Lake Rohunta

Natural Resource Inventory

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Background and Scope

Lake Rohunta has always had a local reputation for its diversity of natural resources and is a favorite destination for local naturalists and sportsmen. With the exception of a small, isolated block of the New Salem State Forest and the DFW boat ramp at Eagleville Road, the land surrounding Lake Rohunta is in private ownership (lands of the MDC Quabbin Reservation extend north to North Spectacle Pond at the southern end of the study area). Miraculously, the surrounding land has escaped the intensive development so common in the region and large expanses natural landscape remain intact.

This study was conceived as a way to formally document what local naturalists already knew or suspected – that the lake and its environs support diverse biota and have exceptional natural resource values.

The study was designed to be a broad-based natural resource inventory. Specialists in botany, plant ecology, invertebrates, herptiles and birds spent considerable field time in the study area. The following report is a compilation of sub-reports from the various specialists, tied together with some background material and notes prepared by the senior authors, Matt Hickler and Dave Small.

The study area is outlined on map 1. It encompasses 908 hectares (2,244 acres) and includes all of Lake Rohunta and North Spectacle Pond along with a generous buffer of surrounding landscape circumscribed arbitrarily by conveniently placed roads. Inventory work around White Pond and South Athol Pond was also undertaken by some field-workers. Lands in the towns of Athol (Worcester County), Orange, and New Salem (Franklin County) are included in the study area, which is entirely within the Millers River watershed in the Worcester Plateau Ecoregion of North-Central Massachusetts.

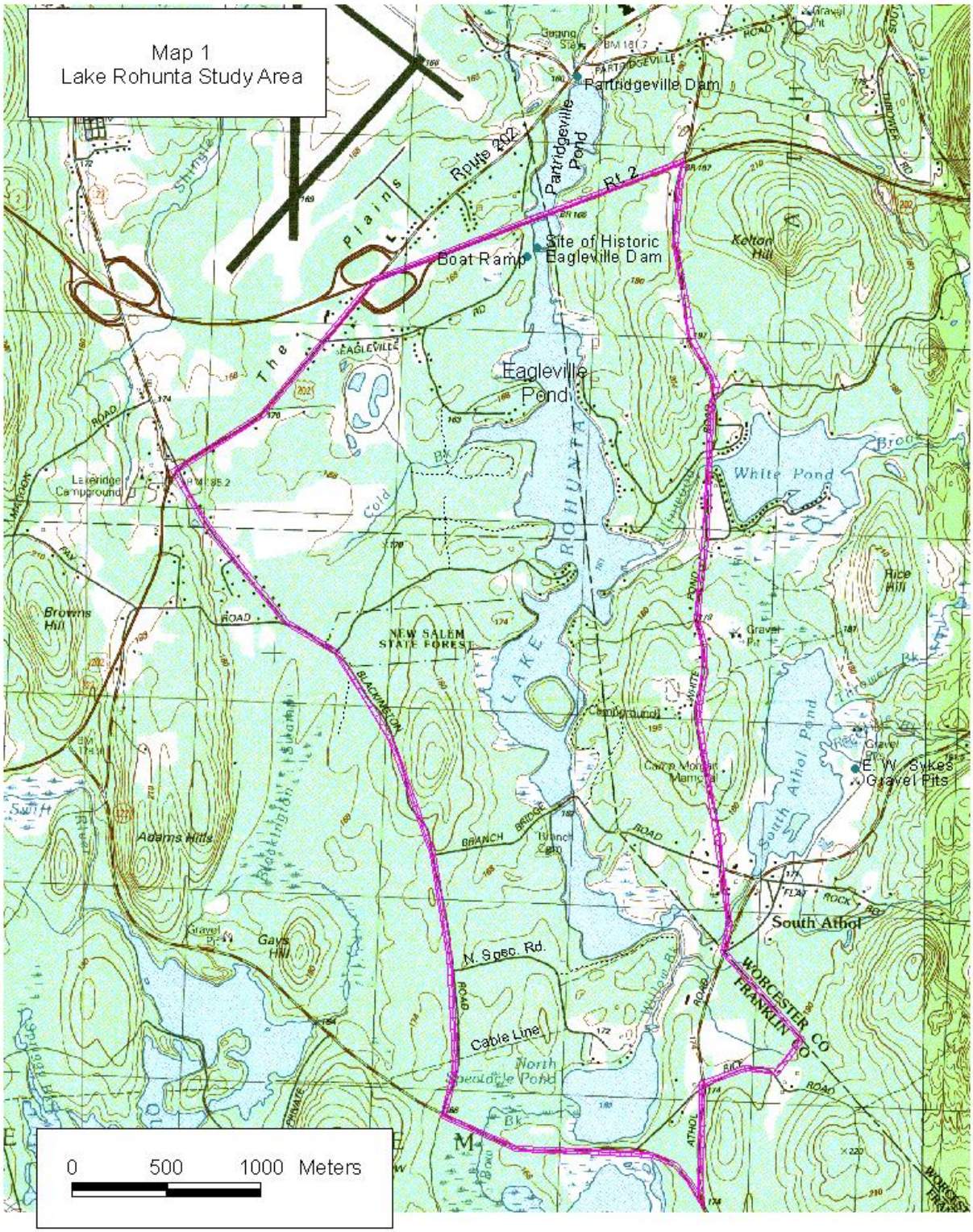
Contributors:

Flora and plant communities: Matt Hickler, assisted by Karen Searcy, Beth Bone, and Jim McKeag.
Invertebrates: Shaun Werle, assisted by Ed Klekowski with SCUBA exploration.
Fred Morrison – Odinates
Dave Small – Lepidopterans
Reptiles and Amphibians: Molly Hale
Vernal Pools: Molly Hale
Birds: Dave Small, Dave McLain, and Greg Watkevich

Dave Small organized and orchestrated the work of all the contractors and volunteers.

The Massachusetts Executive Office of Environmental Affairs funded the project.

Map 1


Map 1
Lake Rohunta Study Area
Partridgeville Dam
Partridgeville Pond
Rt. 2
Rpute 202
Site of Historic Eagleville Dam
Boat Ramp
Kelton Hill
Eagleville Pond
White Pond
Hice Hill
Browns Hill
NEW SALEM STATE FOREST
Adams Hills
Gaye Hill
E. W. Sykes Gravel Pits
South Athol
South Athol Pond
N. Spec. Rd.
Cable Line
North Spectacle Pond
WORCESTER CO
FRANKLIN CO
0
500
1000 Meters

Geology and Landscape

During retreat of the Wisconsin ice sheet 12,000 to 14,000 years ago, a dam of ice and glacial debris blocked the Millers River valley near present-day Wendell Depot creating Glacial Lake Orange. The Millers River and other streams entering the lake dropped their sediment loads creating large deltas. Outwash deposits accumulated in the lake up to depths of 200 feet over an area of 13 square miles. Lake Rohunta sits in the middle of the old glacial lake basin in the midst of a landscape sculpted from sand and gravel deposits. North Spectacle Pond occupies a large ice block depression.

The land is flat to gently rolling. It has scattered pockets of light to moderate density residential development, but largely undeveloped and covered in young oak forests. Kettle hole depressions, frequently deep enough to intersect the water table, are common. Wetlands and open water habitats cover 22% of the study area (202 hectares; 499 acres) and include a remarkable diversity of habitat and community types.

HISTORY

Lake Rohunta is an artificial pond created in the mid 1800's by damming a branch of the Millers River. Throughout the late 19'Th and early 20'Th centuries the stored water was used to power mills and machinery. Small settlements grew up around the mills and were later abandoned as more reliable power sources became available. Uplands were dotted with small farms and homesteads. Most upland acreage was cleared and used for grazing livestock.

Having an historical perspective can help in understanding and interpreting the contemporary landscape and its biota. The following historical synopsis was drawn heavily from records that were kindly provided by Dick Chaisson of Athol Massachusetts. It consists of fragments gleaned from old newspaper clippings, town records, miscellaneous letters, and historic maps that, as a biologist, I found interesting.

An 1832 map entitled "A Topographical Map of the County of Franklin Massachusetts by Arthur W. Hoyt (original at Memorial Library, Deerfield) shows no artificial pond between Spectacle Pond and the Millers River. The brook, known as Millers River Branch meanders through the valley that is now occupied by Lake Rohunta.

In 1837 a stone boundary marker was placed in a *meadow* along The Branch [now in the middle of the lake] to mark the corner of the towns of Athol, Orange and New Salem

Around 1840, the first dam was constructed at the site of the historic Eagleville Dam. This dam was probably much lower than later dams and was used to power a sawmill until around 1860. The mill was operated from May through September, during which time the pond would be drawn down allowing a fall crop of meadow hay to be harvested from the areas that were under water when the reservoir was full. The pond at this time was a "veritable paradise for duck hunting".

Around 1860, the Eagleville Dam and Woolen Mills were constructed. Maps from this era (Beers Atlas, 1871; USGS, 1883) show Eagleville Pond (now subsumed under the name of Lake Rohunta) occupying more-or-less its current footprint. Presumably, trees in areas to be flooded were cut at this time.

A second dam, downstream from Eagleville at the site of the current Partridgeville Dam was built sometime before 1871. The small impoundment known as Partridgeville pond was separated from Eagleville Pond by a short stretch of river until 1907 when the dam was raised to provide power for a small hydroelectric plant. At this time, the maximum water level in Partridgeville Pond was still much lower than that behind the main dam at Eagleville.

In 1943, following the loss of both Eagleville and Partridgeville dams during the Hurricane of 1938, the current Lake Rohunta Dam was built on the site of the former Partridgeville Dam. The new dam brought water levels in Partridgeville Pond to the same height as Eagleville Pond making the Eagleville Dam redundant. The new pond was named Lake Rohunta at this time – an acronym for the dam's owner, The Rodney Hunt Company. The reservoir continued to be used to generate electricity, at least periodically, until the early 1960s.

During the period that water in the reservoirs was used for power (approximately 1840 through 1960) fluctuating water levels and summer drawdowns were probably the norm. As recently as 1953, pond shore residents complained to the dam operator (Rodney Hunt Co.) about summer drawdowns and the effects on water wells and recreation. Since around 1960 when the hydroelectric plant was shut down the dam owners have attempted to maintain consistent year-round water levels in the pond. A 1979 memo from Rodney Hunt Co. states that they try to maintain a constant level, but that in dry years the water sometimes falls below the splash planks.

In the late 1960s newspaper articles and other documents referring to excessive growth of aquatic weeds began appearing. A citizens group devoted to solving the problem remained active through the 1970s. No records of management activities could be found. A 1978 DFW summer fish survey notes that weed growth in the south basin is sufficiently heavy to impede the use of motorboats.

An 1883 visitor to Eagleville wrote of traveling the last half-mile through a forest of "tall sombre pine". Beyond the pine forest, within which the village was nestled were "vast plains, which look like western prairies in miniature. Coarse grass and stunted pine meet the eye, but the ground is covered by the luscious strawberry, and the blue hills of Orange and New Salem, miles away, form a pleasing background to the picture." The "lowing of cattle on the neighboring farms" and "hum of the spindle and the clatter of the loom" complete a picture of the landscape that is difficult to rectify with that of today.

In 1920, a million board feet of pine were cut on and near the island north of Branch Bridge.

WETLAND VEGETATION SURVEY

Objectives

The objective of the wetland vegetation survey was to complete a comprehensive and detailed inventory of wetlands in the study area. The intent was to work at the level of individual wetland community occurrences. For each occurrence of each plant community I endeavored to compile a complete flora and collect vegetation data suitable for community characterization and classification.

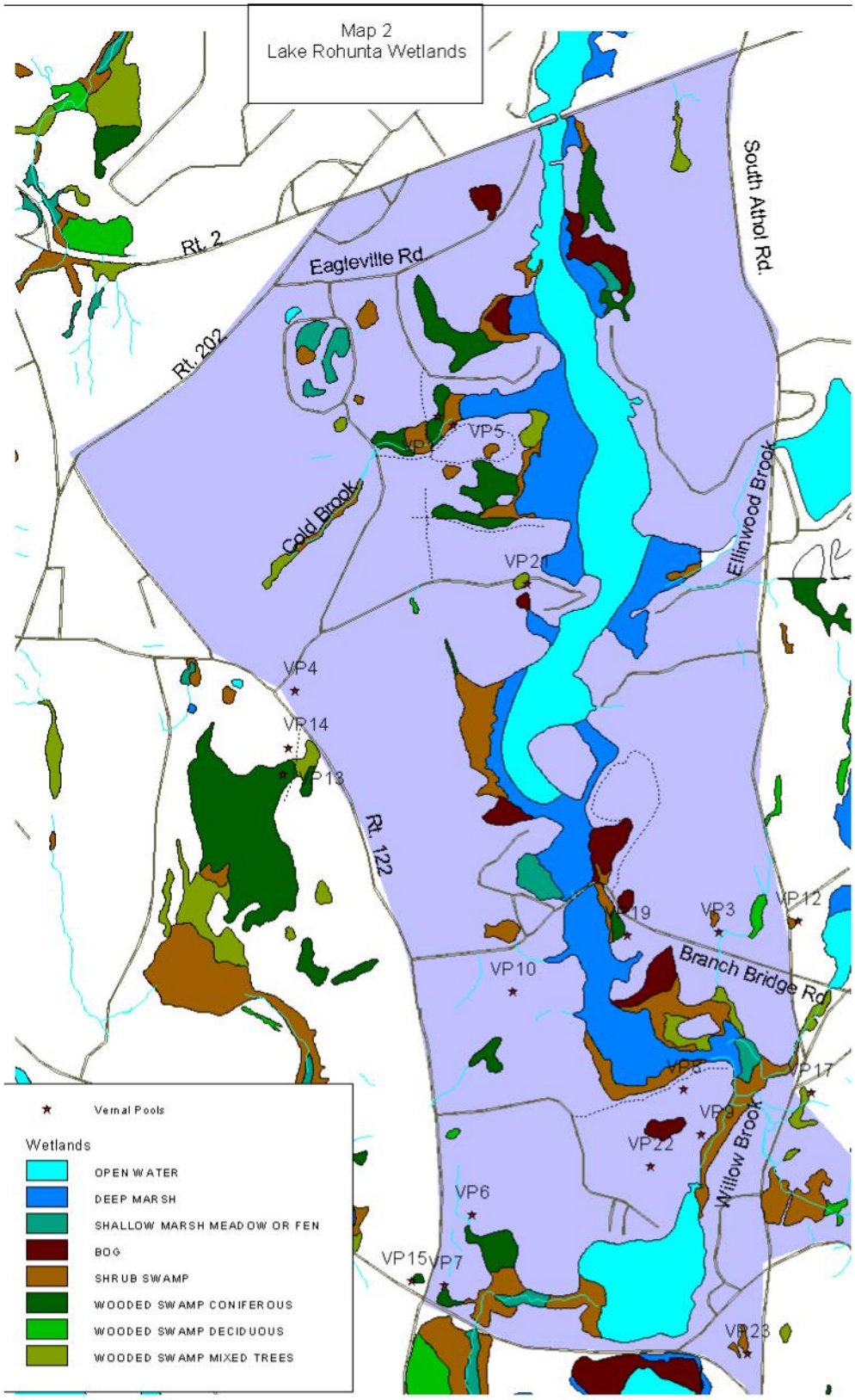
Methods

Wetlands in the study area have been delineated and classified by the DEP Wetlands Conservancy Program (WCP). Wetlands were interpreted from 1:12000 scale color-infrared aerial photos at the University of Massachusetts and then turned into digital GIS coverages. The data layer is available through the Massachusetts Geographic Information System (MASSGIS).

Coverages of the study area were projected onto a base map and used to target wetlands for field investigations (Maps 2&3).

Each wetland was canvassed on foot or by boat and a list was compiled of all vascular plant species observed. A method was devised for attaching a quantitative value to each species reflecting its overall prominence in the community (see Palmer et al, 1995 for a similar method proposed for floristic studies). These data were later used for classifying plant communities. In cases where field reconnaissance indicated that a single WCP polygon actually contained more than one plant community, these were inventoried separately. Judgments about boundaries and extent of communities were made subjectively in the field. Ecotones, edges and aberrant habitat patches were routinely excluded from inventories to ensure that samples were representative of the target community. Extensive field observation notes were kept.

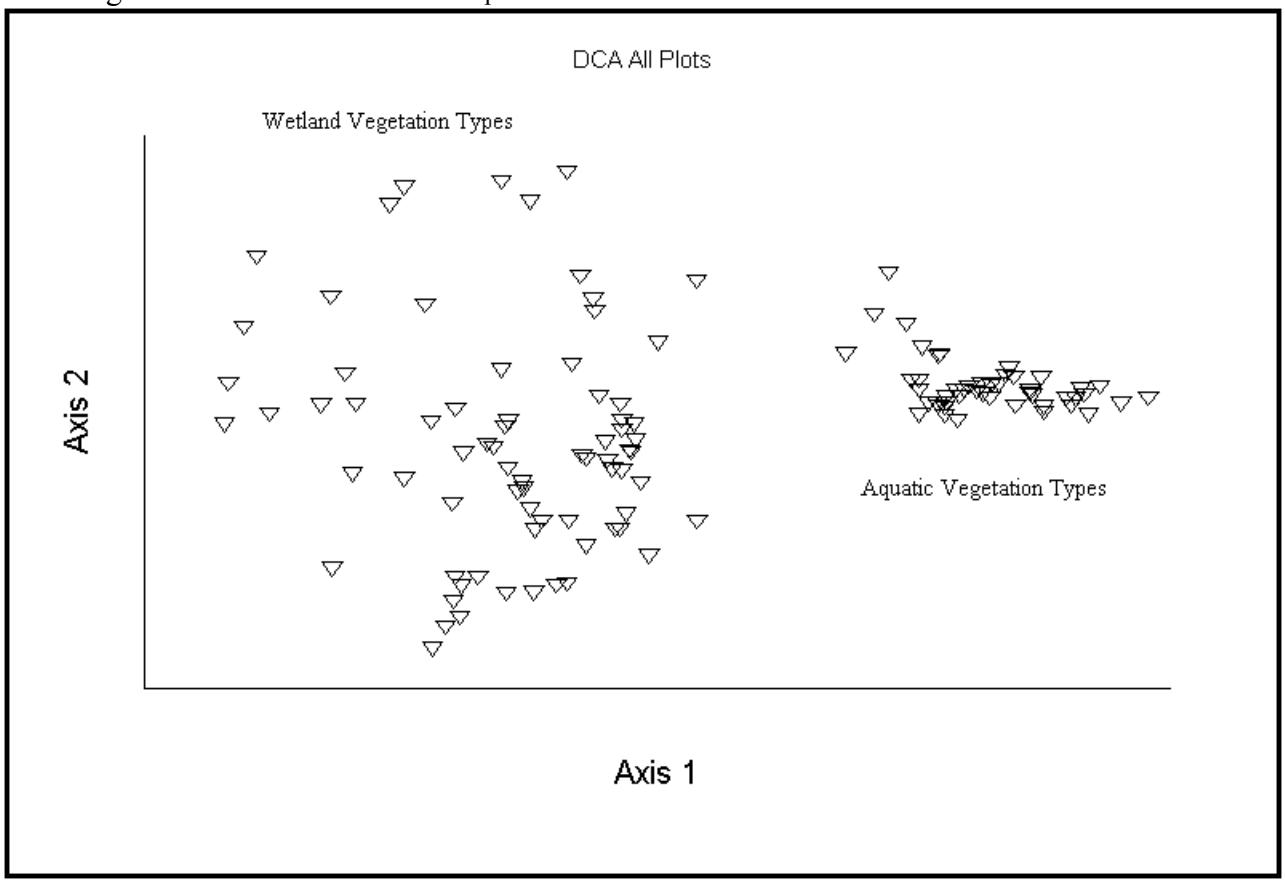
The method used for ranking species in the samples is experimental (see appendix for details). It was devised as a rapid method for generating hierarchical rankings of species in communities that could be used for multivariate analyses. It departs from traditional releve sampling in two important ways: (i) rather than using data from small plots to represent the community in subsequent analyses, the data are collected, without plots, from the entire community unit being assessed (ii) rather than using per-cent cover estimates to rank species by their importance in the plot (and, by extension, in the community as-a-whole) species are ranked based on a combination of estimated frequency at a community-wide scale, and estimates of local cover. Samples collected by this method will invariably have more species than quadrat samples in the same community. Species rankings are also expected to vary somewhat from those derived from plot samples due to the different scales of observation. To evaluate the compatibility of data collected by the two methods, 18 traditional releves were collected in communities that had been previously sampled by the rapid assessment method. Replicates of each of the WCP wetland types were chosen by random number to select sample sites. Quantitative data from all samples (both releve and rapid assessment) were transformed to a three point hierarchical scale and combined into a single data set. Data were subjected to multivariate analyses (TWINSPAN and DECORANA). Detailed discussion of results is beyond the scope of this report, but results were quite satisfactory, with releve and corresponding rapid assessment samples consistently falling in the same clusters and close to each other in ordination space.


Map 2
Lake Rohunta Wetlands
Rt. 2
Rt. 202
Eagleville Rd.
South Athol Rd.
Cold Brook
Ellinwood Brook
Rt. 122
Branch Bridge Rd.
Willow Brook
VP5
VP20
VP4
VP14
VP13
VP19
VP3
VP12
VP10
VP17
VP22
VP6
VP15
VP7
VP23
Vernal Pools
Wetlands
OPEN WATER
DEEP MARSH
SHALLOW MARSH MEADOW OR FEN
BOG
SHRUB SWAMP
WOODED SWAMP CONIFEROUS
WOODED SWAMP DECIDUOUS
WOODED SWAMP MIXED TREES

Vegetation Classification

A total of 123 vegetation samples were collected from wetlands in the study area. These included 74 rapid assessment transect plots, 33 aquatic releves and 18 releves in bordering and isolated vegetated wetlands. For preliminary exploration, the entire data set was subjected to cluster analysis (TWINSPAN) and indirect ordination (Detrended Correspondence Analysis). The software package PCORD (McCune and Medford, 1997) was used for all analyses. The DCA scatter plot (fig. 1) shows that the samples form two distinct and insular clusters, one composed entirely of aquatic samples, the other of wetland samples. For further analysis, the data set was divided in two based on the identified clusters.

Figure 1: DCA ordination of all samples.



WETLAND VEGETATION CLASSIFICATION –(types <u>not</u> dominated by aquatic bed and floating leaved species).

Four major wetland types, based on physical setting and/or vegetation physiognomy, are found in the greater Lake Rohunta area:

1. Pondshore fens, shallow marshes (meadows) and shrub swamps.
2. Streamside marshes (meadows) and shrub swamps

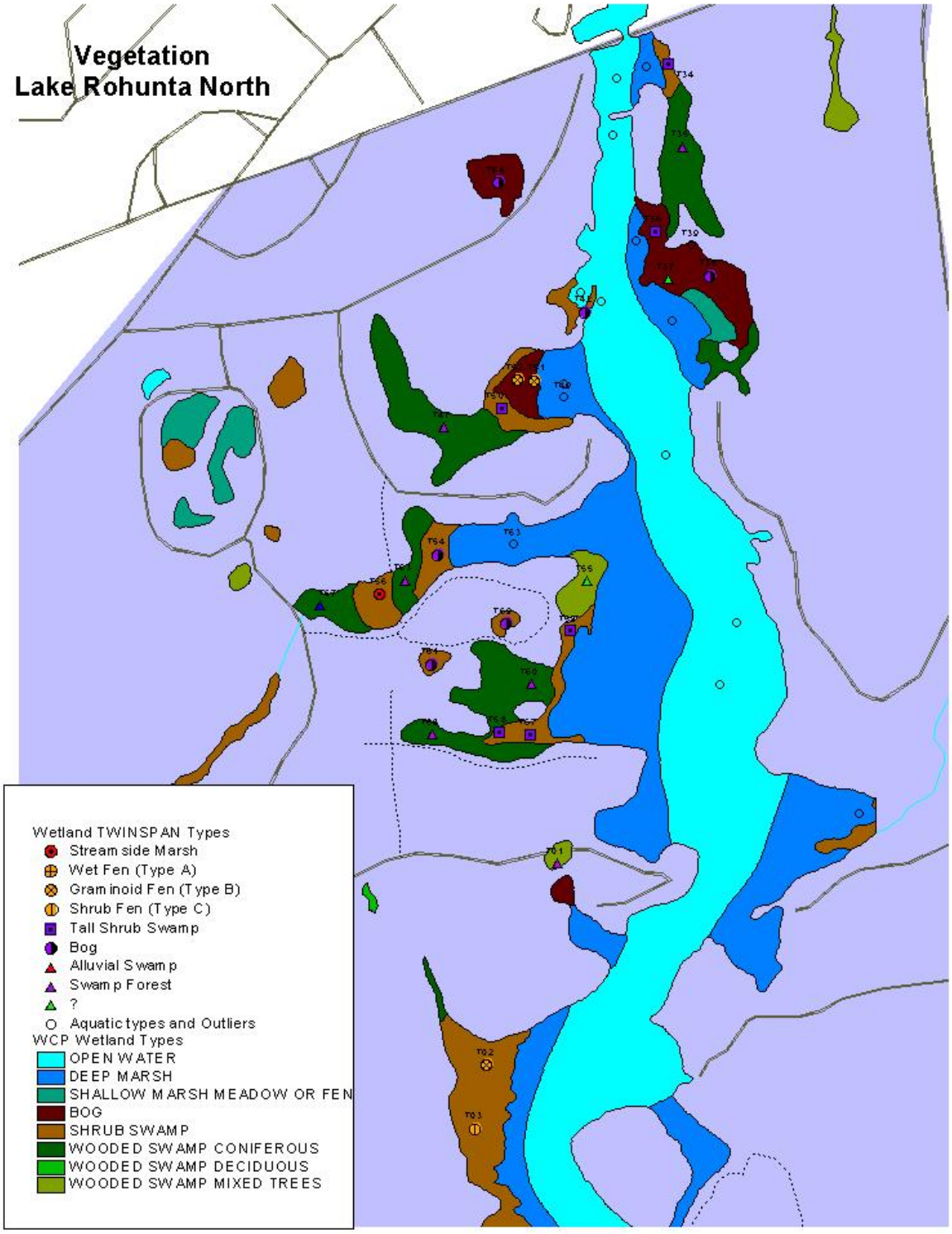
3. Kettle hole bogs
4. Swamp forests

It is interesting to note that wetlands with similar physical structure but occurring in different physical settings (e.g. shrub dominated communities in kettle holes, on pond shores and adjacent to streams) separate into different clusters very early in the TWINSPAN classification (fig. 3). Similarly, the graminoid dominated pondshore fens and graminoid dominated streamside marshes, although visually similar, are floristically distinct and therefore only distantly related in the classification. At the opposite extreme, some vegetation cover types that appear visually distinct are poorly discernible in multivariate analyses. For example, pondshore fens have shrub dominated, graminoid dominated, and mixed variants. These cover types are visually distinct and can often even be discerned on aerial photographs. However, they are so similar in species composition that they are not readily separable in multivariate analyses. As a consequence, the data based community classification of wetlands presented here varies from the photo interpreted wetland delineations and classification from the WCP (maps 2&3; Table 1). For example, on the WCP wetland maps, pondshore fen communities are variously classified as shrub swamps, bogs, and shallow marsh/meadow/fen. Some kettle hole bogs are classified as shrub swamps; some shrub swamps are classified as bogs, and-so-on.

Maps 2 & 3 below show vegetation sample locations and their TWINSPAN classifications overlaid on the WCP polygons. Table 1 compares WCP, TWINSPAN and subjective classifications from field notes. No single method provides a wholly satisfactory classification, however useful information can be gleaned from each. For purposes of the following discussion I have drawn from all three sources.

At least eight plant communities (sensu Swain, 1999) can be found among the four major vegetation types. Names used for communities on the maps and in discussion depart somewhat from those in current use by the Massachusetts Natural Heritage and Endangered Species Program (MNHESP) but cross-references and community codes (in parentheses following names) are provided with descriptions of community types below.

Map 2


Vegetation
Lake Rohunta North
Wetland TWINSPAN Types
Stream side Marsh
Wet Fen (Type A)
Graminoid Fen (Type B)
Shrub Fen (Type C)
Tall Shrub Swamp
Bog
Alluvial Swamp
Swamp Forest
?
Aquatic types and Outliers
WCP Wetland Types
OPEN WATER
DEEP MARSH
SHALLOW MARSH MEADOW OR FEN
BOG
SHRUB SWAMP
WOODED SWAMP CONIFEROUS
WOODED SWAMP DECIDUOUS
WOODED SWAMP MIXED TREES

Map 3

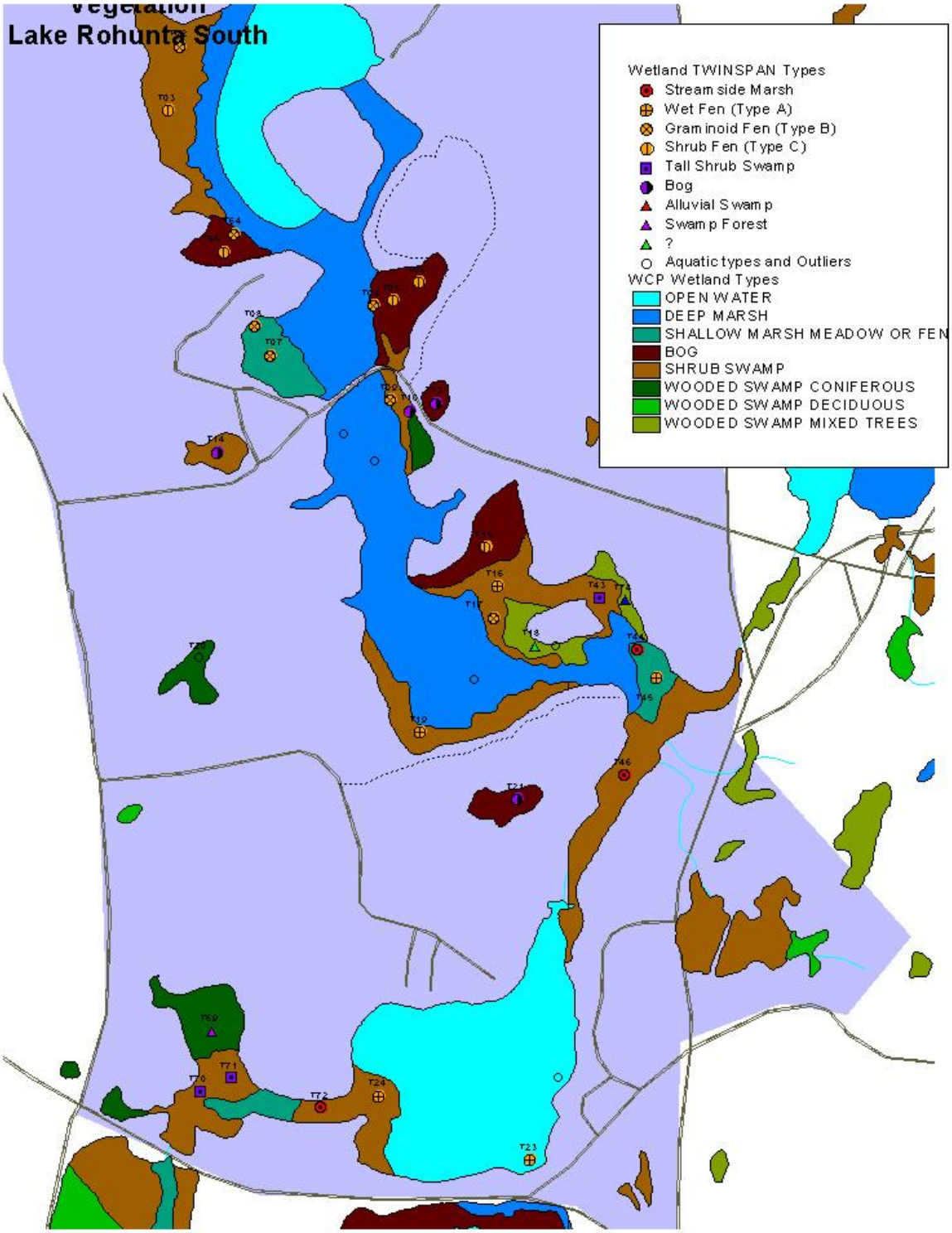

Lake Rohunta South
Wetland TWINSPAN Types
Stream side Marsh
Wet Fen (Type A)
Graminoid Fen (Type B)
Shrub Fen (Type C)
Tall Shrub Swamp
Bog
Alluvial Swamp
Swamp Forest
?
Aquatic types and Outliers
WCP Wetland Types
OPEN WATER
DEEP MARSH
SHALLOW MARSH MEADOW OR FEN
BOG
SHRUB SWAMP
WOODED SWAMP CONIFEROUS
WOODED SWAMP DECIDUOUS
WOODED SWAMP MIXED TREES

Table 1

Comparison of vegetation classifications from the Wetlands Conservancy Program aerial photo interpretation, Cluster analysis (TWINSPAN) of samples, and subjective classification based on field observations. Sample numbers are the same as those used to label points on the vegetation maps. WCP wetland polygon numbers are a combination of orthoquad and wetland polygon numbers from the MASSGIS Wetlands datalayer.

Sample No.	WCP Wetland Polygon	Subjective Vegetation Type	Twinspan Veg. Type	WCP Vegetation Type
T44	14191892	Shallow Marsh	Streamside Marsh	SHALLOW MARSH MEADOW OR FEN
T72	13791892	Streamside Marsh	Streamside Marsh	SHRUB SWAMP
T56	137922125	Streamside Marsh/Open Swamp	Streamside Marsh	SHRUB SWAMP
T46	14191893	Streamside marsh with shrubs	Streamside Marsh	SHRUB SWAMP
T16	13791859	Graminoid Fen	Fen, Type A	SHRUB SWAMP
T19	13791865	Mixed Fen	Fen, Type A	SHRUB SWAMP
T23	13791879	Shrub Swamp	Fen, Type A	OPEN WATER
T24	13791892	Shrub Fen	Fen, Type A	SHRUB SWAMP
T45	14191892	Shallow Marsh	Fen, Type A	SHALLOW MARSH MEADOW OR FEN
T17	13791859	Mixed Fen	Fen, Type B	SHRUB SWAMP
T64	13791832	Mixed Fen	Fen, Type B	BOG
T52	137922107	Shrub Fen	Fen, Type B	BOG
T51	137922107	Graminoid Fen	Fen, Type B	BOG
T08	13791839	Mixed Fen	Fen, Type B	SHALLOW MARSH MEADOW OR FEN
T09	13791844	Graminoid Fen	Fen, Type B	SHRUB SWAMP
T07	13791839	Graminoid Fen	Fen, Type B	SHALLOW MARSH MEADOW OR FEN
T04	13791834	Mixed Fen	Fen, Type B	BOG
T02	13791819	Graminoid Fen	Fen, Type B	SHRUB SWAMP
T65	13791832	Shrub Fen	Fen, Type C	BOG
T15	13791855	Shrub Fen	Fen, Type C	BOG
T03	13791819	Shrub Fen	Fen, Type C	SHRUB SWAMP
T05	13791834	Shrub Fen	Fen, Type C	BOG
T06	13791834	Mixed Fen	Fen, Type C	BOG
T43	14191882	Tall Shrub Swamp	Tall Shrub Swamp	SHRUB SWAMP
T50	137922105	Tall Shrub Swamp	Tall Shrub Swamp	SHRUB SWAMP
T58	137922128	Mixed Fen with tall shrubs	Tall Shrub Swamp	SHRUB SWAMP
T36	13792292	Tall Shrub Swamp mixed with Graminoids	Tall Shrub Swamp	BOG
T34	13792278	Tall Shrub Swamp	Tall Shrub Swamp	SHRUB SWAMP
T70	13791889	Streamside marsh	Tall Shrub Swamp	SHRUB SWAMP
T71	13791889	Streamside Shrub Swamp	Tall Shrub Swamp	SHRUB SWAMP
T58	137922128	Mixed Fen with tall shrubs	Tall Shrub Swamp	SHRUB SWAMP
T67	137922128	Tall Shrub Swamp	Tall Shrub Swamp	SHRUB SWAMP
T14	13791849	Kettle Bog	Kettle Bog	SHRUB SWAMP
T42	13792297	Shrub Fen with tall shrubs	Kettle Bog	SHRUB SWAMP
T21	13791872	Kettle Bog	Kettle Bog	BOG
T66	13792288	Kettle Bog	Kettle Bog	BOG
T13	13791846	Kettle Bog	Kettle Bog	BOG
T59	137922130	Kettle Bog	Kettle Bog	SHRUB SWAMP
T38	13792292	Shrub Fen with tall shrubs	Kettle Bog	BOG
T61	137922135	Kettle Bog	Kettle Bog	SHRUB SWAMP
T10	13791844	Tall Shrub Swamp	Kettle Bog	SHRUB SWAMP
T54	137922119	Tall Shrub Swamp	Kettle Bog	SHRUB SWAMP
T74	14191879	Hardwood Swamp	Alluvial/Seepage Swamp	WOODED SWAMP MIXED TREES
T57	137922127	Mixed Swamp	Alluvial/Seepage Swamp	WOODED SWAMP CONIFEROUS
T47	137922100	Hemlock Swamp	Swamp Forest	WOODED SWAMP CONIFEROUS
T69	13791886	Spruce Swamp	Swamp Forest	WOODED SWAMP CONIFEROUS
T60	137922133	Spruce Swamp	Swamp Forest	WOODED SWAMP CONIFEROUS
T35	13792283	Mixed Swamp	Swamp Forest	WOODED SWAMP CONIFEROUS
T01	1379185	Hardwood Swamp	Swamp Forest	WOODED SWAMP MIXED TREES
T68	137922133	Mixed Swamp	Swamp Forest	WOODED SWAMP CONIFEROUS
T53	137922118	Mixed Swamp	Swamp Forest	WOODED SWAMP CONIFEROUS
T37	13792292	Tall Shrub Swamp	Orphan	BOG
T55	137922122	Hardwood Swamp	Orphan	WOODED SWAMP MIXED TREES
T18	13791862	Mixed Swamp/ Shrub Swamp	Orphan	WOODED SWAMP MIXED TREES

Figure 2: DCA ordination of wetland transect plots.

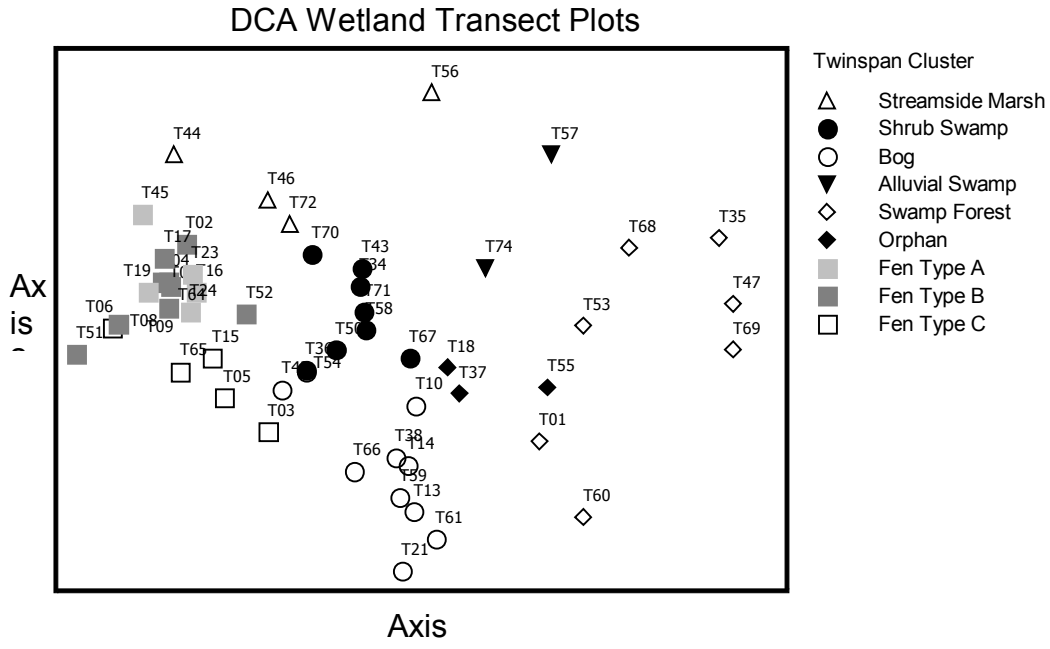


Figure 3: TWINSPAN dendrogram

Order of samples for TWINSPAN dendrogram

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  9 P09     |  56 T56     |  12 P12     |  46 T44     |  13 P13
 48 T46     |  70 T72     |  38 T24     |  32 T16     |  35 T19
 37 T23     |  47 T45     |   1 P01     |   2 P02     |   3 P03
 15 P15     |  17 P17     |  18 P18     |  20 T02     |  22 T04
 25 T07     |  26 T08     |  27 T09     |  33 T17     |  51 T51
 52 T52     |  62 T64     |   7 P07     |  16 P16     |  21 T03
 23 T05     |  24 T06     |  31 T15     |  63 T65     |  45 T43
 68 T70     |  69 T71     |  41 T36     |  58 T58     |   5 P05
  6 P06     |  39 T34     |  50 T50     |  65 T67     |  28 T10
  4 P04     |  43 T38     |  44 T42     |  54 T54     |  64 T66
 10 P10     |  29 T13     |  36 T21     |  61 T61     |  30 T14
 59 T59     |   8 P08     |  57 T57     |  71 T74     |  53 T53
 66 T68     |  14 P14     |  40 T35     |  49 T47     |  67 T69
 11 P11     |  19 T01     |  60 T60     |  34 T18     |  42 T37
 55 T55     |
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  51414733334   111222223556 12223646645  3562 4456123635 575614461163 45
962638082577123578025673122761341358918569058434440961098713640971904 25

000000000000000000000000000000000000000000000000000000011111111111111
000000000000000000000000000000000011111111111111111111110000000000111
000000011111111111111111111111111111000000000001111111111110001111111
001111100000111111111111111111111100000111110000000111111   000000111
  00111011110000000000000001111111000110001101111100001 1   001111
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Non-Forested Wetlands *Myrica gale*						Forested Wetlands *Acer rubrum* *Coptis trifolia*	
Meadows and Fens: *[Asclepias incarnata] [Carex lasiocarpa], [Drosera intermedia] [Triadenum virginicum]*				Shrub Swamps and Bogs *Vaccinium corymbosum* *Kalmia angustifoliua* *Nemopanthus mucronatus* [Assorted shrubs]		Swamps *Carex trisperma* *[Picea rebens]*	
Streamside Marshes: *Scirpus cyperinus, Calamagrostis canadensis,[Carex stricta] [Galium*	Poor Fens:*Carex lasiocarpa. Drosera intermedia, [Carex utriculata], [Chamaedaphne calyculata], [Peltandra virginica]*			Tall Shrub Swamps: *Thelypteris palustris Lysimachia terrestris, [Alnus incana], [Osmunda cinnamomea], [Spiraea alba* var. *latifolia], [Carex stricta]*	Kettle Bogs: *[Smilacina trifolia], Gaylusaccia baccata], [Picea mariana], [Sarracenia purpurea]*	Swamp forests, various types: *[Picea rubens], [Tsuga canadensis], [Thelypteris simulata], [Coptis trifolia], [Kalmia latifolia]*	
	Type A Fens: *[Asclepias incarnata], [Typha latifolia], [Decodon verticillatus]*	Type B, Graminoid Fens:*Triadenum virginicum, [Dulichium arundinaceum], [Carex utriculata], [Peltandra virginica], [Chamaedaphne calyculata]*	Type C, Shrub Fens: Heavy *Chamaedaphne calyculata* and *Myrica Gale*				

Acidic Graminoid Fens (CP2B0B1000) and Acidic Shrub Fens (CP2B0B2000)
19 Transect Samples; 8 Releve Plots
72 Species

Poor Fens are the commonest pond-shore community at Lake Rohunta and cover extensive acreage, particularly in coves. Soils are permanently saturated and shallowly flooded at high-water periods. Scattered pools of standing water may remain through the growing season but most of the ground surface is emersed. Some areas have pronounced hummock-and-hollow topography others are relatively flat.

The fen communities have all developed in coves that were shallowly flooded when the lake was created. Comparisons of historic and modern maps suggest that the original Eagleville dam, built around 1860 and the current (1943) Partridgeville dam maintain the same pool level in the lake south of Eagleville and, thus, the fens have had some 140 years of time to develop. Substantial accumulations of peat under the shoreline fens (40 – 50 cm) support this conclusion.

Half submerged cut stumps – the remains of the pre-lake forest – are common along the lakeshore and can also be found, by probing with a rod, beneath the peat throughout many of the fen communities. Stumps which emerge from open water support small, but surprisingly diverse shrub communities with a variety of associated herbs. A buried stump also invariably underlies shrub pockets in the open fens.

Soil profiles in the fens typically have the following pattern:

1. 40 - 50 cm of well preserved fibric peat. This material has presumably accumulated since the basin was originally flooded around 1860.
2. 1.5 - 2.5 meters of muck with wood fragments and well preserved tree roots in the upper region. This material is the original substrate and is indicative of forested swamp habitats.
3. Mineral soil.

Both shrub dominated and Sedge dominated fens occur, frequently appearing as patch mosaics, although large-area blocks of both types can also be found. The two communities are readily distinguished from afar, and larger patches can even be distinguished on aerial photographs due to the differences in vegetation structure. However, the two communities are very similar in species composition and were not distinct in cluster analysis (TWINSPAN) or ordination (DECORANA).

In the TWINSPAN classification, the fen samples emerge as a cohesive cluster at the third division (Fig. 3). Subsequent divisions of this cluster produce three sub-groups, which I have called: Type A Wet Fens, Type B Graminoid Fens, and Type 3 Shrub Fens. However, these clusters appear to be only marginally cohesive when evaluated in light of field notes (table 1) and plot data (table 2).

A fourth type characterized by widely scattered tall shrub pockets in a matrix of fen vegetation was observed several times in the field. Each tall shrub pocket generally covers only a few square meters, is composed of few, or a single species, and is invariably centered on a buried stump. The species composition of these pockets varies considerably from occurrence to occurrence so that overall they support a diverse flora of wetland shrubs. In TWINSPAN, samples of this type were misclassified as tall shrub swamps (three samples) and bog (one sample).

Table 2 shows the distribution of species among 27 samples in poor fen communities. *Chamaedaphne calyculata*, *Myrica gale*, and *Carex lasiocarpa* are the most frequently encountered species. Several other *Carex* species and a number of herbs are also regularly encountered and together can be used to reliably distinguish fen communities from other wetland types. The distinction between shrub fens and graminoid fens must be made on the basis of relative dominance of herbaceous versus woody species rather than differences in species composition. On the landscape, these communities form a continuum from those that are overwhelmingly shrub dominated (principally *Myrica gale* and *Chamaedaphne calyculata*) to those that are heavily dominated by graminoids and forbs. Mixed communities where neither growth form predominates are common (these often occur as fine grain mosaics with alternating patches of shrub and graminoid types).

Table 2

Poor Fen communities species composition. Values in cells reflect prominence of the species in the sample.

SP_CODE	Count	P01	P02	P03	P07	P15	P16	P17	P18	T02	T03	T04	T05	T06	T07	T08	T09	T15	T16	T17	T19	T23	T24	T45	T51	T52	T64	T65
MYRIGALE	26	1	1	2	2	1	2	1	1	2		2	3	3	2	2	1	3	2	2	2	2	3	2	1	3	2	2
CHAMCALY	25	1	1	2	3	2	3	1	2		3	2	3	3	2	3	1	3	2	2	2	2	3		1	3	2	3
CARELASI	24	2	2	1	1	2	1	2	1	3		2		3	3	2	3	1	3	3	3	2	2	3	3	2	3	
DROSINTE	20	1	1	1		1		1	1	1		1	2	1	2	1	2		1	1	1	2			2		2	1
SAGILATI	20	1	1	1	1	1		1	1	1		1		1	2	2	1		1	2				1	1	2	2	2
CARECANE	19	1		1	1	1	1	1	1	2		1	2		2	1	1	1			1				1	2	2	2
CAREUTRI	19	1		1		1	1		2	2		2	2	3	3	3	3	2	2	2	2			2			3	2
CEPHOCCI	19	1	1	2		1	1				2	1			2	2	1	1	2	1	2	2		2		1	2	1
TRIAVIRG	18	1	1	1		1		1	1	1		2			1	1	1		1	2	1		1	2	2		2	
PELTVIRG	17	1	1	1				1		1		2	2		2	2	1	2	2	1	2	2	2				1	
SPHAGNUM	17	1	1	3	3	2	3	2	2			2	3	2		3		3		2	3						3	3
DROSROTU	16		1	1	1	1	1		1	1		1	2	1		1		1	2		1					1		1
JUNCCANA	13	1	1			1		1	1	1					1	1	1		1	1					1		2	
ACERRUBR	12			1						1		1					1	1	2		1	2	1	1		1	1	
ALNUINCA	12		1								2	1					1	1	2	1	1			2		1	1	1
VACCCORY	12	1			1		1					1	2		1		1		2			2				1	1	1
TYPHLATI	11		1		1	1									2				2		2	2	1	2		2	2	
CARESTRI	10									1		1			1			1	1	1	1	2		2			2	
SPIRTOME	10									1		1			2		1	1	1	1	1					1	1	
CAREATLA	9									1			1		2	1	1	1	1		1		1					
DULIARUN	9	1	1		1			1				1			1					1	1						2	
LYSITERR	9			1						1		2			1		1		1	2				1			1	
CARELACU	7		1	2		1	1													2							2	2
KALMANGU	7				1						2						1	1	1								1	1
NYMPODOR	7			1						1				2	1				2					1			2	
SPARAMER	7	1		1				1		1							1			2				1				
SPIRALLA	7									1		1					1		2		1	2				1		
CALACANA	6		1	1						1														1		1	2	
LYONLIGU	6														2		1	1	1			2					1	
PINUSTRO	6				1		1						1					1	1							1		
RHYNALBA	6					1		2	1																2		2	2
SARRPURP	6				1								2	1	1						1				1			
THATCH	6	3	3	2		2		3	3																			
UTRIINTE	6			1				1				1							1		1					1		
ASCLINCA	5																		1		1	2	1	2				
GALITRIF	5	1	1	1																1						1		
JUNCPELO	5	1	1	1		1																					1	
ROSAPALU	5																		2	1		2	2	1				
CICUBULB	4		1	1											1											1		
CLETALNI	4	1															1	1				2						
DECOVERT	4																				2	2	3		1			
UTRIVULG	4	1												2	1				1									
ARONMELA	3																						1			1	1	
CAREBULL	3																			2							2	2
ELEOPALU	3									1												2					2	
ERIOTENE	3	1	1		1																							
NEMOMUCR	3																	1	1								1	
THELPALU	3																		1			2		1				
ARONARBU	2				1					1																		
BRASSCHR	2													2													2	
EPILSTRI	2	1		1																								
ERIOVIRG	2				1								1															
HYPEBORE	2			1																					1			
NUPHVARI	2													2					2									
OSMUREGA	2																		1			2						
PONTCORD	2																							2			1	
VACCMACR	2															1						2						

Streamside Shallow Emergent Marshes (CP2A0A1300) and Shrub Swamps (CP2A0C0000)
4 transect samples; 2 Releve plots
83 species

Vegetation along three perennial streams (Bow Brook, Cold Brook and Willow Brook) was sampled. These streams all have broad, wetland flats associated with them. The predominant cover types are shrub swamps and shallow emergent marshes. Some examples have a park-like red maple canopy. Tussock-forming sedges are common and hummock-and-hollow topography is typical. Many species are segregated between hummocks and hollows. Soils are mucky with little peat accumulation. Shrub dominated and herbaceous types are not distinct in multivariate analyses and are treated here as a single community type under the name "streamside marsh". Plots from the three stream systems, whether shrub dominated, graminoid dominated, mixed, and with or without light tree cover, cluster together in multivariate analyses (fig. 2&3). They are distinct from physiognomically similar vegetation types in pondshore and kettle hole settings. Good Indicator Species include:

Asclepias incarnata
Calamagrostis canadensis
Carex stricta
Cicuta bulbifera
Osmunda regalis
Rosa palustris
Scirpus cyperinus
Solanum dulcamara
Thalictrum pubescens

Many shrubs are common in the type, but because they are also common in other wetland community types they are not strong indicators. Typically encountered shrubs include:

Spirea alba var *latifolia*
Spirea tomentosa
Alnus incana ssp *rugosa*
Myrica gale
Acer rubrum

Environmental factors associated with streamside habitats that may be instrumental in structuring the community include: increased supply of dissolved materials including nutrients and oxygen; Flushing of the rooting zone; Physical disturbance during flood events.

Tall Shrub Communities (CP2A0C0000)
8 transect samples; 2 releve plots
91 species

Tall shrub swamp communities are found in the same physical position as pondshore fens (shallow, peat-filled coves adjacent to the pond). They are sometimes found in close proximity to the fens but appear to be concentrated in the northern half of the study area whereas fens are predominantly in the southern half. Site differences that might explain the distributions of the two communities are not apparent.

The community is characterized by dense stands of tall shrubs. Openings with good herbaceous cover are often present. Many examples have hummock-and-hollow topography with shrub clumps occupying the hummocks. Sphagnum cover may be locally heavy. Species diversity is high (91 species in 10 samples). Many tall shrub species typically coexist in each community occurrence.

Good indicator species include:
Alnus incana ssp. rugosa
Amelanchier spp.
Aronia arbutifolia
Lyonia ligustrina
Thelypteris palustris

Species which are nearly always present but which do not make good indicators because of their distribution in other types as well include:
Chamaedaphne calyculata
Myrica gale
Vaccinium corymbosum
Ilex verticellata
Nemopanthus mucronata
Kalmia angustifolia

Kettle Bogs (CP2B0C1100)
10 samples
42 species

Six kettle hole bogs were located and sampled. In the TWINSPAN classification, five of these form a discrete group, the sixth is misclassified with the tall shrub communities. The misclassified bog is species poor and graminoids and forbs are completely lacking. It does, however clearly belong in the bog group, not the shrub swamps. In addition, the TWINSPAN classification places two fen samples and two tall shrub swamp samples in the same cluster as the true kettle bogs. Explanations for these misclassifications have not been sought, but these samples have been excluded from the following descriptions.

Low heaths dominate the bogs, often times with spotty cover of black spruce saplings and sometimes tamarack (Type C and Type D Dwarf Ericaceous Shrub Bogs in the Kearsley [1996] Massachusetts peatland classification). Tall shrubs are common, particularly around moted edges and typically include *Nemopanthus mucronata*, *Vaccinium corymbosum* and *Aronia melanocarpa*. The herbaceous flora is not particularly diverse but the State Watch Listed *Smilacina trifolia* (*Maianthemum trifolium*) is sometimes abundant. *Calla palustris* and *Carex cannescens* are also frequently present.

The bog west of Willow Brook (T21) was sampled by Kearsley (1999) as part of her survey of non-forested acidic peatlands in Massachusetts. It is classified as an I.B.1.a [Type C] dwarf ericaceous shrub bog with vegetation of the Chamaedaphne calyculata-Kalmia polifolia-Maianthemum trifolium association. It is the only peatland in the Valley District that received an "A" rank and is currently being tracked by the Massachusetts Natural Heritage and Endangered Species Program as an exemplary example of the community type (Element Occurrence CP2B0C1100*MA*008). Since fieldwork for this project was completed, a commercial sand and

gravel mining operation has commenced on the land adjacent to the bog. During field inventory, a newly placed property boundary marker was observed in the bog suggesting that at least a portion of the bog is on the parcel being mined.

One of the two kettle bogs south of cold brook (misidentified as shrub swamps in the WCP Wetlands Inventory) has vegetation that closely approximates that in the Willow Brook bog. It is smaller, but richer in species than the Willow Brook bog and is probably worthy of an A or AB EO rank.

Forested Swamps
7 samples
72 species

Wooded swamps in the study area, for-the-most-part, occupy positions between pondshore fens or shrub swamps and uplands. Surface elevations tend to be at or near that of the pond and it is presumed that hydrologies were altered when the reservoir was created. Some stands clearly receive minor amounts of seepage from surrounding uplands, and two stands are in a fluvial setting adjacent to Cold Brook. One isolated seepage swamp was sampled (T20 south of Branch Bridge Road) but it was identified as an outlier in multivariate analyses and was omitted from the data set. Two spruce swamps (T69, west of North Spectacle Pond, and T60 south of Cold Brook) sit over deep peat deposits (± 3 m).

Fifteen samples were collected in forested swamps. Although the first TWINSPAN division accurately separates the forested swamp plots from other wetland types, subsequent divisions produce only two more sensible clusters (a cluster of three odd-ball "orphan" plots, and a cluster of four fluvial/seepage swamp plots. The remaining nine plots include representatives of spruce swamps, hemlock swamps, classic red maple swamps, and mixed swamps. The difficulty in dividing this heterogeneous cluster more finely is probably due to its small size (9 plots) and lack of enough replicate samples in each type.

Fluvial/Seepage Swamps (4 Plots, 92 species)
Plots: T53, T57, T68, T71 (P08)

Four plots stand out for their diversity of tree species and floras rich in *Carex* species and grasses (11 and 7 species respectively). Three of these stands are along small streams (two on Cold Brook, one on Bow Brook) the fourth occupies flats on both sides of a seasonal stream (not shown on topo maps but evident in the field) south of Michael Lane. Common tree species include *Acer rubrum, Betula alleghaniensis, Betula populifolia, Fraxinus nigra, Tsuga canadensis, Pinus strobus,* and *Picea rubens*. *Nyssa sylvatica, Ulmus americana,* and *Pinus rigida* may also occur. Tall shrubs that sometimes form dense thickets dominate the understory. *Nemopanthus mucronatus*, *Ilex verticellata*, and *Vaccinium corymbosum* are especially common. *Toxicodendron vernix* is sometimes alarmingly abundant. Herb cover is generally low, but diversity is high with ferns, grasses, sedges and forbs all well represented. T71, on Bow Brook is somewhat different form the other three plots in that tree species are mostly of shrub and sapling stature. It was originally subjectively classified as a shrubby variant of the streamside meadow community, however its placement with the fluvial swamp plots by TWINSPAN appears correct.

Spruce Swamps (2 plots, 38 species)
Plots: T60, T69, (P14)

Red spruce occurs as an occasional associate in many forested swamps, but becomes dominant over substantial areas in two swamps in the study area. It is unclear how closely related the two spruce swamps are - they do not cluster together in the TWINSPAN classification (fig. 3) and are rather distant from each other in ordination space (fig. 2). Floristic similarities are not particularly strong. However, a larger data set is needed before these swamps can be reliably classified. The two stands are described separately below.

Spruce Swamp T60; NRC Wetland Tile #137922, Polygon #133

The community occupies a long, linear, peat-filled valley confined by low ridges to the north and south. Peat depth exceeded the 186 cm rod length on three of five probes and was 176 cm at two probe locations. Sub surface material left clinging to the rod was chocolate-brown well-decomposed hemic peat.

Sphagnum and other mosses carpet the ground surface. *Osmunda cinnamomea* is locally abundant, otherwise herbs are sparse and include: *Coptis trifolia, Gaultheria hispidula, Maianthemum trifolia* (state watch-list), *Sarracenia purpurea, Carex brunescens and Carex trisperma*. Shrub cover is patchy, varying from 0%-20% cover. Locally common species include: *Vaccinium corymbosum* and *Nemopanthus mucronatus*. *Picea rubens* is the dominant tree but is locally co dominant with *Larix laricina*. *Acer rubrum* is common and *Pinus strobus* occasional.

Spruce Swamp T69 (P14); NRC Wetland Tile #37918, Polygon #86

The community occupies a broad, flat, shallow basin. Surface water flowage into or out of the swamp is not evident. Peat depth exceeded 300 cm (maximum rod length) on four of five plunges. Subsurface peat extracted with the rod consisted of well-decomposed hemic materials.

Sphagnum and other mosses carpet the ground and climb over stumps and logs forming a continuous blanket. *Osmunda cinnamomea* has heavy cover over large areas but is locally sparse. Herbaceous species are otherwise sparse and include: *Coptis trifolia, Thelypteris simulata, Gaultheria hispidula, Dalibarda virginica*, and *Carex trisperma*. Shrub cover is light with *Kalmia latifolia* the most abundant species. *Picea rubens* is the dominant canopy species but is locally co dominant with *Tsuga canadensis*. *Acer rubrum* and *Betula alleghaniensis* are common associates.

Miscellaneous Swamp Forests (3 plots, 41 species)

Plots T01, T35, T47

These plots represent common red maple and mixed Hemlock-Red maple swamps. There are too few plots in this group for any kind of meaningful analysis.

Orphans (3 Plots)

Plots T18, T37, T55

These plots were separated from the rest of the data set at the second TWINSPAN division. They appear to be poorly related to each other floristically and have only weak affinities with other clusters. They were subjectively classified as a tall shrub swamp, a red maple swamp, and a mixed swamp. They are sufficiently different from other plots in the data set that they are best left unclassified.

AQUATIC VEGETATION

Lake Rohunta is a shallow, eutrophic pond that, with minor exceptions, supports dense aquatic vegetation from shore-to-shore throughout the study area. Aquatic vegetation was surveyed using rapid assessment sampling (15 samples) and 1 m x 1 m releves (33 samples). In a subset of the releves (14 quadrats), vegetation was harvested and processed for biomass measurement.

General Description

There are three physiognomic aquatic vegetation types on the pond:

Group 1, Aquatic Beds: Areas dominated by submerged aquatic species such as *Utricularia spp*., *Myriophyllum spp*. and *Cabomba caroliniana*. Floating leaved species have light cover or are absent.

Group 2, Floating Leaved Communities: Areas dominated by floating leaved species such as *Nymphaea odorata* and *Brassenia schreiberi*. Aquatic bed species are normally present but typically at lower density than in group 1.

Group 3, Deep Emergent Marsh: Shallowly flooded areas dominated by *Pontederia cordata*. Other emergent forbs and graminoids may be present but are typically of low abundance. Aquatic bed species and floating leaved species from groups 1 and 2 are often present.

Evaluation of sample data suggest that of the three physiognomic types, Group 2 and Group 3 can each be treated as a single community type. Group 1 can be divided into two cohesive communities consisting of (i) Deep Water Beds dominated by the non-native species *Cabomba caroliniana* and *Myriophyllum heterophyllum*, and, (ii) Shallow Water Beds dominated by a suite of native aquatic macrophytes.

Figure__ shows the distribution of component species by water depth.

Community Descriptions

Deep Water Aquatic Beds

Deep Water Aquatic Beds cover portions of the pond where water is greater than about one meter in depth. The invasive exotic *Cabomba caroliniana* is dominant. *Myriophyllum heterophyllum* (also an invasive exotic) is commonly found mixed with *Cabomba* and also occurs as small dominance patches in the *Cabomba* matrix. Native *Utricularia* species are often present at low abundance. Floating leaved species (particularly *Nuphar variegatum*) are sometimes present but tend to be scattered with light cover.

The aquatic beds are dense with total cover typically at or near 100%.

Shallow Water Aquatic Beds

Shallow water aquatic beds occupy areas with water depths less than about 1 meter. Five *Utricularia* species (*U. purpurea, U. radiata, U vulgaris, U. intermedia, and U. gibba*) are the principal component species with *U. purpurea* the most frequent and abundant of the five. *Najas*

flexilis, Najas gracillima, and a variety of *Potamogeton* species are often present. The community reaches its best development in patches where floating leaved species are scarce or absent, but in practice, it usually occurs as a mosaic with floating leaved species and the distinction between this community and the next is not always clear.

Floating Leaved Community

The floating leaved species *Nymphaea odorata, Nuphar variegatum* and *Brassenia schreiberi* cover vast areas of shallow water on Lake Rohunta. Each of these species may form dominance patches covering tens of square meters (apparent in the 1- m^2 releve plots) but at larger grain sizes the species appear as co dominants in the community and are treated as such here for classification purposes. Cover approaches 100% in many areas. *Potamogeton natans, Potamogeton epihydrous*, and *Scirpus subterminalis* are common associates. Species from the Shallow Water Aquatic Bed community are nearly always present under the floating leaved canopy – sometimes at high cover values, and distinctions between the two communities are often vague.

Deep Water Emergent Marsh Community

Emergent marshes are not widespread at Lake Rohunta. They occur occasionally as narrow shoreline bands in shallow water and cover more extensive areas in muddy shallows at the southern end of the pond. The dominant species is *Pontederia cordata*, which often forms dense floating, mats. Common associates include: *Eleocharis palustris* and *Scirpus validus. Eriocaulon aquaticum, Sagittaria latifolia* and *Scirpus subterminalis* are sometimes present. Floating leaved and native aquatic bed species from the previous communities are normally present at low abundance levels.

Notes on non-native exotic species

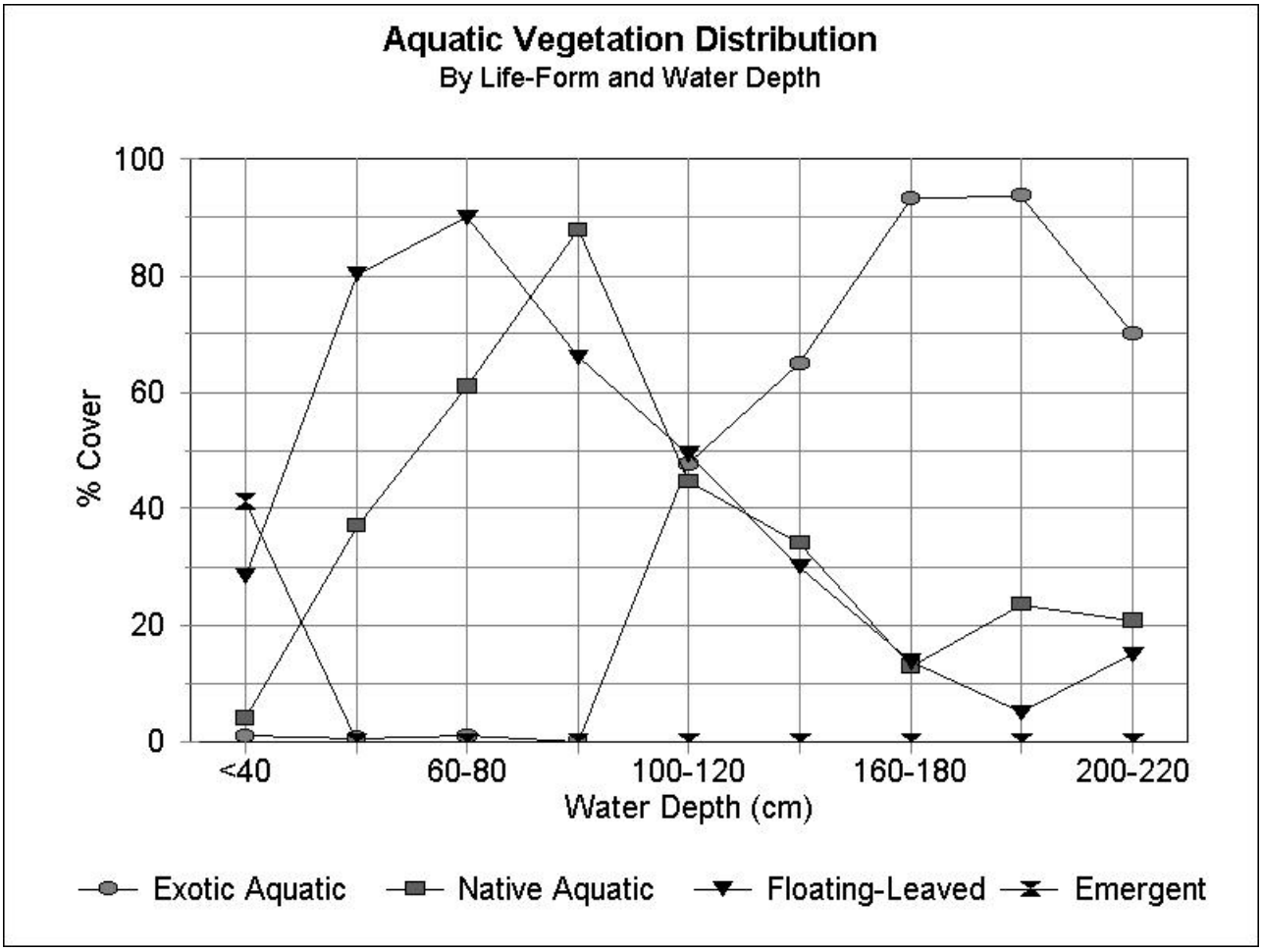
Lake Rohunta is heavily infested with the non-native invasive species *Cabomba caroliniana* (fanwort) and *Myriophyllum heterophyllum* (variable milfoil). Of the two, *Cabomba* is by far the more prevalent. The two species are normally found growing together in mixed or mosaic (alternating dominance patch) stands at very high densities. The earliest documentation of *Cabomba* at Lake Rohunta is a specimen at the UMASS herbarium collected by Robert Livingston in 1960. Infested areas of the lake north of Branch Bridge were treated with herbicides in the mid 1990s. The management may have caused a change in the relative abundance of *Myriophyllum* and *Cabomba* (Rick Wilke, personal communication) but were otherwise ineffective.

Populations of common reed (*Phragmites australis*) were encountered in two wetlands in the study area: In a streamside marsh on Cold Brook (T56 on Map 3) and in the fen south of the Branch Bridge causeway (T09 on Map 4). Of the two, the Cold Brook infestation is by far the more serious with a dense, robust stand covering several hundred square meters. The Branch Bridge population was treated with herbicides in 1998 (Rick Wilke, personal communication). The residual stand is sparse and of short stature but will undoubetedly gain ground in the absense of additional management.

One of the more alarming consequences of invasions is the possibility for the loss of less competitive native species. At Lake Rohunta, however, the exotic aquatic bed species are restricted in their distributions to the deepest waters (1-2 meters) and native communities continue to thrive in water less than 1 meter in depth (Fig.4). The boundaries between native and exotic communities are typically abrupt with mixed stands occupying only a very narrow band around the 1-meter water

level. After forty years of residence on the pond it is reasonable to presume that the boundaries between native and exotic species populations are relatively stable and that the native species communities are not in peril of being over-run by exotics. On the other hand, *Phragmites* is actively encroaching on native wetland communities and appears to be causing changes in species composition in heavily infested portions of the Cold Brook marsh. Infestation of the extensive pondshore fen communities could cause serious degredation of this critical habitat.

Figure 4



FLORA

The list of 193 vascular plant species found in wetland and aquatic habitats in the study area can be found in the appendix. Upland areas were not inventoried, however, some species more typical of upland habitats have are included in the flora if they were encountered in wetlands. One state listed species (*Maianthemum trifolia*; Watch List) was found. It is among the dominant herbs in three kettlehole bogs and is present in two forested swamps.

LAKE ROHUNTA REPTILE AND AMPHIBIAN INVENTORY
FINAL REPORT: JUNE 30, 2000

GOALS

1. Document as many locations of focus species as possible. Focus species are rare species that could potentially be found in this study area.

Focus Species	MA Status	Search Strategies (see below)
Jefferson Salamander	SC	1,2,10
Four-toed Salamander	SC	2,5
Marbled Salamander	T	1,1A
Northern Spring Salamander	SC	8
Eastern Spadefoot Toad	T	3
Northern Leopard Frog		6
Spotted Turtle	SC	1,4,7,8
Wood Turtle	SC	4,7,8
Eastern Box Turtle	SC	8,11
Eastern Hognose Snake	watch list	6

2. Keep a count of sightings of any other herp species found in the study area.

3. Locate and certify vernal pools in the study area.

METHODS

Methods used and time spent:	Field Hours
1. Search and dip net in vernal pools with water	15.25
1A. Search dry vernal pool basins	2.0
2. Nocturnal road cruises on wet, spring nights	4.0
3. Nocturnal and daytime road cruises during and within 3 days of torrential downpour	3.25
4. Turtle traps	15.75
5. Search sphagnum areas	9.5
6. Cover boards	19.75

7. Look in sandy, open areas for nesting turtles, especially in early morning	18.5	
8. Search in streams	6.0	
9. Search pond edges	2.75	
10. Minnow traps for salamanders	1.0	
11. Walking, driving, or canoeing within study site		24.75
Total field hours		122.5

RESULTS

The following results are organized according to the methods used.

1. Search and dip net in vernal pools containing water: Twenty-one vernal pools were searched in late spring of 1999 and early through late spring 2000. Fifteen pools contained at least one mass each of wood frog eggs, and twenty pools contained at least one mass of spotted salamander eggs. One pool (ROH 23) contained about a thousand eggs of Jefferson salamanders. This same pool also contained abundant eggs of wood frogs and spotted salamanders. Vernal Pool ROH 13 was remarkable in containing an unusually high number of spotted salamander egg masses (79).

1A. Search dry vernal pool basins: Searching dry vernal pool basins can sometimes yield findings of marbled salamanders hiding beneath logs, leaf litter or other cover. I found and thoroughly searched four dry vernal pools (ROH 3, ROH 7, ROH 11, and ROH 12) on 26 Aug 99 and 02 Sep 99. ROH 3 and ROH 12 had quite a bit of bare mud and little leaf litter or other cover. No marbled salamanders were found, but a recently metamorphosed spotted salamander was found in ROH 12, and fingernail clams were found in ROH 11. Vernal pools not searched for marbled salamanders were either part of sphagnum bogs (5), lacking any suitable cover on the pond floor (3), still containing water in fall (3) or not discovered yet (3).

2. Nocturnal road cruises on wet, spring nights: Road cruises were conducted on 09 Mar 00, 16 Mar 00, and 20 Jun 00. On all three nights, all the roads within the study area were covered. The first cruise yielded no sightings, probably because rainfall had ceased by the time the road cruise began, although the roads were still wet. On 16 Mar 00, the cruise yielded 2 spotted salamanders, 1 redback salamander, 4 wood frogs, 2 spring peepers, and notably, 4 Jefferson salamanders. The Jeffersons were found crossing South Athol Road next to vernal pool ROH 23. Temperatures on this night were in the low 40's and this could contribute to the low total number of amphibians found. The cruise on 20 Jun 00 yielded only a single American toad. It may be that this was late in the season to find many amphibians. Almost all the amphibians found with this method were found on paved roads, which comprised less than half of the total road distance.

3. Nocturnal and daytime road cruises during and within 3 days of torrential downpour: On the afternoon of 01 Jul 99 and the night of 06 Sep 99 searches by car were made to listen for the vocalizations of the eastern spadefoot. Heavy rains had preceded both of these times within the last 24 hours. This species was not detected, nor were any depressions that looked like they could form the ephemeral pools these amphibians need for breeding.

4. Turtle traps: During the nights of 16 Sep 99 through 23 Sep 99, six "David Carroll traps" were set out and baited with canned sardines. These traps are 36" long cylinders made of hardware cloth, with funnel entrances at either end, similar to a minnow trap. Six traps were placed in streams, swamps, and vernal pools with the intent of capturing spotted and possibly wood, musk, and painted turtles. On one night two of the traps were flooded by heavy rains of tropical storm Floyd, and had to be moved to new locations. A total of eight trap locations were used. No turtles were caught throughout the 36 trap-nights.

5. Search sphagnum areas: Sphagnum areas were searched for four-toed salamanders on 07 May 99, 13 May 99, and 05 May 00. Four-toed salamanders prefer the combination of vertical, fluffy, sphagnum hummocks to standing water. Although sphagnum is common throughout the study area in shrubby kettle holes, in the moist woods, and along streams, only six sites were found that had even two of the three preferred characteristics. Much of the sphagnum in the kettle holes is rather flat, and standing water may not be present. The six sites were searched thoroughly, and no four-toed salamanders were found. If future searches are to be conducted, the most likely areas, based on the desired characteristics, are the shrubby kettle hole north of Branch Bridge Road to the west of Lake Rohunta, and the swampy stream between the AT&T right-of-way and Bow Brook.

6. Cover boards: Cover "boards", made of ¼ inch paneling, wood boards, or rectangular carpet samples were placed at more than eighteen locations throughout the study area to attract snakes and amphibians. Most were at least 2' by 2' or smaller pieces were overlapped to make a cover at least this size. Locations were chosen along field edges, in sand pits, log landings, and small clearings. These were checked almost every time I was in the field for any purpose. In addition, several sites with pre-existing cover such as piles of boards, old tires, and discarded carpet were included in my regular checks of cover boards. Ten of eleven snakes I found with this method were found under pre-existing cover. One old pile of carpeting, along the edge of an old grassy logging road west of Blackington Road, was a treasure trove. It yielded seven sightings of three different snake species (northern black racer, northern ringneck snake, and eastern milk snake. Unfortunately, this site was taken over by wasps in the fall of 1999, and then was destroyed to make a log landing. The boards and carpet squares placed in the sandpit at the south end of a large field south of Branch Bridge Road were fairly good lures for a variety of common amphibians, especially pickerel frogs. Mice were also commonly found under cover boards. A spotted salamander was found under a stump in an old log landing. I was hoping to find hognose snakes because of the sandy soil on the study site. None were found by this method, and neither were very many toads, the staple food for this reptile.

7. Look in sandy, open areas for nesting turtles, especially in early morning: Ten areas within a few hundred meters of Lake Rohunta, Cold Brook, or Willow Brook were searched on 16 Jun 99 and 24 Jun 99 for nesting turtles. All the areas were either sand pits, edges of agricultural fields, or grassy fields. Several predated turtle nests were found. Some were definitely snapping turtle, judging by

the thickness of the eggshells. Others were probably painted turtle nests, because they had thinner shells, the number of eggs in the clutch, and the juxtaposition of the nests to aquatic habitat where I have seen painted turtles. On 11 Jun 00, from 6:15 to 9:20 a.m., I returned to the six sites where I found eggshells the previous year. The only turtles actually seen were two snapping turtles each digging a nest in the sand pit south of Branch Bridge Road. In addition I found several sites, possibly false nests, where digging was evident, and the remains of one predated nest containing about 24 thick-shelled eggs. A 1999 nesting site east of North Spec Pond Road has since been excavated into a large gravel pit. No signs of turtle nesting were found in 2000 around the perimeter of this new pit.

8. Search in streams: This method was used on 24 Jun 99 and 15 Jul 99 to look for stream salamanders in Riceville Brook and the streams leading into Willow Brook. In the Willow Brook area were found a northern dusky salamander and a two-lined salamander. In Riceville Brook were found six two-lined salamanders and one dusky. Both streams also were homes to several larval salamanders (either two-lined or dusky) that I could not identify. If northern spring salamanders inhabit these sections of the streams (not likely anyway because of low elevation), I feel they would have been found during these searches because "no stone was left unturned".

On 28 Oct 99 I searched Willow and Riceville Brooks unsuccessfully for wood turtles. Both streams are somewhat trashy, with old tires and other human-made debris evident. I am uncertain of the water quality and whether this might be a limiting factor for wood turtles.

Cold Brook was not searched because it is very densely shrubby and therefore difficult to access.

9. Search pond edges: This method was used to locate musk turtles and possibly other species of turtle hatchlings. The outlets of South Athol Pond and White Pond are areas where floating debris accumulates, and this debris was sifted through with a net, but no hatchlings were found. However, during this process in South Athol Pond, a musk turtle was found on 09 Sep 99 moving along the pond bottom. On the same day, a second musk turtle was found basking on the spillway that empties that pond.

10. Minnow traps: As an experiment, unbaited minnow traps were set out in the vernal pools ROH 3, 7, 8, 11, 12, 15, 18, 19, and 23 in an attempt to capture Jefferson salamanders, if present. According to John Behler, curator of herpetology at the Bronx Zoo, Jefferson salamanders enter these traps as they walk along the pond bottom. We caught only Spotted Salamanders with this method.

11. Walking, driving, and canoeing within study area: Many of the reptiles and amphibians found were chance sightings that occurred while I drove or walked within the site. Reptiles found dead along roads included a Hognose Snake, a milk snake, a water snake, a garter snake, a painted turtle, and two hatchling snapping turtles. Live reptiles found while driving were two Hognose Snakes, Northern Water Snake, and a snapping turtle. This is in addition to the amphibians found during nocturnal road cruises.

Some herps were observed by chance while I was either purposely looking for them or performing another task. Reptiles I found by chance while walking on the study site included the only sighting of a spotted turtle. This was found basking on 13 May 99 along the edge of the Cowl's

lumber road where a causeway crosses Cold Brook. Other herps found this way included a black racer, several garter snakes, and three snapping turtles. The snapping turtles were each slowly making their way down small sluggish streams that enter Lake Rohunta on the west, south of Branch Bridge Road. In addition, several dozen painted turtles and several more snapping turtles were observed in Lake Rohunta and the neighboring ponds while I was canoeing or walking along the shore.

SUMMARY OF RESULTS

Focus species found:
Spotted Turtle (*Clemmys guttata*), 13 May 1999: 1 sighting in vernal pool bordering Cold Brook, next to Cowls lumber road
Jefferson Salamander (*Ambystoma jeffersonianum*), 16 Mar 2000: Four adults crossing South Athol Road next to vernal pool ROH 23; 12 Apr 2000: about 1000 eggs in vernal pool ROH 23

Less common species found:
Common Musk Turtle: 2 individuals in 1 location
Northern Black Racer: 2 sightings in 2 locations
Northern Ringneck Snake: 5 sightings in 3 locations
Eastern Milk Snake: 5 sightings in 2 locations
Eastern Hognose Snake: 3 sightings in 3 locations

Common species found:

Spotted Salamander	2 plus abundant eggs
Red Spotted Newt	22
Northern Dusky Salamander	6
Redback Salamander	37
Northern Two-lined Salamander	7
Eastern American Toad	14 plus abundant tadpoles in Cold Brook
Northern Spring Peeper	9 (including vocalizations)
Gray Tree Frog	9 (all vocalizations)
Bullfrog	11
Green Frog	43 (including vocalizations)
Wood Frog	10 plus abundant eggs and tadpoles
Pickerel Frog	15 (including vocalizations)
Common Snapping Turtle	11
Eastern Painted Turtle	60+
Northern Water Snake	2
Eastern Garter Snake	9
Eastern Smooth Green Snake	1 (Photo record by D.H. Small 8/29/1994)

Note: The numbers observed do not necessarily reflect relative abundance because some species are more easily observable than others.

Species potentially occurring in this range but not found:
Marbled Salamander
Blue-spotted Salamander
Four-toed Salamander
Northern Spring Salamander
Eastern Spadefoot
Fowler's Toad
Northern Leopard Frog

Wood Turtle
Eastern Box Turtle
Northern Brown Snake
Northern Redbelly Snake
Eastern Ribbon Snake
Black Rat Snake

VERNAL POOL CERTIFICATION

Vernal pools were located by exploring by car and by foot, and by using aerial photos. Documentation will be submitted to the Natural Heritage and Endangered Species Program to certify twenty vernal pools found in the study area. All these pools contained at least two egg masses of spotted salamanders, and most were sites of wood frog breeding as well. Five pools stand out in terms of the abundance or variety of species found. ROH 4 was the only pool found to contain fairy shrimp. In ROH 11 were fingernail clams, and historical records of Jefferson salamanders. ROH 13 and ROH 14 are interesting in that they occur in cranberry bogs, and ROH 13 had a remarkable number of spotted salamander egg masses—79--- but no signs of wood frogs except two tadpoles. ROH 10, located in a deep, steep-sided depression, also had a notable abundance of amphibian eggs: 36 spotted salamander egg masses and a huge raft of wood frog eggs. ROH 23 was the single most impressive vernal pool, containing not only an abundance of spotted salamander and wood frog eggs, but also a good number of Jefferson salamander eggs.

Figure 5. Target Species

Site	Date	Species	Number	Method
A	4/29/99	Spotted Salamander	1	Turning Logs
B	4/30/99	Black Racer	1	Chance sighting
C	4/30/99	Ring neck snake	1	Turning Covers
C	5/13/99	Ring neck snake	1	Turning Covers
C	5/27/99	Milk Snake	1	Turning Covers
C	5/27/99	Black Racer	1	Turning Covers
C	6/12/99	Ring neck snake	1	Turning Covers
C	7/1/99	Milk Snake	1	Turning Covers
C	7/15/99	Milk Snake	1	Turning Covers
C	7/24/99	Milk Snake	1	Turning Covers
D	5/27/99	Milk Snake	1	Dead on road
E	5/27/99	Ringneck Snake	1	Turning Covers
F	6/24/99	Ringneck Snake	1	Turning Covers
G	6/24/99	Dusky Salamander	3	Turning rocks in stream
H	8/9/99	Musk turtle	2	Wading
I	5/13/99	Spotted turtle	1	Chance - walking
J	3/16/00	Jefferson salamander	4	search driving
J	4/12/00	Jefferson salamander eggs		Wading
K	7/15/00	Two lined salamander	6	turning rocks
K	7/15/00	Dusky salamander	1	turning rocks
G	6/24/99	Two lined salamander	1	turning rocks in stream

Lake Rohunta Invertebrate Summary

Invertebrates in the Lake Rohunta basin were sampled by a variety of specialists through selected searches of habits of interest. The vast number of genera, infrequency of the searches, and the elusive nature of many of the species of interest makes this summary a snapshot of known invertebrates and not a definitive list. Habitats where rare or unusual species were located or are of interest for future study are indicated below.

1. The entire length of the stream from South Athol Pond to the southern end of Lake Rohunta where Triangle floater *Alasmidonta undulata*, a freshwater mussel of "Special Concern", was observed.
2. The kettle bogs West of Willow Brook produced observations of the "Watch Listed" Elfin Skimmer *Nannothemis bella*- and New England Bluet *E. laterale*- a damselfly of "Special Concern". The "watch listed" Big Sand Tiger Beetle *Cicindela Formosa* and *Cicindela scutellaris* with which it often occurs were present in open sand areas in this vicinity. Recent gravel operations on property adjacent to the kettle bogs while producing potential habitats for Cicindela may have extremely negative implications for the Odonate species and water regime of the bogs.
3. Gravel operation at E.W. Sykes adjacent to South Athol Pond, contains early successional habitat sand numerous shallow pools and streams. Species of interest observed here include the "watch listed" Harvester Butterfly *Feniseca tarquinnius*, Common Buckeye *Junonia coenia*, Variegated Fritillary *Euptoieta claudia*, Milbert's Tortoiseshell *Nymphalis milberti*, "watch listed" Martha's Pennant *Celithemis martha* and Unicorn Clubtail *Arigomphus villosipes* (DHS).
4. A rare ant species in Massachusetts *Dolochoderus pustulatus* was located in the sphagnum area Northeast of Branch Bridge. A more detailed look at this location may prove interesting.
5. The small pond/bog and associated wetlands just south of White Pond and The northwest end of South Athol Pond appeared to have good examples of bog habitat but were not adequately explored in this project.

Lake Rohunta Butterfly Summary

The dominance of forest cover in the Rohunta Basin reflects the general low numbers of species recorded in the study area. Woodland species such as Mourning Cloak, Little Wood Satyr, Appalachian Brown, Eastern Comma and Question Mark were observed through out the area in suitable microhabitats. Three managed/disturbed areas stood out as enclaves of broader butterfly diversity: Morgan Memorial Residential Camp, The large Gravel Pits of the E.W. Sykes Gravel and Construction Company and the abandoned right of way of an AT&T underground cable which bisects the study area east to west North of North Spectacle Pond.

Members of the Athol Bird and Nature Club, including Mike Polana, Dolores Price and Dave Small, visited the area over a three-year period. These visits occurred on days when the temperature was above 60 degrees and had at least partial sunshine. All observers are experienced butterfliers.

Identifications were made by observing free flying Butterflies with close-focusing binoculars. In cases where identification was difficult netting and close observation were employed as a back up.

Camp Morgan Memorial: several fields, which remained uncut for most of the observation season created good general butterfly habitat where Clouded and Orange Sulphurs, Cabbage White, several species of Grass Skippers and Fritillaries were recorded. These species are widespread and common in the region.

AT&T underground cable right of way: The stretch of cable line east of Blackington Road was the most interesting area for butterflies. The 30 foot wide cut, which had been maintained by mowing until approximately 1995 is dominated by grasses and shrubs bordered by oak barrens. The linear structure of this area is conducive to congregating woodland butterflies. Morning Cloaks were observed patrolling the right of way often encountering and interacting with others of its species. Juvanal's, Dreamy, and Sleepy Duskywings were drawn to this habitat in large numbers (over 50 individuals in a 30 meter area). This site also produced the only Cobweb Skipper, usually associated with much larger Grasslands habitat

E.W. Sykes Gravel Pit: This 50 acre Gravel mining and processing operation is at a point where the native gravel has been mined and processing efforts are centered on imported material. A large portion of the mined area is in early successional cover of grasses and shrubs, interspersed with numerous small ponds and pools. The company uses the area, in different ways depending on operational needs creating a diverse mixture of plant species. Highlights have included the presence of Harvester Butterflies and their larval host insect Alder Wooly Aphid, Breeding Common Buckeye, and Milbert's Tortoiseshell.

A Preliminary list of Butterfly Species observed in the Lake Rohunta Vicinity

SWALLOWTAILS - ***Papilionidae Papilioninae***

Black Swallowtail *Papilio polyxenes*
Eastern Tiger Swallowtail *Papilio glaucus*
Canadian Tiger Swallowtail *Papilio canadensis*

WHITES - ***Pieridae Pierinae***

Cabbage White Pieris rapae

SULPHURS - ***Pieridae Coliadinae***

Clouded Sulphur *Colias philodice*
Orange Sulphur *Colias eurytheme*

HARVESTERS - ***Lycaenidae Miletinae***

Harvester *Feniseca tarquinius*

COPPERS - ***Lycaenidae Lycaeninae***

American Copper *Lycaena phlaeas*

HAIRSTREAKS - ***Lycaenidae Theclinae***

Banded Hairstreak *Satryium calanus*
Striped Hairstreak *Satyrium liparops*
Eastern Pine Elfin Callophrys niphon

BLUES - ***Lycaenidae polyommatinae***

Eastern Tailed-Blue *Everes comyntas*
Spring Azure *Celastrina ladon*

FRITILLARIES - **N*ymphalidae Heliconiinae***

Variegated Fritillary *Euptoieta claudia*
Great Spangled Fritillary *Speyeria cybele*
Aphrodite Fritillary *Speyeris aphrodite*
Silver-bordered Fritillary Boloria selene

BRUSH-FOOTS - ***Nymphalidae Nymphalinae***

Pearl Crescent *Phyciodes tharos*
Question Mark *Polygonia interrogationis*
Eastern Comma *Polygonia comma*
Mourning Cloak *Nymphalis antiopa*
Milbert's Tortoiseshell *Nymphalis milberti*
American Lady *Vanessa virginiensis*
Red Admiral *Vanessa atalanta*
Common Buckeye *Junonia coenia*

ADMIRALS AND RELATIVES ***Nymphalidae Limenitidinae***

Red-spotted Purple *Limenitis arthemis*
White Admiral *Limenitis arthemis arthemis*
Viceroy *Limenitis archippus*

SATYRS - ***Nymphalidae Satyrinae***

Northern Pearly-eye *Enodia anthedon*

Appalachian Brown	*Satyrodes appalachia*
Little Wood-Satyr	*Megisto cymela*
Common Ringlet	*Coenonympha tullia*

MONARCHS	***Nymphalidae Danainae***
Monarch	*Danaus plexippus*
SPREAD-WING SKIPPERS	***Hesperiidae Pyrginae***
Silver-spotted Skipper	*Epargyreus clarus*
Northern Cloudywing	*Thorybes pylades*
Dreamy Duskywing	*Erynnis icelus*
Juvenal's Duskywing	*Erynnis juvenalis*
GRASS SKIPPERS -	***Hesperiidae Hesperiinae***
Least Skipper	*Ancyloxypha numitor*
European Skipper	*Thymelicus lineola*
Leonard's Skipper	*Hesperia leonardus*
Cobweb Skipper	*Hesperia metea*
Indian Skipper	*Hesperia sassacus*
Peck's Skipper	*Polites peckius*
Tawny-edged Skipper	*Polites themistocles*
Long Dash	*Polites mystic*
Northern Broken-Dash	*Wallengrenia egeremet*
Little Glassywing	*Pompeius verna*
Delaware Skipper	*Anatrytone logan*
Hobomok Skipper	*Poanes hobomok*
Dun Skipper	*Euphyes vestris*

Prepared by David Small
Observers: Mike Polana, Dolores Price, David Small

A Preliminary Checklist to the Dragonfly and Damselfly Species Found in the Lake Rohunta Vicinity

DRAGONFLIES	**ANISOPTERA**
Darners	**Aeshnidae**
Mottled Darner	*Aeshna clepsydra*
Spatterdock Darner	*A. mutata*--**Endangered**
Green-striped Darner	*A. verticalis*
Common Green Darner	*Anax junius*

Springtime Darner	*Basiaeschna janata*
Harlequin Darner	*Gomphaeschna furcillata*
Clubtails	**Gomphidae**
Black-shouldered Spinyleg	*Dromogomphus spinosus*
Lancet Clubtail	*Gomphus exilis*
Emeralds	**Corduliidae**
American Emerald	*Cordulia shurtleffi*
Petite Emerald	*Dorocordulia lepida*
Racket-tailed Emerald	*Dorocordulia libera*
Beaverpond Baskettail	*Epitheca canis*
Common Baskettail	*E. cyanosura*
Prince Baskettail	*E. princeps*
Uhler's Sundragon	*Helocordulia uhleri*
Skimmers	**Libellulidae**
Calico Pennant	*Celithemis elisa*
Halloween Pennant	*C. eponina*
Martha's Pennant	*C. martha*- **Watch list**
Eastern Pondhawk	*Erythemis simplicicolis*
Frosted Whiteface	*Leucorrhinia frigida*
Hudsonian Whiteface	*L. hudsonica*
Dot-tailed Whiteface	*L. intacta*
Red-waisted Whiteface	*L. proxima*
Spangled Skimmer	*Libellula cyanea*
Blue Corporal	*L. deplanata*
Slaty Skimmer	*L. incesta*
Chalk-fronted Corporal	*L. julia*
Widow Skimmer	*L. luctuosa*
Common Whitetail	*L. lydia*
Twelve-spotted Skimmer	*L. pulchella*
Four-spotted Skimmer	*L. quadrimaculata*
Elfin Skimmer	*Nannothemis bella*-**Watch Listed**
Blue Dasher	*Pachydiplax longipennis*
Spot-winged Glider	*Pantela hymenaea*
Eastern Amberwing	*Perithemis tenera*
Carolina Saddlebags	*Tramea carolina*

DAMSELFLIES ZYGOPTERA

Broad-winged Damsels	**Calopterygidae**

Sparkling Jewelwing	*Calopteryx dimidiata*
Ebony Jewelwing	*C. maculata*
Spreadwings	**Lestidae**
Common Spreadwing	*Lestes disjunctus*
Emerald Spreadwing	*L. dryas*
Amber-winged Spreadwing	*L. eurinus*
Elegant Spreadwing	*L. inaequabilis*
Slender Spreadwing	*L. rectangularis*
Swamp Spreadwing	*L. vigilax*
Pond Damsels	**Coenagrionidae**
Variable Dancer	*Argia fumipennis violacea*
Skimming Bluet	*Enallagma geminatum*
New England Bluet	*E. laterale*-**Special Concern**
Orange Bluet	*E. signatum*
Vesper Bluet	*E. vesperum*
Lilypad Forktail	*Ischnura kellicotti*
Fragile Forktail	*I. posita*
Eastern Forktail	*I. Verticalis*

Prepared by Fred Morrison, September 2000
Observers: Fred Morrison, David McLain & Laurie Sanders

A Preliminary Checklist to the Aquatic invertebrate Species Found in the Lake Rohunta Vicinity

Date	Order	Genus or species	Common name	Collector	Notes
18-Sep-99	Isopoda	*Caecidotea communis*		P. Kusmierski	On a dive in May 99 we observed literally millions of these congregating on the bottom. S. Werle
18-Sep-99	Amphipoda	*Hyalella azteca*		D. Howe	
18-Sep-99	Amphipoda	*Crangonyx r. richmondensis*		C. Steinback	
9-Oct-99	Collembola		Springtail	E. O'Brien	
9-Oct-99	Collembola		Springtail	E. O'Brien	
5-May-99	Odonata	*Basiaeshna janata*	Springtime darner	S. Werle	
5-May-99	Odonata	*Pachydiplax longipennis*	Blue dasher	S. Werle	

5-May-99	Odonata	*Epitheca cynosura*	Common Baskettail	S. Werle	
5-May-99	Odonata	*Helocordulia uhleri*	Uhler's sunfly	S. Werle	
5-May-99	Odonata	*Libellula incesta*	Slaty skimmer	S. Werle	
5-May-99	Odonata	*Libellula julia*	Chalk-fronted skimmer	S. Werle	
18-Sep-99	Odonata	*Lestes sp.*		P. Kusmierski	
18-Sep-99	Odonata	*Macromia sp.*		P. Kusmierski	
18-Sep-99	Odonata	*Libellula sp.*		P. Kusmierski	
18-Sep-99	Odonata			C. Steinback	
18-Sep-99	Odonata	*Anax sp.*		C. Steinback	
9-Oct-99	Odonata	*Gomphus sp.*		E. O'Brien	
9-Oct-99	Odonata	*Boyeria sp.*		E. O'Brien	
9-Oct-99	Ephemeroptera	*Caenis sp.*		E. O'Brien	
9-Oct-99	Ephemeroptera			E. O'Brien	
18-Sep-99	Hemiptera	*Belostoma sp.*	Giant water bug	C. Steinback	
18-Sep-99	Hemiptera		Water boatman	C. Steinback	
18-Sep-99	Hemiptera	*Ranatra sp.*	Water scorpion	C. Steinback	
18-Sep-99	Hemiptera	*Nepa sp.*	Water scorpion	S. Werle	
18-Sep-99	Hemiptera		Backswimmer	C. Steinback	
18-Sep-99	Hemiptera	*Neoplea sp.*		E. O'Brien	
9-Oct-99	Hemiptera	*Limnorporus sp.*	Water strider	E. O'Brien	
18-Sep-99	Trichoptera			C. Steinback	
9-Oct-99	Trichoptera	*Ptilostomis sp.*		E. O'Brien	
9-Oct-99	Trichoptera			E. O'Brien	
18-Sep-99	Coleoptera	*Dineutus sp.*	Whirligig beetle	E. O'Brien	
18-Sep-99	Coleoptera			C. Steinback	
18-Sep-99	Coleoptera		Burrowing water beetle	C. Steinback	
9-Oct-99	Coleoptera	*Haliplus sp.*		E. O'Brien	
9-Oct-99	Coleoptera			E. O'Brien	
12-May-99	Hymenoptera	*Dolochoderus pustulatus*		S. Werle	This is a rare record for the state
12-May-99	Hymenoptera	*Vespula sp.*	Blackjacket	S. Werle	
18-Sep-99	Diptera		Biting midge	E. O'Brien	
18-Sep-99	Diptera		Non-biting midge	S. Werle	
18-Sep-99	Diptera		Ghost midge	S. Werle	

Lake Rohunta Wetland Flora

Nomenclature follows Gleason and Cronquist, 1993.

Pteridophytes

Athyrium filix-femina (L.) Roth var. *angustum* (Willd.) G. Lawson
Dryopteris cristata (L.) A. Gray
Equisetum fluviatile L.
Huperzia lucidula (Michx.) Trev.
Lycopodium obscurum L.
Onoclea sensibilis L.
Osmunda cinnamomea L.
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray
Pteridium aquilinum (L.) *Kuhn* var. *latiusculum* (Desv.) Underw. ex A.
Thelypteris palustris Schott
Thelypteris simulata (Davenp.) Nieuwl.
Woodwardia virginica (L.) J.E. Smith

Gymnosperms

Larix laricina (DuRoi) K. Koch
Picea mariana (Mill.)
Picea rubens Sarg.
Pinus rigida Mill.
Pinus strobus L.
Taxus canadensis Marshall.
Tsuga canadensis (L.) Carriere

Dicots

Acer rubrum L.
Alnus incana (L.) Moench. (*Alnus rugosa* (DuRoi) Spreng.)
Alnus serrulata (Aiton) Willd.
Anemone quinquefolia L.
Apios americana Medik.
Aralia nudicaulis L.
Aronia arbutifolia (L.) Elliott
Aronia melanocarpa (Michx.) Elliott
Asclepias incarnata L. var. *pulchra* (Ehrh.) Pers.
Aster nemoralis Aiton
Aster puniceus L.
Betula alleghaniensis Britton
Betula populifolia Marshall
Boehmeria cylindrica (L.) Swartz
Brasenia schreberi J.F. Gmel.
Cabomba caroliniana A. Gray
Caltha palustris L.
Carpinus caroliniana Walter
Cephalanthus occidentalis L.
Ceratophyllum echinatum A. Gray.
Chamaedaphne calyculata (L.) Moench
Chelone glabra L.
Chrysosplenium americanum Schweinitz
Cicuta bulbifera L.

Clethra alnifolia L.
Coptis trifolia (L.) Salisb.
Cornus amomum Mill. var. *amomum*
Cornus canadensis L.
Dalibarda repens L.
Decodon verticillatus (L.) Elliott
Drosera intermedia Hayne
Drosera rotundifolia L.
Eupatorium perfoliatum L. var. *perfoliatum*
Euthamia graminifolia (L.) Nutt. var. *nuttallii* (Greene) W. Stone
Fagus grandifolia Ehrh.
Fraxinus nigra Marshall
Galium asprellum Michx.
Galium tinctorium L. subsp. *tinctorium*
Galium trifidum L. var. *trifidum*
Gaultheria hispidula (L.) Muhl.
Gaultheria procumbens L.
Gaylussacia baccata (Wangenh.) K. Koch
Hamamelis virginiana L.
Hydrocotyle americana L.
Hypericum boreale (Britton) Bickn.
Ilex laevigata (Pursh) A. Gray
Ilex verticillata (L.) A. Gray
Impatiens capensis Meerb.
Kalmia angustifolia L.
Kalmia latifolia L.
Kalmia polifolia Wangenh.
Lindera benzoin (L.) Blume
Lonicera caerulea L. var. *villosa* (Michx.) T. & G.
Ludwigia palustris (L.) Elliott
Lycopus uniflorus Michx.
Lyonia ligustrina (L.) DC.
Lysimachia terrestris (L.) .
Mimulus ringens L. var. *ringens*
Mitchella repens L.
Myrica gale L.
Myriophyllum heterophyllum Michx.
Nemopanthus mucronatus (L.) Trelease
Nuphar variegata Durand
Nymphaea odorata Aiton var. odorata
Nymphoides cordata (Elliott) Fern.
Nyssa sylvatica Marshall var. sylvatica
Panax trifolius L.
Parthenocissus vitacea (Knerr) A. Hitchc.
Pilea pumila (L.) A. Gray
Polygonum arifolium L.
Polygonum sagittatum L.
Proserpinaca palustris L. var. *crebra* Fernald & Griscom
Quercus alba L.
Quercus rubra L.
Ranunculus recurvatus Poir.
Rhamnus frangula L.
Rhododendron prinophyllum (Small) Millais

Rhododendron viscosum (L.) Torr.
Rosa palustris Marshall
Rubus hispidus L.
Salix bebbiana Sarg.
Salix discolor Muhl.
Salix sericea Marshall
Sambucus canadensis L. var. *canadensis*
Sarracenia purpurea L. var. *purpurea*
Scutellaria galericulata L.
Scutellaria lateriflora L.
Sium suave Walter
Solanum dulcamara L.
Solidago uliginosa Nutt.
Sorbus americana Marshall
Spiraea alba Duroi var. *latifolia* (Aiton) Dippel
Spiraea tomentosa L. var. *tomentosa*
Thalictrum pubescens Pursh
Toxicodendron radicans (L.) Kuntze
Toxicodendron vernix (L.) Kuntze
Triadenum virginianum (L.) Raf.
Trientalis borealis Raf.
Ulmus americana L.
Utricularia gibba L.
Utricularia intermedia Hayne.
Utricularia purpurea Walter
Utricularia radiata Small
Utricularia vulgaris L.
Vaccinium angustifolium Aiton
Vaccinium corymbosum L.
Vaccinium macrocarpon Aiton
Vaccinium oxycoccos L.
Viburnum dentatum L. var. *lucidum* Aiton
Viburnum nudum L. var. *cassinoides* (L.) Torr. & Gray
Viola cucullata Aiton
Viola lanceolata L. var. *lanceolata*

Monocots

Arisaema triphyllum (L.) Schott
Calamagrostis canadensis (Michx.) P. Beauv.
Calla palustris L.
Carex atlantica L. Bailey var. *atlantica*
Carex brunnescens (Pers.) Poir.
Carex bullata Schkuhr
Carex canescens L.
Carex comosa Boott
Carex crinita Lam.
Carex folliculata L.
Carex gynandra Schweinitz
Carex intumescens Rudge
Carex lacustris Willd.
Carex lasiocarpa Ehrh. var. *americana* Fernald
Carex lurida Wahlenb.
Carex stipata Muhl. var. *stipata*

Carex stricta Lam.
Carex trisperma Dewey
Carex utriculata F. Boott.
Clintonia borealis (Aiton) Raf.
Corrallorhiza trifida Chatel.
Dulichium arundinaceum (L.) Britton
Eleocharis acicularis (L.) Roem. & J.A. Schultes
Eleocharis palustris L.
Eriocaulon aquaticum (L.) Druce
Eriophorum vaginatum L. var. spissum (Fern.) B. Boivin.
Eriophorum virginicum L.
Glyceria canadensis (Michx.) Trin.
Glyceria melicaria (Michx.) F.T. Hubb.
Glyceria striata (Lam.) A. Hitchc. var*. striata*
Glyceria x laxa (Scribn.) Scribn.
Iris versicolor L.
Juncus canadensis J. Gay
Juncus effusus L. var. *solutus* Fernald & Weigand
Juncus pelocarpus E. Meyer
Lemna minor L.
Maianthemum canadense Desf. var. *canadense*
Najas flexilis (Willd.) Rostk. & W.L.E. Schmidt
Najas gracillima (A. Braun) Magnus.
Peltandra virginica (L.) Schott & Endl.
Phragmites australis (Cav.) Trin.
Pogonia ophioglossoides (L.) Ker Gawler
Pontederia cordata L.
Potamogeton epihydrus Raf.
Potamogeton natans L.
Potamogeton pulcher Tuckerman.
Potamogeton pusillus L.
Puccinellia pallida (Torr.) R.T. Clausen
Rhynchospora alba (L.) Vahl
Sagittaria graminea Michx.
Sagittaria latifolia Willd. var*. latifolia*
Scirpus cyperinus (L.) Kunth
Scirpus microcarpus C. Presl.
Scirpus subterminalis Torr.
Scirpus validus Vahl
Smilacina trifolia (L.) Desf.
Sparganium americanum Nutt.
Sparganium chlorocarpum Rydb.
Spirodela polyrhiza (L.) Schleid.
Typha angustifolia L.
Typha latifolia L.