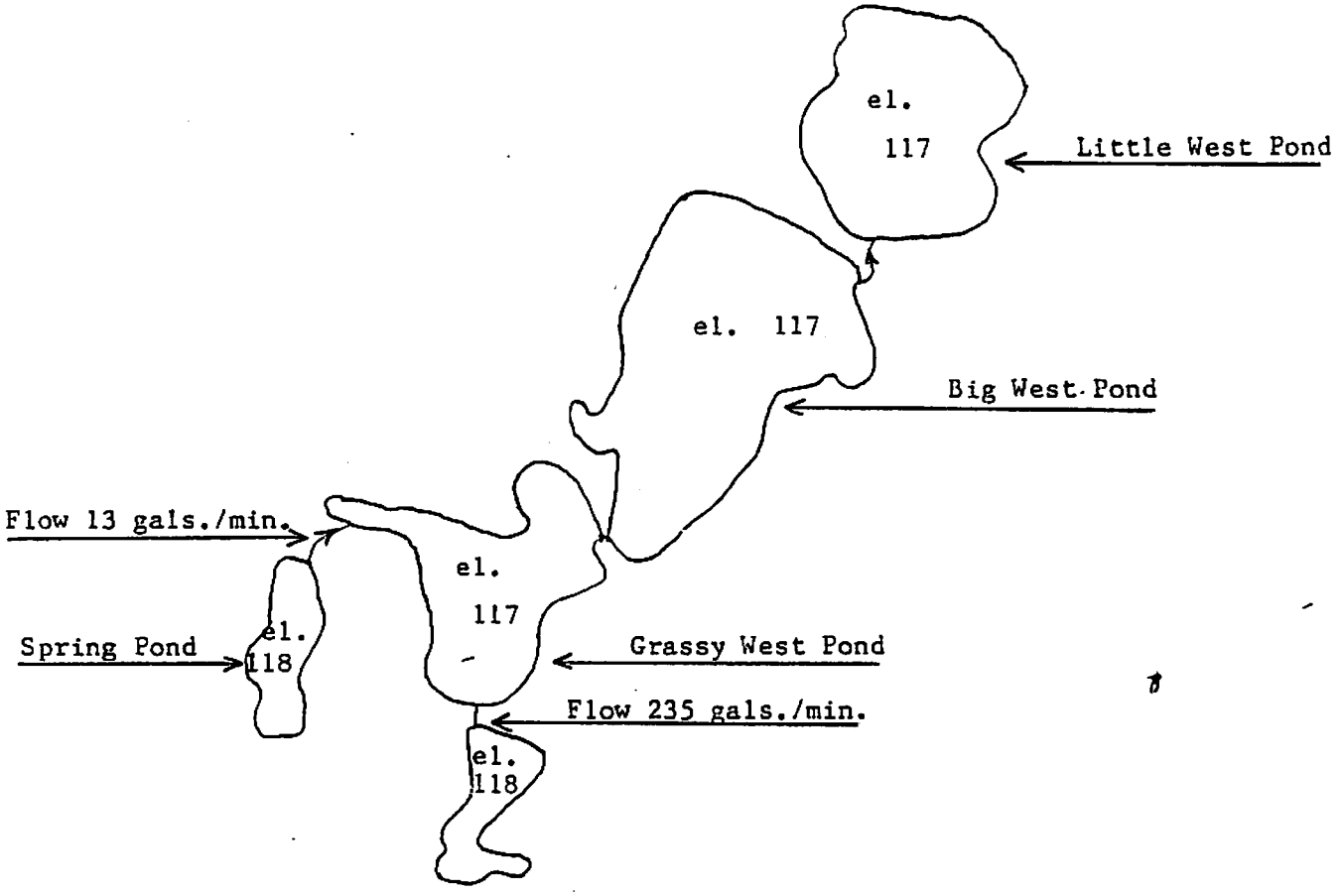
Benthos

Total P	116
Total Nitrogen	18.2
Percent solids	4.8
Total volatile solids	.5 %

All figures in mg/l unless otherwise noted.

SPRING POND

(Impoundment Map)



There are no commercial agriculture enterprises affecting the surface flow of this impoundment.

Scale 1:1030

SPRING POND

Using a modified trophic level index Spring Pond ranks 39th.

Spring Pond is a natural, warm water, spring fed, non-stratified pond with maximum depth of 5 feet. Macrophyte population is dense and floating aquatic plants cover 90% of the surface; emergent species were present throughout the whole pond and submersed aquatic plants cover the bottom - potamogetons, milfoil, bladderwort, and elodea were dominant. On the plant trophic index it ranked 37th. The Secchi disc reading was 5 feet which ranked it 37th in this parameter. Phosphate readings were above the permissable level while nitrates were acceptable. These figures are misleading due to the utilization of nutrients by the abundant plant population.

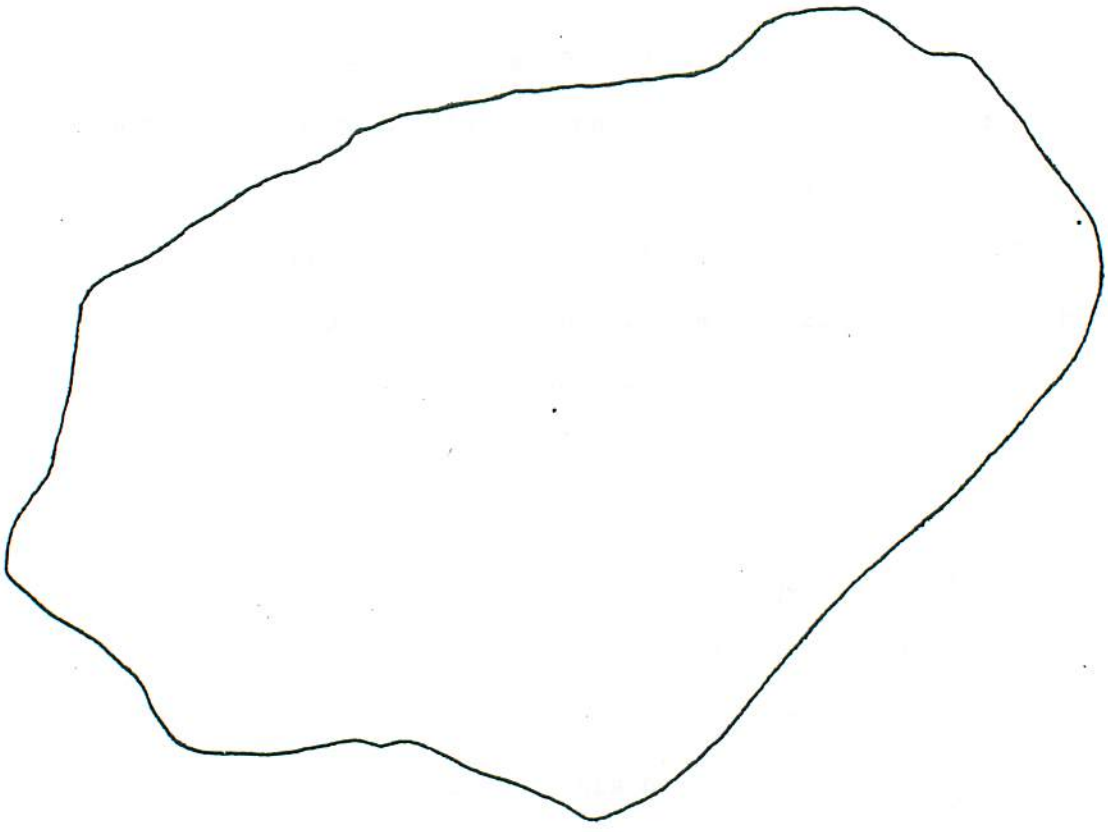
Number of houses affecting pond: none

Cranberry bogs affecting pond: none

This pond is rated ultra-eutrophic

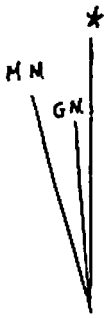
Note: This pond is totally spring fed and feeds into West ponds.

WALL POND



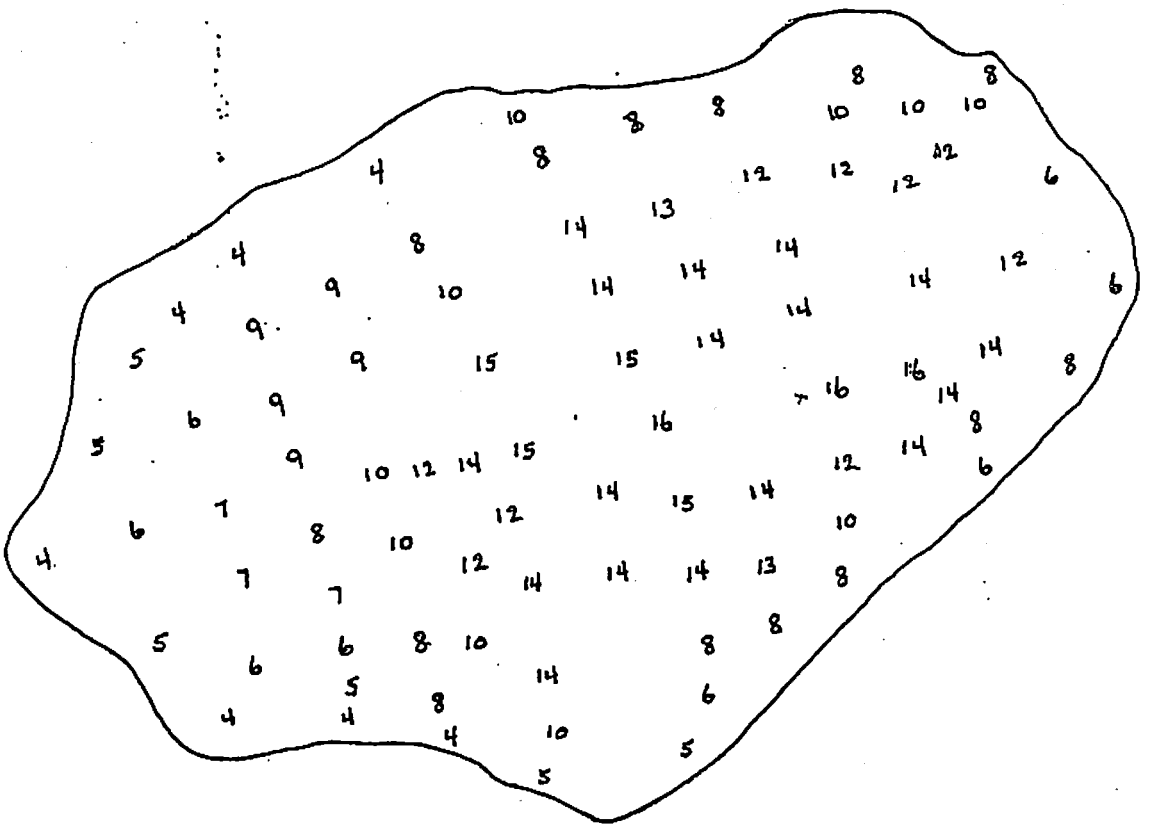
11 Pond
ymouth, Mass.
tershed: coastal
res: 12
titude: 052
tertype: warm
nd type: kettlehole
ratified: no
nd use: recreation, esthetics
po sheet: USGS 1:24000 Sagamore
sition Topo sheet up 13.8 R 3.1
oreline distance: .6 M (3,168 ft.).

Scale 1:190'



WALL POND

(Bathymetric Map)



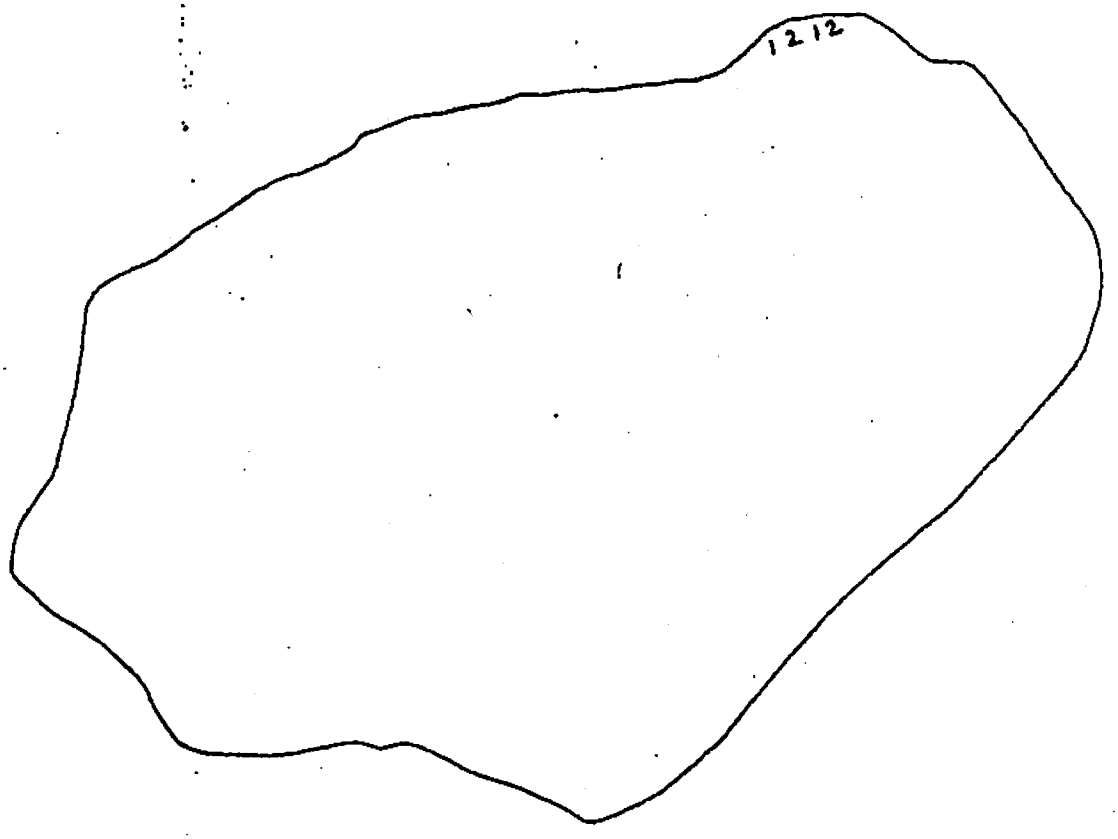
Maximum depth 16' 4.88 M
Mean depth 9' 2.74 M
Surface area 12 acres 4.86 H
Acre feet 108
Total gals. 35,191,908

Scale 1:190'

MN GN

WALL POND

Floating Aquatic Plant Map with Key



Scale 1:190'

FLOATING AQUATIC PLANTS ATTACHED

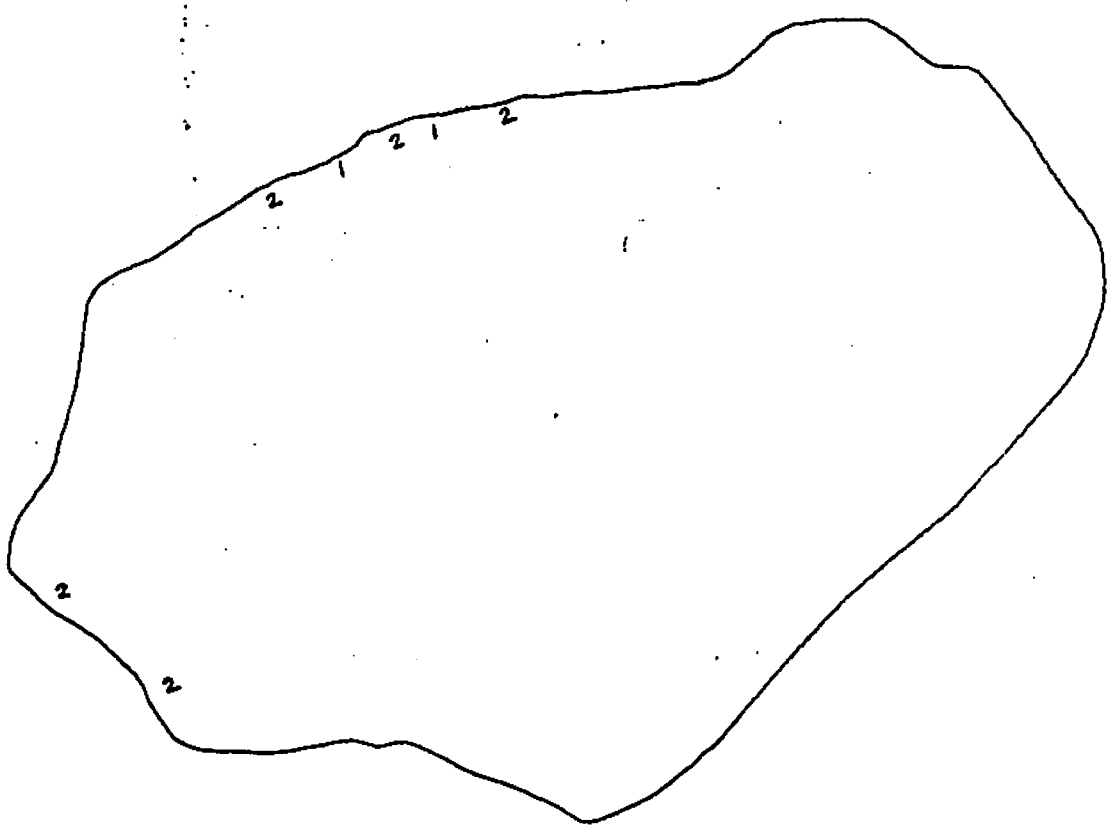
LATIN	COMMON	MAP NUMBER
Nuphar	Cow Lily, Yellow Water Lily, Spatterdock	
Nymphaea	Water Lily, White Water Lily	1
Brasenia	Watershield	2
	Addenda	

FLOATING AQUATIC PLANTS - UNATTACHED

LATIN	COMMON	MAP NUMBER
Lemna	Duckweed	
Spirodelia	Big Duckweed	
Wolffia	Watermeal	
	Addenda	

WALL POND

Emersed Aquatic Plant Map with Key



Scale 1:190'

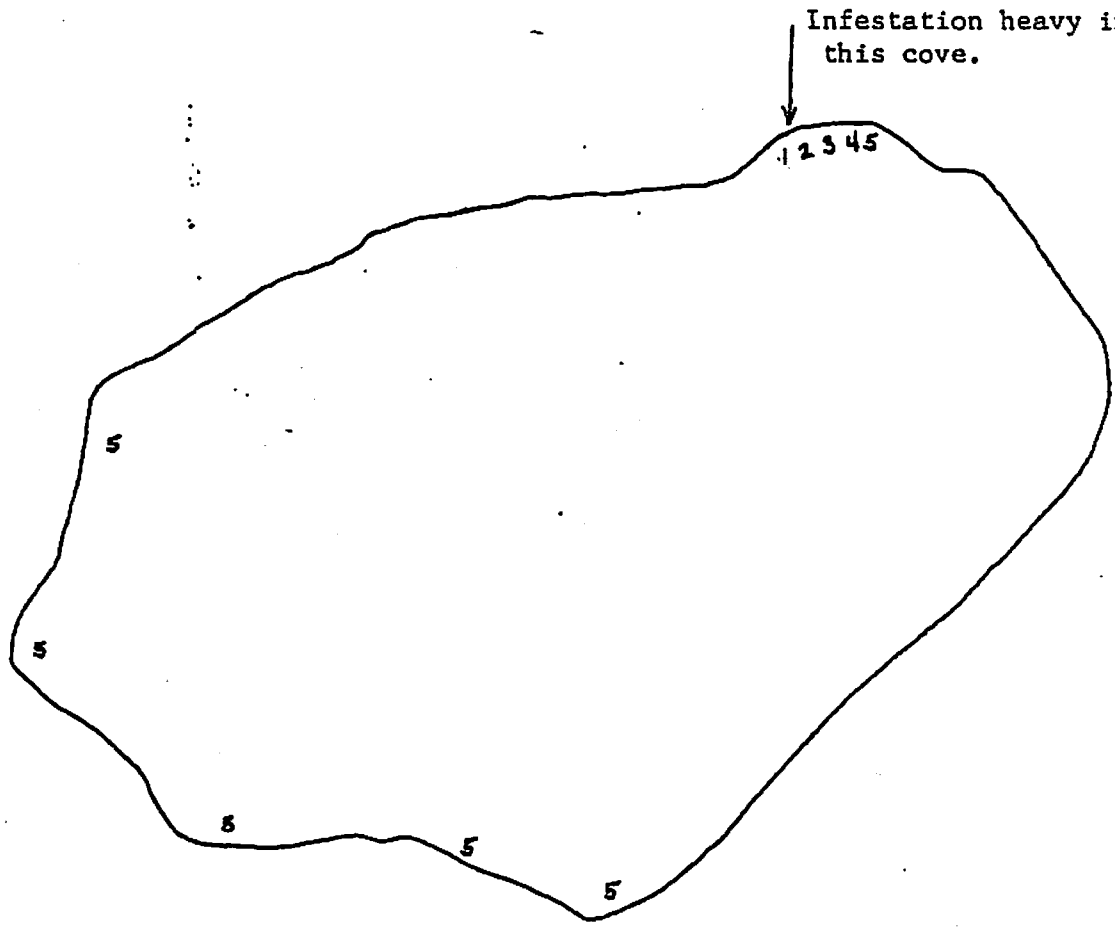
EMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Peltandra	Arrow Arum	
Pontederia	Pickerel Weed	
Sagittaria	Arrowhead; Duck Potatoe	
Polygonum	Watersmart Weed	
Typha	Cattail	
Eleocharis	Spike Rush Sedge	
Scirpus	Bulrush Sedge	1
Juncaceae	Juncus Rush	2

Addenda

WALL POND

Submersed Aquatic Plant Map with Key



Vegetation sparse to non-existant except in noted areas.

Scale 1:190'

SUBMERSED AQUATIC PLANTS

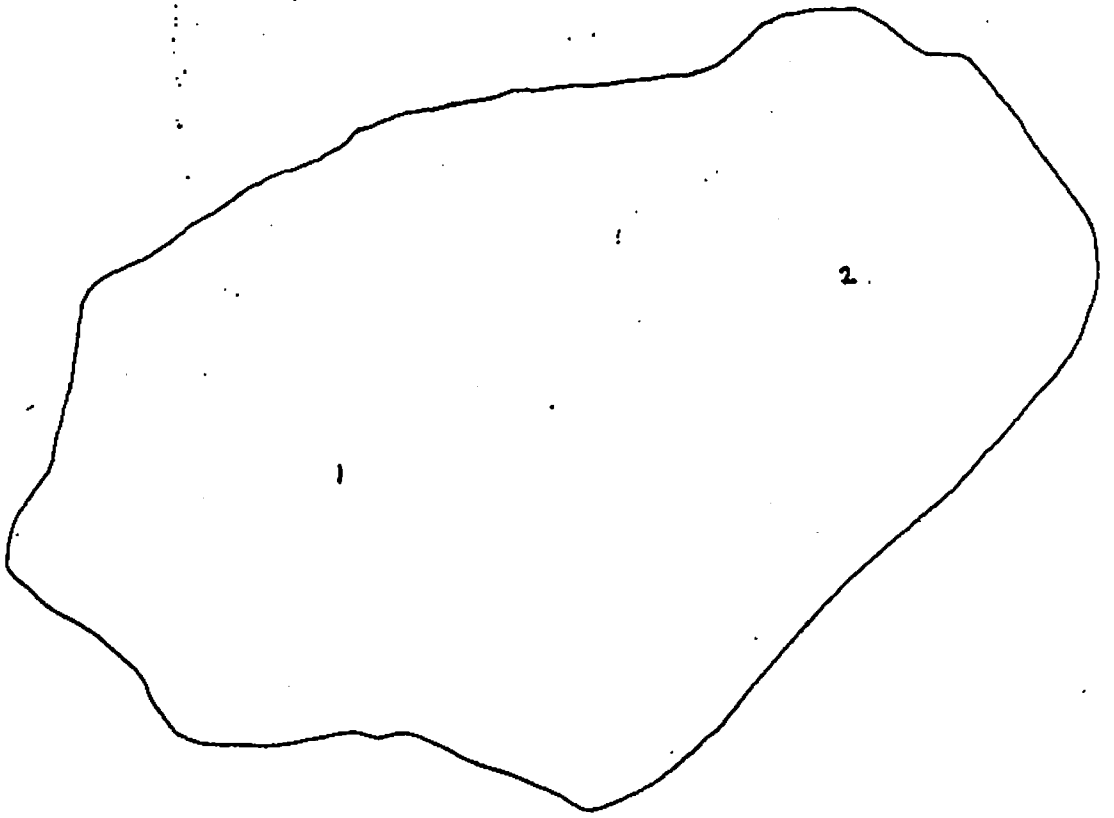
LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	
Potamogeton Crispus	Curly Leaf Pondweed	
Potamogeton Diversifolius	Waterthread Pondweed	
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	1
Potamogeton Gramineus	Variable Pondweed	
Potamogeton Natans	Floating Brown Leaf	2
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	
Zannichellia	Horned Pondweed	
Elodea	Waterweed	
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	3
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	
Utricularia	Bladderwort	4
Vallisneria	Wild Celery	
	Addenda	
Cyanophyceae filamentous	Blue-green algae	5

MN

GN

WALL POND

Chemical Sample Stations



Scale 1:190'

	Wall IN LAKE STATION			OUTFALL			SOURCES		
	1	2	3	1	2	3	1	2	3
Total P	.02	.02	.02						
Nitrate (N)	.10	.10	.10						
Free Acid	0								
Total Acidity	0								
Alkalinity	0								
DO	8								
Total Hardness	17								
CO_2	17								
Pn	62								
Temp (C+F) 1' Levels	21° C								
Secchi	8 ft.								

Heavy Metals

Zn	.005
CD	.001
Sn	.004
Au	.001
Fe	.037
PD	.003
AL	.052
Cu	.006
Ni	.011
AG	.001

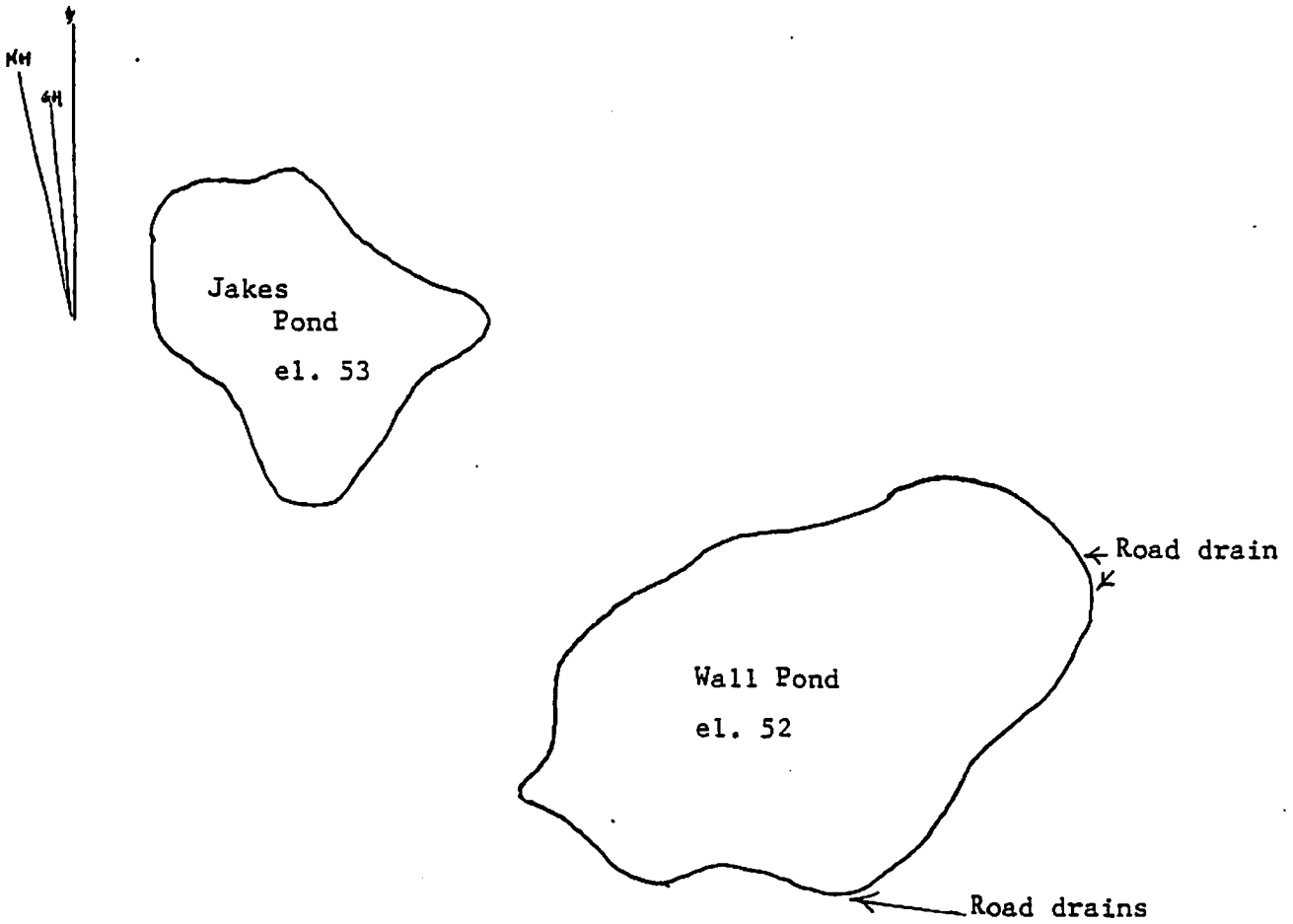
Benthos

Total P	248
Total Nitrogen	22.4
Percent solids	1.3
Total volatile solids	.38%

All figures in mg/l unless otherwise noted.

WALL POND

Impoundment Map



Pond type: kettlehole
Tributary: none
Outfall: none
Overland flow: none
Groundwater and underground aquifers primary source
Rainfall secondary source
Surface run-off secondary source
Agriculture practices directly affecting impoundment none
Industrial practices directly affecting impoundment none
Possible sources of nutrient influx
- Houses permanent & seasonal around perimeter of pond
- Beach area
- Road drains leading directly into pond

Scale 1:380'

WALL POND

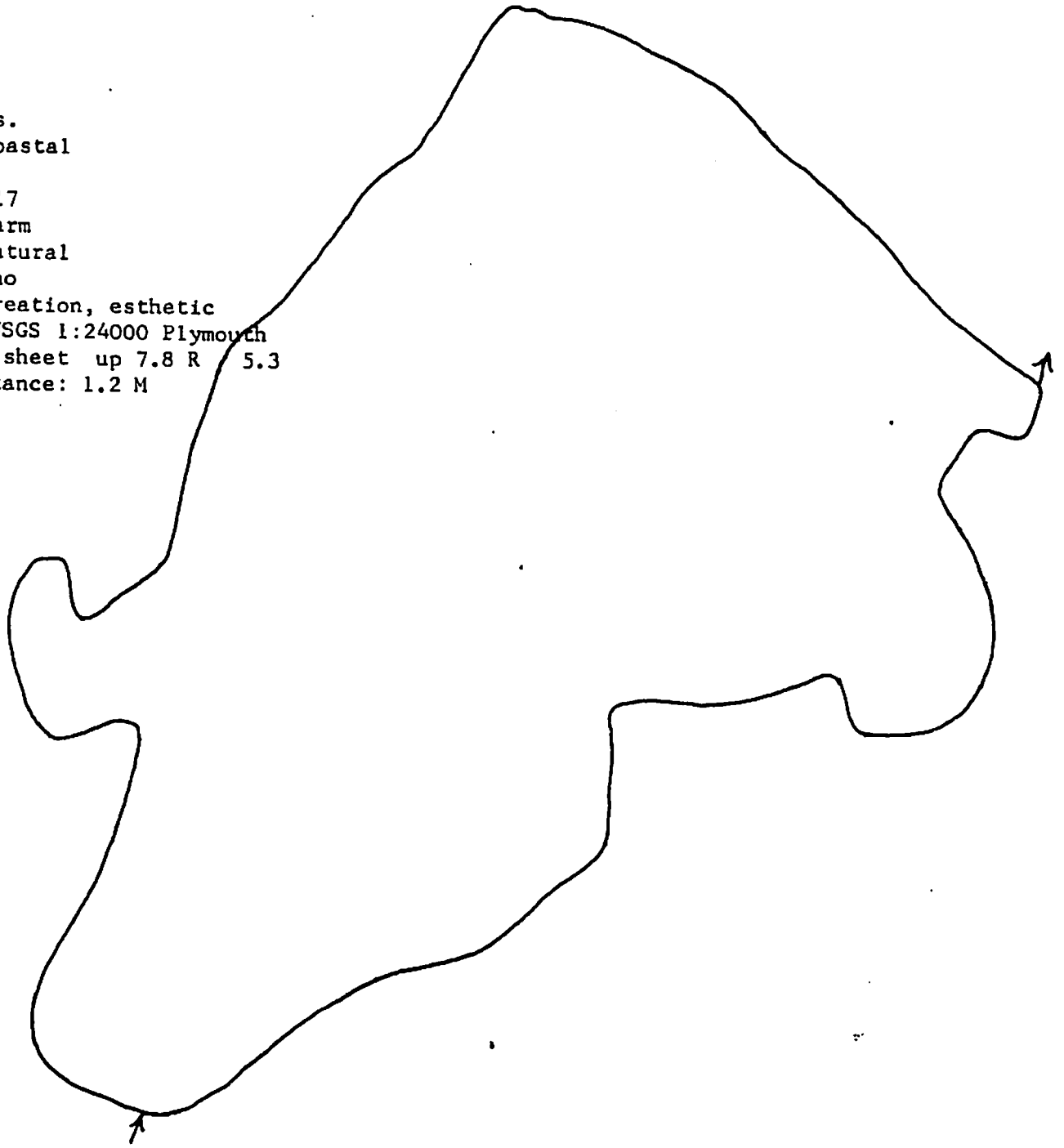
Wall Pond ranks 15 using a modified trophic level index. It is a kettlehole, non-stratified, spring-fed, warm water type of pond, with a maximum depth of 16 feet. Floating aquatic plants cover 2% of total surface; submerged aquatic plants cover 2% of the bottom. With classification as dense, milfoil is target species. Most of the pond was rated as sparse vegetation. Green and blue-green filamentous algae was found in all shallow areas. On the plant trophic index, it ranked 11th. The secchi disc reading was 8 feet, which ranked it as 25th. The phosphate readings were permissib.The nitrate readings were permissible.

Number of homes affecting system: approx 13 on shore. Cranberry acreage affecting impoundment: none.

Problems: New homes affecting all down slopes leading into pond. Recreation area could be a major problem. Culverts and drains lead into pons on south and east shore. Pond is rated as eutrophic.

BIG WEST POND

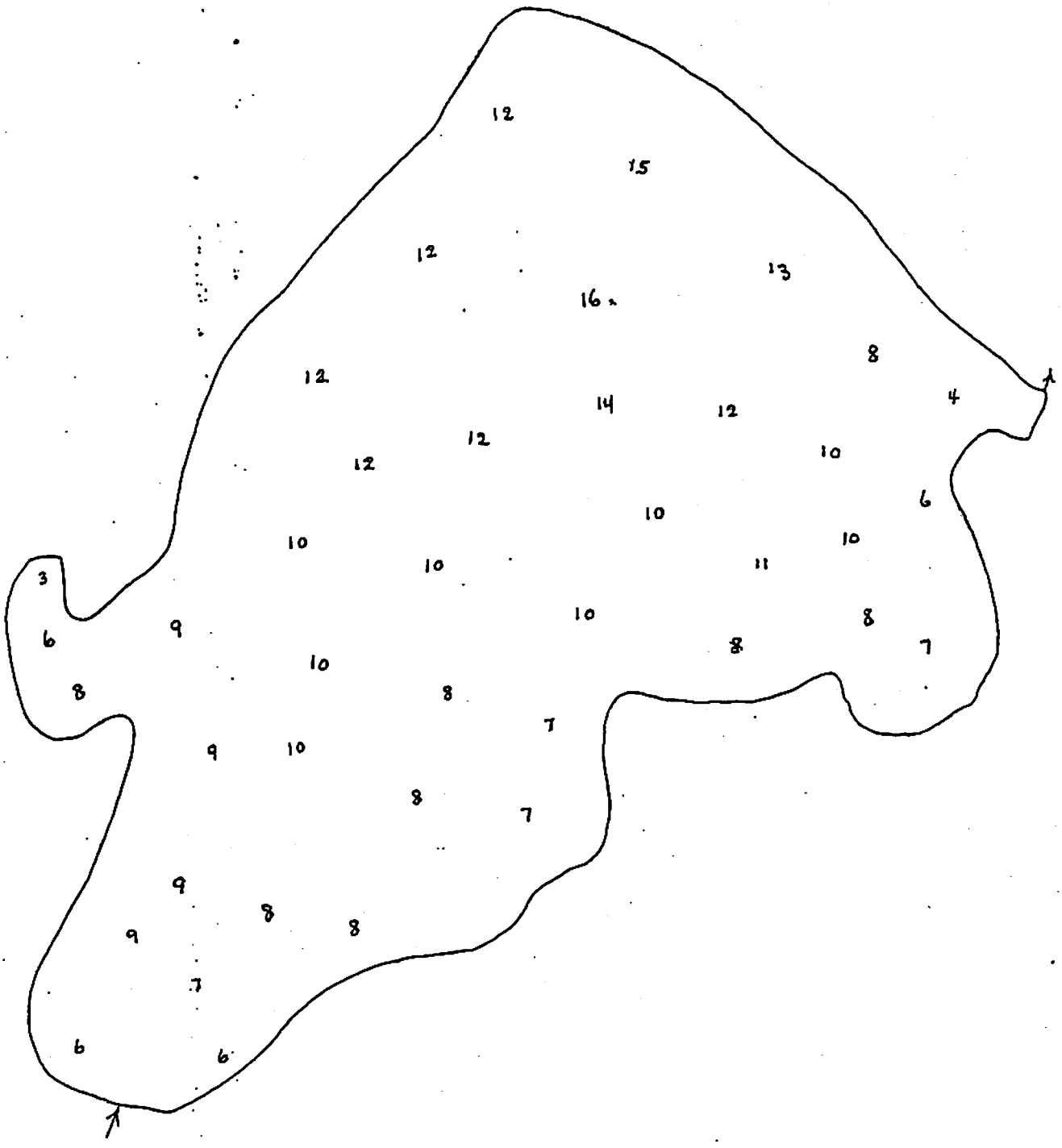
; West Pond
ymouth, Mass.
tershed: coastal
res: 40
titude: 0117
tertype: warm
id type: natural
tatified: no
id use: recreation, esthetic
o sheet: USGS 1:24000 Plymouth
ition Topo sheet up 7.8 R 5.3
reline distance: 1.2 M
336 ft)



Scale 1:220'

BIG WEST POND

(Bathymetric Map)

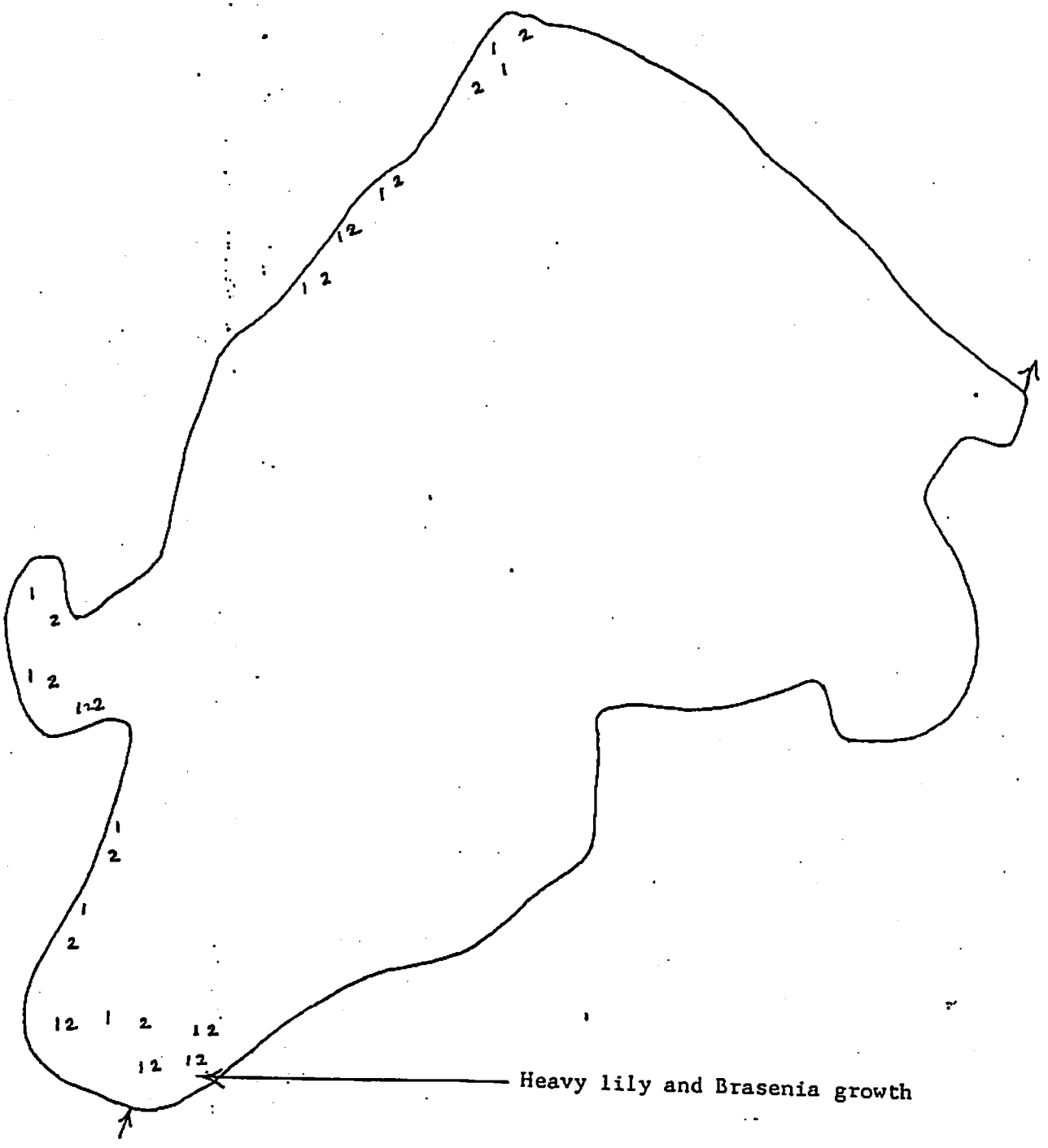


Maximum depth 16' 4.88 M
Mean depth 9' 2.74 M
Surface area 40 acres 16.2 H
Acre feet 36
Total gals. 11,730,636

Scale 1:220'

BIG WEST POND

Floating Aquatic Plant Map with Key



Scale 1:220'

FLOATING AQUATIC PLANTS ATTACHED

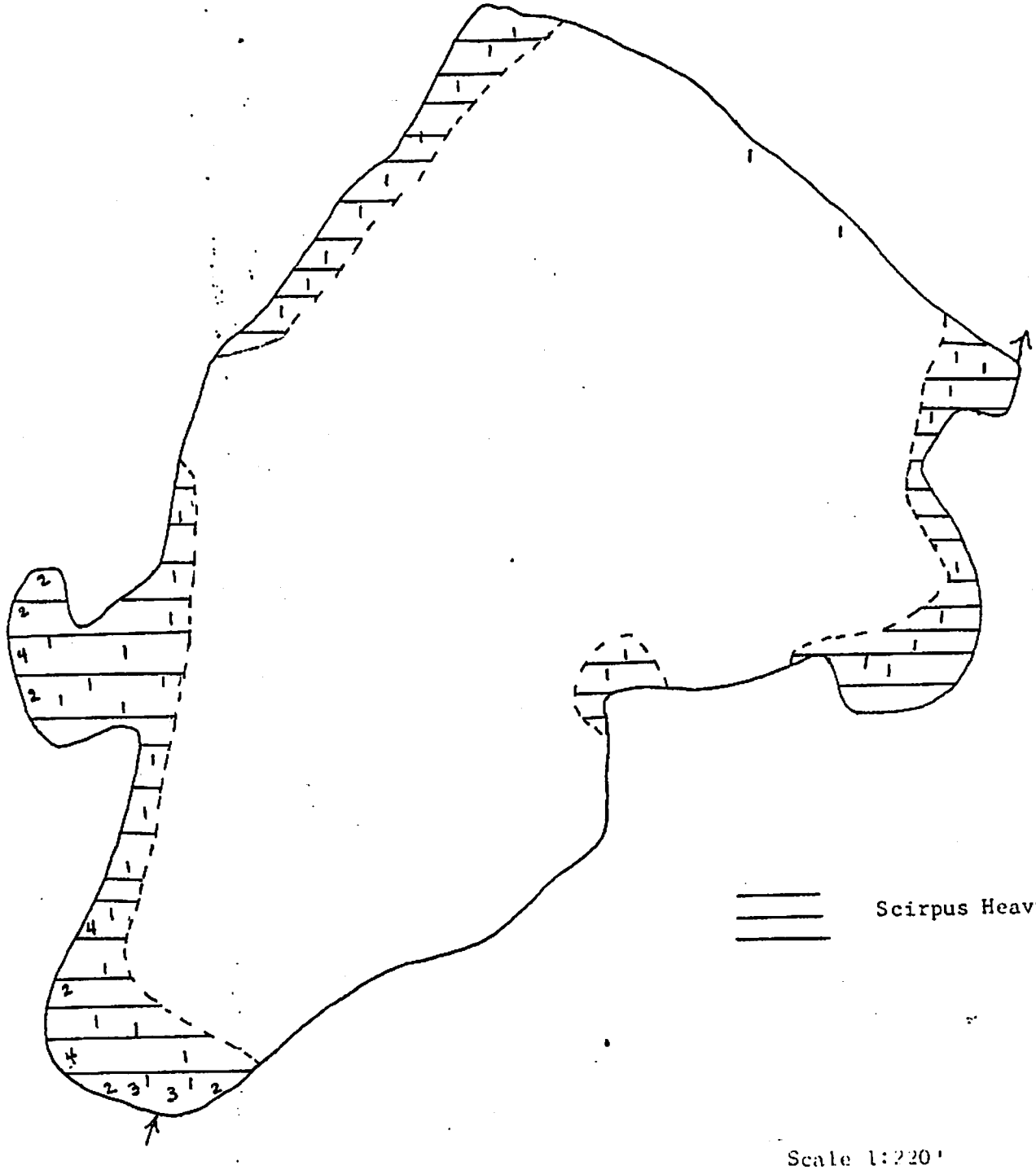
LATIN	COMMON	MAP NUMBER
Nuphar	Cow Lily, Yellow Water Lily, Spatterdock	
Nymphaea	Water Lily, White Water Lily	1
Brasenia	Watershield	2
	Addenda	

FLOATING AQUATIC PLANTS - UNATTACHED

LATIN	COMMON	MAP NUMBER
Lemna	Duckweed	
Spirodelia	Big Duckweed	
Wolffia	Watermeal	
	Addenda	

BIG WEST POND

Emersed Aquatic Plant Map with Key



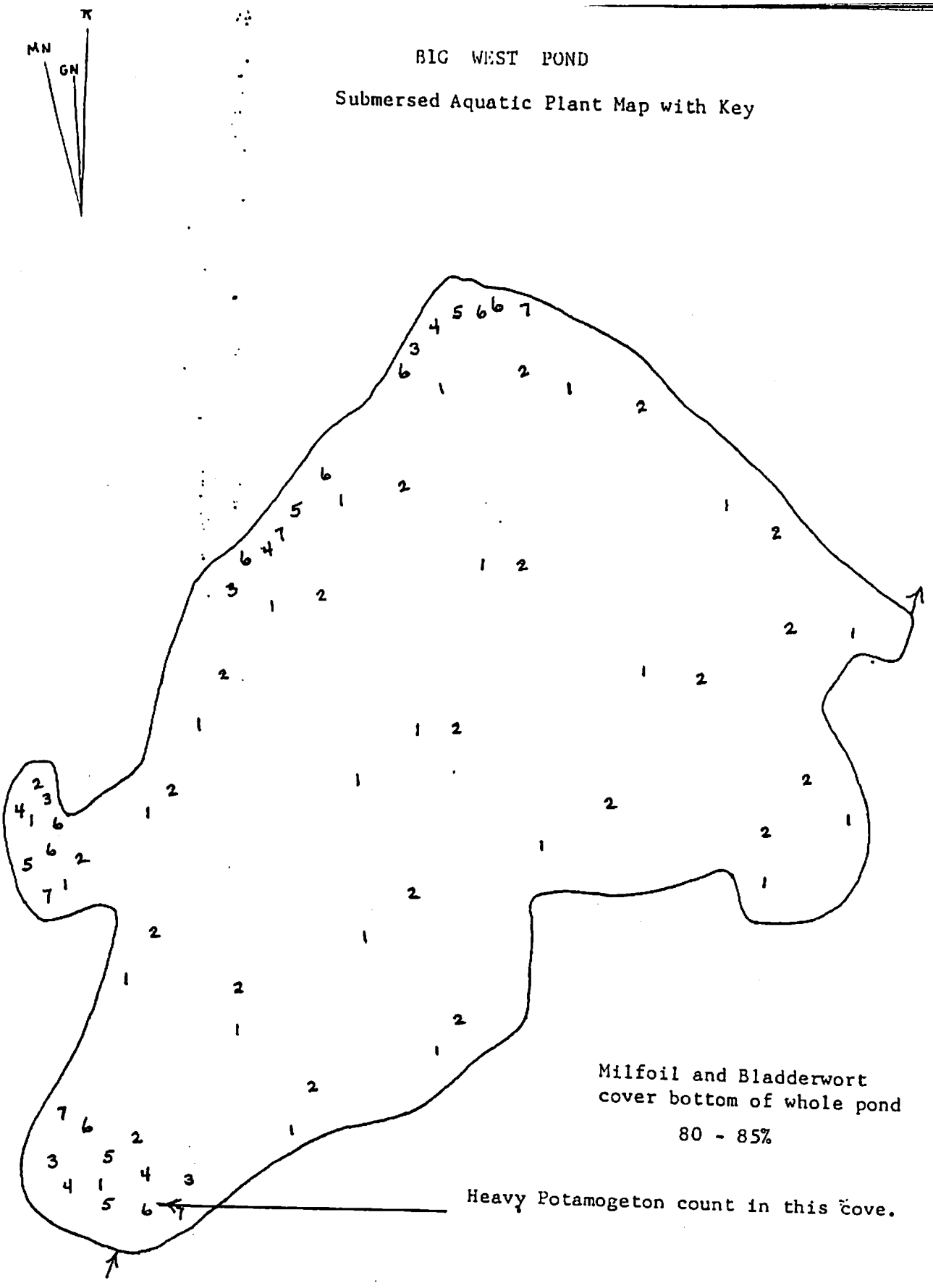
Scale 1:220'

EMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Peltandra	Arrow Arum	
Pontederia	Pickerel Weed	3
Sagittaria	Arrowhead; Duck Potatoe	
Polygonum	Watersmart Weed	
Typha	Cattail	
Eleocharis	Spike Rush Sedge	
Scirpus	Bulrush Sedge	1
Juncaceae	Juncus Rush	2
	Addenda	
Sparganium	Bur Reed	4

BIG WEST POND

Submersed Aquatic Plant Map with Key



Scale 1:220'

SUBMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	
Potamogeton Crispus	Curly Leaf Pondweed	
Potamogeton Diversifolius	Waterthread Pondweed	3
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	
Potamogeton Gramineus	Variable Pondweed	4
Potamogeton Natans	Floating Brown Leaf	5
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	6
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	7
Zannichellia	Horned Pondweed	
Elodea	Waterweed	
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	1
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	
Utricularia	Bladderwort	2
Vallisneria	Wild Celery	

Addenda


MN
GN
BIG WEST POND
Chemical Sample Stations
1
2
3
Scale 1:220'

	Great West IN LAKE STATION 1	2	3	OUTFALL 1	2	3	SOURCES 1	2	3
Total P	.03			.03			.03		
Nitrate (N)	.1			.05			.05		
Free Acid	0								
Total Acidity	0								
Alkalinity	0								
DO	7								
Total Hardness	17								
CO_2	18								
Pn	6.5								
Temp (C+F) 1' Levels	12° C								
Secchi	8 ft.								

Heavy Metals

Zn	.009
CD	.001
Sn	.004
Au	.001
Fe	.173
P_D	.004
AL	.038
Cu	.009
Ni	.019
AG	.001

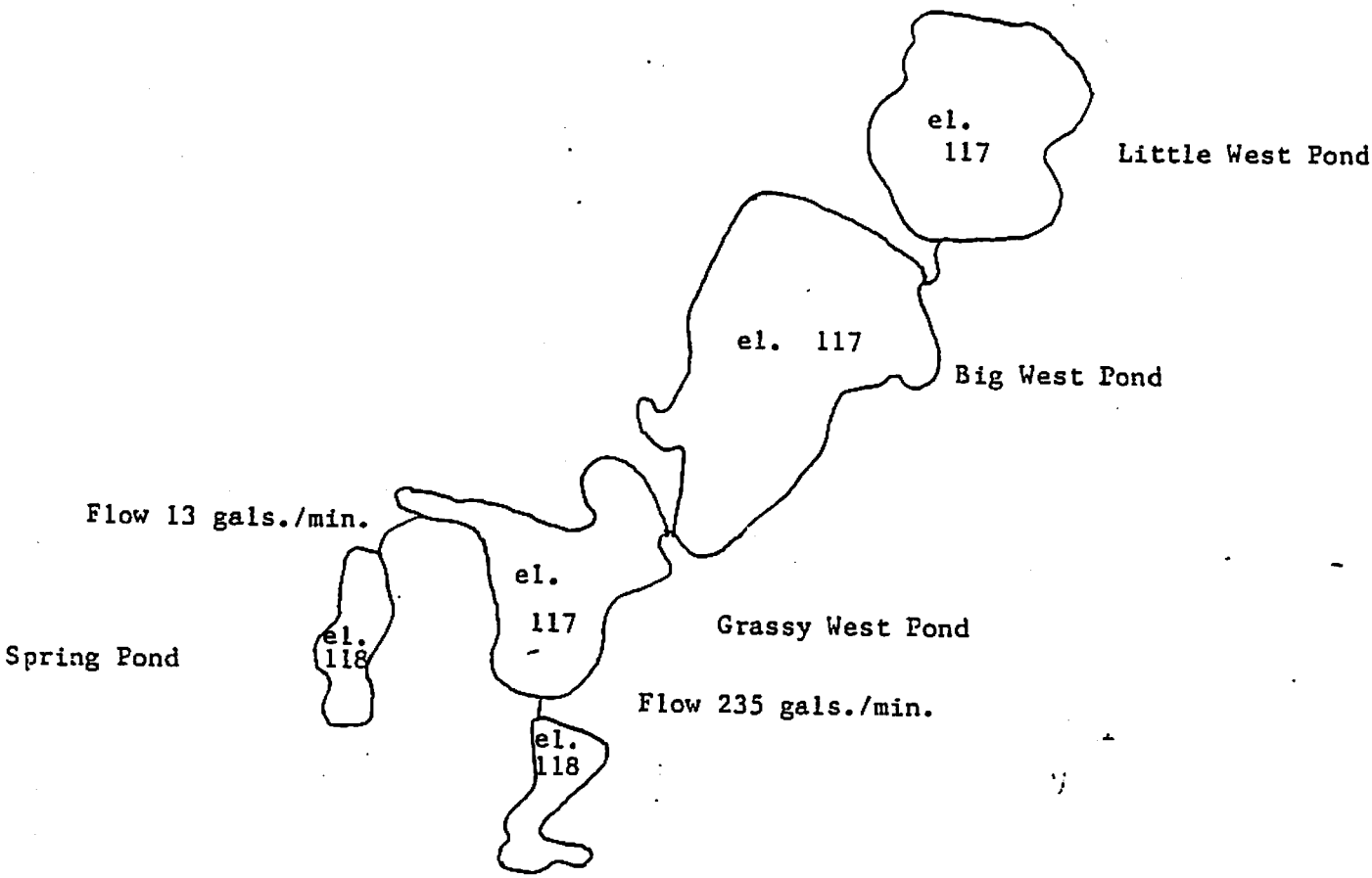
Benthos

Total P	123
Total Nitrogen	5.1
Percent solids	2.9
Total volatile solids	.21%

All figures in mg/l unless otherwise noted.

BIG WEST POND

(Impoundment Map)



There are no commercial agriculture enterprises affecting the surface flow of this impoundment.

Scale 1:1030

BIG WEST

Using a modified trophic level index Big West ranks 26th.

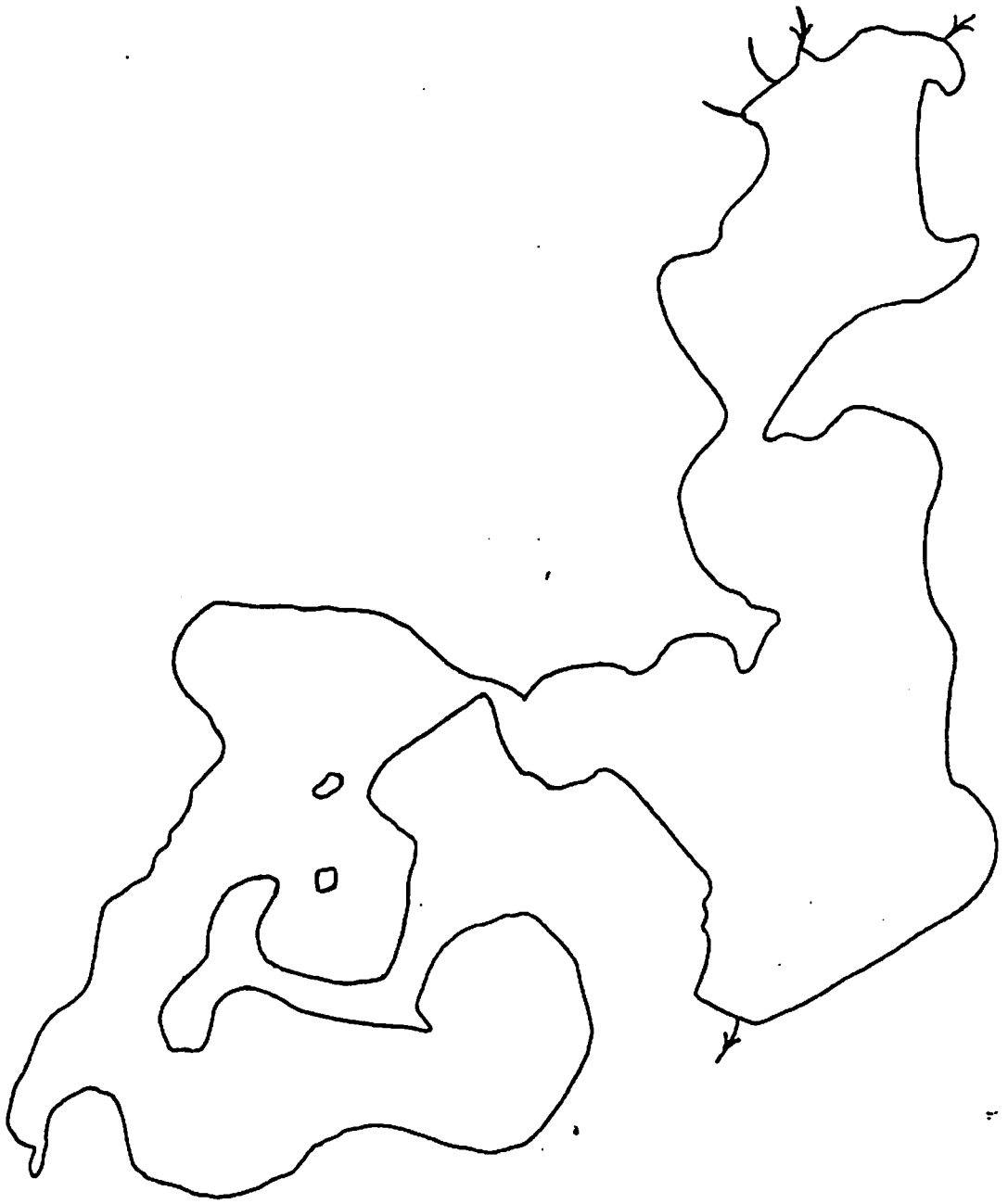
Big West is a natural, warm water, partially spring fed, non-stratified pond with a maximum depth of 16 feet. Macrophyte population ranges from medium to dense. Floating aquatic plants cover 7 acres of surface area with white lilies the dominant species. Emersed aquatic vegetation is thick in some areas. Submersed aquatic plants cover the bottom of the pond with milfoil the dominant species. On the plant trophic index it ranked 20th. The Secchi disc reading was 8.5 feet and ranked 22 nd in this parameter. Phosphate readings were above permissable level, while nitrate readings were marginal.

Number of houses affecting pond: approximately 20 with more construction apparent.

Cranberry bogs affecting pond: none

Problem: new construction will accelerate the deterioration of this already eutrophic pond.

WHITE ISLAND POND



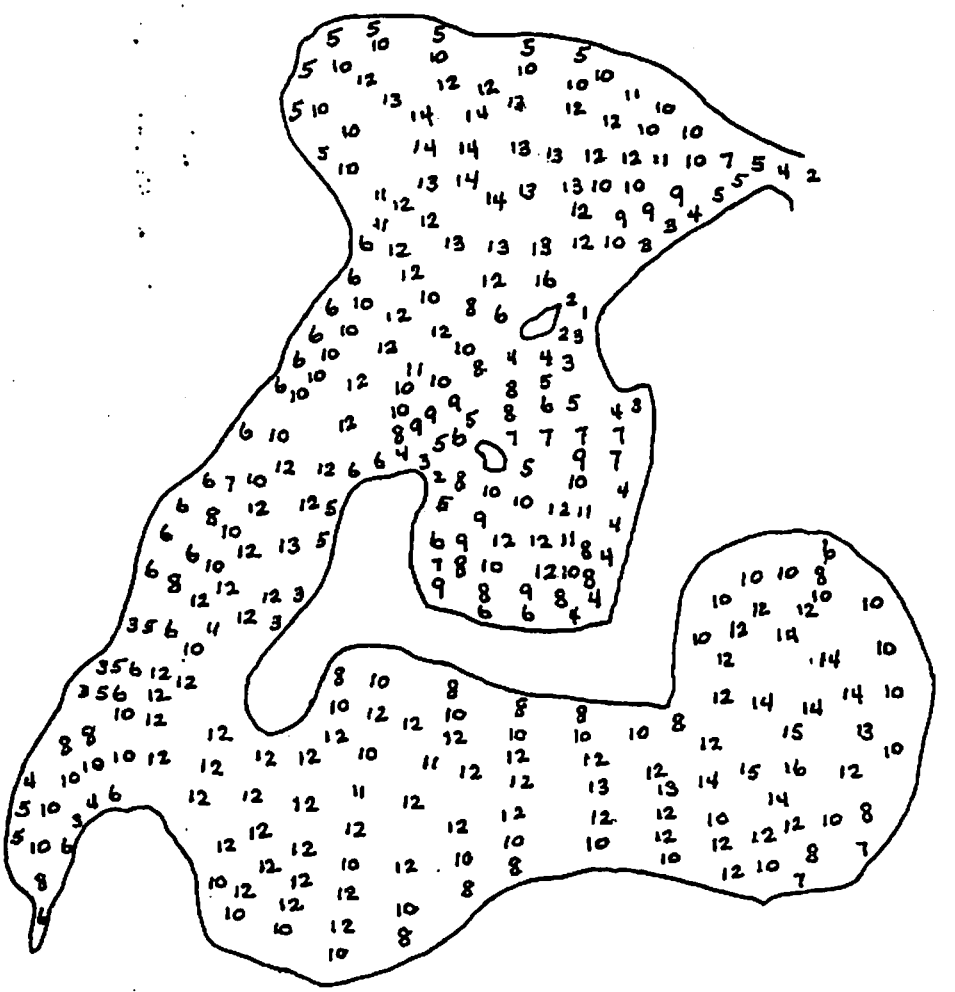
te Island Pond
mouth, Mass.
ershed: coastal
es: 294
itude: 048
ertype: warm
d type: natural
ntified: no
d use: irrigation, recreation, esthetic
o sheets: USGS 1:24000 Wareham, Sagamore

Position Topo sheet: Wareham up 10 R 16
Sagamore up 11 R 1
Shoreline distance 3.8 M (20,064 ft.)

Scale 1:1010'

WHITE ISLAND POND

(Bathymetric Map)

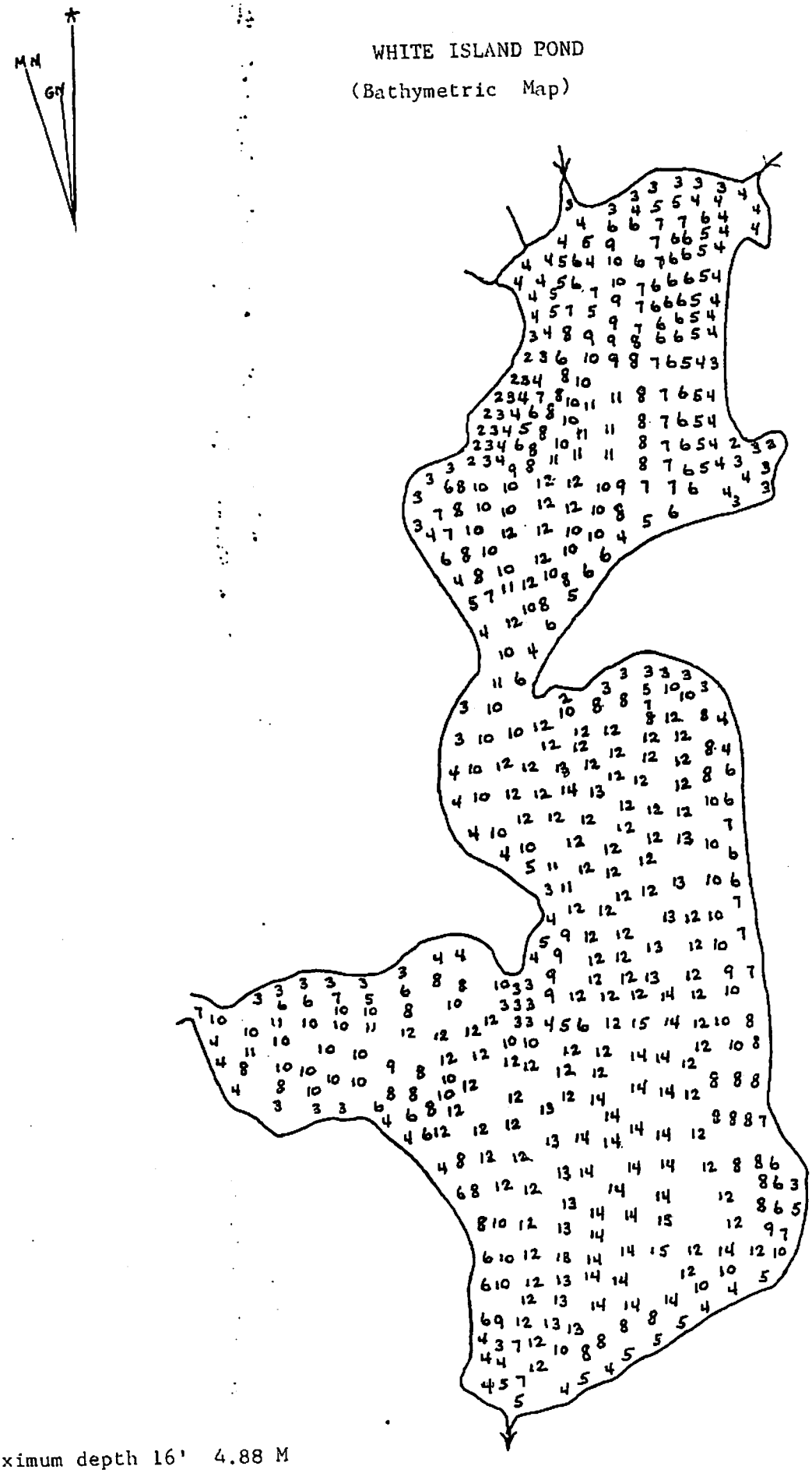


Maximum depth 16' 4.88 M
Mean depth 10' 3.05 M
Surface Area 294 acres 119.07 H
Acre feet 2940
Total gals. 958,001,940

Scale 1:650'

WHITE ISLAND POND

(Bathymetric Map)

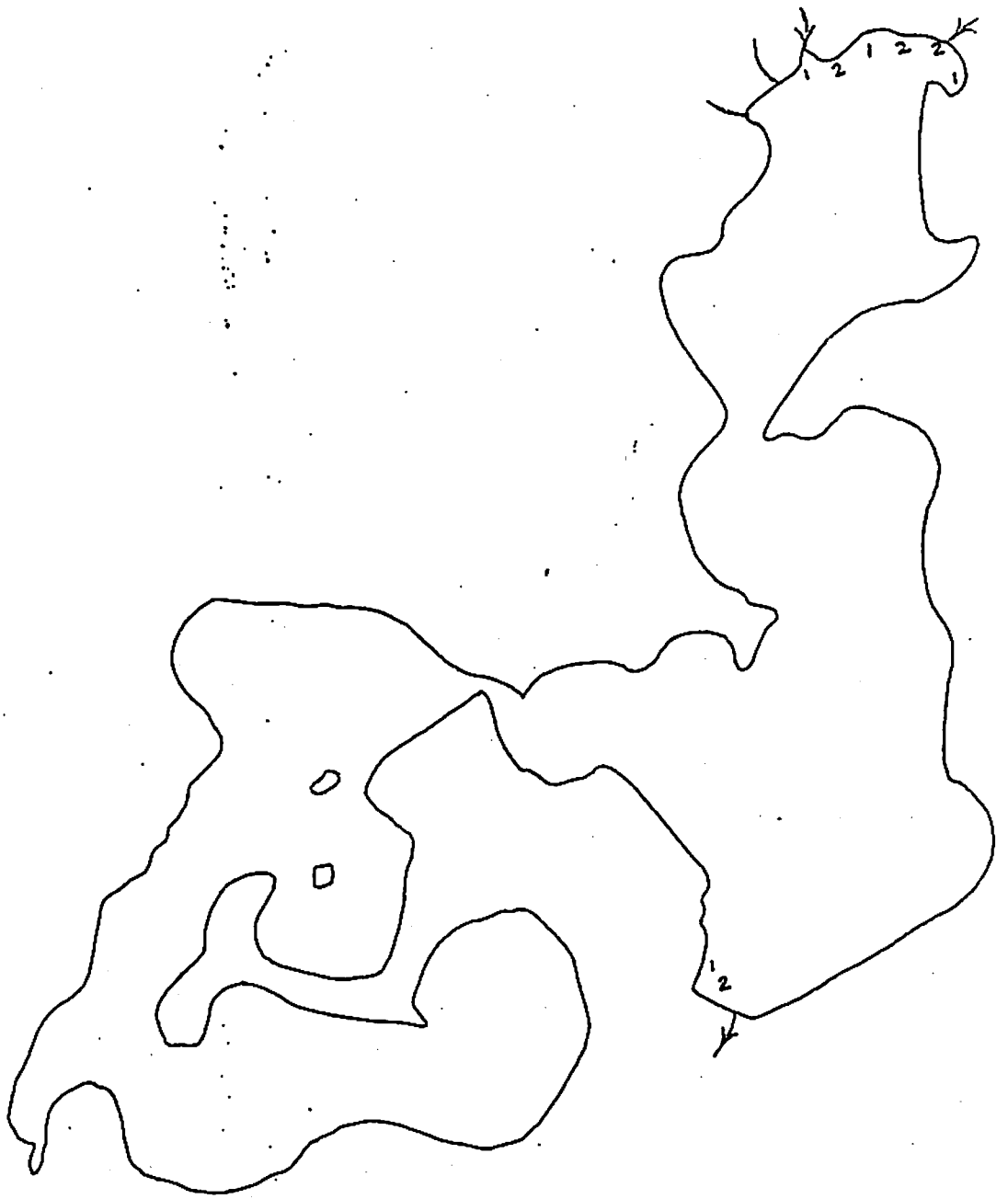


Maximum depth 16' 4.88 M
Mean depth 10' 3.05 M
Surface Area 294 acres 119.07 H
Acre feet 2940
Total gals. 958,001,940

Scale 1:650 '

WHITE ISLAND POND

Floating Aquatic Plant Map with Key



Scale 1:1010'

FLOATING AQUATIC PLANTS ATTACHED

LATIN	COMMON	MAP NUMBER
Nuphar	Cow Lily, Yellow Water Lily, Spatterdock	
Nymphaea	Water Lily, White Water Lily	1
Brasenia	Watershield	2
	Addenda	

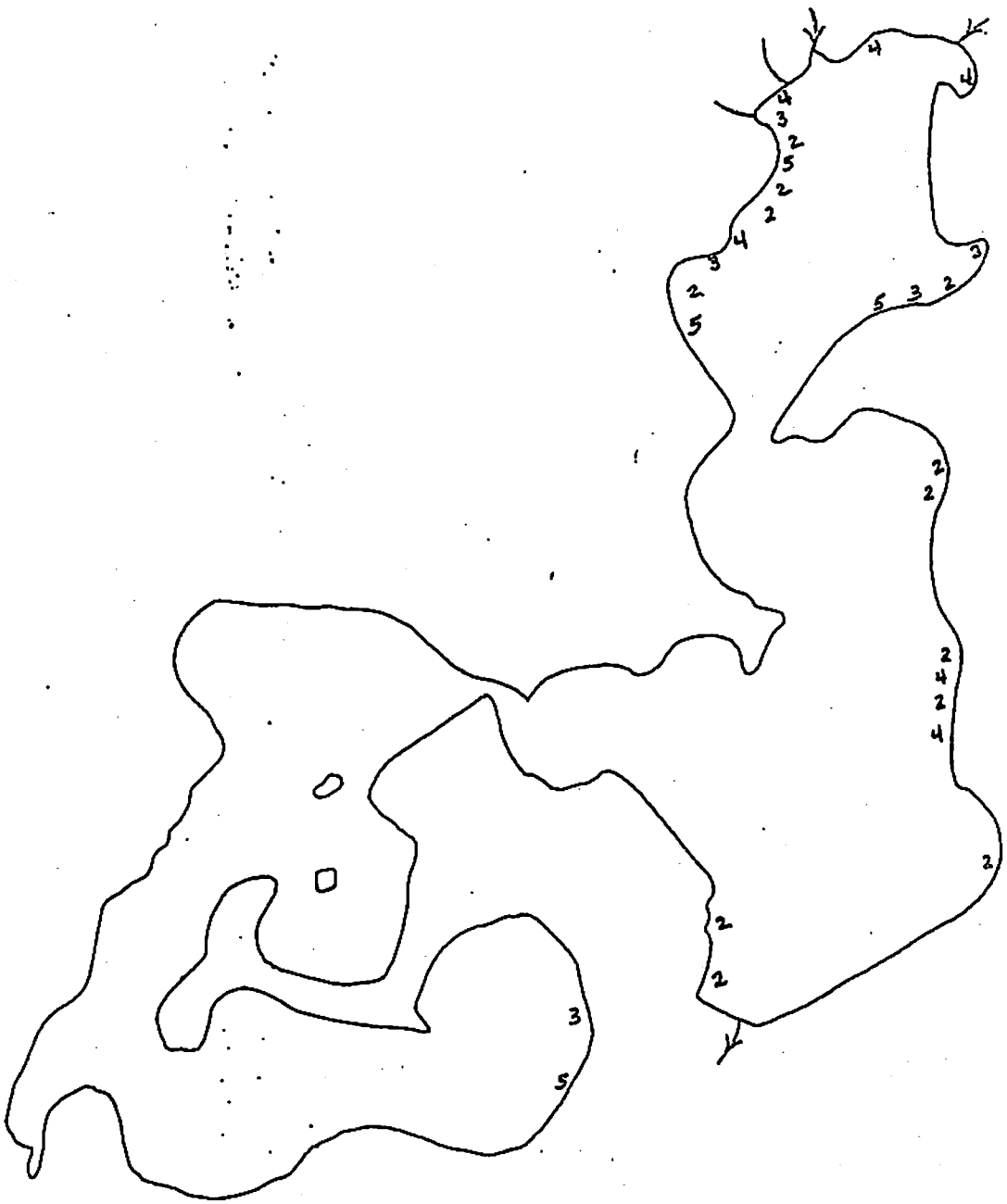
FLOATING AQUATIC PLANTS - UNATTACHED

LATIN	COMMON	MAP NUMBER
Lemna	Duckweed	
Spirodelia	Big Duckweed	
Wolffia	Watermeal	
	Addenda	

MN GN

WHITE ISLAND POND

Emersed Aquatic Plant Map with Key



Scale 1:1010'

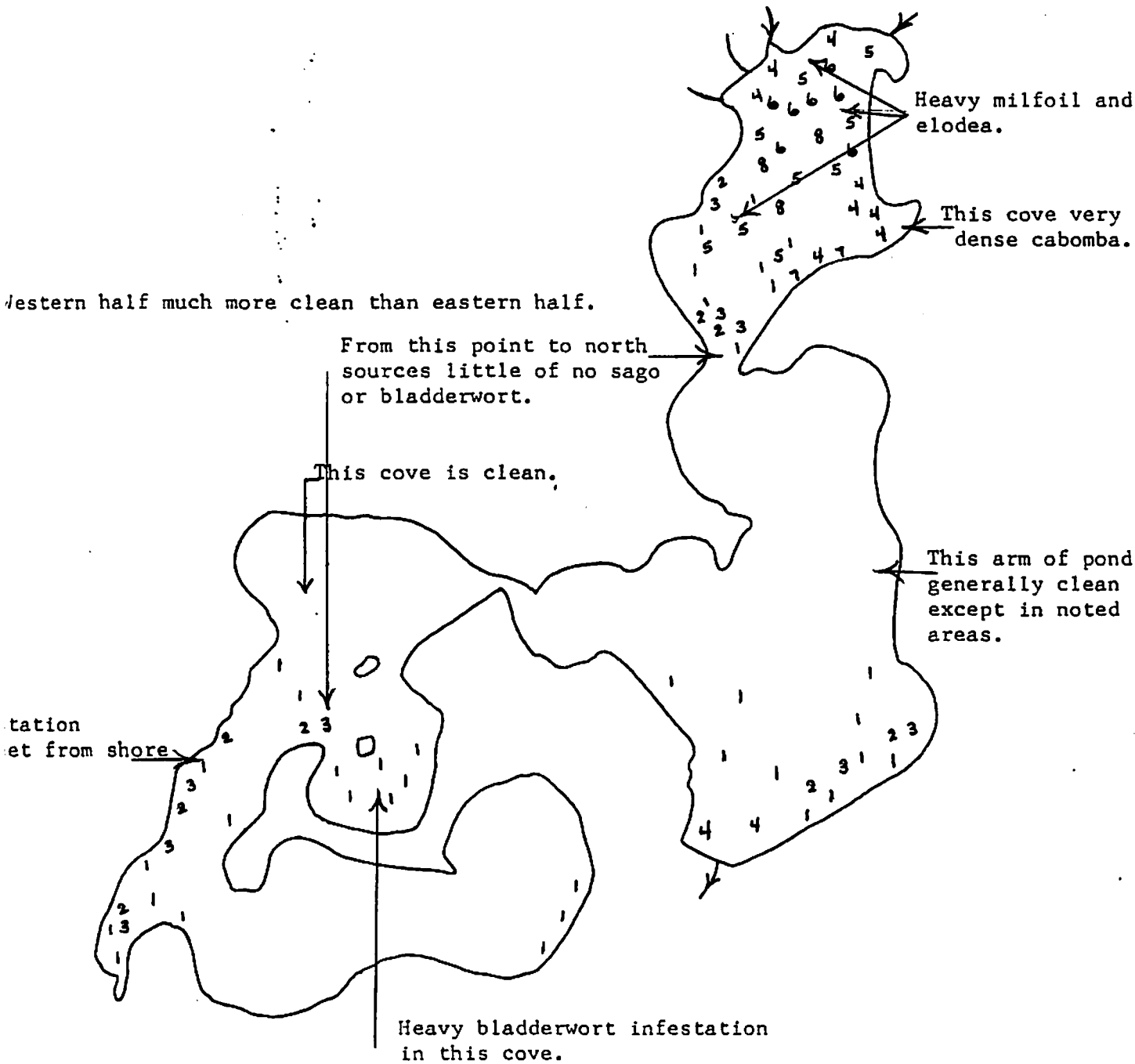
EMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Peltandra	Arrow Arum	1
Pontederia	Pickerel Weed	2
Sagittaria	Arrowhead; Duck Potatoe	
Polygonum	Watersmart Weed	
Typha	Cattail	
Eleocharis	Spike Rush Sedge	3
Scirpus	Bulrush Sedge	4
Juncaceae	Juncus Rush	5

Addenda

WHITE ISLAND POND

Submersed Aquatic Plant Map with Key



Scale 1:1010'

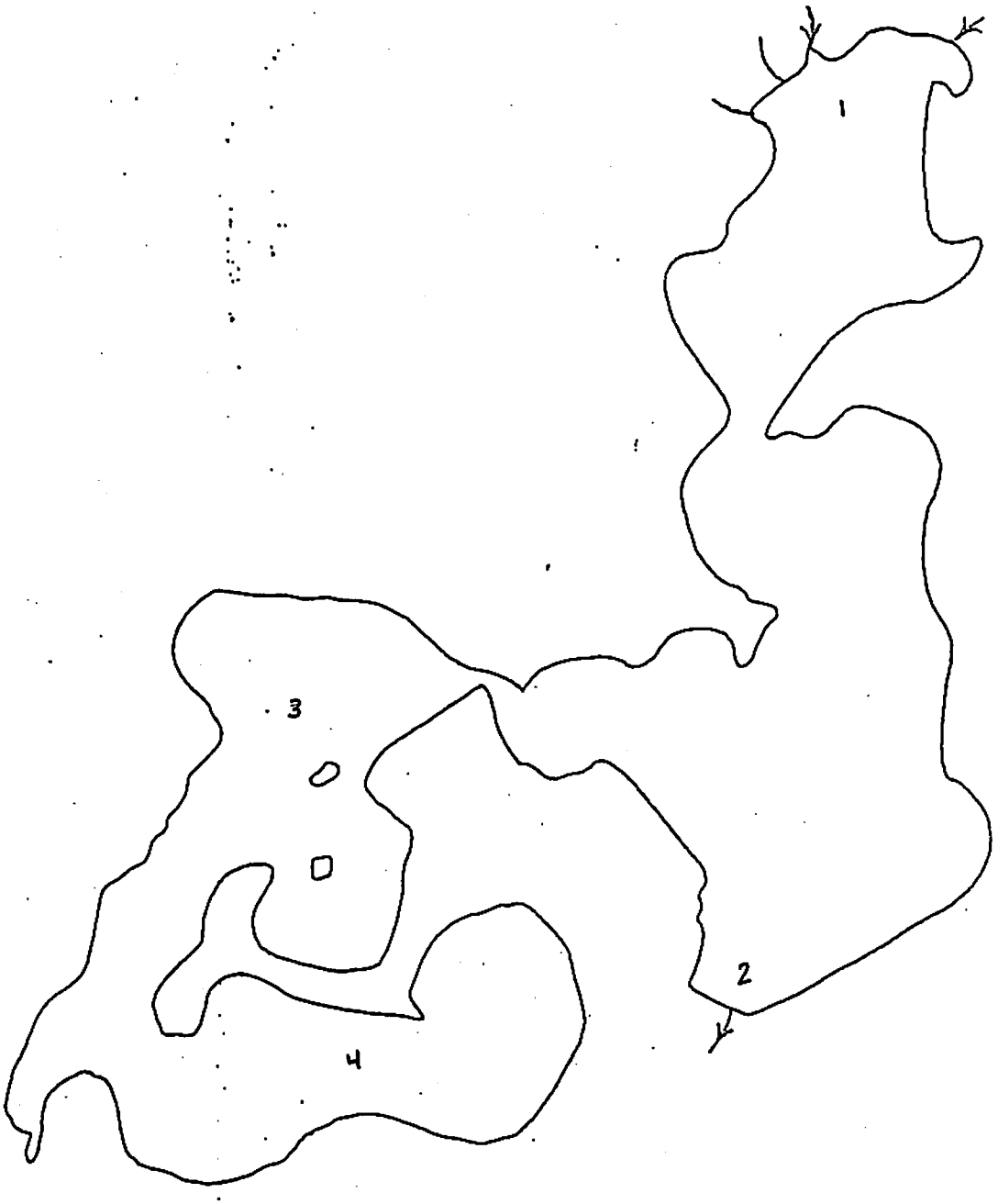
SUBMERSED AQUATIC PLANTS

LATIN	COMMON	MAP NUMBER
Potamogeton	Pondweed	
Potamogeton Americanus		
Potamogeton Ampl. Folius	Large Leaf Pondweed	
Potamogeton Crispus	Curly Leaf Pondweed	
Potamogeton Diversifolius	Waterthread Pondweed	2
Potamogeton Filiformus		
Potamogeton Filiosus	Leafy Pondweed	
Potamogeton Gramineus	Variable Pondweed	
Potamogeton Natans	Floating Brown Leaf	8
Potamogeton Nodosus	American Pondweed	
Potamogeton Pectinatus	Sago Pondweed	3
Potamogeton Praelongus	White Stem Pondweed	
Potamogeton Richardsonii	Richardson Pondweed	
Potamogeton Robinsii		
Potamogeton Vaginatus	Giant Pondweed	
Najas	Bushy Pondweed	7
Zannichellia	Horned Pondweed	
Elodea	Waterweed	6
Ranunculus	Water Buttercup	
Ceratophyllum D.	Coontail	
Myriophyllum	Water Milfoil	5
Alisma	Waterplantain	
Heteranthera D.	Water Star Grass; Mud Plantain	
Nasturtium	Water, Cress	
Utricularia	Bladderwort	1
Vallisneria	Wild Celery	
	Addenda	
Cabomba	Fanwort	4

MN GN

WHITE ISLAND POND

Chemical Sample Stations



Scale 1:1010'

	White Island IN LAKE STATION 1	2	3	OUTFALL 1	2	3	SOURCES 1	2	3
'	.01	.02	.01	.02			.01		
: (N)	.10	.10	.05	.10			.10		
:id	0								
:cidity	0								
ıity	0								
	7								
Hardness	15								
	20								
	6.5								
C+F) 1' Levels	24.5° C								
	13 ft.								
Metals									
.007									
.001									
.004									
.001									
.044									
.004									
.061									
.008									
.010									
.014									

'	10.9
'itrogen	13.7
olatile solids	.02%
solids	8.81

All figures in mg/1 unless otherwise noted.

WHITE ISLAND POND

Impoundment Map

Flow varies depending on bog usage.
3 checks 43 gal/min
62 gal/min
seepage between boards

Total bogs affecting impoundment 96A. app.

Total bogs affecting impoundment 5A. app.

el. 48

el. 0
48

White Island Pond

Flow varies depending on bog usage.

Total bogs on outfall side 82A. app.

Bartlett Pond
el. 42

Cranberry bogs

Scale 1:2000'

White Island

Using a modified trophic level index White Island ranks 12th.

White Island is a natural, non-stratified, warm water pond with a maximum depth of 16 feet. Floating aquatic vegetation was sparse except for northern part of eastern basin. Submersed aquatic vegetation was sparse throughout the western basin, but heavy on the northern part of the east basin. The dominant species is elodea. On the plant trophic index it ranked 14th. The Secchi disc reading was 13 feet which ranked it 13th in this parameter. The phosphate readings were permissible but nitrate readings were high at various stations.

Number of houses affecting impoundment: over 200
Cranberry bogs affecting impoundment: approximately 100 acres
Problems: Encroaching overpopulation. Highest macrophyte counts were in the northern section of the east basin, this fact coupled with higher nutrient readings would make the bogs on northern inlets suspect. This lake is classified mesotrophic and in relatively good condition but any increased cultural shock would lead to rapid deterioration.

EUTROPHICATION LIST

1. Long
2. Little
3. Great South
4. Little South
5. Bloody
6. Fresh
7. Gallows
8. Micajah
9. Sandy
10. Boot
11. Round
12. White Island
13. Little West
14. Ezekial
15. Wall
16. Little Sandy
17. Island 39
18. Gunners Exchange
19. Long Island
20. Morey Hole
21. Russell Mill
22. Island 52
23. Great Herring
24. Little Herring
25. Clear
26. Big West
27. Kings
28. Hoyts
29. Forge
30. Scokes
31. Little Long
32. Savery
33. Ship
34. Bartlett
35. Hedges
36. Indian
37. Fresh Meadow
38. Halfway
39. Spring
40. N. Triangle
41. Grassy West

*** Billington Sea would rank 31**

CLASSIFICATION DEFINITION

OLIGOTROPHIC; Aquatic plant production is low; aquatic animal production is low; aquatic plant nutrient flux is low. Oxygen is present in the hypolimnion. Depth; tends to be deeper. Water quality for most domestic and industrial use is good, total salts or conductance is usually lower. Number of plant and animal species is varied and diverse. Oligotrophic waters have only a small supply of available nutrients, hence, they support little organic production.

EUTROPHIC; Aquatic plant production is high; aquatic animal production is high; aquatic plant nutrient flux is high. Oxygen in hypolimnion is absent. Depth; tends to be more shallow. Water quality for most domestic and industrial uses is generally poor. Total salts or conductance is mostly higher. Number of plant and animal species is fewer. Eutrophic waters are waters with a good supply of nutrients, they may support rich organic production such as algal blooms.

MESOTROPHIC; lakes exhibit conditions between eutrophic and oligotrophic, their water is less transparent than oligotrophic waters, but more transparent than eutrophic waters. Supplies of dissolved oxygen decrease during the summer months in deep water, but do not disappear entirely as in eutrophic waters. Less all-round production than eutrophic waters.

The above is a brief description of classification, and the trophic index was developed along these qualifications. The following parameters were considered in rating the lakes:

1.) hypolimnetic dissolved oxygen
2.) transparency
3.) phytoplankton
4.) nitrates
5.) total phosphorous
6.) aquatic vegetation

ADDENDA

Macrophyte Populations and Nutrient Utilzation

When it is obvious that intense macrophyte growth has consumed large quantities of nutrients, adjustments were made in the overall rating. For example, a reading of .01 mg/l of phosphate on North Triangle Pond would indicate that it falls in the acceptable level, however, a 90% weed cover on the pond keeps the nutrient level low because of heavy plant utilizations and should not raise North Triangle Pond in the overall rating. Dense plant growth and a high algae count would affect nutrient readings in such a manner.

A good example of this anomaly is chemical weed control, plants disingegrate after treatment and in some cases 40-60 days after the kill an algae bloom occurs due to the release of nutrients through decomposition.
Another impoundment showing this anomaly is Indian brook - again, index evaluation was kept in its true perspective.

EUTROPHICATION INDEX USED TO RATE 41 PONDS IN PLYMOUTH

arameters

Secchi Disc Readings Rank 1 - 41 — Rank

.. Phytoplankton coloration

clear	0			
green tint	1	x 100% volume	=	Points
moderate green	2			
deep green	3			

!. Macrophytes

emergent	none 0			
floating	sparse 1	x % covered	=	Points
submersed	medium 2			
	dense 3			

3. Algae Filamentous

	none 0			
	sparse 1	x % area covered	=	Points
	medium 2			
	dense 3			

'otal of 1 + 2 + 3 = Points = Rank

Secchi Rank + Macro and Microphyte Rank = x

: times 4 = Ranking Points

lutrient Points

.. Phosphates

0 ppm.	- .025 ppm.	=	0
.025	- .03	=	1
.03	- .04	=	2
.04	- .06	=	3
.06	-	=	4

Points _____

. Nitrate

0	- .05	=	0
.05	- .1	=	1
.1	-.25	=	2
.25	- .4	=	3
.4	-	=	4

Points _____

= 1 + 2 x 2 Ranking Points

+ Y = Total Ranking Points
Ponds Rank 1 to 41

EXAMPLE
BIG WEST

Parameter

Secchi Disc Reading 1 - 41 8 1/2 ft. = 22nd

1. Phytoplankton

Clear + 0 x 100% volume 0

2. Macrophytes - Emergent and Floating

Dense	1.5 acres	3.75% x 3		11.25 points
Medium	5.72	14.0 % x 2		28.00
Submersed				
Dense	8.7	21.75% x 3		65.25
Medium	31.3	78.25 x 2		153.56

3. Algae Filamentous

None 0 x area 0 = 0

Total 1 + 2 + 3 = 261.00

Rank 1 - 41 Plant Index = 28

Secchi Rank 22
Plant Rank 28
50 Ranked 26th combined

Combined rank = 26 x 4 = 104

Nutrient

a. Phosphate .03 ppm. = 1 point
b. Nitrates .1 ppm. = $\frac{1}{2}$

Y = a + b = 2 x 2 = 4

X = 104
Y = 4
108 Total This ranked it 26th overall