

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

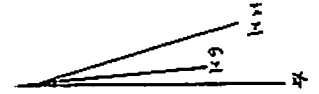
WHITE ISLAND

By

Lyons - Skwarto Associates
147 Whitewood Road
Westwood, Massachusetts 02090

RUSSELL MILL POND

RUSSELL POND



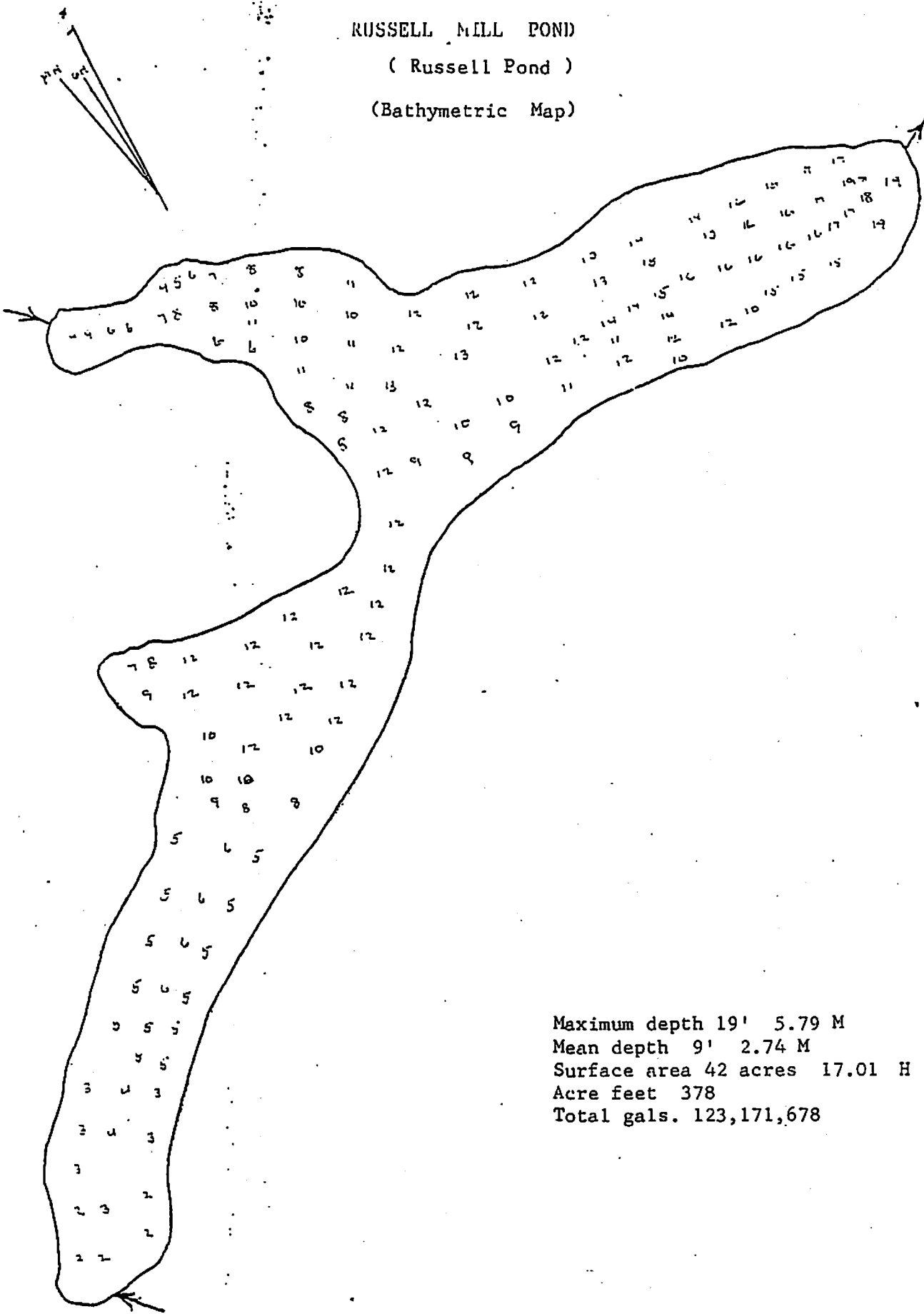
Russell Mill Pond
Plymouth, Mass.
watershed type: Eel River
area: 42
elevation: 055
water type: warm-cold
pond type: artificial
ratified: no
primary use: recreation, esthetic
topographic sheet: USGS 1:24000 Plymouth
location: Topo sheet: up 7.7 right 15.0
shoreline distance 1.8 miles 9.504'

Scale 1:570

RUSSELL MILL POND

(Russell Pond)

(Bathymetric Map)

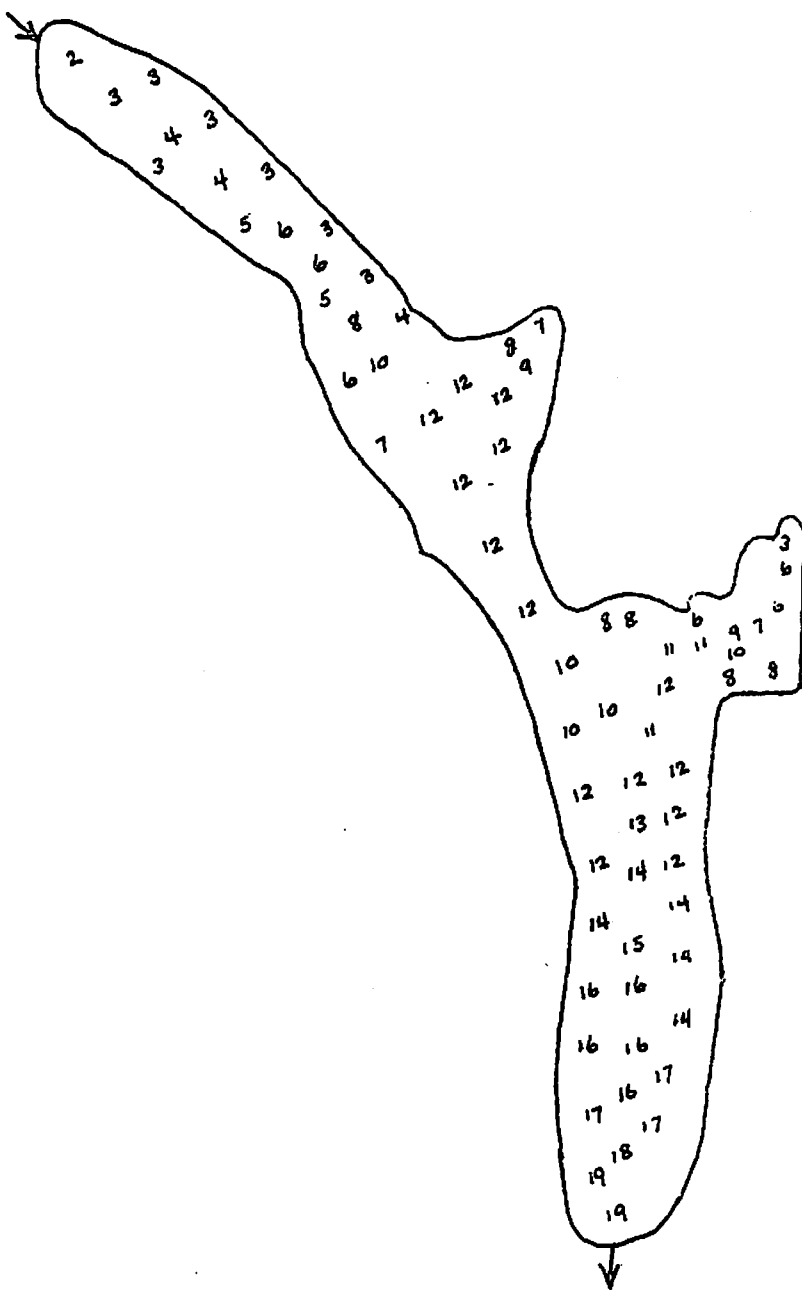


Maximum depth 19' 5.79 M
Mean depth 9' 2.74 M
Surface area 42 acres 17.01 H
Acre feet 378
Total gals. 123,171,678

Scale 1:400'

RUSSELL MILL POND

RUSSELL POND

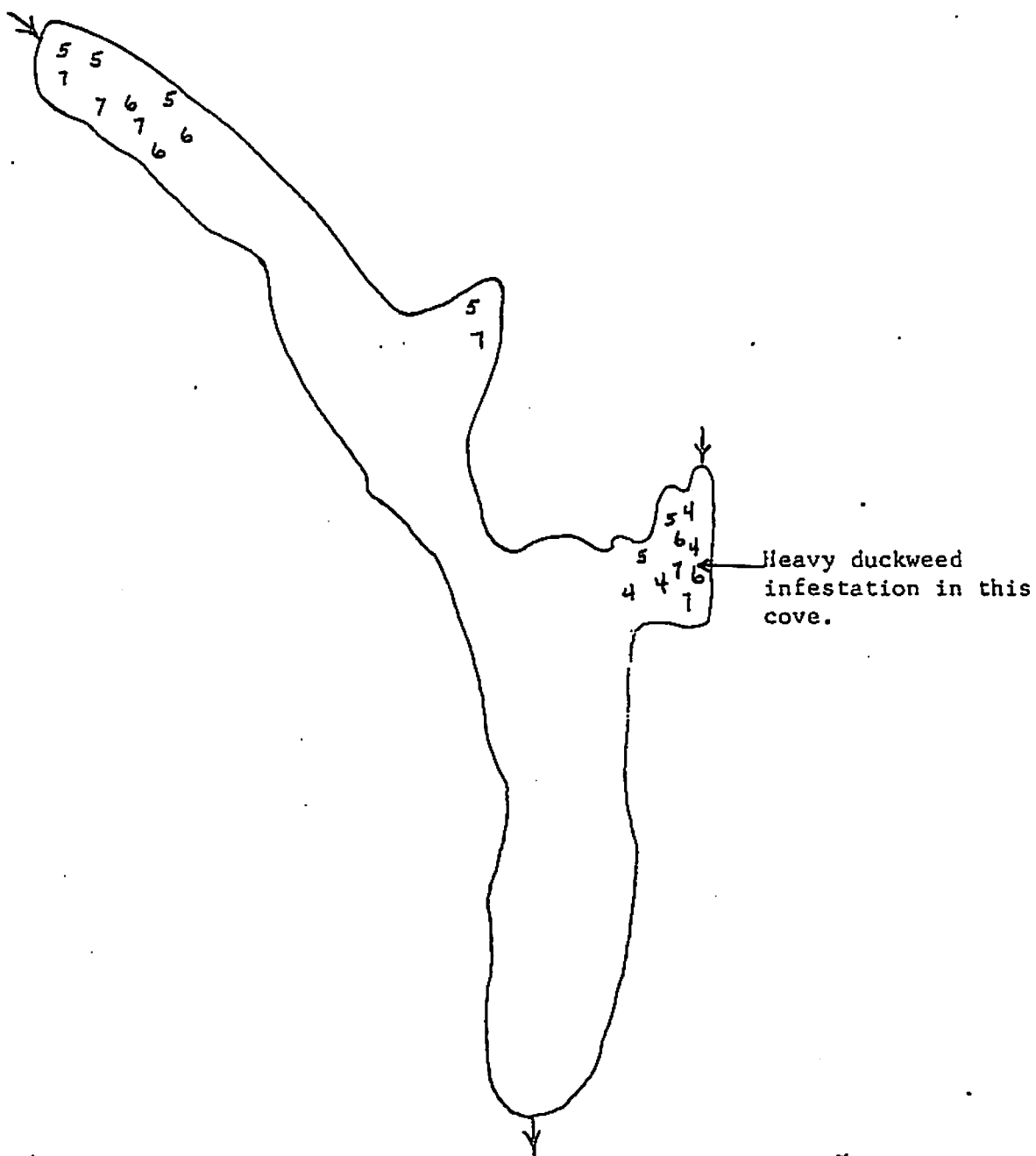


Scale 1:570

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 | |

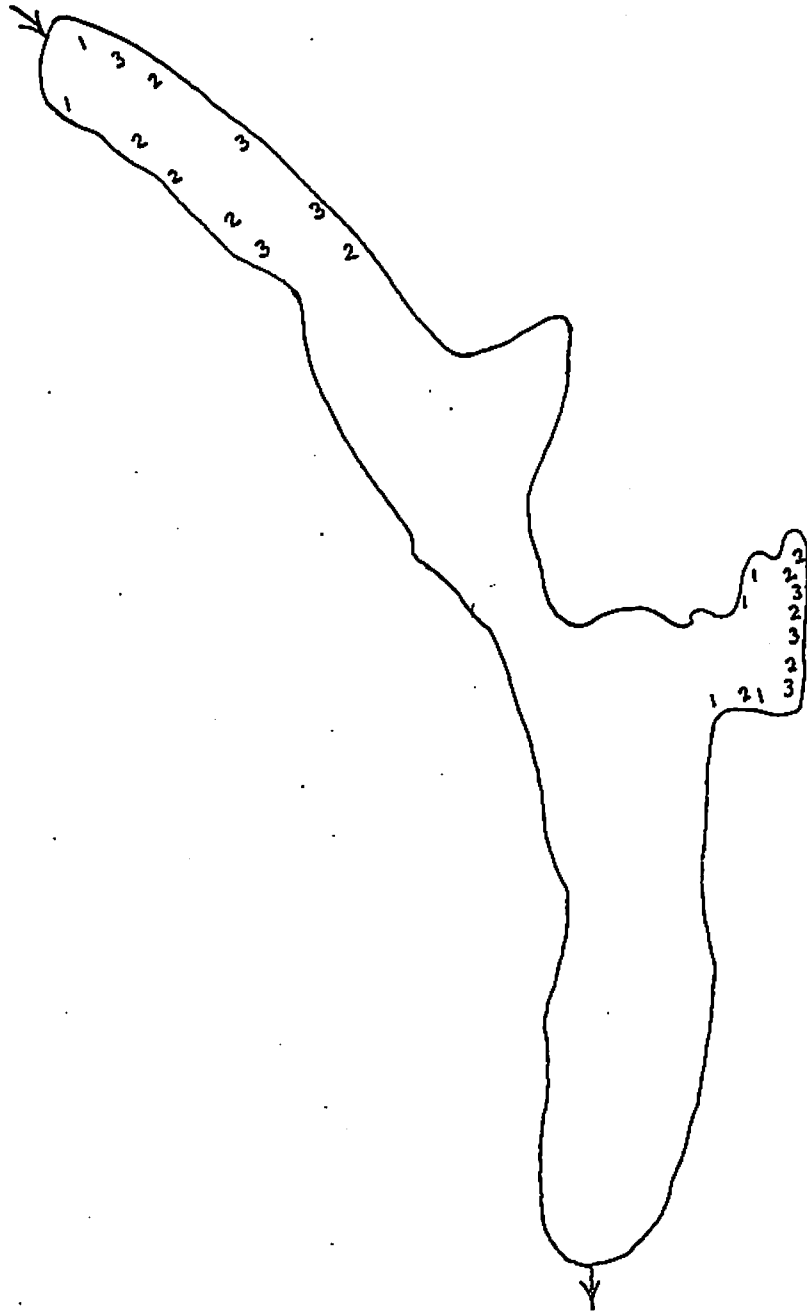
FLOATING AQUATIC PLANTS - UNATTACHED

| LATIN | COMMON | MAP NUMBER |
|-----------|--------------|------------|
| Lemna | Duckweed | 4 |
| Spirodela | Big Duckweed | |
| Wolffia | Watermeal | |
| | Addenda | |

RUSSELL M.L.L. POND

RUSSELL POND

Emerged Aquatic Plant Map with Key



Scale 1:570

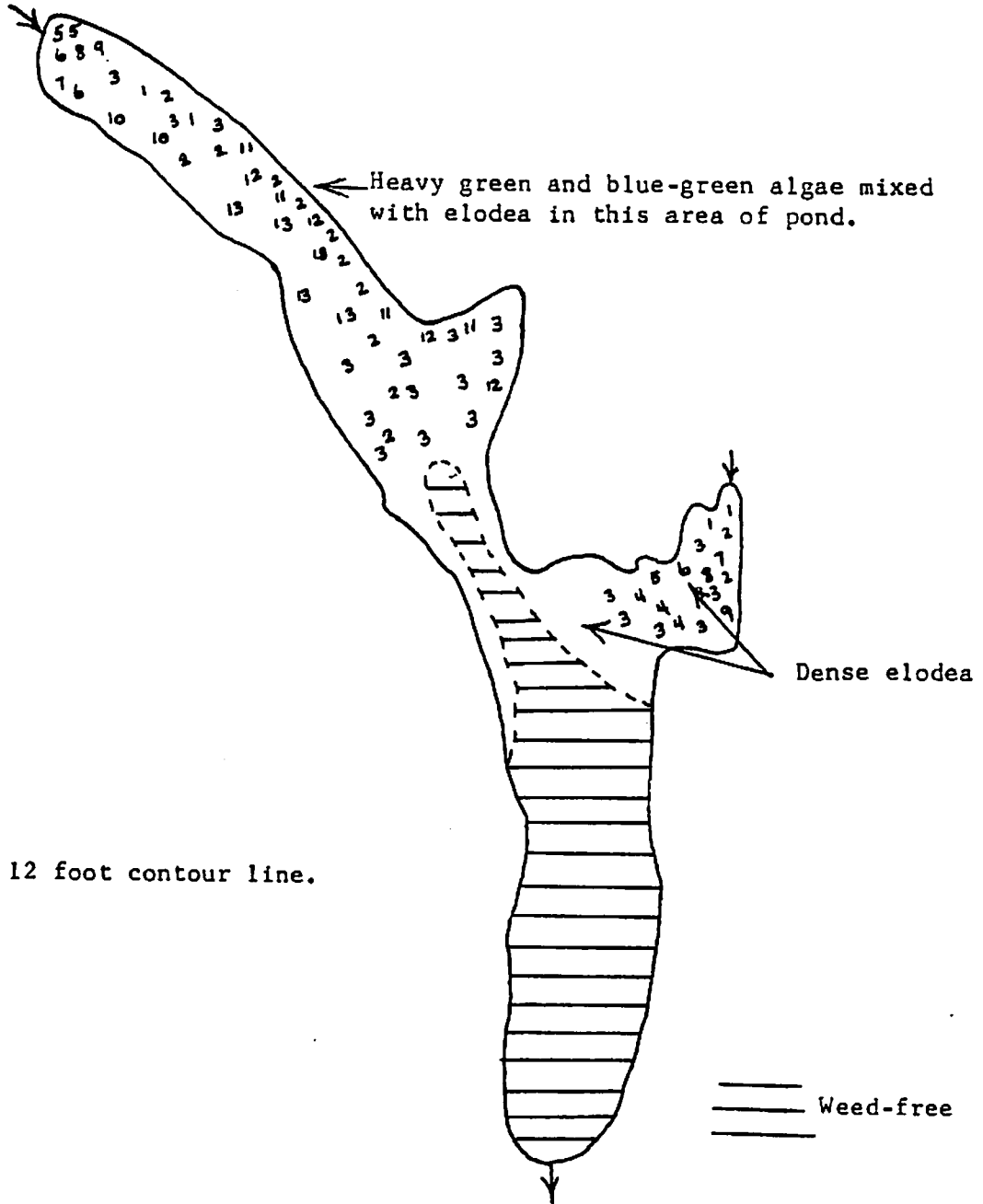
EMERSED AQUATIC PLANTS

| 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 | SPARGANUM | 3 |

RUSSELL MILL POND

RUSSELL POND

Submersed Aquatic Plant Map with Key



Elodea heavy out to 12 foot contour line.

==== Weed-free

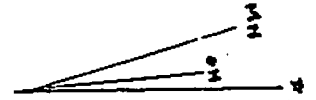
Scale 1:570

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 unicellular filamentous | Blue-green _____ | 12 |
| Cabomba | _____ | 13 |
| Nitella | Algae | 4 |

RUSSELL M.I.I. POND

RUSSELL POND
Chemical Sample Stations



Scale 1:570

Russell Mill
IN LAKE STATION

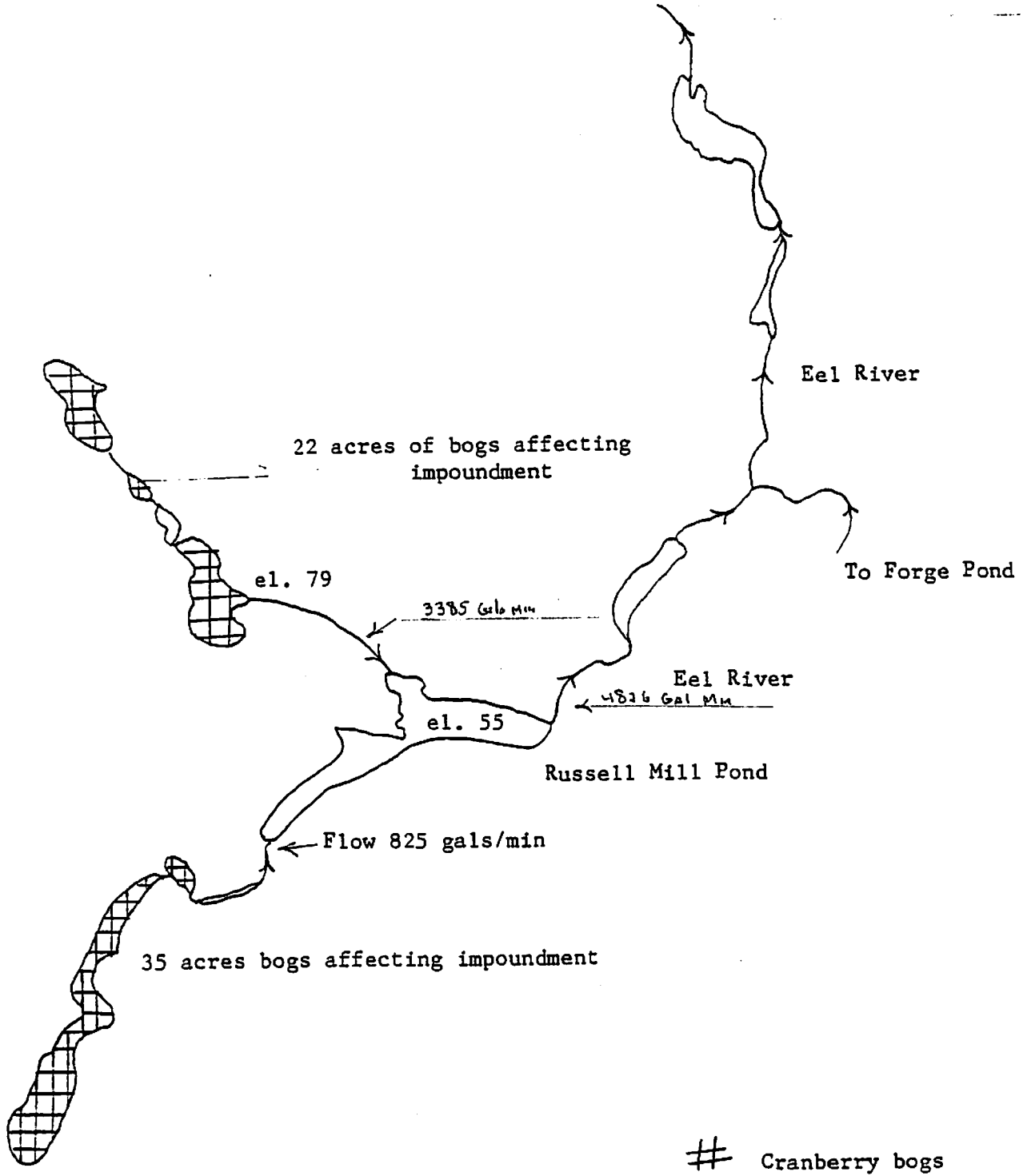
OUTFALL
1 2 3

SOURCES
1 2 3

| | 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 ⁰ 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. Emerged 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

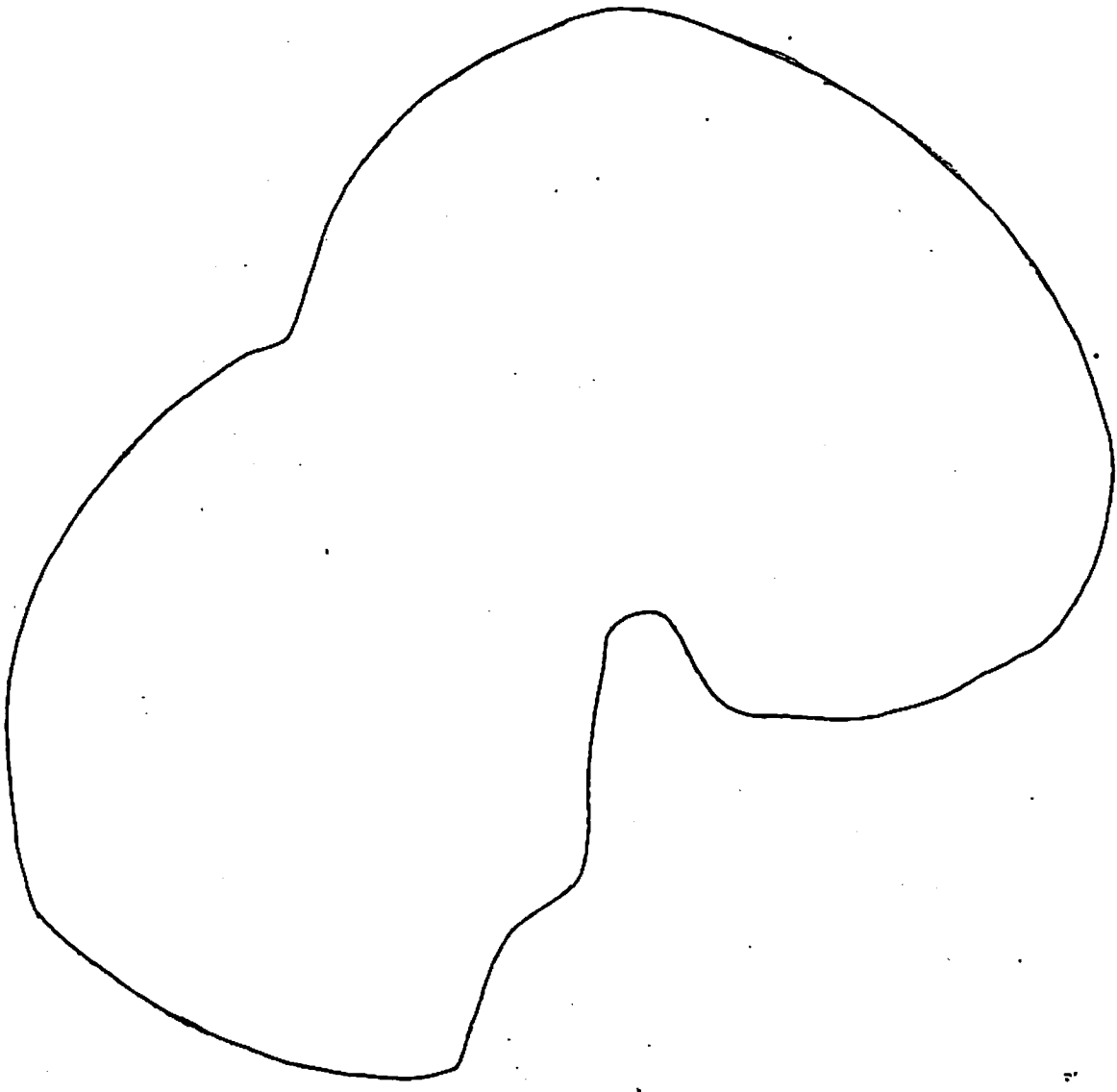
Cranberry bogs affecting pond: approximately 60 acres

This pond is rated eutrophic

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



SANDY POND
BIG SANDY POND

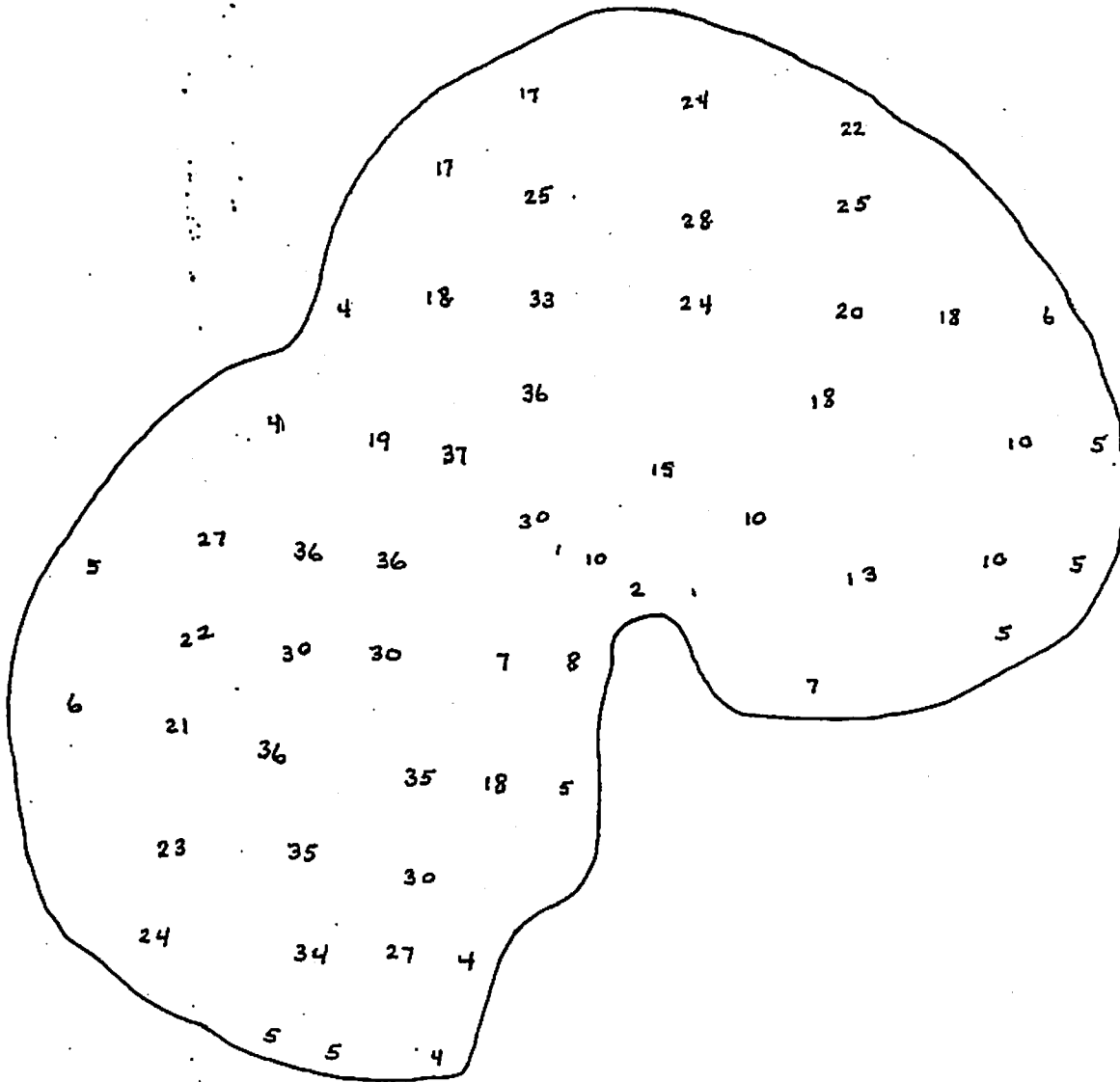


Sandy Pond
Mouth, Mass
Watershed: coastal
Area: 135
Elevation: 048
Water type: cold
Wetland type: natural
Certified: no
Primary use: recreation, esthetics
Topographic sheet: USGS 1:24000 Sagamore
Location Topo sheet up 11.2 R 2.9
Reference distance: 1.9 M (10032 ft.)

Scale 1:550'



SANDY POND
BIG SANDY POND

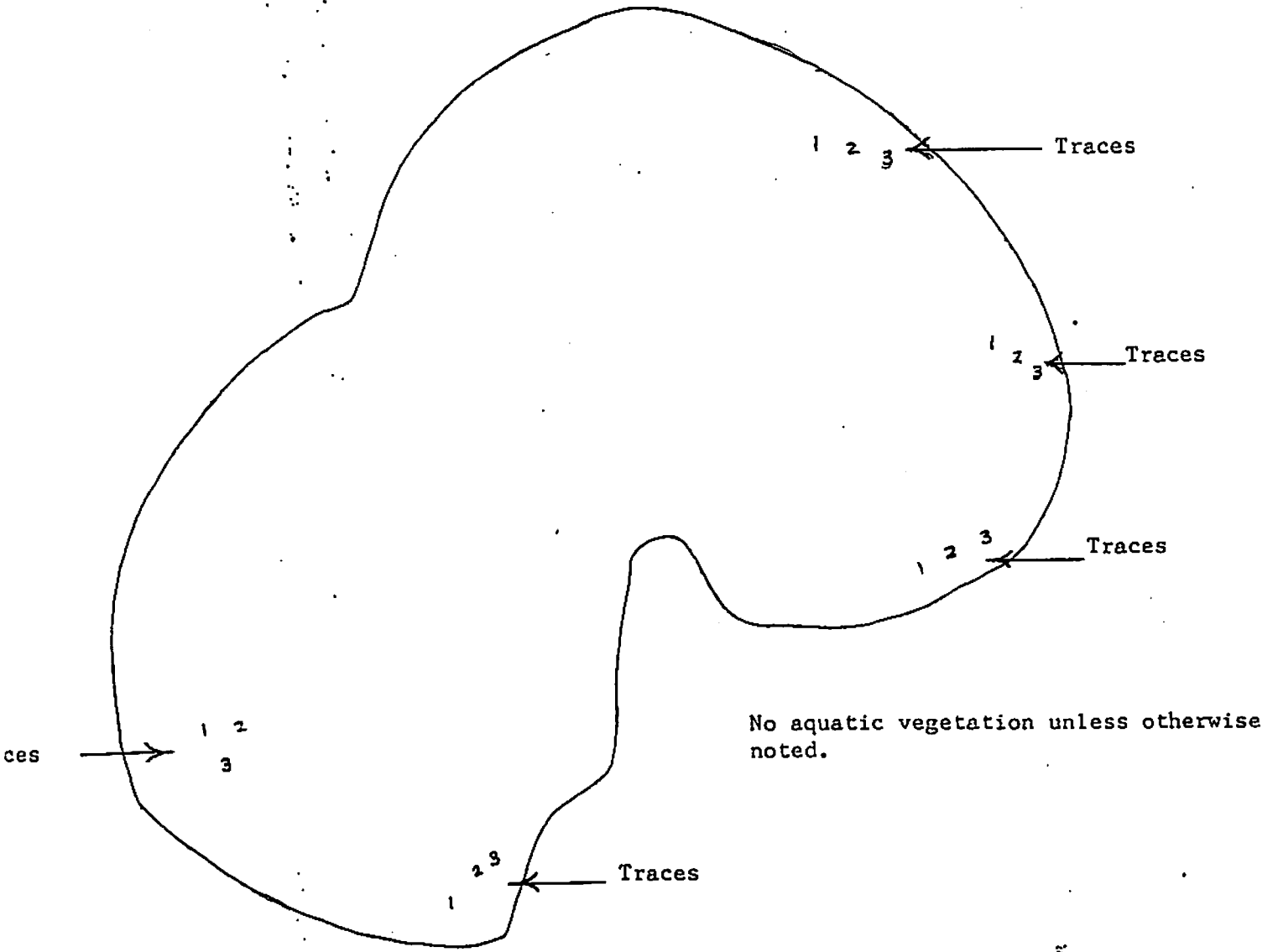


Maximum depth 37' 7.57 M
 Mean depth 19' 5.8 M
 Surface area 135 acres 54.68 H
 Acre feet 2565
 Total gals. 835,807,515

Scale 1:550'



SANDY POND
BIG SANDY POND
Submersed Aquatic Plant Map with Key



No aquatic vegetation unless otherwise noted.

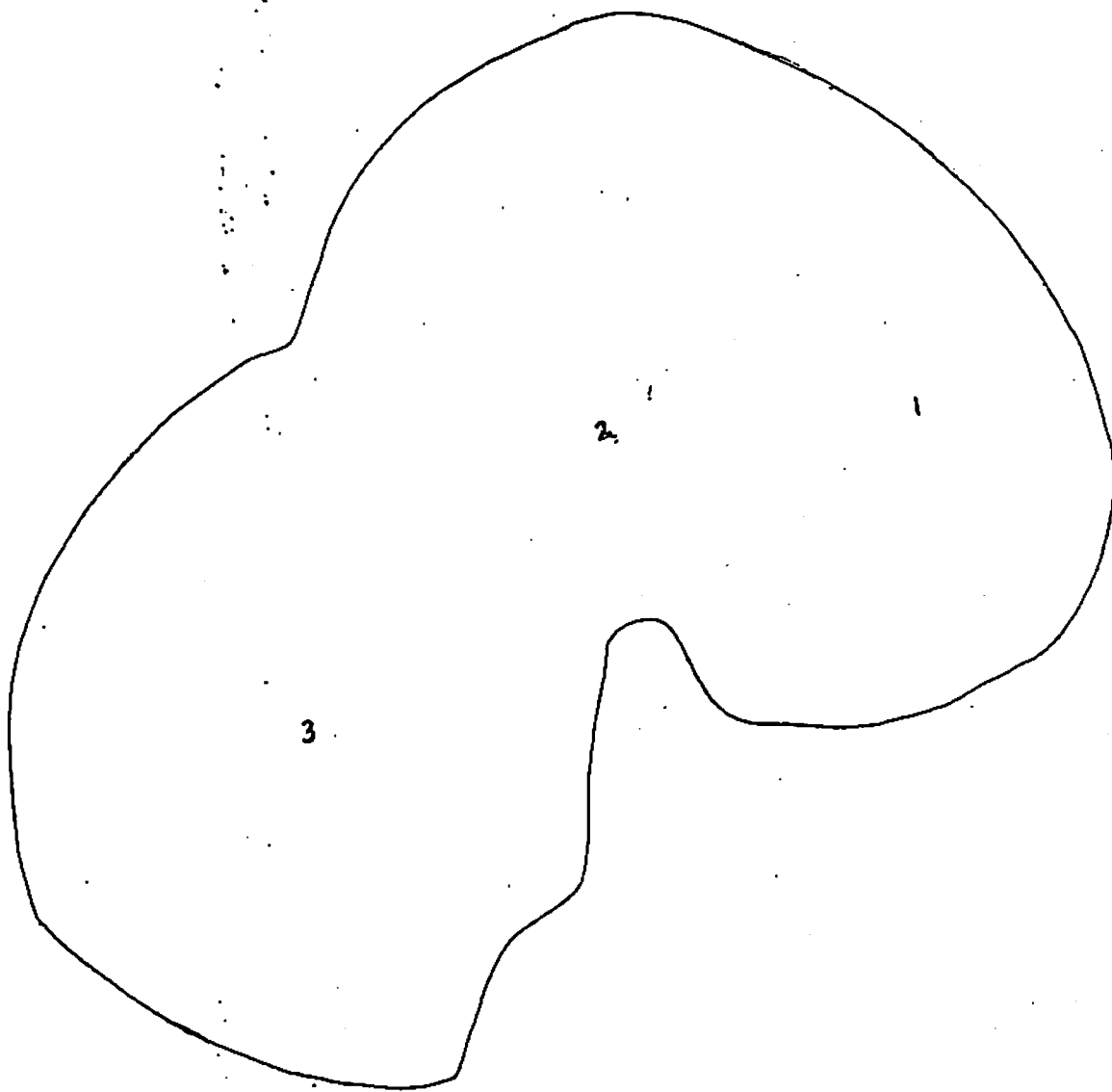
Scale 1:550'

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

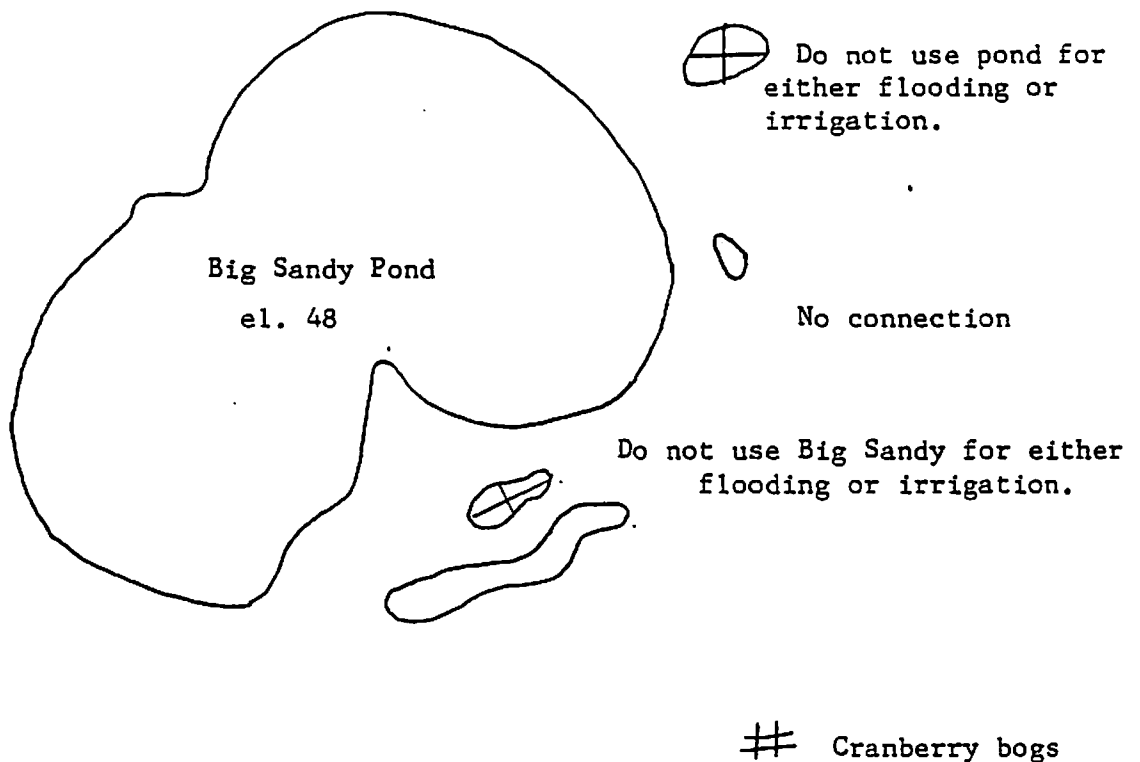
SOURCES

| | 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

SANDY POND

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

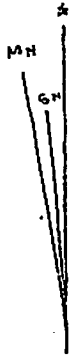
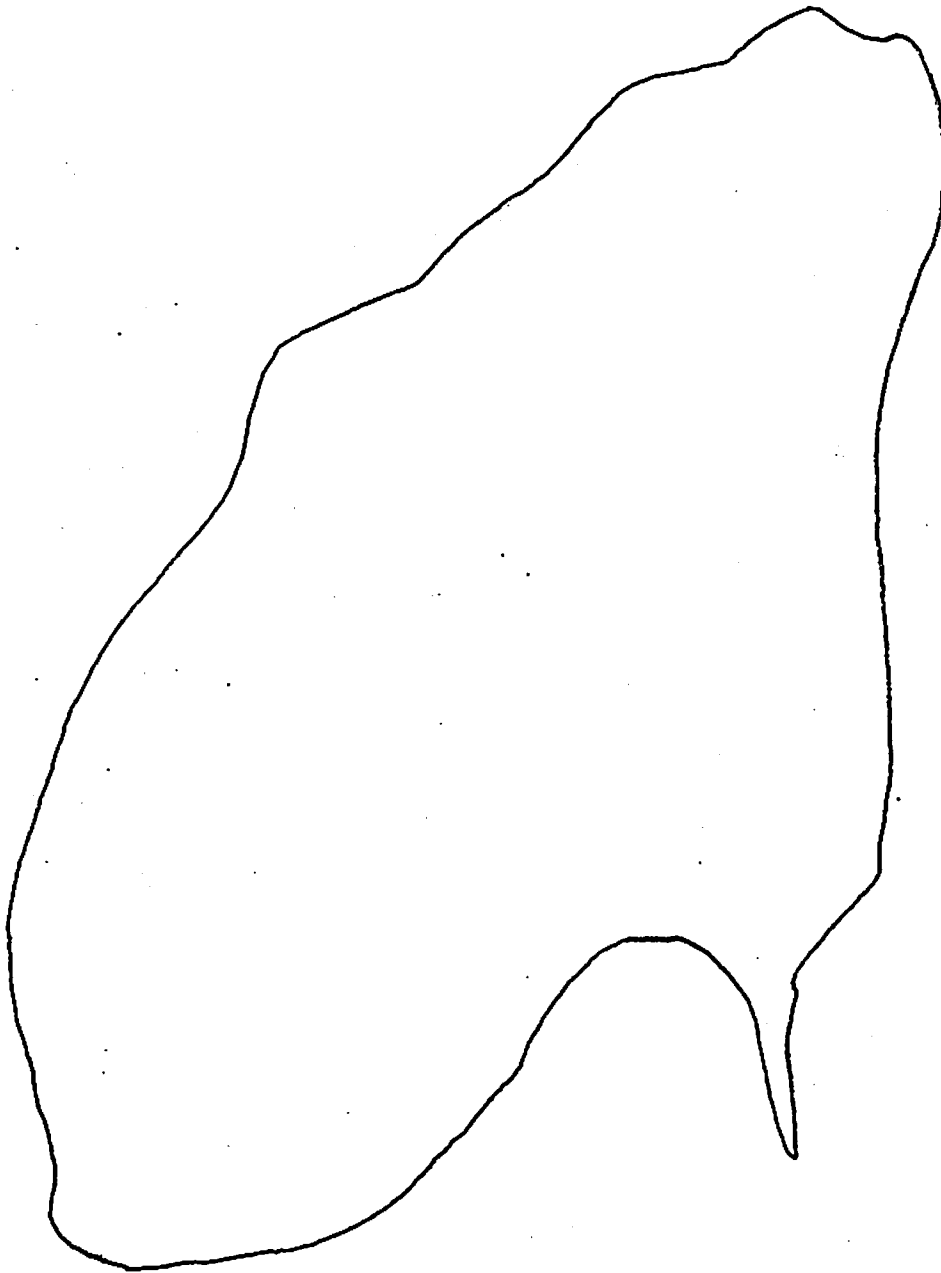
Sandy Pond is a natural cold water, spring fed pond with a maximum depth of 37 feet. Macrophyte population is sparse with no emergent or floating plants noted. Submersed aquatic vegetation is sparse with traces of potamogetons and bladderwort; on the plant trophic list it ranks 9th. Secchi disc reading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

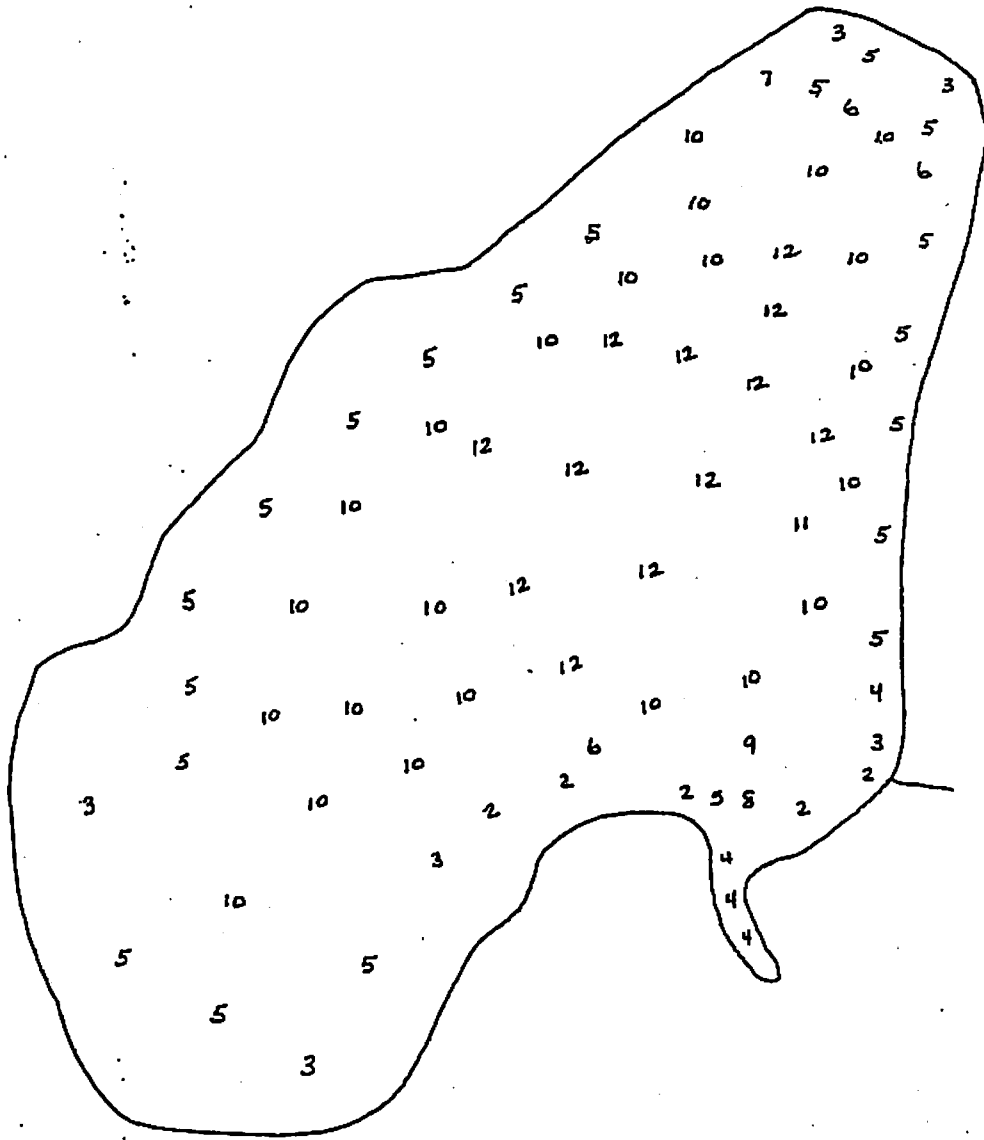
SAVERY POND



Savery Pond
mouth, Mass.
marsh type: coastal
ages: 33
elevation: 028'
water type: warm
land type: natural
artificial: no
primary use: recreation, esthetic
topographic sheet: USGS 1:24000 Sagamore
grid location: up 17.7 right 10.3
reference distance: .9 miles 4752'

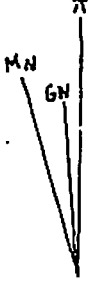
Scale 1:257'

SAVERY POND
(Bathymetric Map)



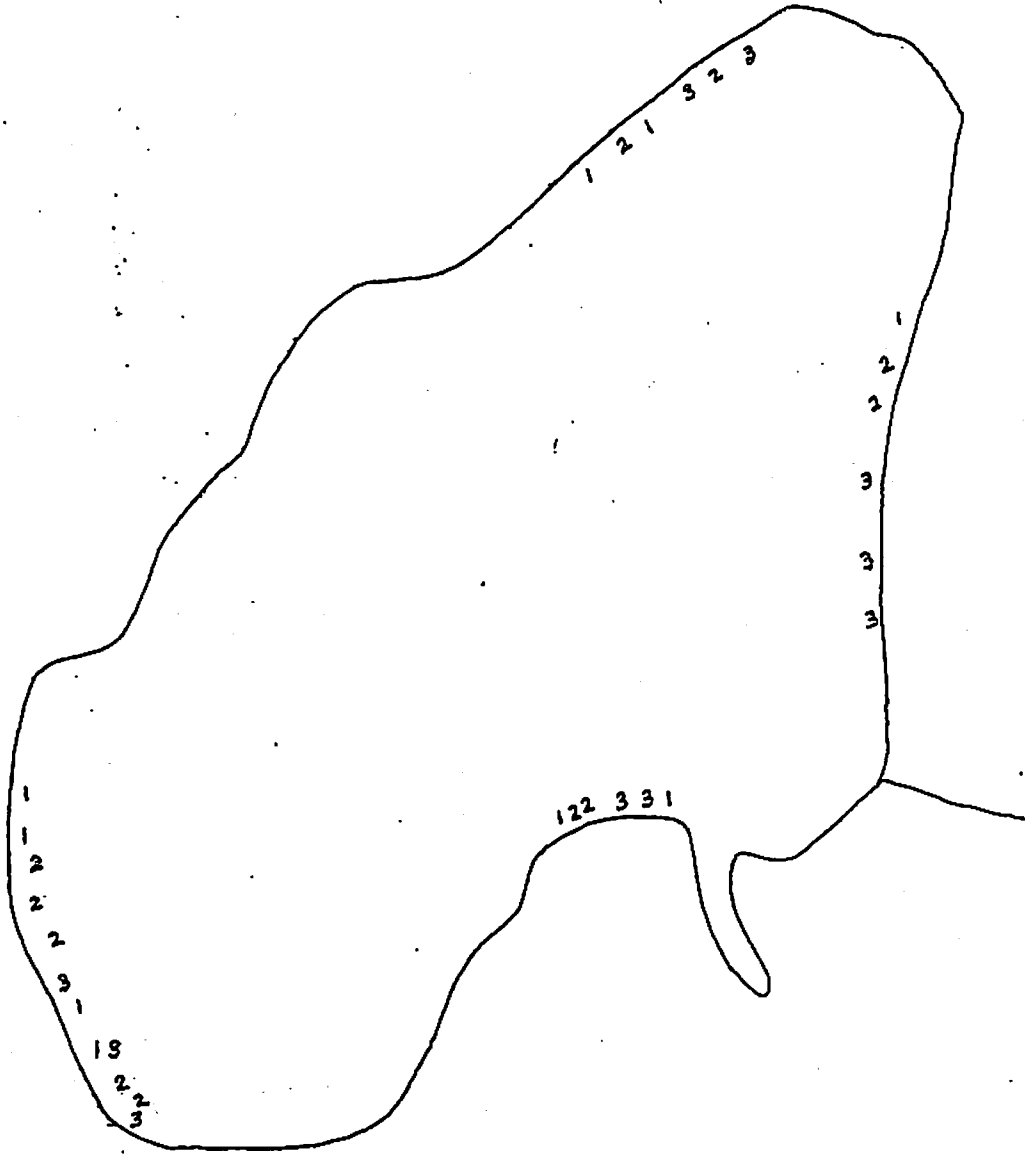
Maximum depth 12' 3.66 M
Mean depth 7' 2.13 M
Surface area 33 acres 13.37 H
Acre feet 231
Total gals. 75,271,581

Scale 1:280'



SAVERY POND

Emerged Aquatic Plant Map with Key



Scale 1:280'

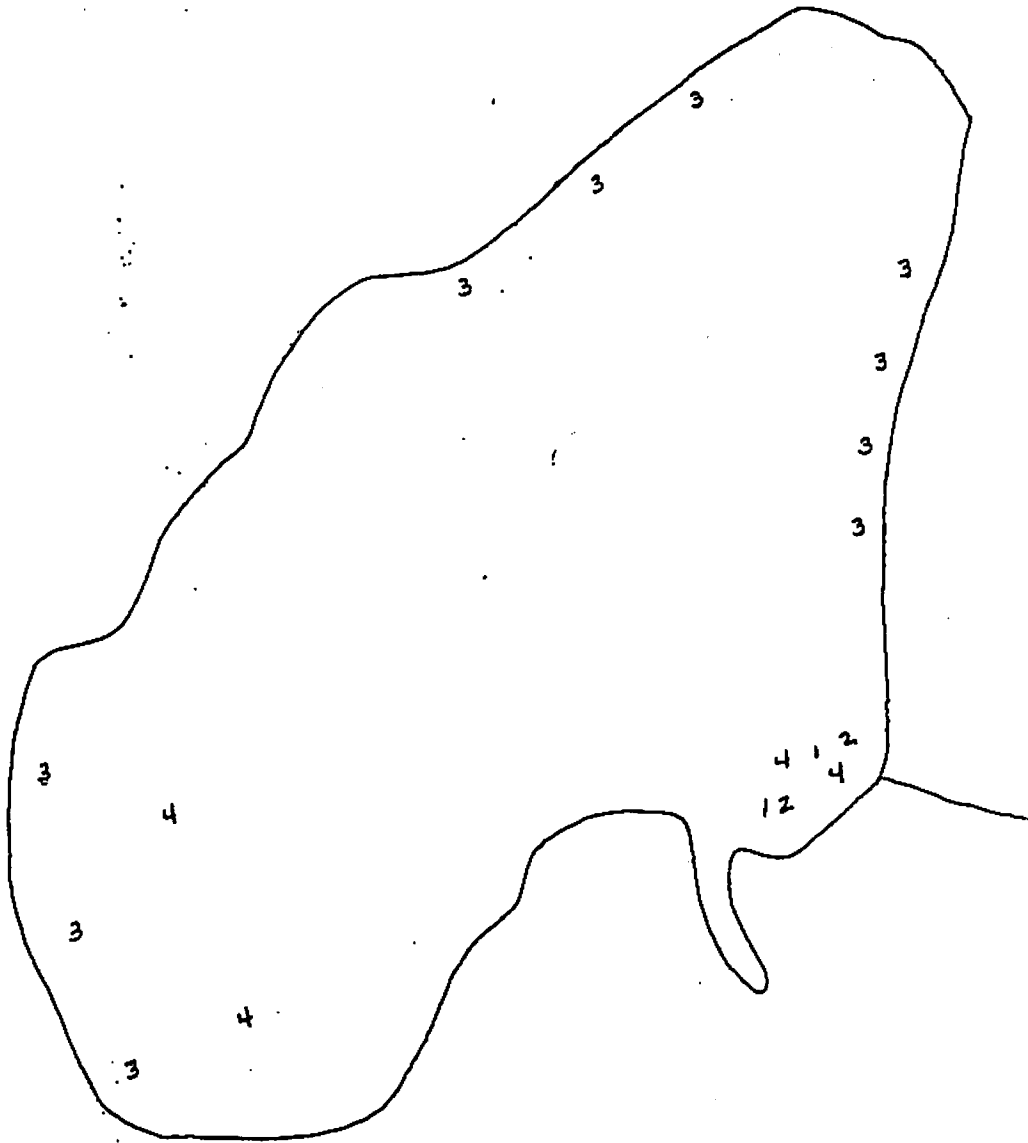
EMERSED AQUATIC PLANTS

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



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

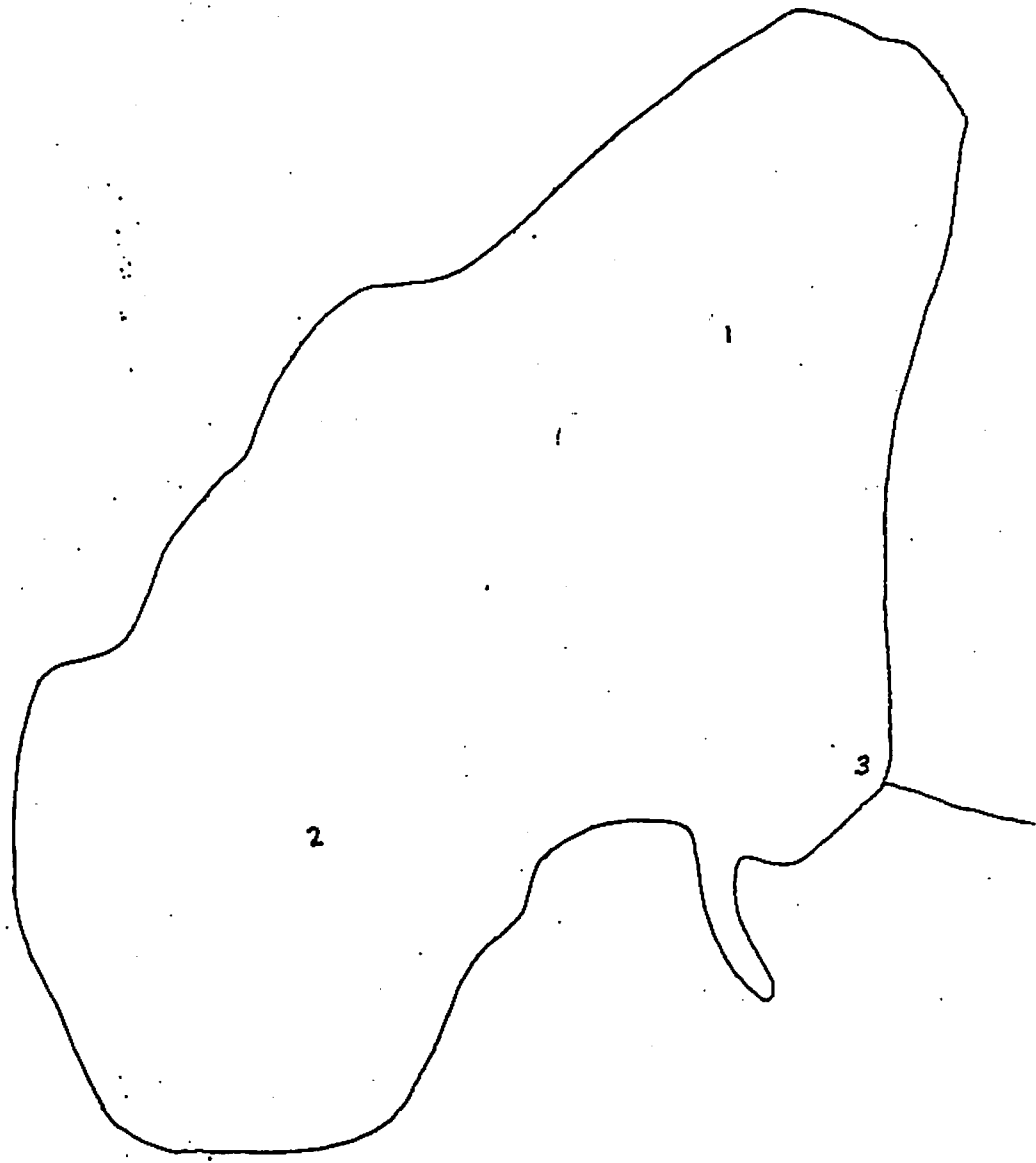
CHLOROPHYCEAE
FILAMENTOUS

GREEN ALGAE

4



SAVERY POND
Chemical Sample Stations

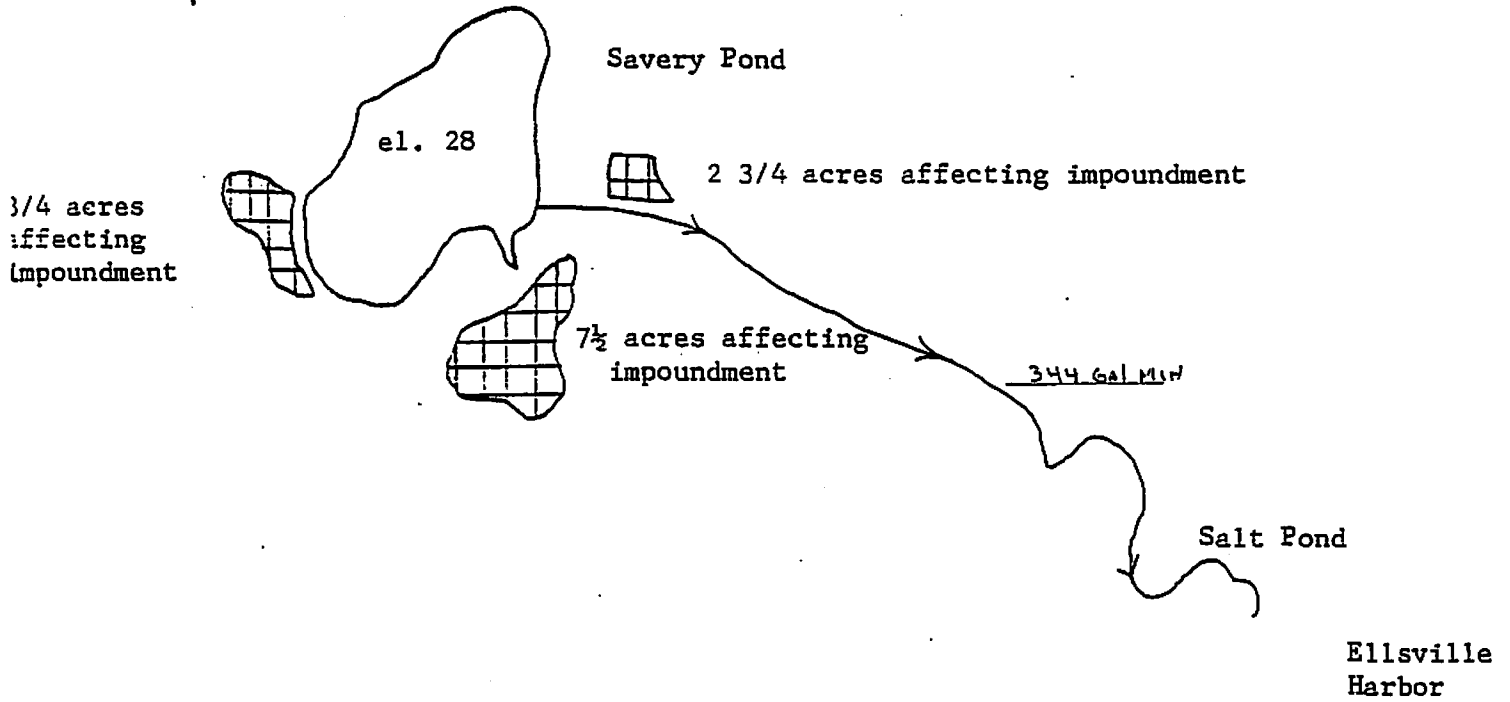


Scale 1:280'

| | 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



Cranberry bogs

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 permissible and nitrate readings were marginal.

Number of houses affecting pond: approximately 10

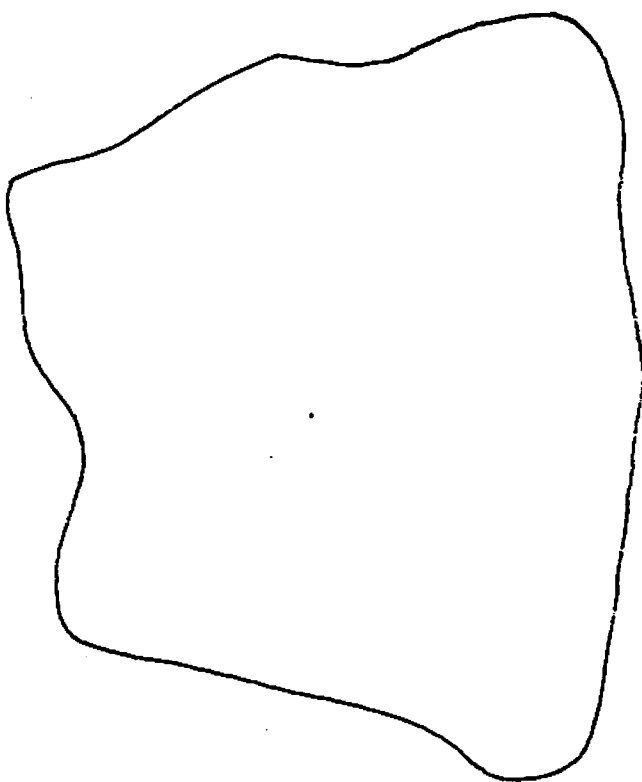
Cranberry bogs affecting pond: approximately 15 acres

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



SKOKES POND

SCOUX POND

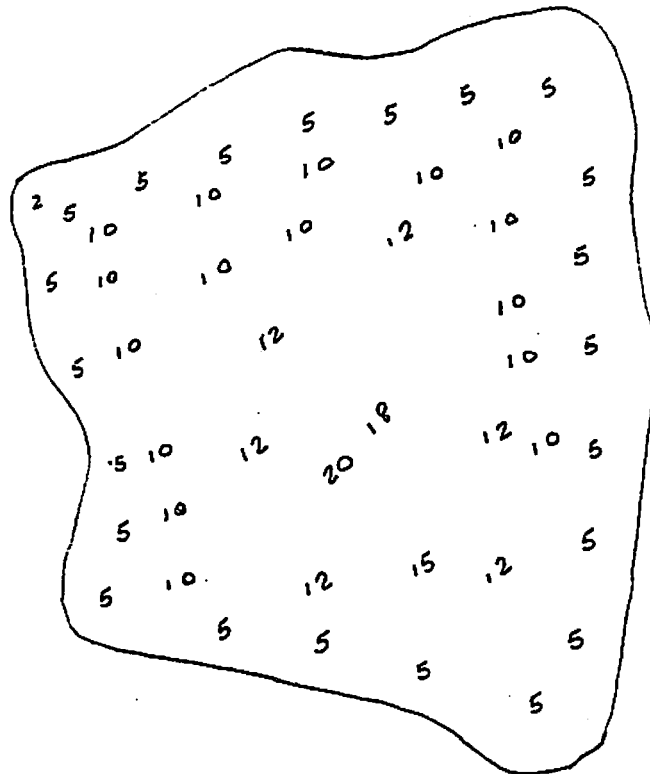


Skokes Pond
Plymouth, Mass.
Watershed: coastal
Acres: 6
Altitude: 08
Water type: warm
Pond type: kettlehole
Stratified: no
Pond use: recreation, aesthetic
Topo sheet USGS 1:24000 Manomet .
Position Topo sheet up 8.5 R 11.0
Shoreline distance .5 M (2640 ft.)

Scale 1:170



SCOKES POND
Bathymetric Map



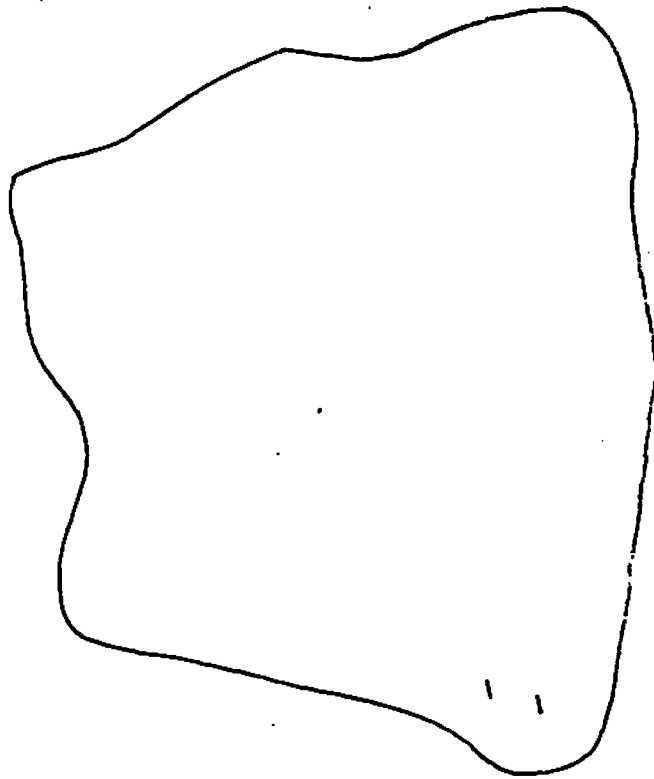
Maximum Depth 20 feet 6.1 m
Mean Depth 11 feet 3.4 m
Surface Area 6 A. 2.4 H.
Acre Feet 66
Total Gallons 21,506,166



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

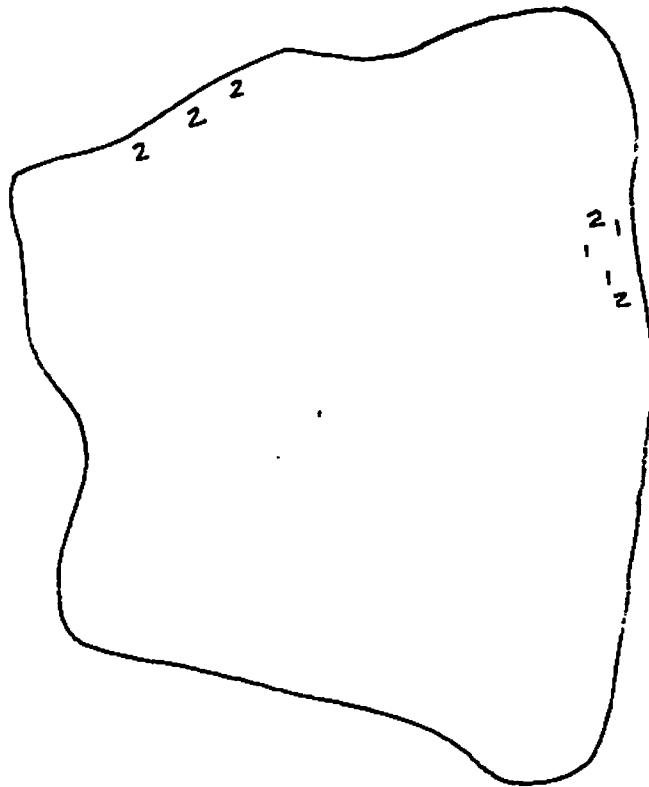
| LATIN | COMMON | MAP NUMBER |
|-----------|--------------|------------|
| Lemna | Duckweed | |
| Spirodela | Big Duckweed | |
| Wolffia | Watermeal | |
| | Addenda | |



SCORES POND

SCOUX POND

Emerald Aquatic Plant Map with Key



Scale 1:170

EMERSED AQUATIC PLANTS

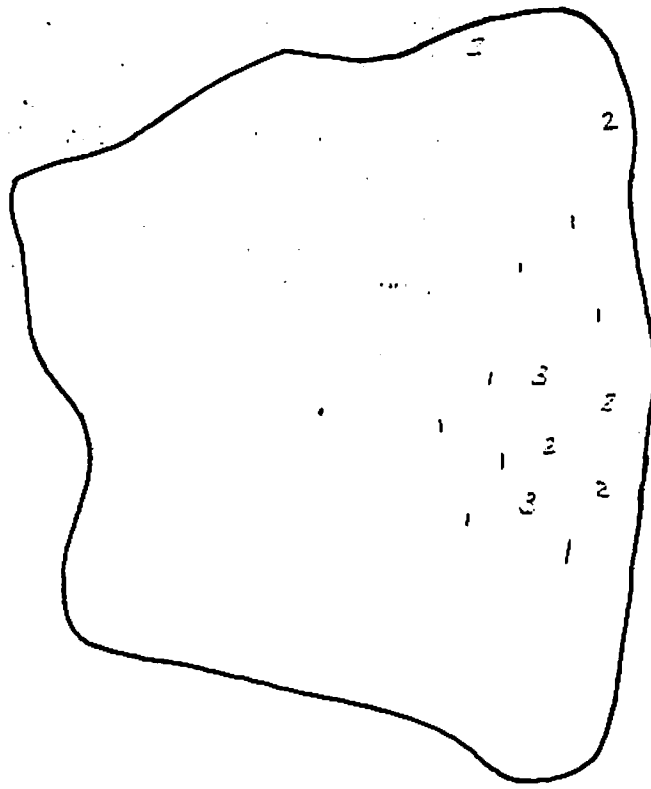
| LATIN | COMMON | MAP NUMBER |
|------------|-------------------------|------------|
| Peltandra | Arrow Arum | |
| Pontederia | Pickereel Weed | 1 |
| Sagittaria | Arrowhead; Duck Potatoe | |
| Polygonum | Watersmart Weed | |
| Typha | Cattail | |
| Eleocharis | Spike Rush Sedge | |
| Scirpus | Bulrush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



SCOKES POND

SCOUX POND

Submersed Aquatic Plant Map with Key



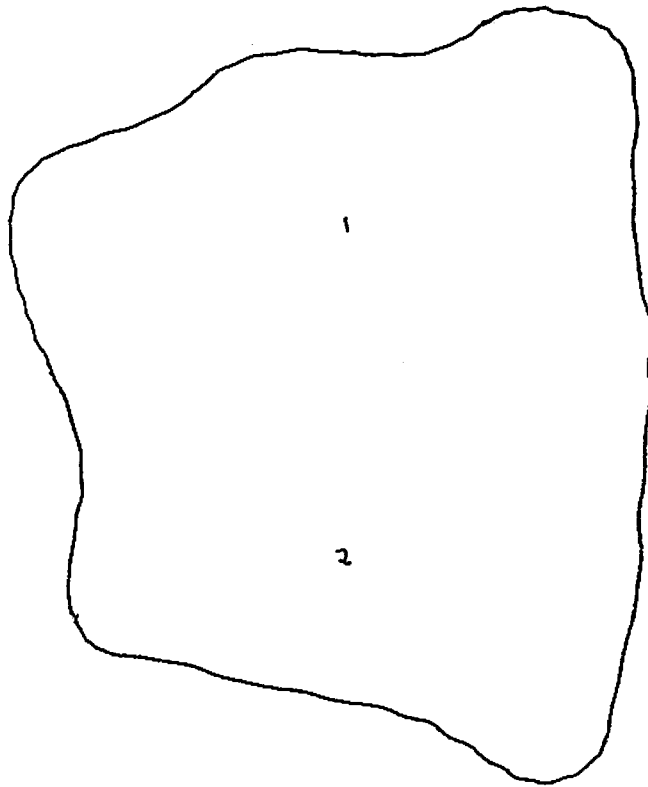
Scale 1:170

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



Sokes
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 ^o | C | |
| Secchi | 7 | ft. | |

Heavy Metals

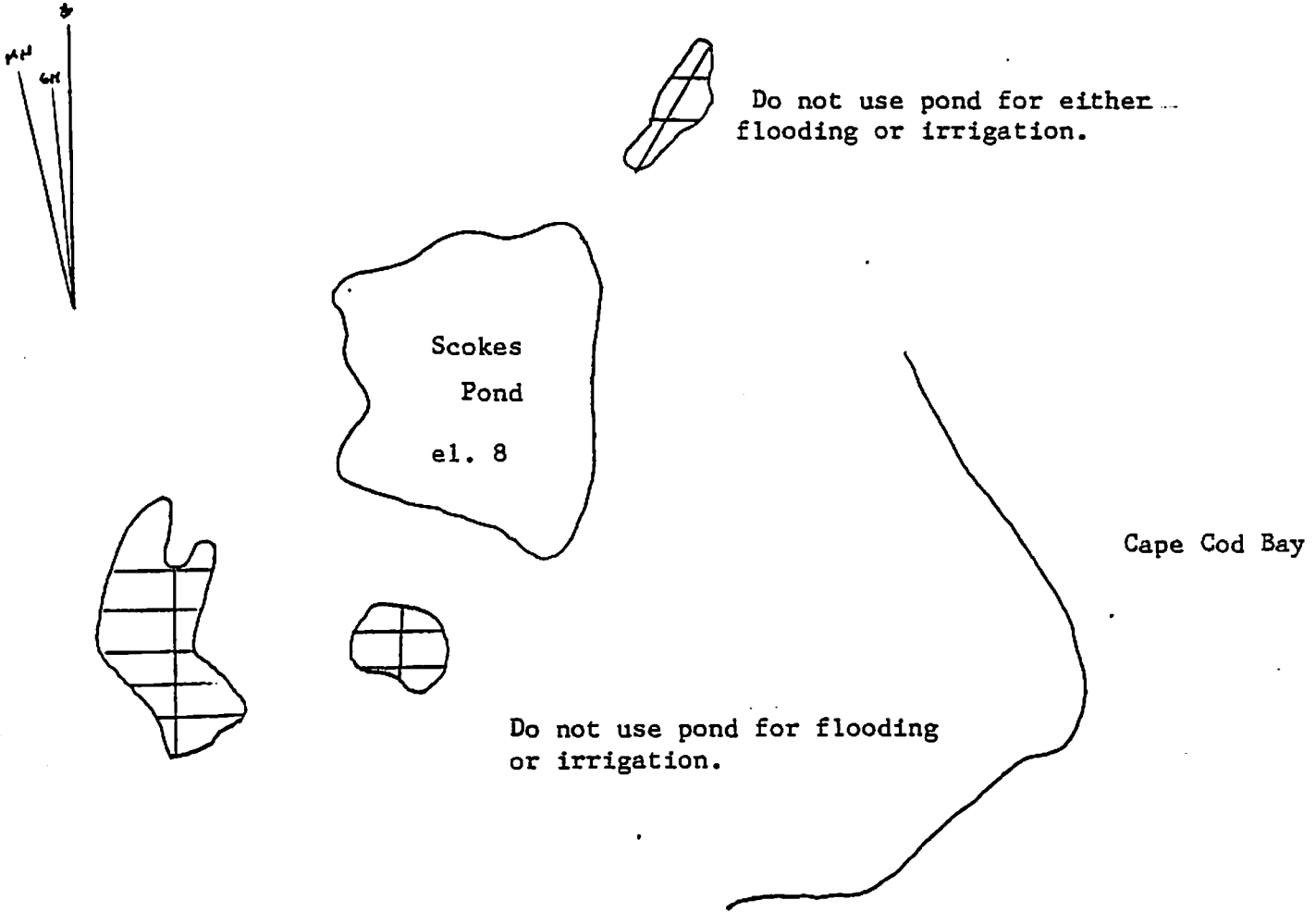
| | |
|-----|------|
| Zn | .003 |
| CD | .001 |
| Sn | .010 |
| Au | .001 |
| Fe | .320 |
| P D | .013 |
| AL | .050 |
| Cu | .009 |
| Ni | .011 |
| AG | .003 |

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



Do not use pond for flooding
or irrigation.

Cranberry bogs

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.

Scokes

Using a relative trophic level index Scokes ranks 30th.

Scokes is a warm water, spring fed, non-stratified kettle hole.

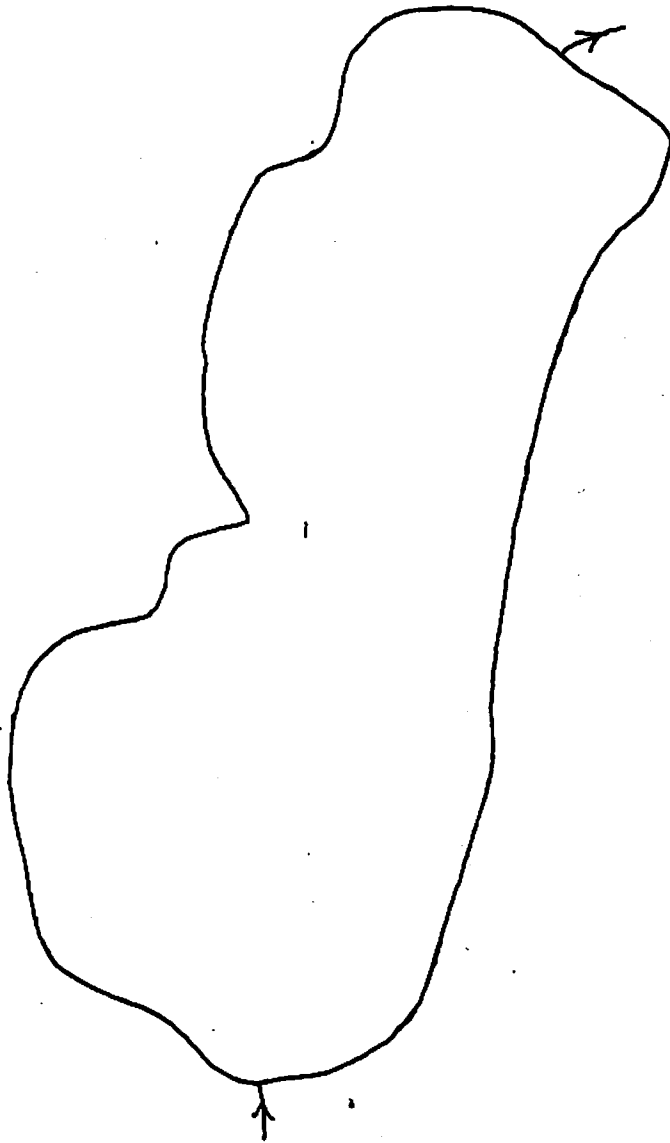
The Secchi disc reading was 5 feet which ranked it 36th. On the plant trophic index it ranked 24th. The macrophyte population was relatively low. Phosphate and nitrate readings were permissible, however any new building near this lake should proceed cautiously with a careful eye on septic waste handling.

Number of houses affecting impoundment: approximately 4

Cranberry bogs affecting impoundment: none

This pond is rated as eutrophic.

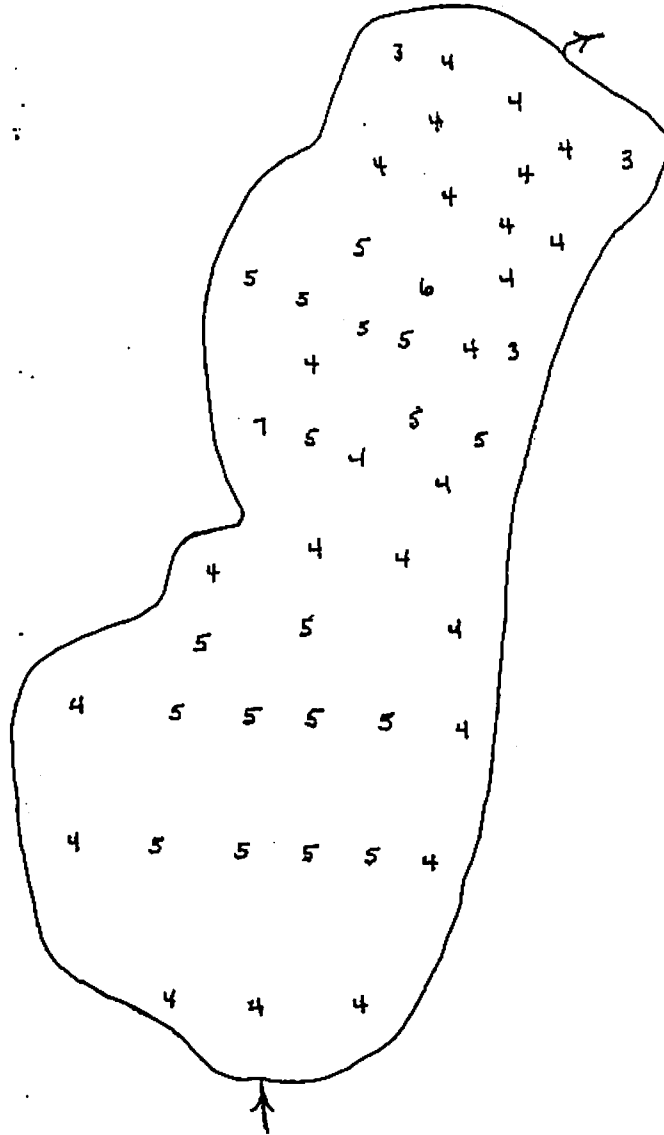
SHIP POND



Ship Pond
Plymouth, Mass.
Watershed: coastal
Area: 10
Elevation: 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'

SHIP POND

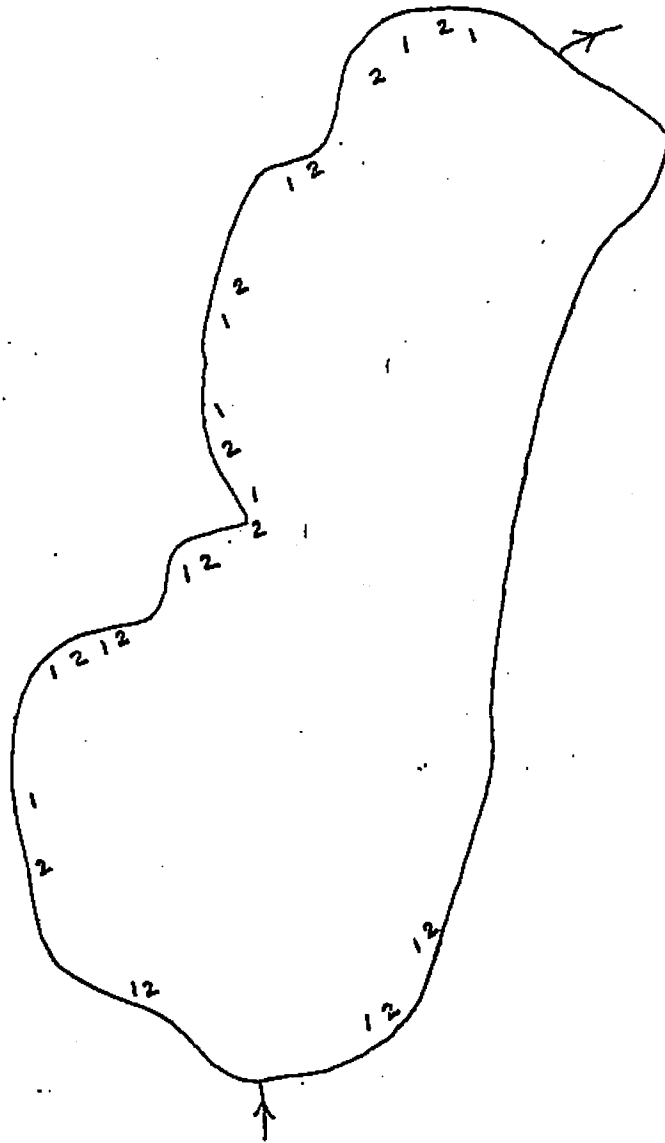


Maximum depth 6' 1.83 M
 Mean depth 4' 1.22 M
 Surface Area 10 acres 4.05 H
 Acre feet 40
 Total gals. 13,034,040

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 | |

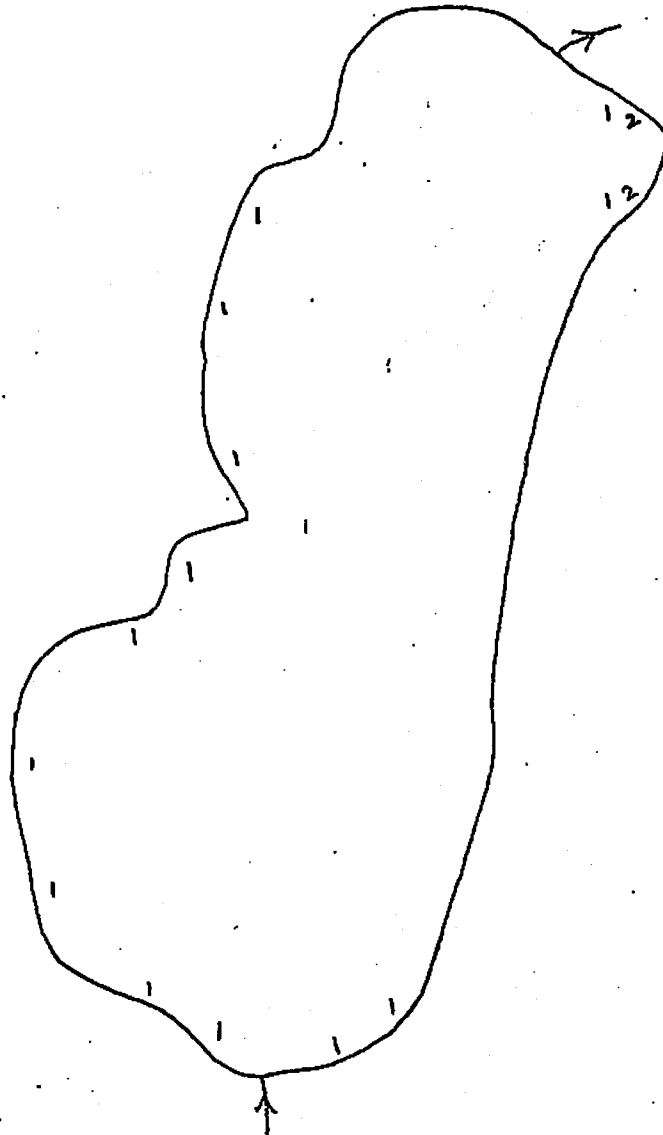
FLOATING AQUATIC PLANTS - UNATTACHED

| LATIN | COMMON | MAP NUMBER |
|-----------|--------------|------------|
| Lemna | Duckweed | |
| Spirodela | Big Duckweed | |
| Wolffia | Watermeal | |
| | Addenda | |



SUIP POND

Emerged Aquatic Plant Map with Key

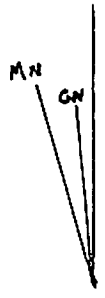


Scale 1:230'

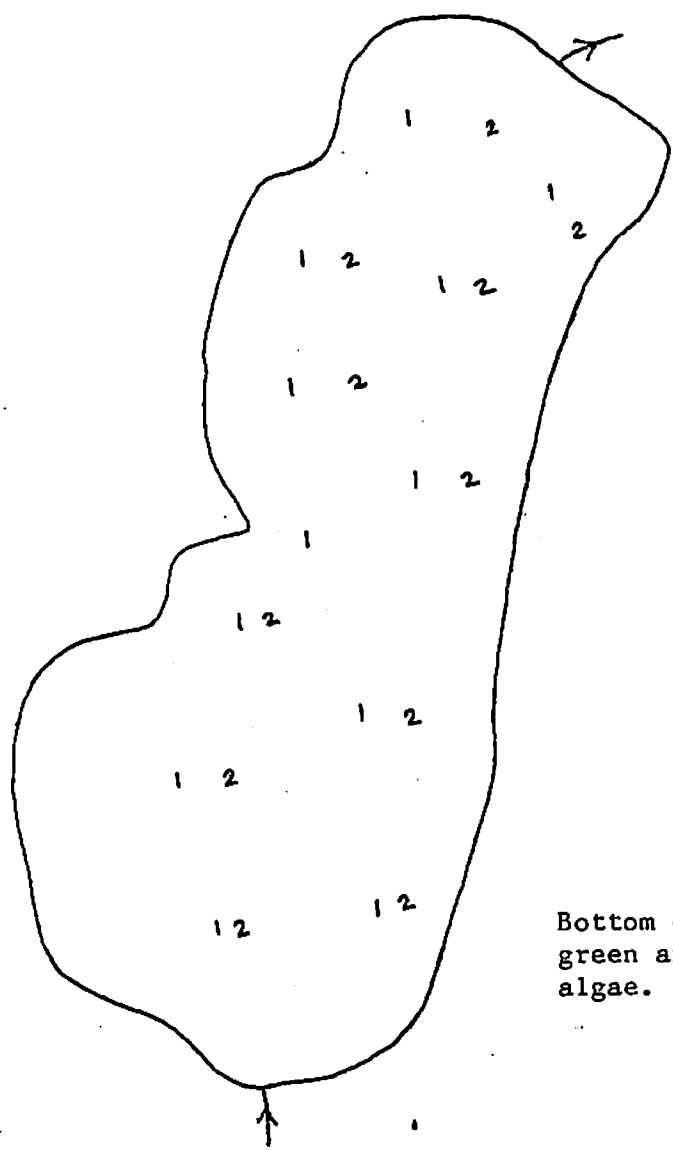
EMERSED AQUATIC PLANTS

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

PHRAGMITES



SHIP POND
Submersed Aquatic Plant Map with Key



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

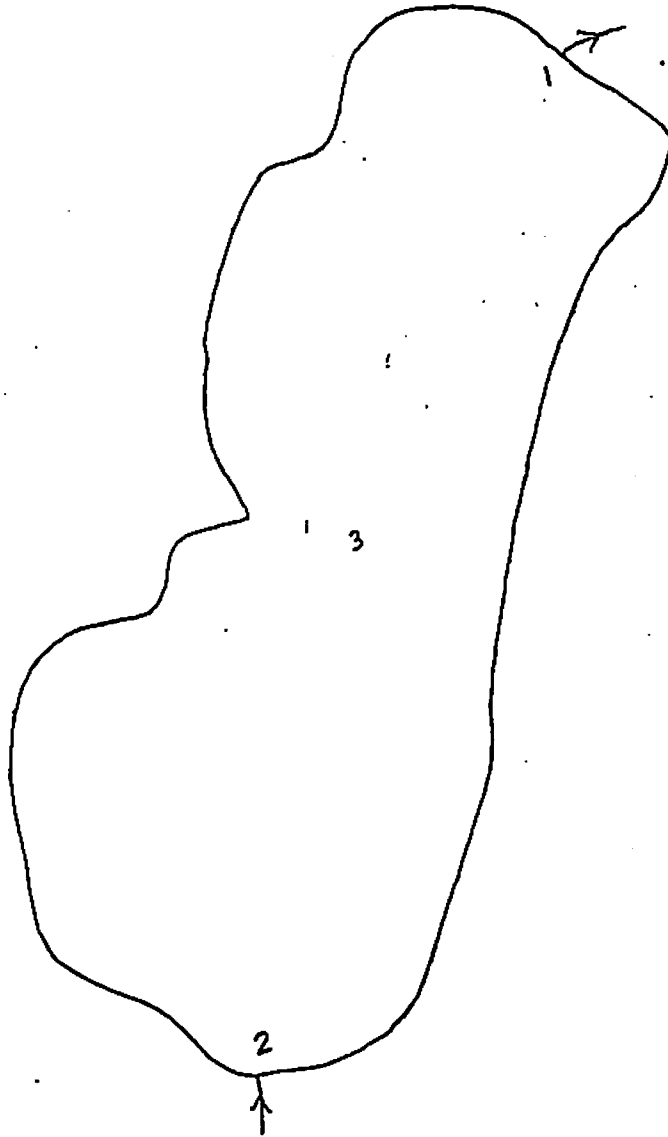
Scale 1:230'

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 |



SHIP POND
Chemical Sample Stations

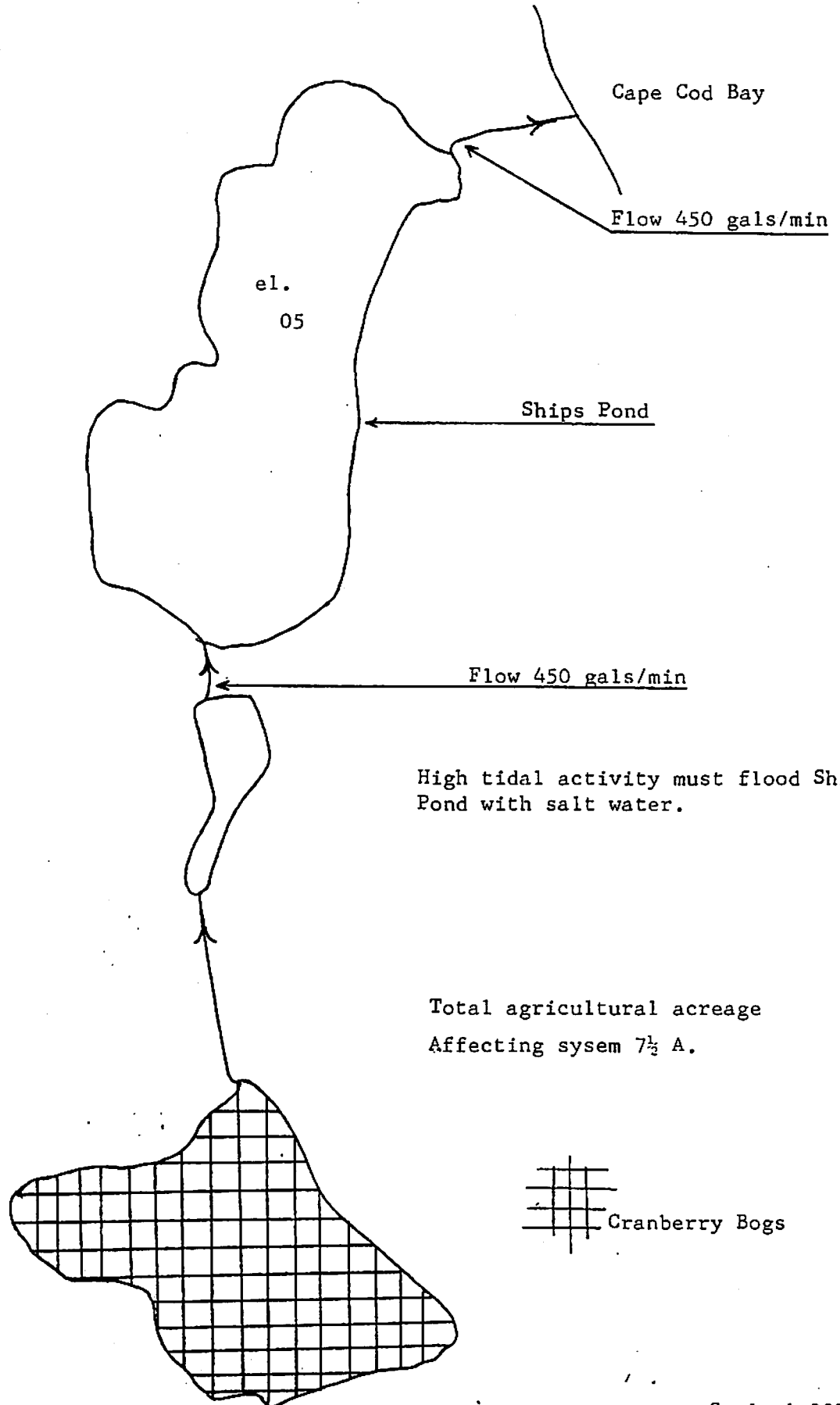
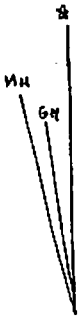


Scale 1:230'

| | Ship | | | OUTFALL | SOURCES |
|-----------------------|---------|---------|---|---------|---------|
| | IN LAKE | STATION | | | |
| | 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 | | | | |
| PD | .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.

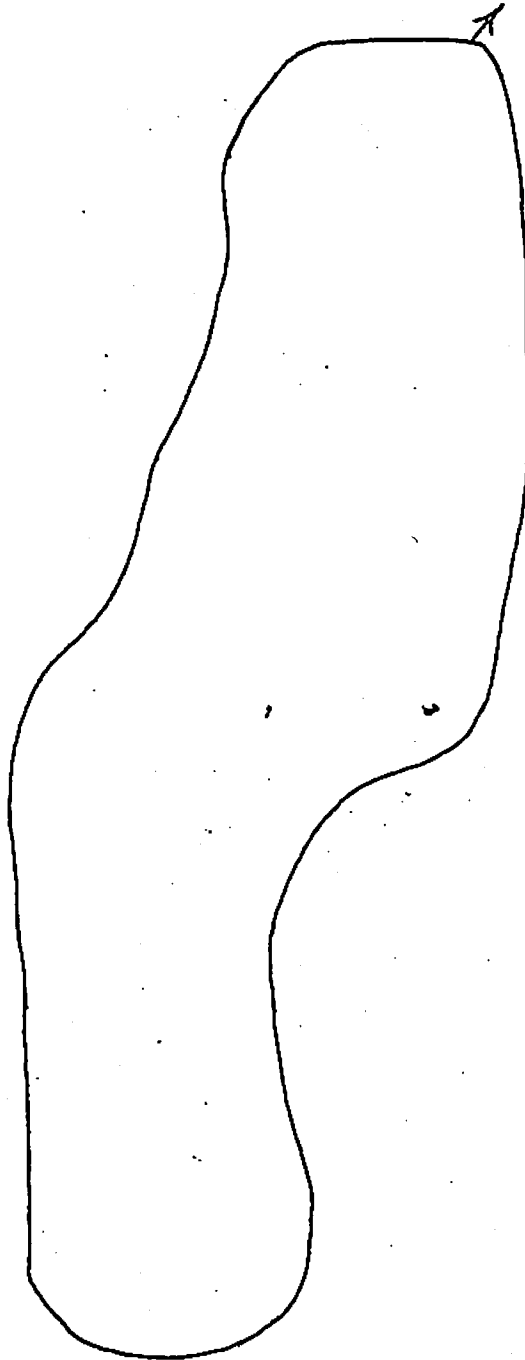
Number of houses affecting ecosystem: about 16

Cranberry bogs affecting impoundment: approximately 10 acres

This pond is classified as eutrophic.



SPRING POND



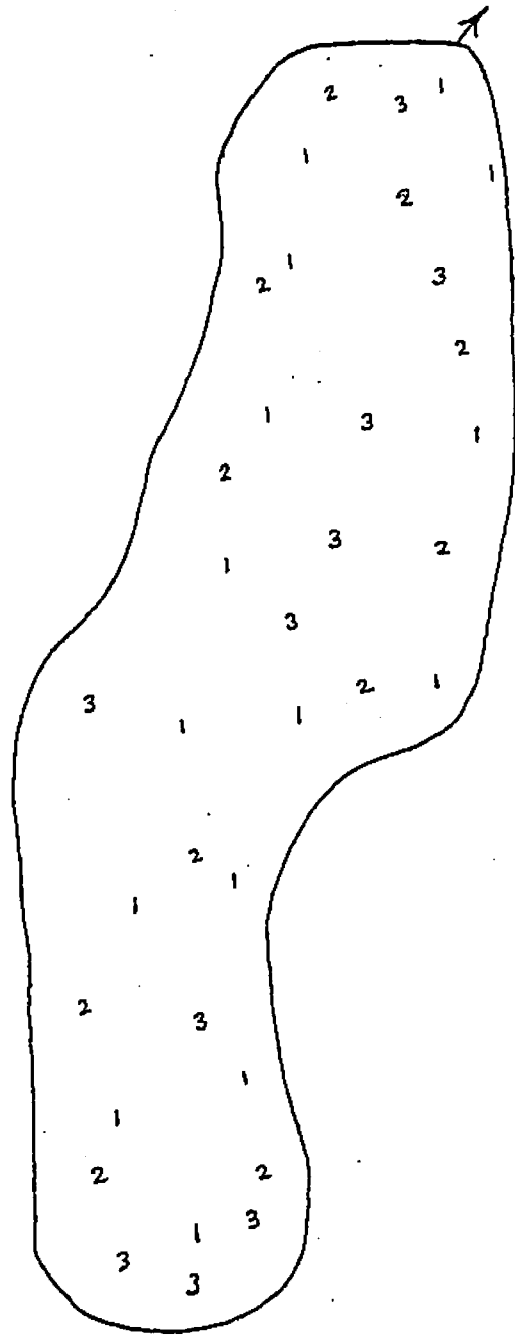
Spring Pond
Plymouth, Mass.
Drainage type: coastal
Area: 5
Elevation: 0118'
Water type: warm
Pond type: natural
Stratified: no
Pond use: esthetic, recreation
Topo sheet: USGS 1:24000 Plymouth
Position Topo sheet: up 7.1 right 4.0
Perimeter distance .4 miles 2112'

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% |

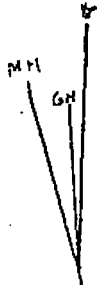
Scale 1:145

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 | |

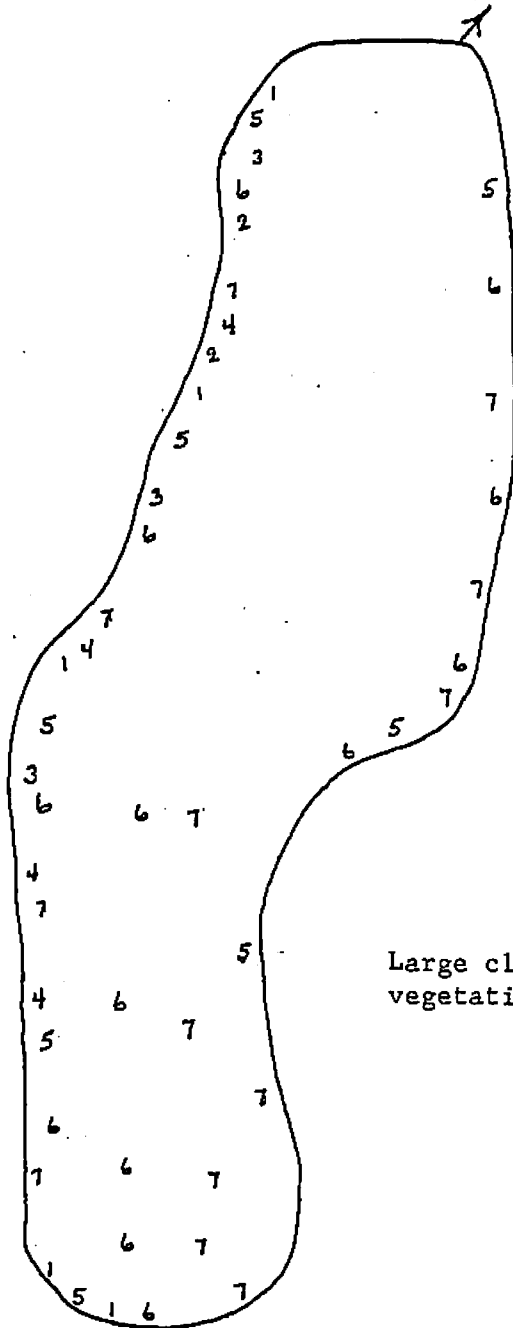
FLOATING AQUATIC PLANTS - UNATTACHED

| LATIN | COMMON | MAP NUMBER |
|-----------|--------------|------------|
| Lemna | Duckweed | |
| Spirodela | Big Duckweed | |
| Wolffia | Watermeal | |
| | Addenda | |



SPRING POND

Emerged Aquatic Plant Map with Key



Large clumps of emerged vegetation at this end of pond.

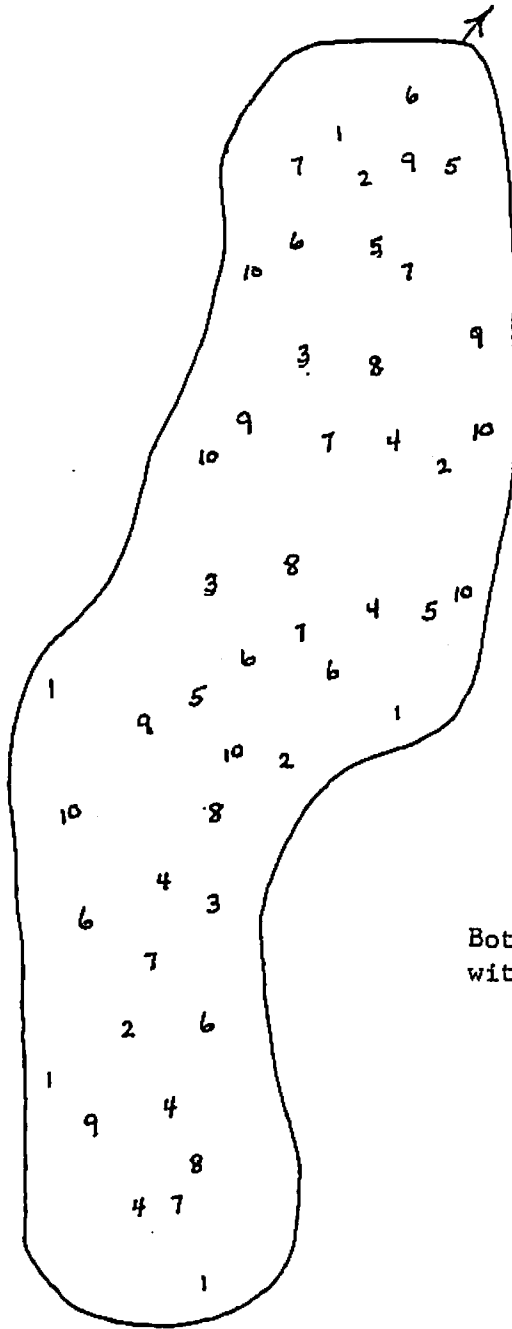
EMERSED AQUATIC PLANTS

| LATIN | COMMON | MAP NUMBER |
|------------|-------------------------|------------|
| Peltandra | Arrow Arum | |
| Pontederia | Pickereel 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

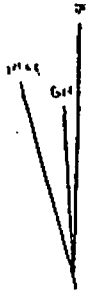


Bottom of entire pond covered with submersed aquatic plants.

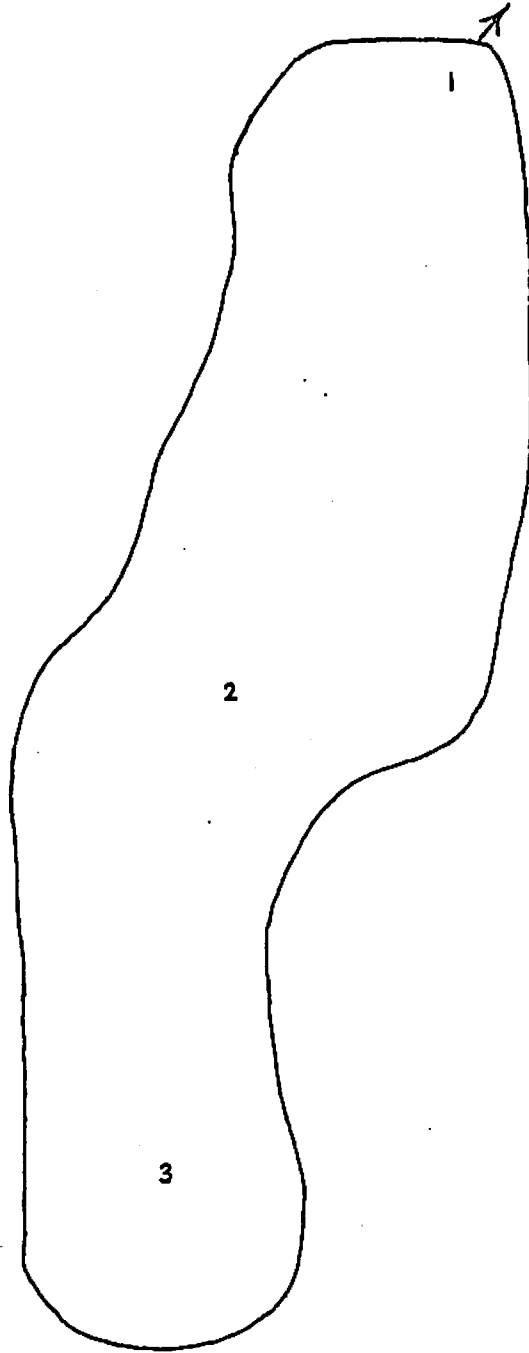
Scale 1:145

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 | |
| Filizoa. Toss | | 9 |
| CHLOROPHYCEAE | Green | |
| Filizoa. Toss | | 10 |



SPRING POND
Chemical Sample Station



Scale 1:145

Spring
IN LAKE STATION

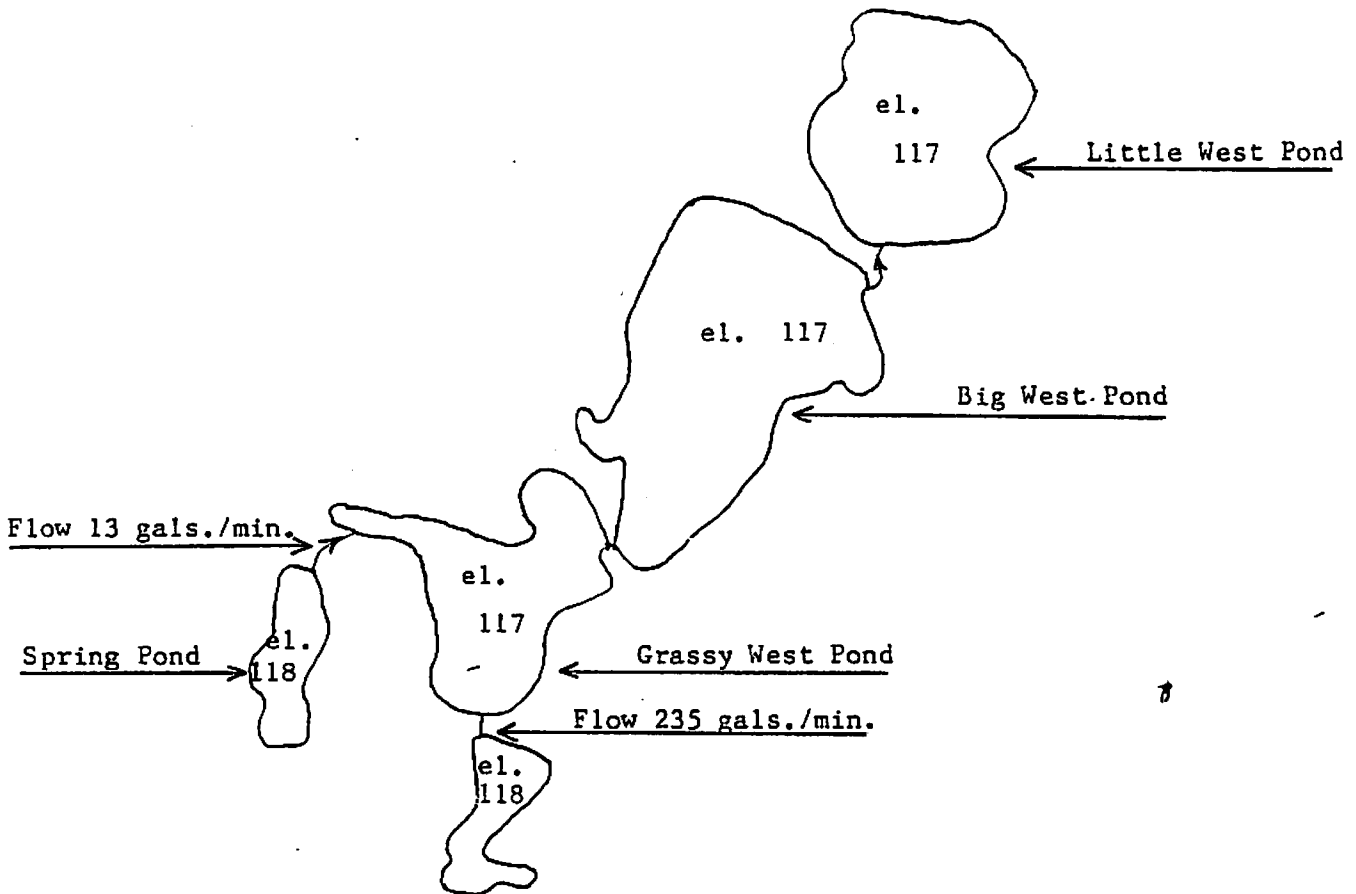
OUTFALL

SOURCES

| | Spring | | | 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 permissible 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

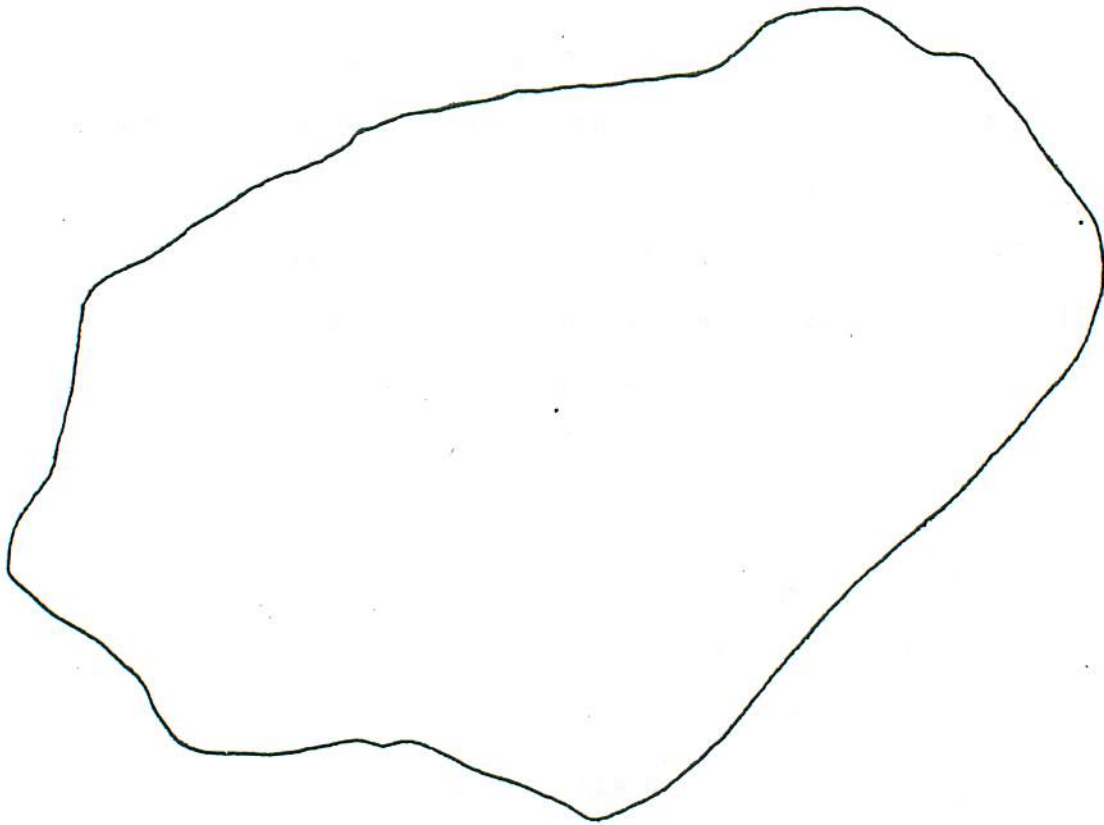
Cranberry bogs affecting pond: none

This pond is rated ultra-eutrophic

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

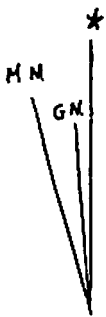


WALL POND

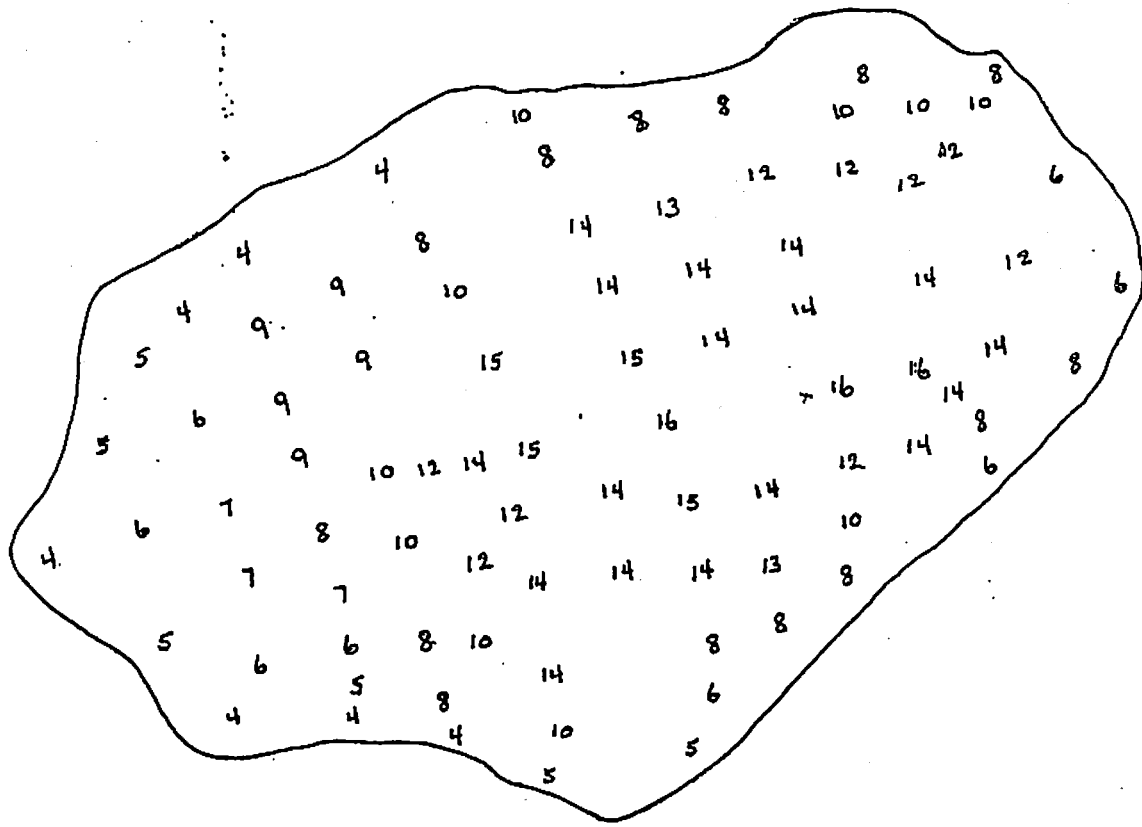


11 Pond
ymouth, Mass.
tershed: coastal
res: 12
titude: 052
tertype: warm
nd type: kettlehole
ratified: no
nd use: recreation, esthetics
po sheet: USGS 1:24000 Sagamore
sition Topo sheet up 13.8 R 3.1
oreline distance: .6 M (3,168 ft.).

Scale 1:190'



WALL POND
(Bathymetric Map)



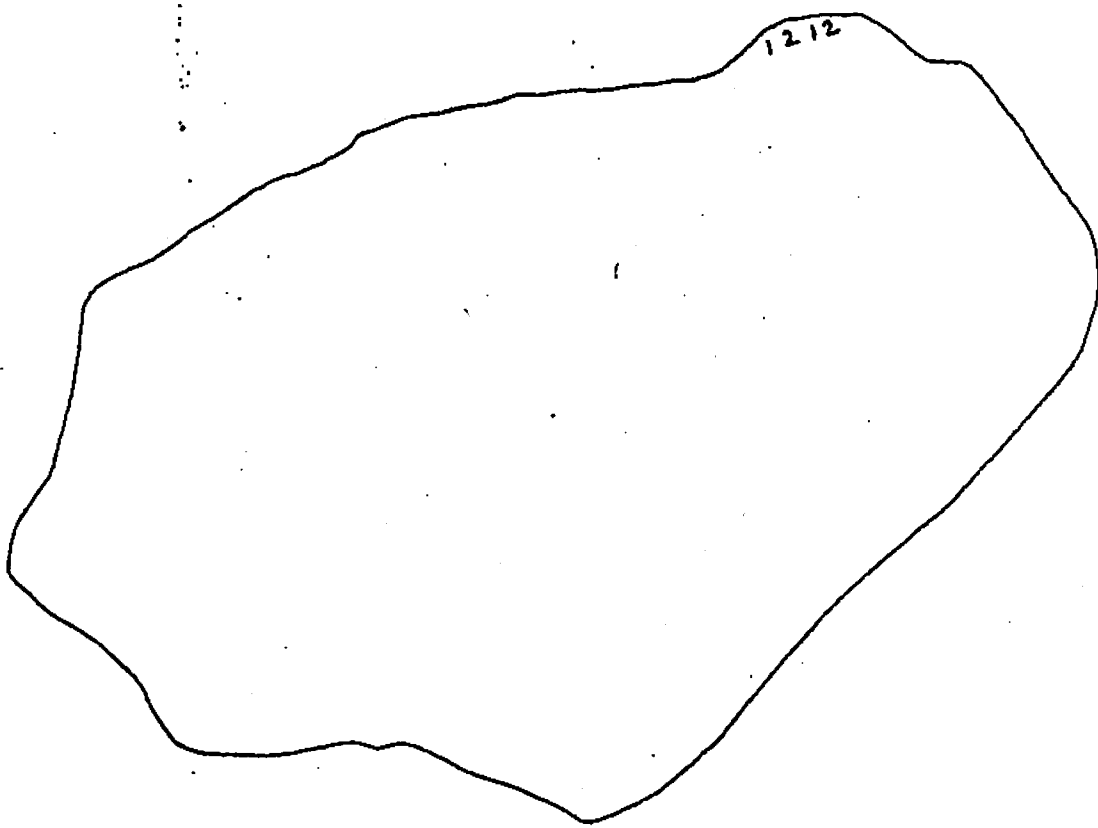
Maximum depth 16' 4.88 M.
Mean depth 9' 2.74 M.
Surface area 12 acres 4.86 H
Acre feet 108
Total gals. 35,191,908

Scale 1:190'

MN
GN

WALL POND

Floating Aquatic Plant Map with Key



Scale 1:190'

FLOATING AQUATIC PLANTS ATTACHED

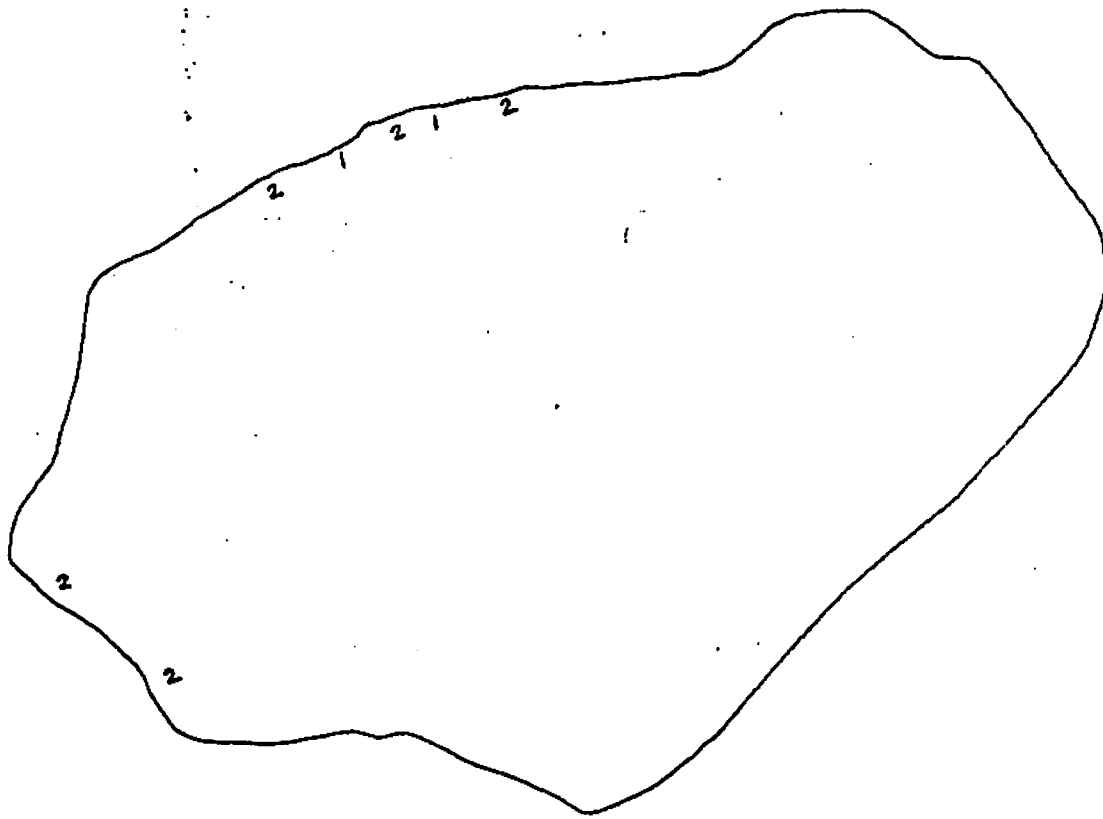
| LATIN | COMMON | MAP NUMBER |
|----------|--|------------|
| Nuphar | Cow Lily, Yellow Water Lily, Spatterdock | |
| Nymphaea | Water Lily, White Water Lily | 1 |
| Brasenia | Watershield | 2 |
| | Addenda | |

FLOATING AQUATIC PLANTS - UNATTACHED

| LATIN | COMMON | MAP NUMBER |
|-----------|--------------|------------|
| Lemna | Duckweed | |
| Spirodela | Big Duckweed | |
| Wolffia | Watermeal | |
| | Addenda | |



WALL POND
Emerged Aquatic Plant Map with Key



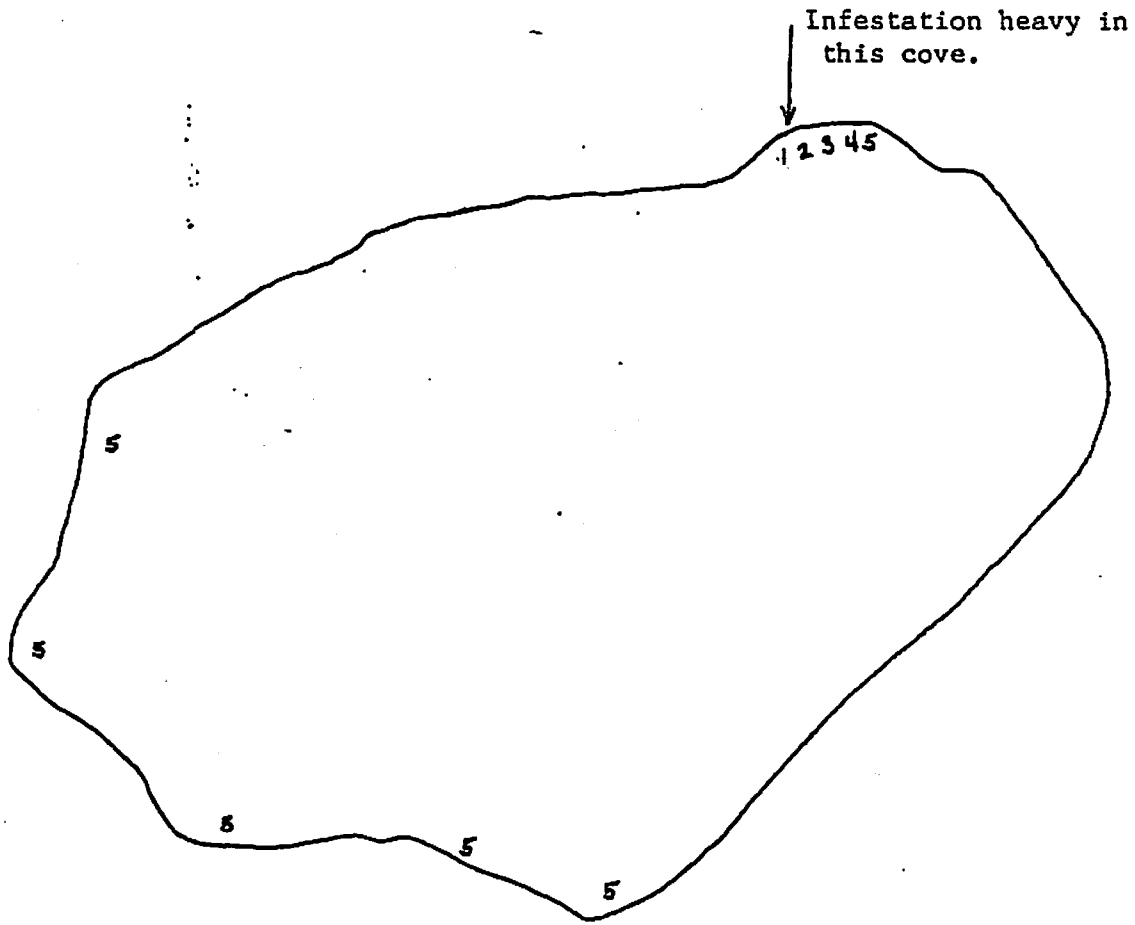
Scale 1:190'

EMERSED AQUATIC PLANTS

| LATIN | COMMON | MAP NUMBER |
|------------|-------------------------|------------|
| Peltandra | Arrow Arum | |
| Pontederia | Pickereel 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-existent
except in noted areas.

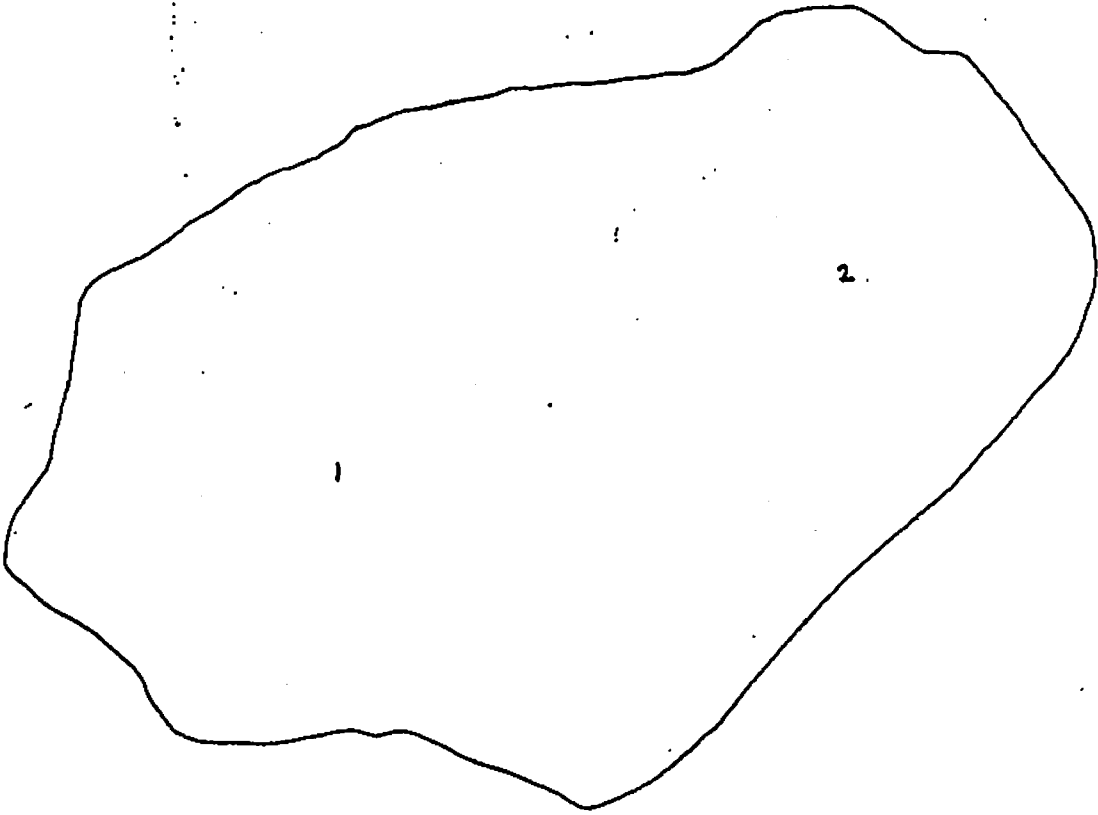
Scale 1:190'

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 |

WALL POND

Chemical Sample Stations

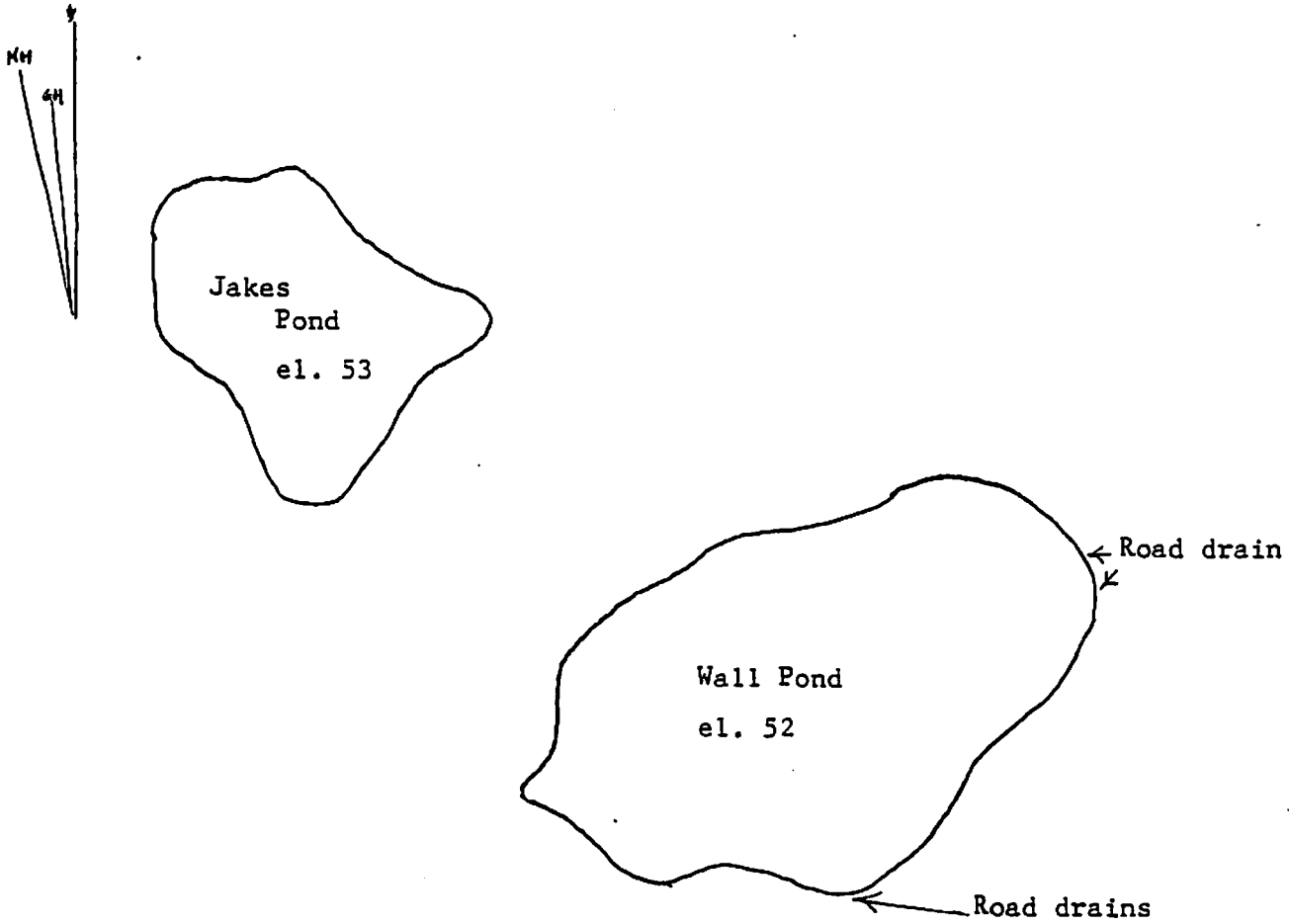


Scale 1:190'

| | 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



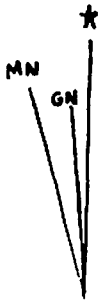
Pond type: kettlehole
 Tributary: none
 Outfall: none
 Overland flow: none
 Groundwater and underground aquifers primary source
 Rainfall secondary source
 Surface run-off secondary source
 Agriculture practices directly affecting impoundment none
 Industrial practices directly affecting impoundment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

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.

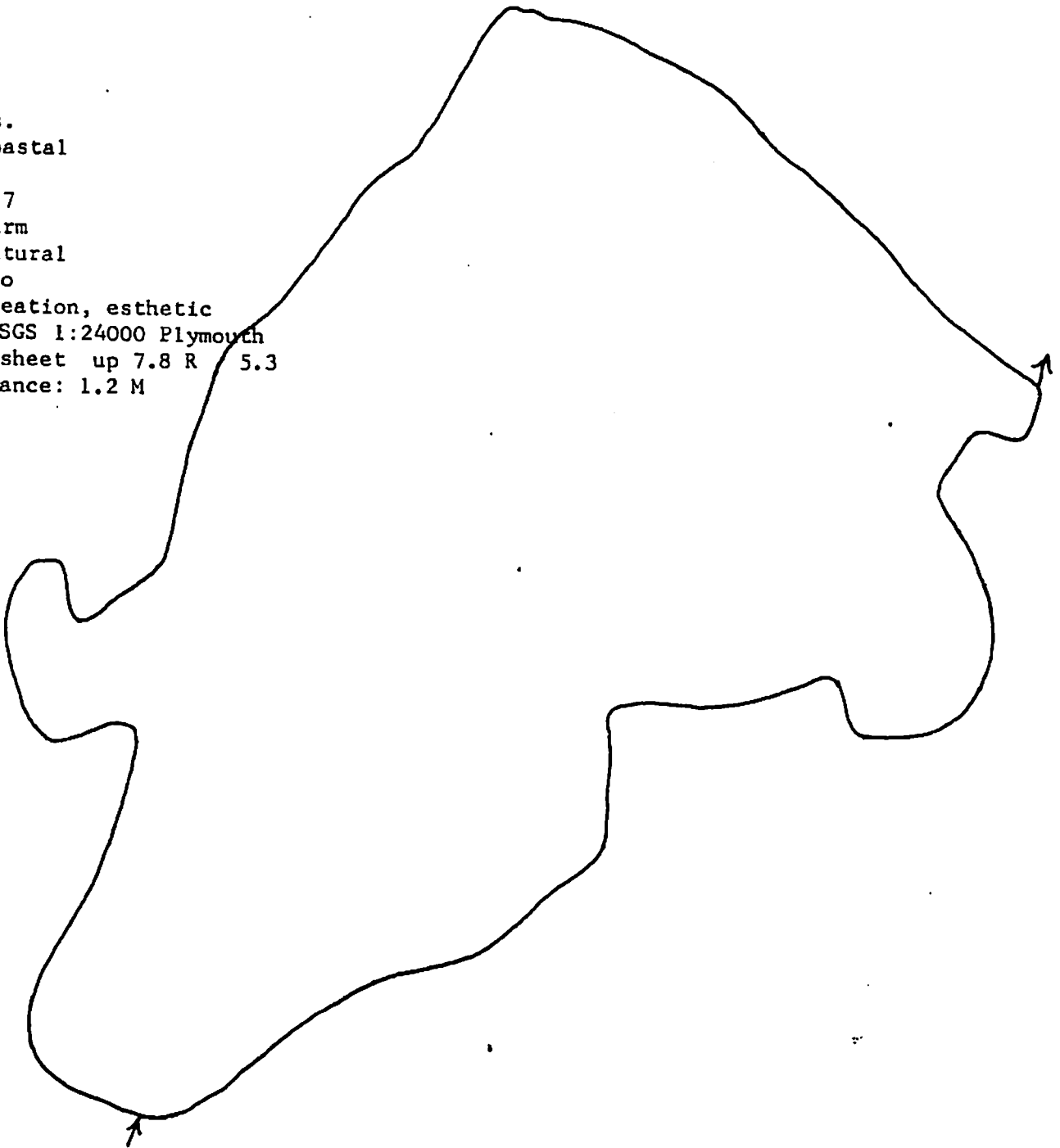
Number of homes affecting system: approx 13 on shore. Cranberry acreage affecting impoundment: none.

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

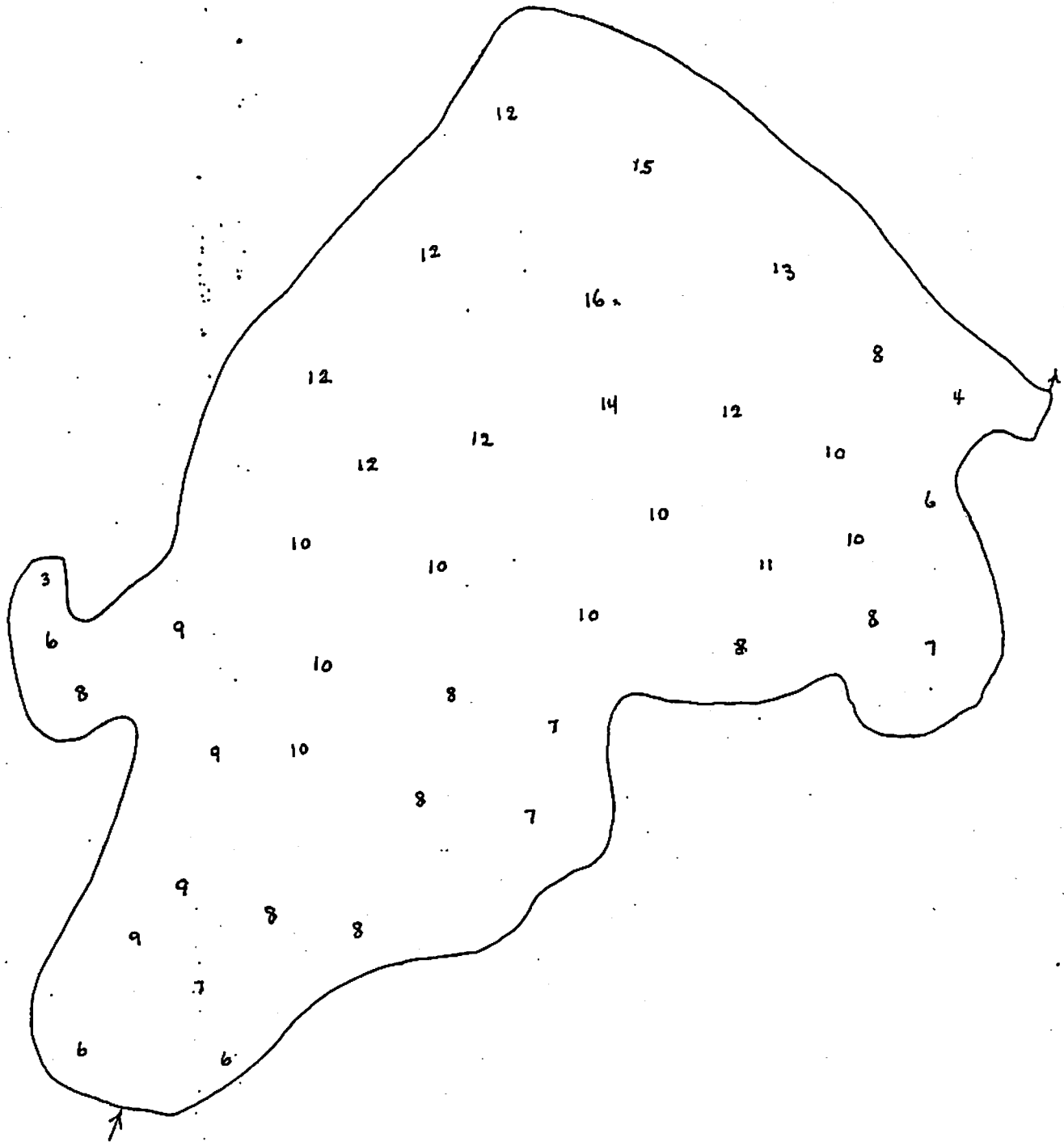
Big West Pond
Plymouth, Mass.
Watershed: coastal
Area: 40
Elevation: 0117
Water type: warm
Shore type: natural
Regulated: no
Land use: recreation, esthetic
Topo sheet: USGS 1:24000 Plymouth
Position Topo sheet up 7.8 R 5.3
Perimeter distance: 1.2 M
(336 ft)



Scale 1:220'

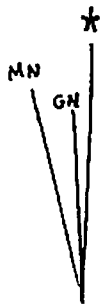


BIG WEST POND
(Bathymetric Map)

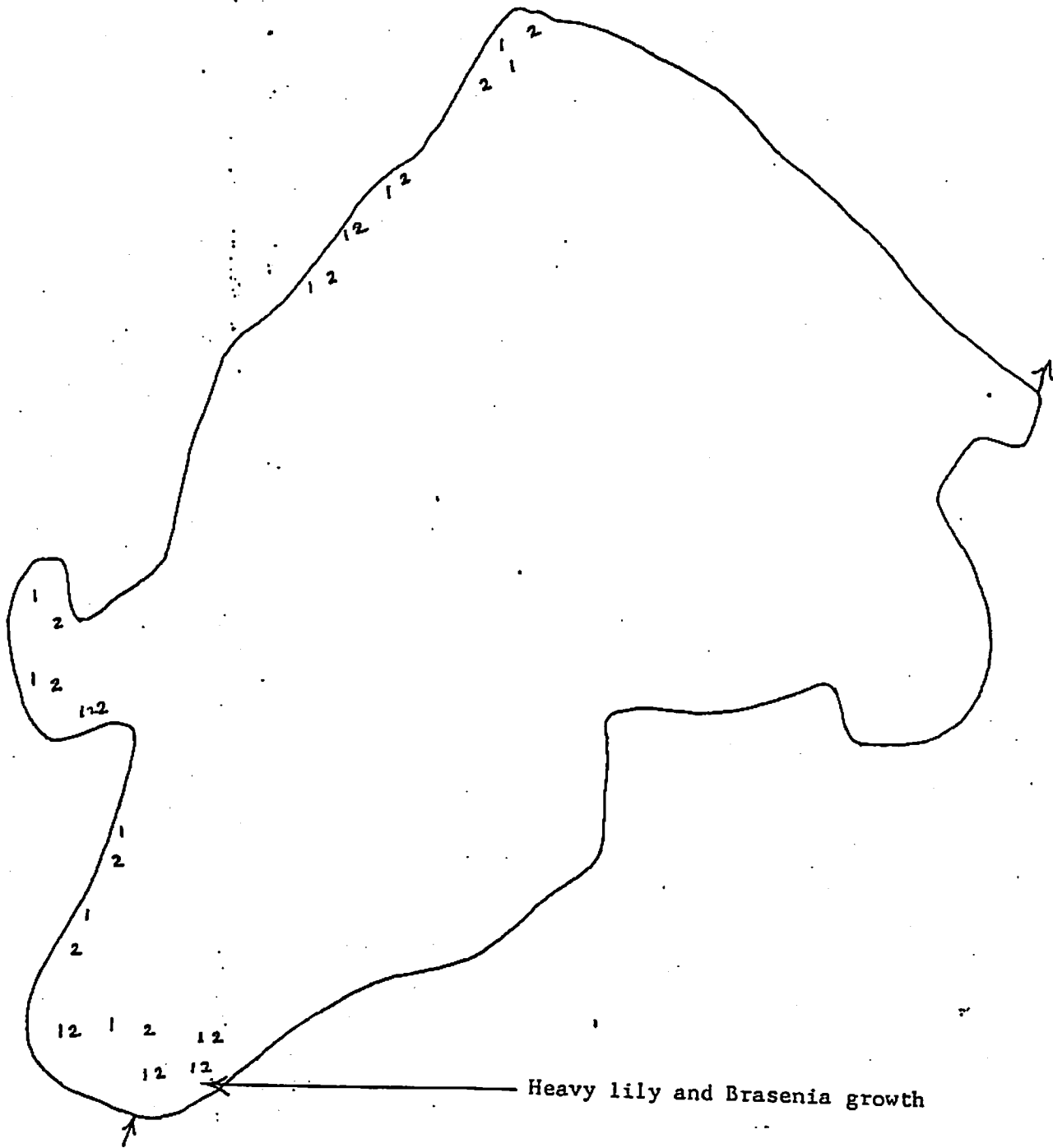


Maximum depth 16' 4.88 M
Mean depth 9' 2.74 M
Surface area 40 acres 16.2 H
Acre feet 36
Total gals. 11,730,636

Scale 1:220'



BIG WEST POND
Floating Aquatic Plant Map with Key



Scale 1:220'

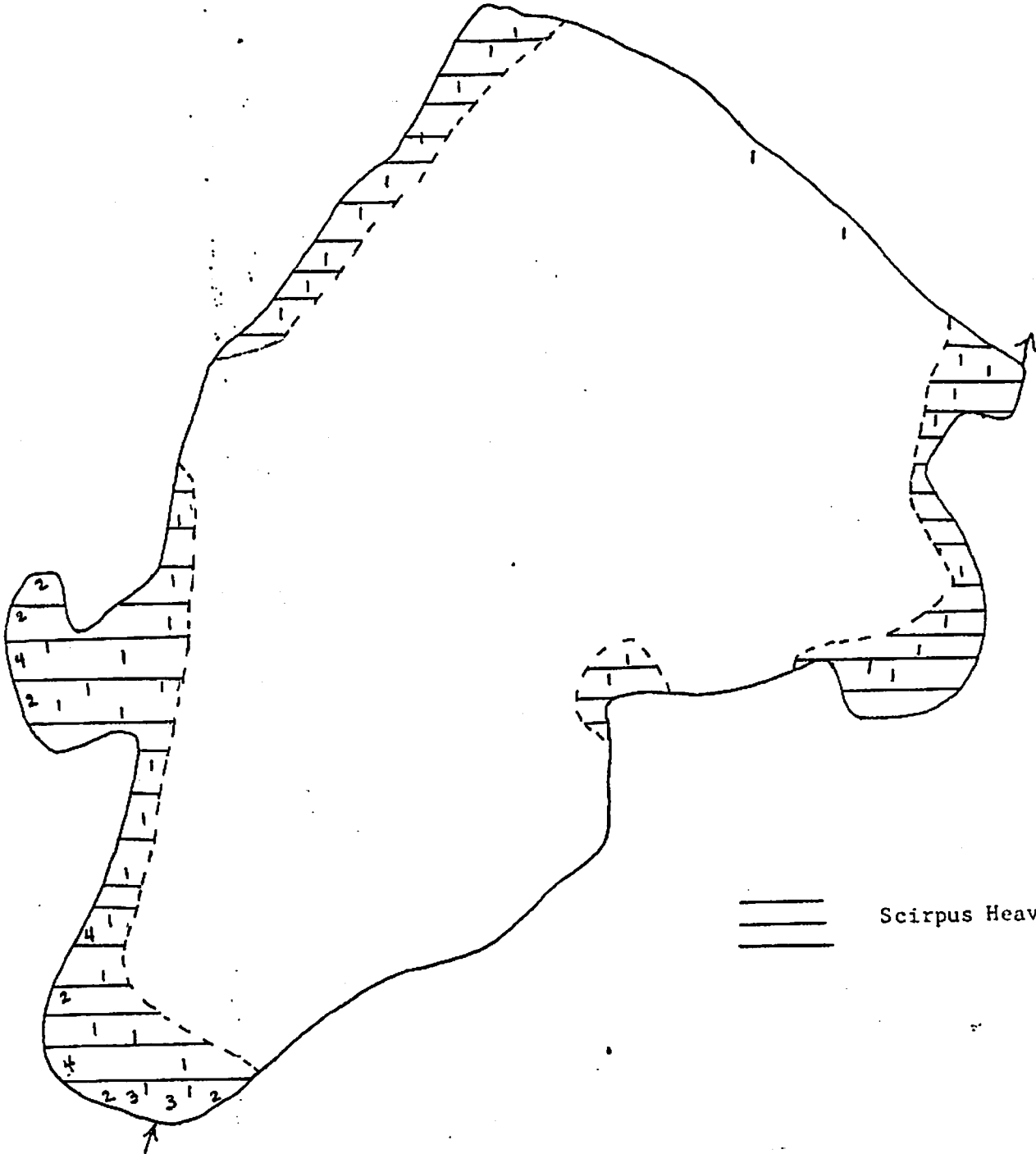
FLOATING AQUATIC PLANTS ATTACHED

| LATIN | COMMON | MAP NUMBER |
|----------|--|------------|
| Nuphar | Cow Lily, Yellow Water Lily, Spatterdock | |
| Nymphaea | Water Lily, White Water Lily | <u>1</u> |
| Brasenia | Watershield | <u>2</u> |
| | Addenda | |

FLOATING AQUATIC PLANTS - UNATTACHED

| LATIN | COMMON | MAP NUMBER |
|------------|--------------|------------|
| Lemna | Duckweed | |
| Spirodella | Big Duckweed | |
| Wolffia | Watermeal | |
| | Addenda | |

BIG WEST POND
Emerged Aquatic Plant Map with Key



≡≡≡ Scirpus Heavy

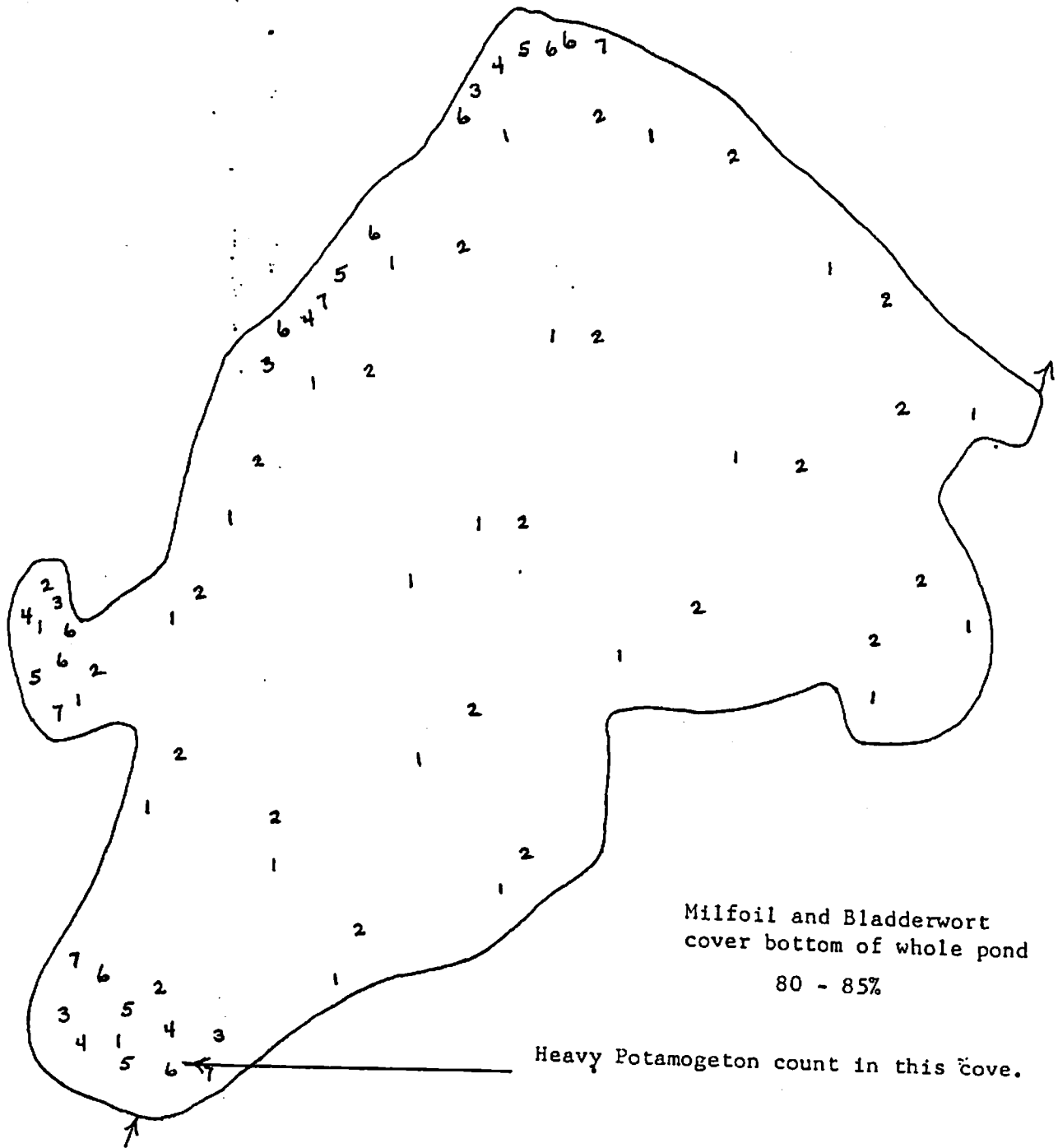
Scale 1:220'

EMERSED AQUATIC PLANTS

| LATIN | COMMON | MAP NUMBER |
|------------|-------------------------|------------|
| Peltandra | Arrow Arum | |
| Pontederia | Pickereel 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



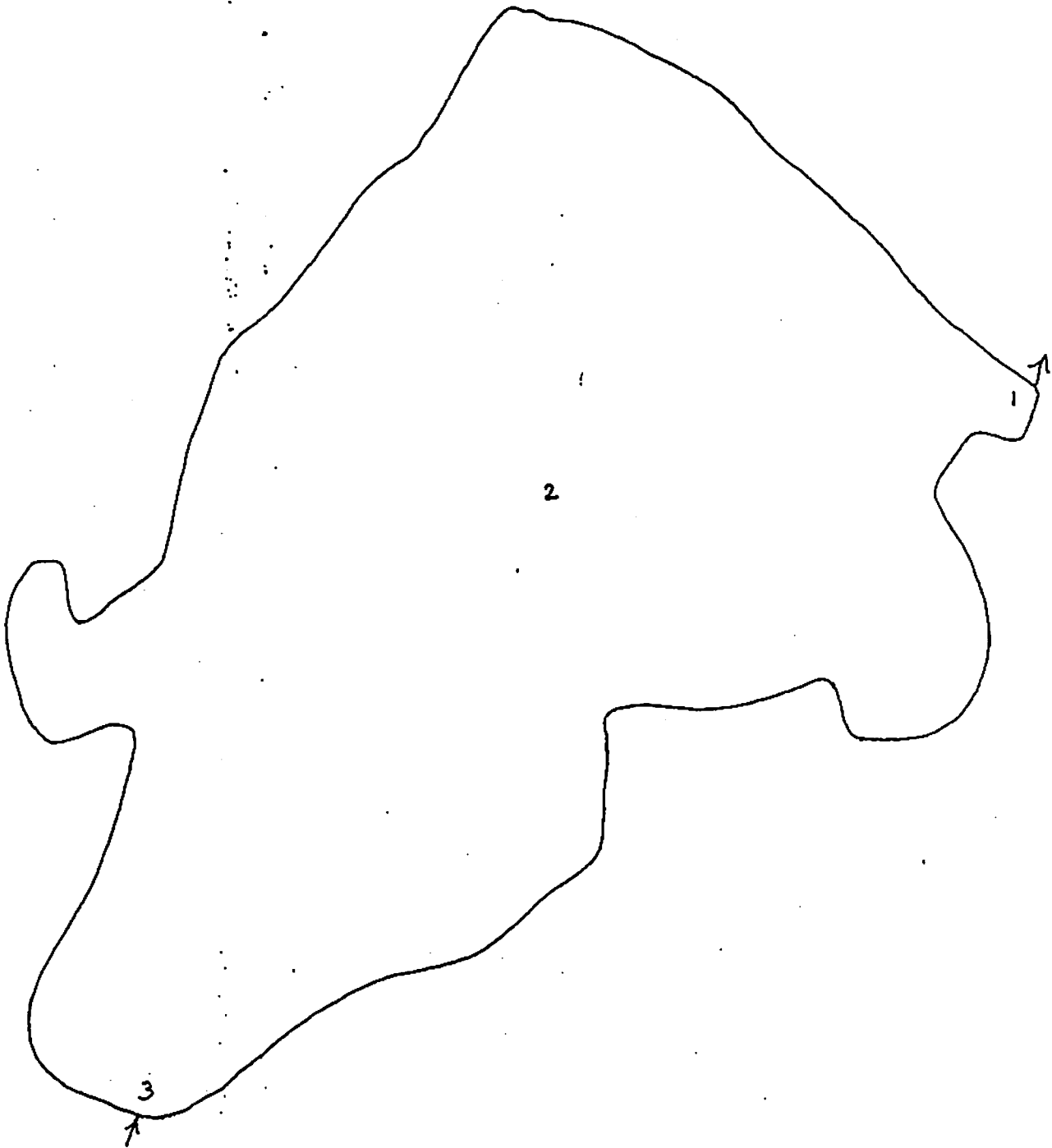
Scale 1:220'

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 | |



BIG WEST POND
Chemical Sample Stations



Scale 1:220'

Great West
IN LAKE STATION

OUTFALL

SOURCES

| | Great West IN LAKE STATION | | | OUTFALL | | | SOURCES | | |
|----------------------|-------------------------------|---|---|---------|---|---|---------|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 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

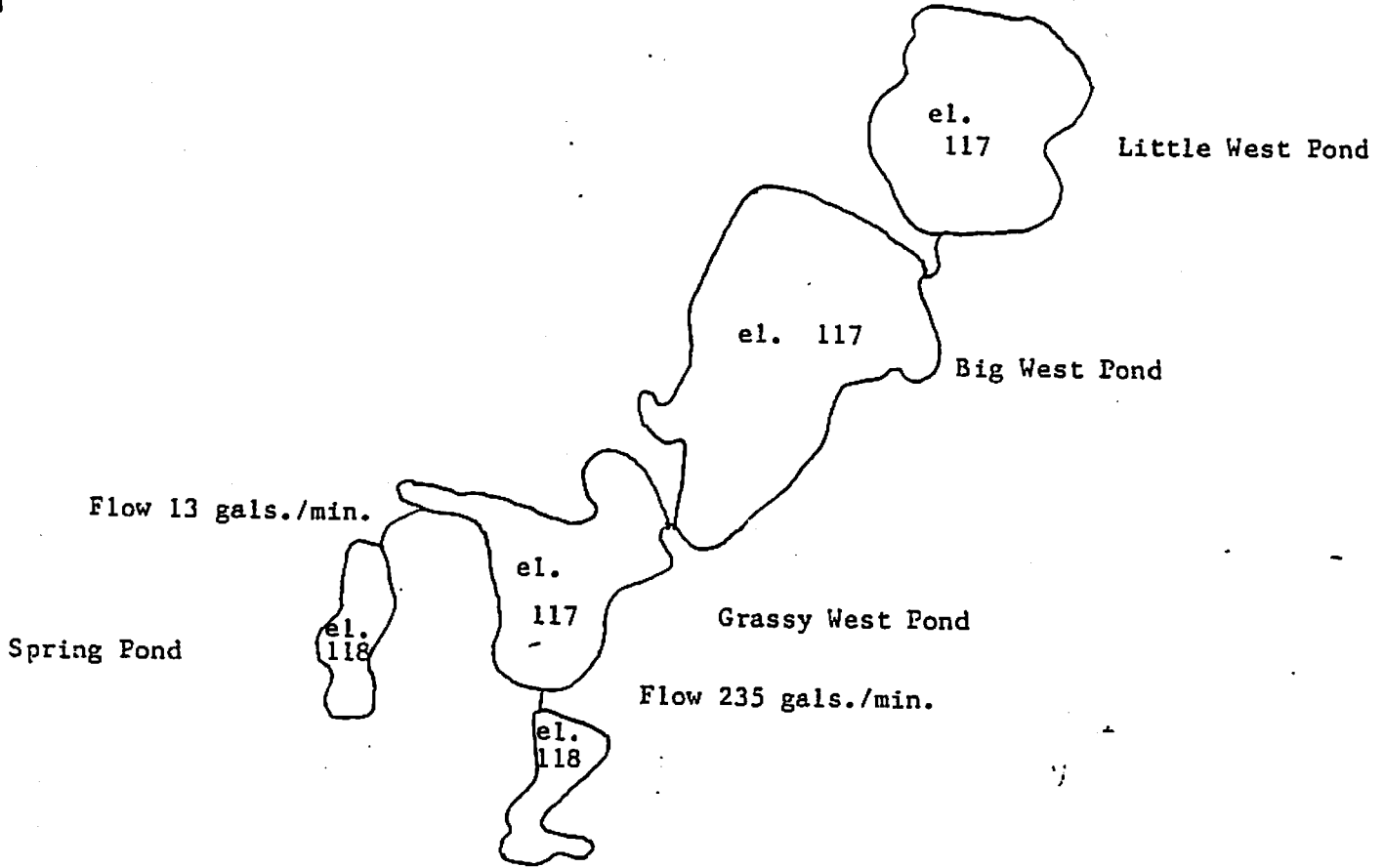
| | |
|----|------|
| Zn | .009 |
| CD | .001 |
| Sn | .004 |
| Au | .001 |
| Fe | .173 |
| Pd | .004 |
| AL | .038 |
| Cu | .009 |
| Ni | .019 |
| AG | .001 |

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. Emerged 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



White Island Pond
Wareham, Mass.
Type: coastal
Area: 294
Elevation: 048
Water type: warm
Classification: natural
Designated: no
Use: irrigation, recreation, esthetic
Map sheets: USGS 1:24000 Wareham, Sagamore

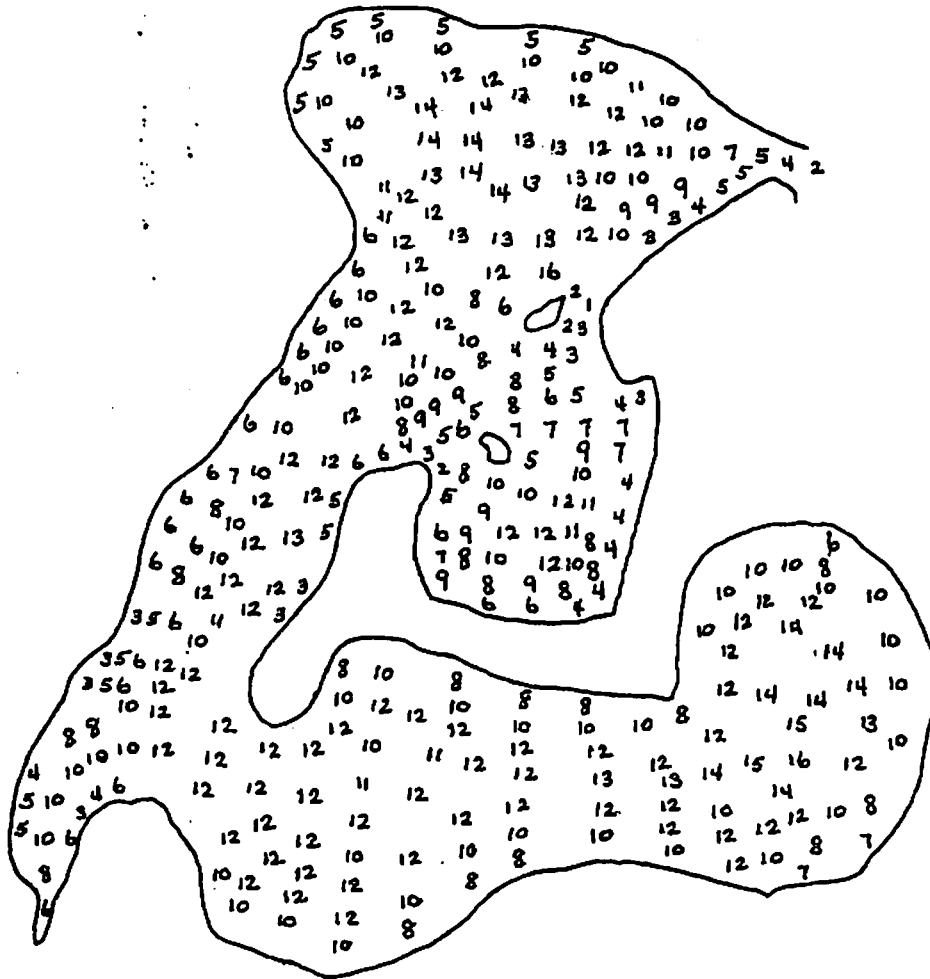
Position Topo sheet: Wareham up 10 R 16
Sagamore up 11 R 1
Shoreline distance 3.8 M (20,064 ft.)

Scale 1:1010'



WHITE ISLAND POND

(Bathymetric Map)

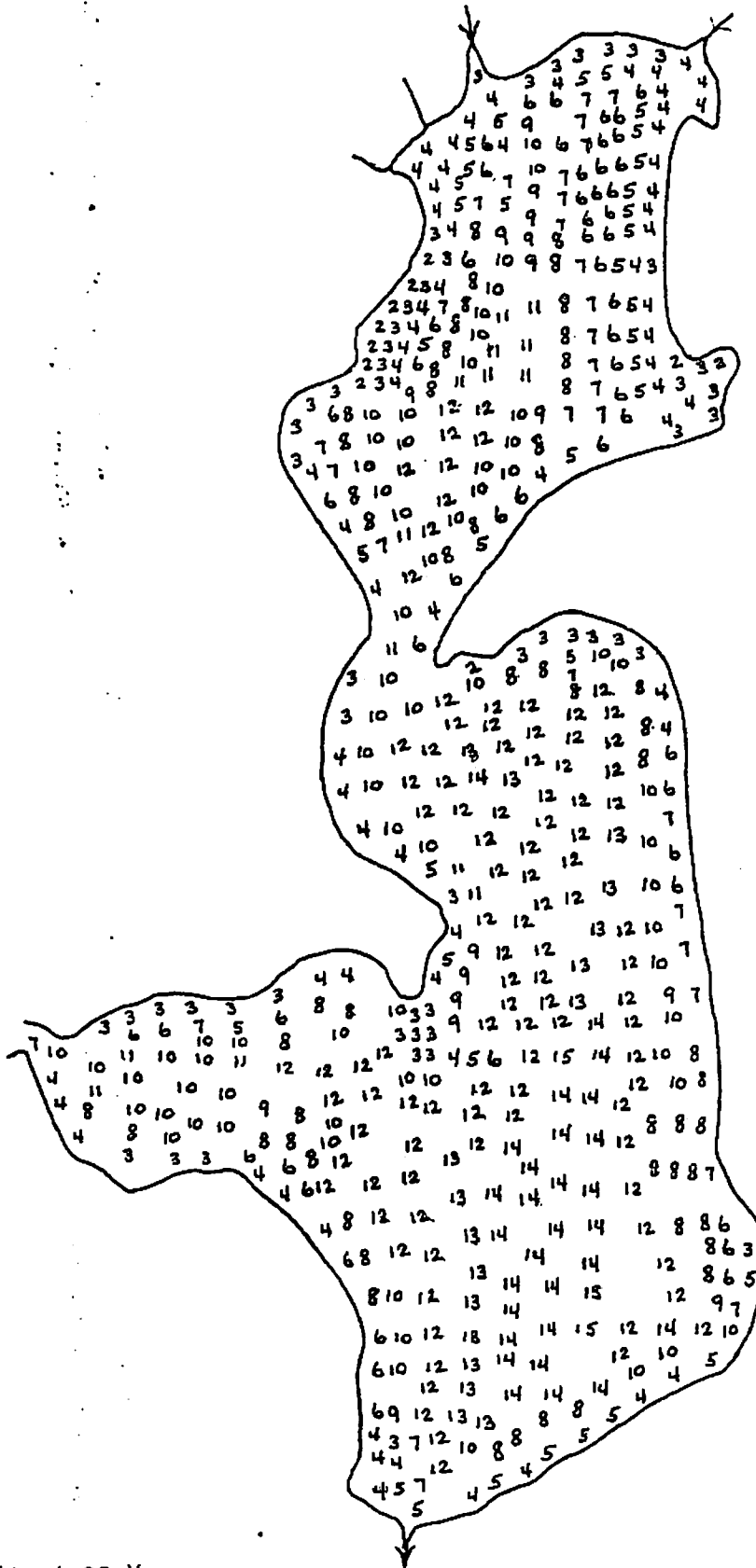


Maximum depth 16' 4.88 M
Mean depth 10' 3.05 M
Surface Area 294 acres 119.07 H
Acre feet 2940
Total gals. 958,001,940

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 | 1 |
| Nymphaea | Water Lily, White Water Lily | 1 |
| Brasenia | Watershield | 2 |
| | Addenda | |

FLOATING AQUATIC PLANTS - UNATTACHED

| LATIN | COMMON | MAP NUMBER |
|-----------|--------------|------------|
| Lemna | Duckweed | |
| Spirodela | Big Duckweed | |
| Wolffia | Watermeal | |
| | Addenda | |



WHITE ISLAND POND

Emerged Aquatic Plant Map with Key



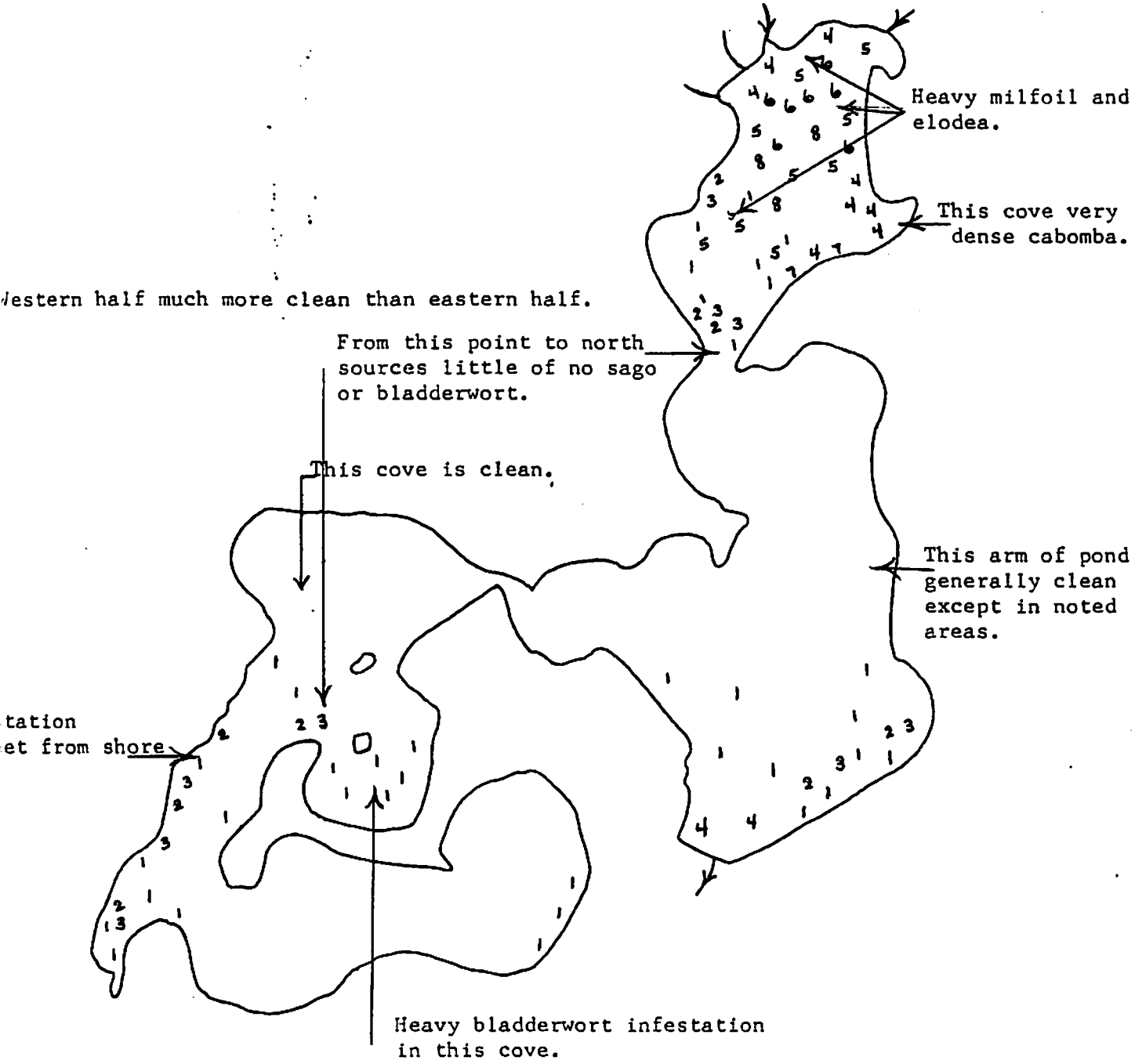
Scale 1:1010'

EMERSED AQUATIC PLANTS

| LATIN | COMMON | MAP NUMBER |
|------------|-------------------------|------------|
| Peltandra | Arrow Arum ----- | 1 |
| Pontederia | Pickereel 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



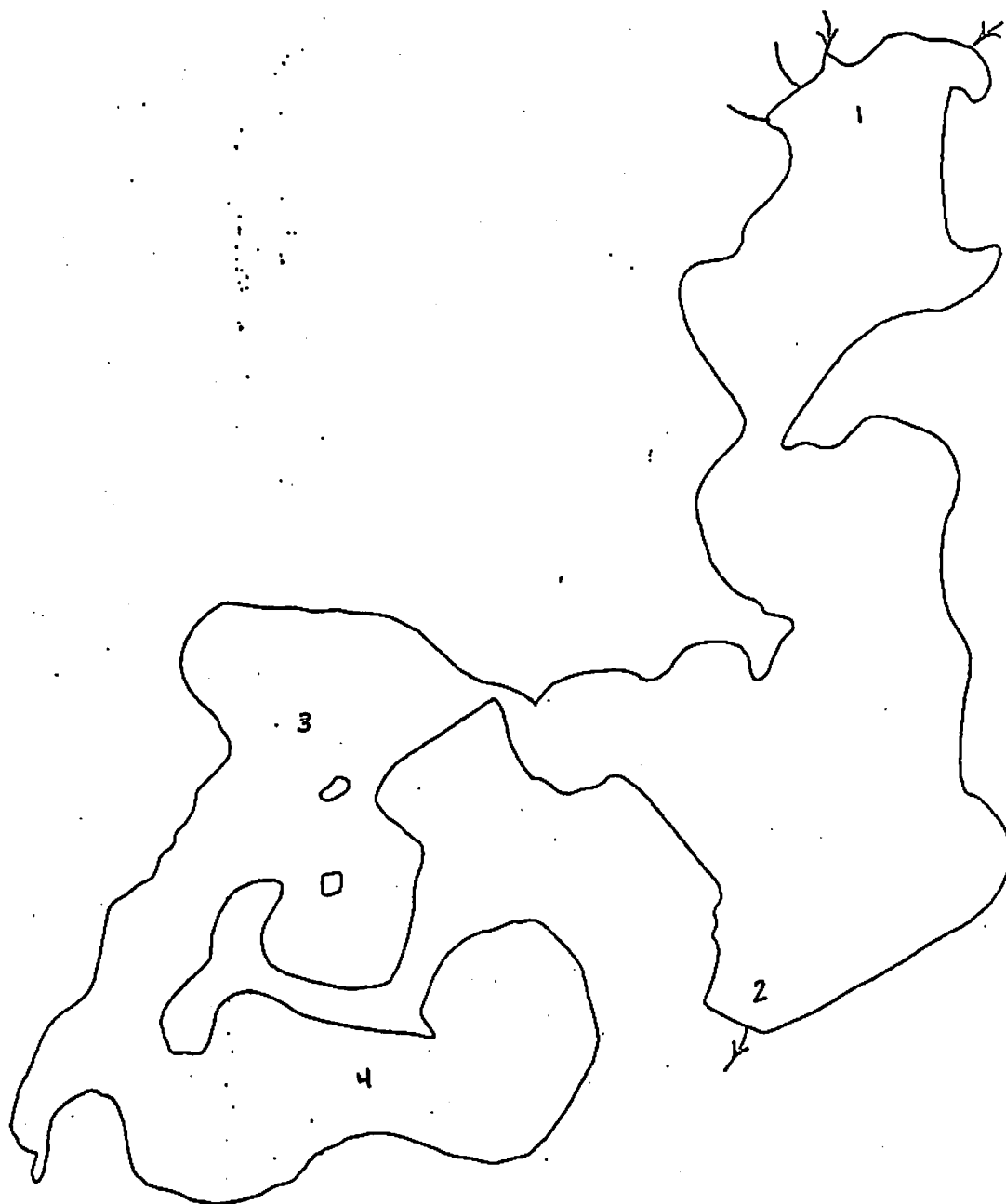
Scale 1:1010'

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 |



WHITE ISLAND POND
Chemical Sample Stations



Scale 1:1010'

| | White Island | | | OUTFALL | SOURCES | | |
|-----------------|-----------------|---------|-----|---------|---------|-----|---|
| | IN LAKE STATION | 1 | 2 | | | 3 | 1 |
| | | .01 | .02 | .01 | .02 | .01 | |
| (N) | | .10 | .10 | .05 | .10 | .10 | |
| id | | 0 | | | | | |
| acidity | | 0 | | | | | |
| nity | | 0 | | | | | |
| ardness | | 7 | | | | | |
| | | 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/l unless otherwise noted.

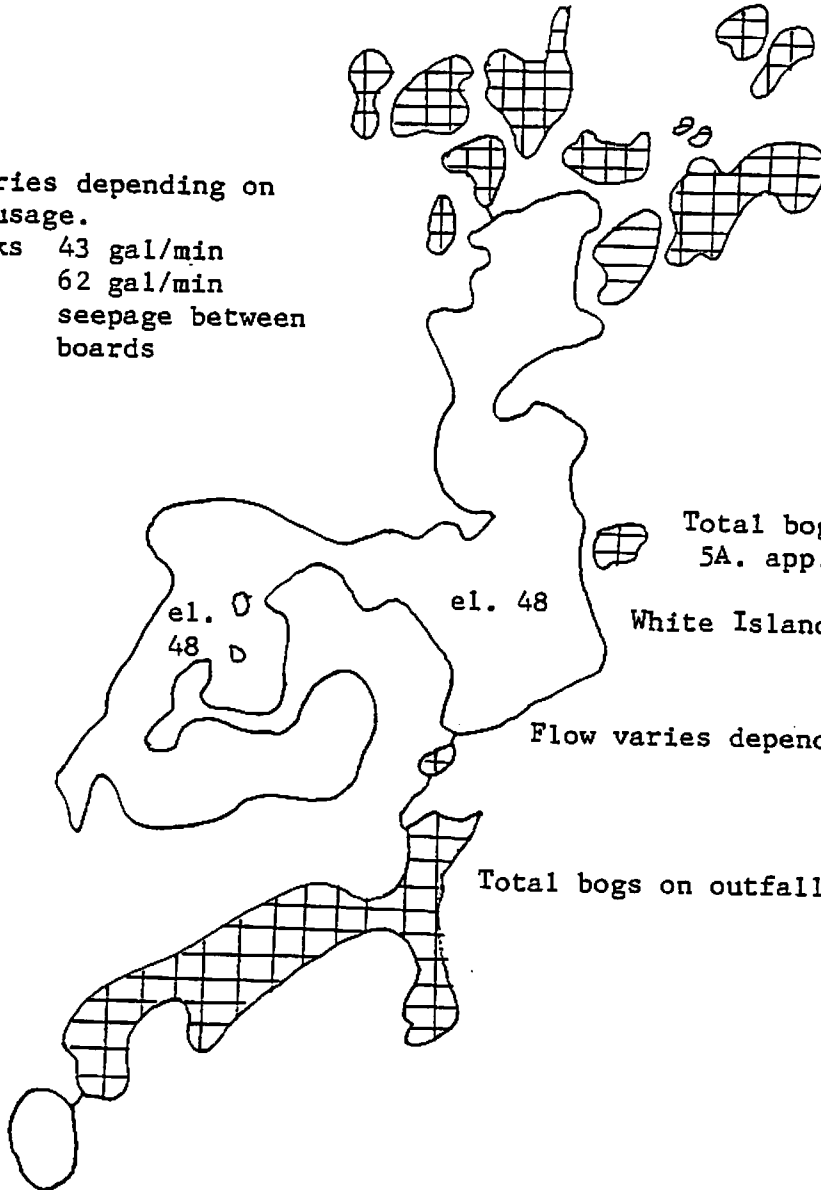
WHITE ISLAND POND

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.

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 | 34. Bartlett |
| 2. Little | 35. Hedges |
| 3. Great South | 36. Indian |
| 4. Little South | 37. Fresh Meadow |
| 5. Bloody | 38. Halfway |
| 6. Fresh | 39. Spring |
| 7. Gallows | 40. N. Triangle |
| 8. Micajah | 41. Grassy West |
| 9. Sandy | * Billington Sea would rank 31 |
| 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 | |

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 Utilization

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 disintegrate 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

Parameters

| | | | | |
|---|--------|---------------|------------------|----------------|
| Secchi Disc Readings Rank 1 - 41 | | | | Rank |
| 1. Phytoplankton coloration | | | | |
| clear | 0 | | | |
| green tint | 1 | x 100% volume | = | Points |
| moderate green | 2 | | | |
| deep green | 3 | | | |
| 2. 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 | | |
| Total of 1 + 2 + 3 | | | = | Points = Rank |
| Secchi Rank + Macro and Microphyte Rank = x | | | = | Ranking Points |
| times 4 | | | | |

Nutrient Points

| | | | | |
|---------------|--------|-------------|-----|----------------------|
| 1. Phosphates | 0 ppm. | - .025 ppm. | = 0 | |
| | .025 | - .03 | = 1 | |
| | .03 | - .04 | = 2 | |
| | .04 | - .06 | = 3 | |
| | .06 | - | = 4 | |
| | | | | Points _____ |
| 2. 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