Biological Survey of Cranberry Bog Summer 1994

*Linda A. Taylor**

INTRODUCTION

Greenwoods Conservancy is a nature preserve of approximately one thousand acres located in the Town of Burlington, ten miles west of Cooperstown, in Otsego County, New York. The Conservancy is protected in perpetuity under a conservation easement through the Otsego Land Trust, a non-profit corporation. One of the purposes of this easement is to preserve the property as a valuable resource for education and scientific research. Most of Greenwoods Conservancy has been designated forever wild; however, some meadows will be mowed to maintain them in an early successional stage. Facilities already present will be kept in good repair. In addition, there are plans to construct field station buildings, a road to these buildings (this was started in the summer of 1994), and a dock to improve access to the wetland. The Conservancy includes a 70 acre wetland known locally as Cranberry Bog. This wetland is not a true bog because it has flowing water input from small streams at least part of the year, whereas true bogs only receive input of water and nutrients from precipitation. It must therefore technically be considered a fen (Mitsch and Gosselink, 1993). Cranberry Bog is well protected from non-point source pollution (including agricultural and accidental) since nearly the entire watershed is contained within the Greenwood's Conservancy. This summer's study was a preliminary biological survey of Cranberry Bog and the area immediately surrounding it.

METHODS

Work on Cranberry Bog and access to the bog mat was performed using a 15-foot canoe. To ensure that no exotic organisms would be introduced into the fen, the canoe was first washed with a chlorine bleach solution.

Vascular plant specimens were collected throughout the summer, brought back to the field station, and dried in an oven at 100-150°F. They were identified by the author and high school interns at the field station. Assistance was sought from SUNY at Oneonta biologists for difficult specimens. Mosses were collected from the bog mat September 7, 1994, with the assistance of Richard Andrus, an expert in *Sphagnum* taxonomy. They were brought back to Binghamton University and identified with his assistance.

Various animals were observed throughout the summer. Difficult field specimens were brought back to the field station for identification, returned, and released at Cranberry Bog. Aquatic invertebrates were collected on three dates spaced throughout the summer and brought to the field station for identification. Confirmation of identifications were made by W. Harman.

Bird species were observed and recorded throughout the summer. Additional assistance was provided by BFS graduate student M. Albright on the mornings of July 15th and July 29th.

At the bog throughout the summer, temperature, pH, dissolved oxygen, and conductivity were routinely monitored utilizing a portable multiprocesser. Water samples were collected, and analyzed at the field station laboratory. Samples not analyzed on the day of collection were refrigerated until the

**Department of Biological Sciences, PO Box 6000, Binghamton University, Binghamton, NY 13902-6000.*

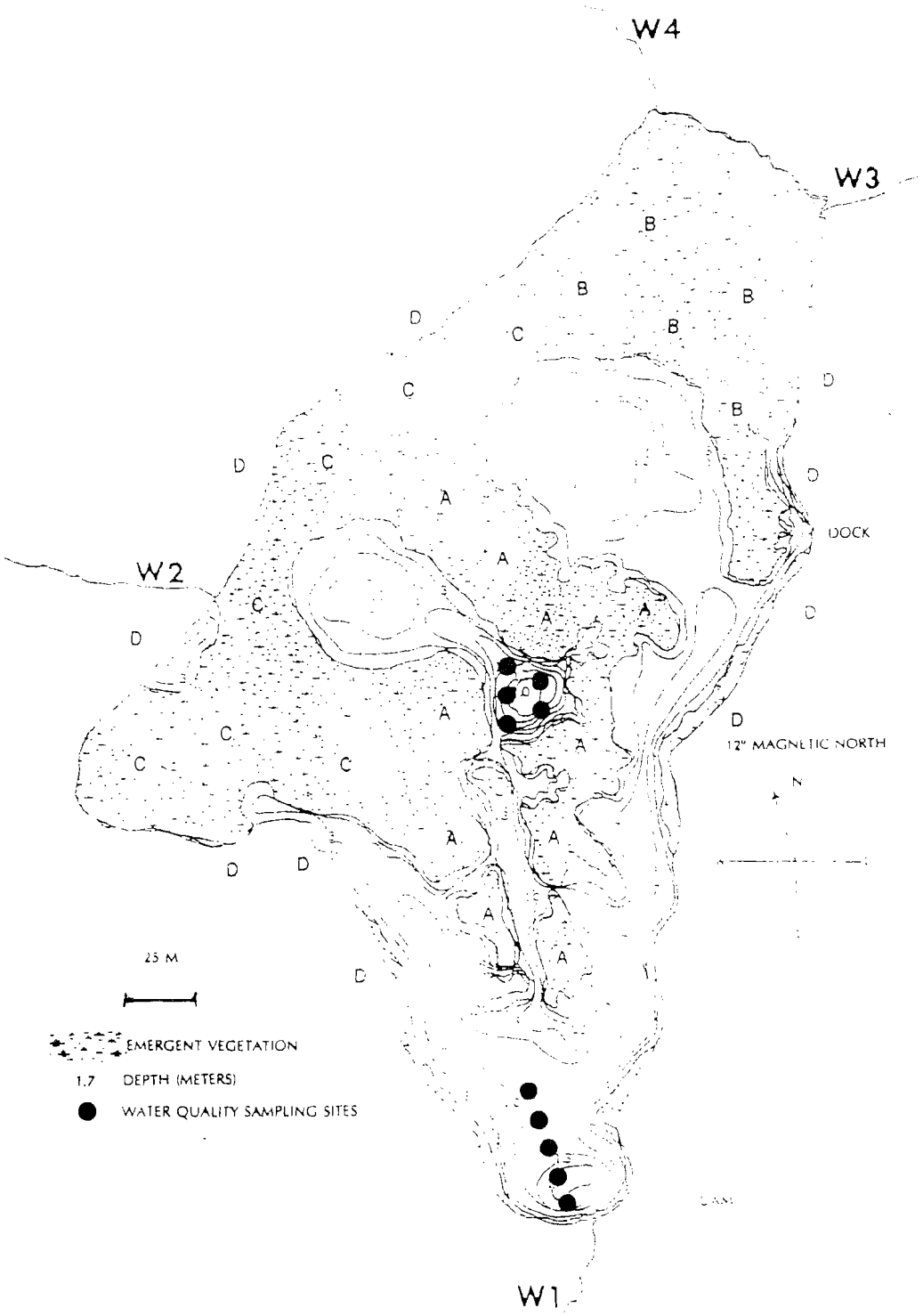

Figure 1. Map of Cranberry Bog. A = The bog mat or dwarf shrub bog.; B = sedge meadow community; C = rich graminoid fen; D = hemlock-hardwood woods. Definitions as per Reschke (1990). Creek W2 is a permanent stream. Creek W4 is dry in extreme weather. Creek W3 is even more ephemeral and driven by precipitation (modified from Pagan and Ferluge, Unpbl.).

following day. Water was analyzed for alkalinity, chlorides, calcium, total phosphorous, and nitrates.

RESULTS AND DISCUSSION

The hydrolab data gathered over the course of the summer is summarized in Table 1. Because much of the bog is very shallow, water temperatures were relatively warm. The pH of the water ranged from 3.98 to 7.25, The acidic readings from water sampled from the hollows between the hummocks and was due to the influence of *Sphagnum* (Clymo, 1964). The water found outside the mat varies around neutral (6.15-7.25 pH). Dissolved oxygen is adequate to support many warm water fish species such as pumpkin seed, blue gills, yellow perch, etc.

From the preliminary limnological data (Table 2) it would seem that Cranberry Bog is able to absorb the input coming from the two creeks which are dependent on precipitation. Whereas the input of alkalinity, calcium, and phosphorous were relatively high, these values show a significant decrease within the body of the fen. I would suggest that when further testing is done it include the outflow at the south end to determine if the wetland serves as a net source or sink of mineral nutrients.

Also surveyed this summer were the bird species found on and around Cranberry Bog (Table 3). Mammals and other vertebrate species are indicated in Table 4. Aquatic invertebrates are listed in Table 5. The large dragonfly and damselfly population at Cranberry Bog would require a large prey population. The large numbers of aquatic invertebrates (many of which have terrestrial stages) found would seem to fulfill that requirement.

The diversity of vascular plant species found in and near Cranberry Bog is high, in all probability, because it spans a number of wetland ecosystems (see Table 6). In part, the diversity comes from the inclusion of fen, bog, and other wetland species. The bog mat itself most resembles a dwarf shrub bog (Reschke, 1990) (Figure 1). It is dominated by *Sphagnum* species and other wetland mosses (Table 7) and low growing, ericaceous shrubs (principally *Chamaedaphne calyculata*, leatherleaf). *Sphagnum subfulvum*, a rare species in New York State, was discovered on the bog mat (R. Andrus, per comm). This is a southern-most record for this species in New York State.

Around the outer upland portion of the pond, especially on the north side, there is a sedge meadow community (Reschke, 1990) (Figure 1). This community is on organic soil permanently saturated and seasonally flooded. This area contains species typical of this type of palustrine community. The dominant species is *Carex stricta*, tussock-sedge. Other species of sedges are common as well as grasses and herbs.

The north side and most of the west side of the pond at water level is primarily a rich graminoid fen (Reschke, 1990) (Figure 1). The pH levels there are high, in the 6.0 to 7.0 range (Table 1). Rich graminoid fens are usually fed by water that is calcareous, and the levels of calcium in the creeks flowing into the north end are significantly higher than that found in the Bog itself (Table 2). This area is dominated by sedges and grasses and other typical wetland species.

The open water of Cranberry Bog appears to have a combination of characteristics of a bog lake and a eutrophic pond (Reschke, 1990). Cranberry Bog does have fish, which are often missing in bog lakes but found in eutrophic lakes. The water is stained brown, is not very transparent, and the pH of Cranberry Bog is higher than that typically reported for bog lakes which have a pH of less than 5.4. Cranberry Bog has an abundance of aquatic insects which is not characteristic of bog lakes. The aquatic plants found at Cranberry Bog are typical of those found in bog ponds and many eutrophic ponds: *Utricularia vulgaris* (greater or common bladderwort), *Nuphar variegatum* (bullhead

lilly/yellow water lilly), *Brasenia schreberi* (water shield), *Potamogeton natans* (floating leaf pond weed), *Potamogeton epihydrus* (leafy pond weed), and green algae. The diversity of the pond also contributes to the overall wetland diversity.

Along the gently sloping edges of the Bog is a hemlock-hardwood woods (Figure 1) composed primarily of *Tsuga canadensis* (hemlock), *Betula alleghaniensis* (yellow birch), and *Acer rubrum* (red maple). These woods appeared to be quite damp throughout the summer, but I did not observe any flooding, periodic or otherwise, which would place them in the swamp category.

This complex mosaic of wetland types grade into each other and are a major factor affecting the rich diversity of species found in the Cranberry Bog wetland system.

ACKNOWLEDGEMENTS

Without the generosity of Dr. Earl Peterson, this summer's research and study would not have been possible. In addition, I would like to take this opportunity to thank the many people who have made my work at the biological field station a joy. They assisted me in identification of taxa and were helpful in many other aspects of my research: Drs. L.P. Sohacki, B.R. Dayton, W.J. Settle, W.L. Butts, W.N. Harman, C.D. Marr and J. Foster. Other students: J. Bennett, K. France, M. Albright, K. Beckering, J. Homburger, J. Frost, J. Hakala, and D. Sickles. I also want to again thank Mr. F. Petta for the use of his canoe over the summer.

REFERENCES

Andrus, R. E. 1980. Sphagnaceae (peat moss family) of New York State. Bulletin No. 442. New York State Museum. The University of the State of New York, The State Education Department, Albany.

Andrus, R. E., W. R. Town and E. F. Karlin. 1994. New York State *Sphagnum* revisions. Bulletin of the Torrey Botanical Club 121(1):69-72.

Andrus, R. E. 1979. *Sphagnum bartlettianum* in the Southeastern United States. The Bryologist 82(2):198-203.

Brown, L. 1979. Grasses: An identification guide. Houghton Mifflin Company, Boston.

Burt, W. H. and R. P. Grossenheider. 1964. The Peterson Field Guide Series: A Field Guide to the Mammals, 2nd ed. Houghton Mifflin Company, Boston.

Conant, R. 1975. Peterson field guides: A field guide of reptiles and amphibians of eastern and central North America, 2nd 3d. Houghton Mifflin Company, Boston.

Conard, H. S. and P. L. Redfearn, Jr. 1979. How to know the mosses and liverworts. Wm. C. Brown Company Publishers, Dubuque.

Crum, H. 1991. Liverworts and Hornworts of Southern Michigan. University Herbarium, University of Michigan, Ann Arbor.

Crum, H. 1976. Mosses of the Great Lakes forest. University Herbarium, University of Michigan, Ann Arbor.

Eddy, S. and J. C. Underhill. 1969. How to Know the Freshwater Fishes, 3rd ed. Wm. C. Brown Company Publishers, Dubuque.

Fernald, M. L. 1950. Gray's Manual of Botany, 8th edition. Dioscorides Press, Portland.

Table 1. Hydrolab data gathered from Cranberry Bog

Date and sample site	temp. C	pH	DO (mg/L)	conductivity µmoh/cm	depth (m)
6/17/1994					
South end	28.09	7.03	7.65	32	0.2
Passage thru hummocks	26.23	6.19	2.60	37	0.3
North pass. hummocks	26.25	6.26	4.10	38	0.2
Open middle	27.35	6.60	4.00	38	0.2
Open water west	27.36	6.46	4.25	41	0.2
7/8/1994					
South end	25.09	6.51	5.80	38	0.2
7/19/1994					
South end	23.99	6.27	3.50	35	0.2
Middle passage	23.23	6.15	4.30	35	0.2
Open middle	24.14	6.47	6.87	40	0.2
West side	24.68	6.30	6.14	42	0.2
East side	24.02	6.51	6.2	38	0.2
North end	24.94	7.05	7.38	46	0.2
8/1/1994					
South end	22.50	7.25	8.32	32	0.1
Passage thru hummocks	22.38	6.37	5.23	34	0.1
Open middle	22.00	6.58	6.34	41	0.1

Table 2. Initial water samples from Cranberry Bog, collected August 2, 1994.

Collection site	Alkalinity mg/L as $CaCO_3$	Chlorides mg/L	Calcium mg/L	Phosphorous micrograms/L	Nitrites/Nitrate mg/L
Creek W4	52	0.5	960	138	.22
Creek W2	78	1.0	1202	32	0.08
North	16	1.0	441	49	0.05
North East	11	1.5	401	37	0.05
North West	14	1.0	361	48	0.04
South East	8	1.5	240	37	0.03
South West	10	1.5	240	38	0.04
South	9	1.5	240	30	0.03

Tests used are all from Standard Methods.
Nitrite/Nitrates were tested with the cadmium reduction method.
Total phosphorous was tested by a persulfate digestion followed by ascorbic acid method.
Calcium was tested with the EDTA titrimetric method.
Chlorides were tested with the mercuric acid method.
Alkalinity was tested by the mg/L as $CaCO_3$ method with bromcresol green indicator and titrated with 0.02 N HCl and alralinite..

Table 3. Birds surveyed at Cranberry Bog and immediate area summer 1994. This list is in NYS bird club list order (names taken from A Field Guide to the Birds: East of the Rockies by Roger Tory Peterson).

Family Ardeidae		
	Ardea herodias	Great blue heron
Family Anatidae	Subfamily Anatinae	
	Anas platyrhynchos	Mallard
	Aix sponsa	Wood duck
Family Accipitridae	Subfamily Buteoninae	
	Buteo jamaicensis	Red-tailed hawk
Family Pandionidae		
	Pandion haliaetus	Osprey
Family Tetraonidae		
	Bonasa umbellus	Ruffed grouse
Family Meleagrididae		
	Meleagris gallopavo	Wild turkey
Family Charadriidae		
	Charadrius vociferus	Killdeer
Family Scolopacidae		
	Calidris minutilla	Least sandpiper
Family Columbidae		
	Zenaida macroura	Mourning dove
Family Trochilidae		
	Archilochus colubris	Ruby-throated hummingbird
Family Alecdinidae		
	Megaceryle alcyon	Belted kingfisher
Family Picidae		
	Colaptes auratus	Northern flicker
	Sphyrapicus varius	Yellow-bellied sapsucker
Family Tyrannidae		
	Tyrannus tyrannus	Eastern kingbird
	Sayornis phoebe	Eastern phoebe
	Empidonax minimus	Least flycatcher
	Contopus virens	Eastern wood pewee
Family Hirundinidae		
	Iridoprocne bicolor	Tree swallow
Family Corvidae		
	Corvus brachyrhynchos	American crow
	Cyanocitta cristata	Blue jay
Family Paridae		
	Parus atricapillus	Black-capped chickadee
	Parus bicolor	Tuffted titmouse
Family Sittidae		
	Sitta carolinensis	White-breasted nuthatch

Sitta canadensis	Red-breasted nuthatch
Family Certhiidae	
Certhia familiaris	Brown creeper
Family Troglodytidae	
Troglodytes aedon	House wren
Family Mimidae	
Dumetella carolinensis	Gray catbird
Family Turdidae	
Turdus migratorius	American robin
Hylocichla mustelina	Wood thrush
Catharus guttatus	Hermit thrush
Catharus fuscescens	Veery
Family Bombycillidae	
Bombycilla cedrorum	Cedar waxwing
Family Vireonidae	
Vireo olivaceus	Red-eyed vireo
Family Parulidae	
Dendroica petechia	Yellow warbler
Dendroica virens	Black-throated green warbler
Dendroica pensylvanica	Chestnut-sided warbler
Seiurus aurocapillus	Ovenbird
Geothlypis trichas	Common yellowthroat
Wilsonia canadensis	Canada warbler
Setophaga ruticilla	American redstart
Family Icteridae	
Agelaius phoeniceus	Red-winged blackbird
Icterus galbula	Northern oriole
Quiscalus quiscula	Common grackle
Molothrus ater	Brown-headed cowbird
Family Thraupidae	
Piranga olivacea	Scarlet tanager
Family Fringillidae	
Passerina cyanea	Indigo bunting
Carduelis tristis	American goldfinch
Pipilo erythrophthalmus	Rufous-sided towhee
Junco hyemalis	Northern junco
Spizella arborea	Tree sparrow
Spizella passerina	Chipping sparrow
Spizella pusilla	Field sparrow
Zonotrichia albicollis	White-throated sparrow
Melospiza geogiana	Swamp sparrow
Melospiza melodia	Song sparrow

Table 4. Mammal and other vertebrate species seen at Greenwoods, summer 1994.

Class Mammalia		
Order Carnivora	Suborder Fissipedia	
Family Mustelidae		
Lutra canadensis		Otter
Order Rodentia		
Family Sciuridae		
Tamias striatus		Eastern chipmunk
Sciurus carolinensis		Eastern gray squirrel
Marmota monax		Woodchuck, groundhog
Family Castoridae		
Castor canadensis		American beaver
Family Phenacomys		
Ondatra zibethicus		Muskrat
Order Lagomorpha		
Family Leporidae		
Sylvilagus floridanus		Eastern cottontail
Order Artiodactyla	Suborder Ruminantia	
Family Cervidae		
Odocoileus virginianus		Whitetail deer
Class Reptilia		
Family Testudinidae	Subfamily Emydinae	
Chrysemys picta picta		Eastern painted turtle
Class Amphibia		
Family Ranidae		
Rana clamitaus melanota		Green frog
Rana catesbeiana		Bullfrog
Rana sylvatica		Wood frog
Family Bufonidae		
Bufo americanus		American toad
Family Hylidae		
Hyla crucifer		Spring peeper
Class Osteichthyes	Subclass Actinopterygii	
Family Centrarchidae		
Lepomis gibbosus (Linnaeus)		Pumpkinseed
Lepomis macrochirus (Rafineque)		Bluegill
Family Esocidae		
Esox niger Lesueur		Chain pickerel
Family Percidae		
Perca flavescens (Mitchill)		Yellow perch

Table 5. Aquatic invertebrates sampled from Cranberry Bog, summer 1994.

- Phyllum Mollusca
  - Class Gastropda
    - Order Pulmonata
      - Family Physidae
        - Genus *Physa*
      - Family Lymnaeidae
        - Genus *Lymnaea*
      - Family Planorbidae
        - Genus *Helisoma*
  - Class Bivalvia
    - Order Neritacea
      - Family Sphaeriidae
        - Genus *Sphaerium*
- Phyllum Annelida
  - Class Hirudinea
    - Order Placobdellida
      - Family Placobdellidae
        - Genus *Placobdella*
- Phyllum Arthropoda
  - Class Crustacea
    - Order Amphipoda
      - Family Taltridae
        - Genus *Hyallela*
    - Order Cladocera
  - Class Hydracariina
  - Class Insecta
    - Order Pleccoptera
    - Order Odonata
      - Family Aeschnidae
      - Family Libellulidae
      - Family Coenagrionidae
        - Genus *Enallagma*
      - Family Agrionidae
    - Order Ephemeroptera
    - Order Trichoptera
      - Family Leptoceridae
    - Order Hemiptera
      - Family Notonectidae
        - Genus *Notonecta*
      - Family Gerridae
        - Genus *Gerris*
      - Family Belostomatidae
        - Genus *Belostoma*
      - Family Corixidae

Family Coleptera
Family Gyrinidae
Genus *Gyrinus*
Family Dytistidae
Family Hydrophilidae
Family Halipidae
Order Diptera
Family Chironomidae

Table 6. Vascular plants surveyed at Cranberry Bog, summer 1994.

Order EQUISETALES	
Family Equisetaceae	
Equisetum pratense	Meadow horsetail/Shade horsetail
Order LYCOPODIALES	
Family Lycopodiaceae	
Lycopodium clavatum	Staghorn clubmoss
Lycopodium complanatum L.	Running pine
Order EUFILICALES	
Family Osmundaceae	
Osmunda cinnamomea L.	Cinnamon fern
Family Polypodiaceae	
Dryopteris spinulosa	Spinulose woodfern
Dryopteris cristata (L.) Gray	Crested fern
Athyrium Felix-femina (L.)	Lady fern
Thelypteris noveboracensis	New York fern
Onoclea sensibilis L.	Sensitive fern
Thelypteris palustris Schott.	Marsh fern
Pteridium aquilinum	Braken fern
Order CONIFERALES	
Family Pinaceae	
Tsuga canadensis	Eastern hemlock
Pinus strobus	White pine
Pinus sylvestris	Scotch pine
Picea glauca	White spruce
Order PANDANALES	
Family Sparganiaceae	
Sparganium americanum	Branching bur-reed
Sparganium sp.	Bur-reed
Order HELOBIAE (NAJADALES)	
Family Najadaceae	
Potamogeton natans	Floating leaf pond weed
Potamogeton epihydrus	Leafy pond weed
Family Alismataceae	
Sagittaria latifolia	Arrowhead
Family Hydrocharitaceae	
Vallisneria americana Michx.	Wild celery/Tape grass

Order GLUMIFLORAE (GRAMINALES)	
Family Gramineae	
Agrostis alba	Redtop
Agrostis perennans	Upland bent
Agrostis sp.	
Danthonia spicata	Poverty grass
Panicum sp.	Panic grass
Phleum pranense	Timothy
Family Cyperaceae	
Carex crinita	
Carex lurida	
Carex stricta	Tussock sedge
Carex diandra Schrank	
Carex sp.	Sedge
Dulichium arundinaceum (L.) Britton	Three way sedge
Scirpus cyperinus	Wool grass
Scirpus atrovirens	Dark green bulrush
Scirpus lineatins Michx	
Eleocharis acicularis	Spike rush
Eleocharis sp.	
Order SPATHIFLORAE (ARALES)	
Family Lemnaceae	
Lemna sp.	Duckweed/Duck's-meat
Order LILIIFLORAE (LILIALES)	
Family Juncaceae	
Juncus effusus	Soft rush
Juncus cadensis	
Juncus sp.	Rush
Juncus marginatus	
Family Liliaceae	
Hermerocallis fulva	Day lily
Family Iridaceae	
Sisyrinchium angustifolium	Blue-eyed grass
Sisyrinchium atlanticum	Blue-eyed grass
Iris versicolor	Blue flag
Order MICROSPERMAE (ORCHIDALES)	
Family Orchidaceae	
Habenaria sp.	
Habenaria orbiculada	Round leaved orchid
Cypripedium acaule	Moccasin-flower/Pink lady's-slipper

Order SALICALES
Family Salicaceae

Salix paralevcafern	Northern gray willow
Salix humilis	Prairie willow

Order FAGALES
Family Corlaceae (Betulaceae)

Alnus rugosa (Du Roi)	Speckled alder
Betula lutea	Yellow birch

Family Fagaceae

Fagus grandifolia	Beech

Order POLYGONALES
Family Polygonaceae

Rumex obtusifolius	Bitterdock
Polygonum persicaria	Lady's thumb/Redleg *(alien)
Polygonum sagittatum	Tearthumb
Polygonum scandens	Climbing false buckwheat

Order CENTROSPERMAE (CARYOPHYLLALES)
Family Caryophyllaceae

Stellaria graminea	Lesser stitchwort *(alien)

Order RANALES (RANUNCULALES)
Family Nymphaeaceae

Nuphar sp.	
Nuphar variegatum	Bullhead lilly/Yellow water lilly
Brasenia schreberi Gmel.	Water shield

Family Ranunculaceae

Coptis groenlandica	Goldthread
Ranunculus aquatilis	
Clematis virginiana	Virgin's bower
Thalictrum polygamum	Tall meadow rue

Family Berberidaceae

Podophyllum peltatum	May apple

Order RHOEADALES (PAPAVERALES)
Family Cruciferae

Brassica rapa	Field mustard, Rape *(alien)

Order SARRACENIACEAE
Family Sarraceniaceae

Sarracena flava L.	Pitcher plant/Trumpets/ Hunter's horn

Family Droseraceae

*Drosera rotundifoli*a	Round leaved sundew

Order ROSALES	
Family Rosaceae	
Crataegis sp.	Hawthorn
Rosa palustris	Swamp rose
Rosa multiflora Thunb.	Multiflora rose *(alien)
Pyrus melanocarpa	Black chokeberry
Potentilla palustris L. (scop.)	Marsh cinquefoil
Potentilla recta	Rough fruited cinquefoil
Prunus pensylvanica	Fire cherry
Rubus hispidus	Swamp dewberry/Bristly dewberry
Spiraea alba	Narrowleaf spirea (Meadowsweet)
Spiraea latifolia	Broadleaf spirea (Meadowsweet)
Family Leguminosae	
Lotus corniculatus	Bird's foot trefoil
Vicia cracca	Cow vetch
Trifolium agrarium	Hop clover
Order GERANILALES	
Family Oxalidaceae	
Oxalis montana	Common wood sorrel
Oxalis acetosella	Wood sorrel
Order SAPINDALES	
Family Aquifoliaceae	
Ilex verticillata (L.) Gray	Common winterberry holly
Ilex sp.	Holly
Family Aceraceae	
Acer pensylvanicum	Striped maple
Acer rubrum	Red maple
Family Balsaminaceae	
Impatiens capensis	Jewel weed/Spotted touch-me-not
Order MALVALES	
Family Malvaceae	
Malva moschata	Musk mallow
Order PARIETALES (VIOLALES)	
Family Guttiferae	
Hypericum mutilum	Dwarf St. Johnswort
Hypericum virginicum	Marsh St. Johnswort
Hypericum perforatum	Common St. Johnswort
Hypericum punctatum Lam.	
Hypericum spathulatum	Spotted St. Johnswort

Order MYRTIFLORAE (MYRTALES)
Family Onagraceae

Circaea alpina	Smaller enchanter's nightshade
Epilobium leptophyllum	Narrow-leaved willow-herb
Epilobium glandulosum	Northern willow-herb

Order UMBELLIFLORAE (UMBELLALES)
Family Umbelliferae

Cictua bulbifera	Bulb-bearing water hemlock

Order ERICALES
Family Ericaeae

Chamaedaphne calyculata	Leatherleaf
Vaccinium oxycoccus	Small cranberry
Vaccinium augustifolium	Late low blueberry
Vaccinium corymbosum	High bush blueberry
Gautheric procumbus	Wintergreen/Checker-berry

Order PRIMULALES
Family Primulaceae

Lysimachia terrestris	Yellow loosestrife/Swamp candles
Trientalis borealis	Starflower

Order OLEALES
Family Oleaceae

Fraxinus americana	White ash

Order CONTORTAE (GENTIANALES)
Family Gentianaceae

Gentiana quinquefolia	Stiff gentian
Solanum dulcamara	Purple nightshade

Order TUBIFLORAE (POLEMONIALES)
Family Hydrophyllaceae

Hydriphyllum virginianum	Virginia waterleaf

Family Verbenaceae

Verbena hastata	Blue vervain

Family Labiatae

Blephilia hirsuta	Hairy woodmint
Lycopus virginicus	Bugleweed
Scutellaria epilobiifolia	Marsh skullcap
Prunella vulgaris	Self heal/Heal all

Family Solanaceae

Solanum dulcamera	Nightshade, bittersweet

Family Scrophulariaceae

Mimulus ringens	Square stemmed monkey flower

Verbascum thapsus	Great mullein
Family Lentibulariaceae	
Utricularia vulgaris	Greater bladderwort
Order PLANTAGINALES	
Family Plantaginaceae	
Plantago major	Plantain *(alien)
Plantago lanceolata	English plantain
Order RUBIALES	
Family Rubiaceae	
Cephelantus occidentalis	Buttonbush
Galium triflorum	Fragrant bedstraw
Galium boreale	Northern bedstraw
Family Caprifoliaceae	
Viburnum recognitum	Northern arrowwood
Viburnum alnifolium	Hobble bush
Family Valerianaceae	
Valeriana offircinalis	Valarian
Order CAMPANULATAE	
Family Compositae	
Aster divaricatus	White wood aster
Achillea millefolium	Yarrow
Artemisia caudata	Mugwort
Cardus crispis	Welted thistle
Chrysanthemum leucanthemum	Ox-eye daisy
Erigeron annuus	Daisy fleabane
Erigeron philadelphicus	Common fleabane
Hieracium aurantiacum	Orange hawkweed
Hieracium Gronouii	Hairy hawkweed
Bidens cernua	Burr-marigold/Sticktights
Rudbeckia hirta	Black-eyed Susan

Table 7. Bryophytes found on the Shagnum mat at Cranberry Bog, Fall 1994.

Class Sphagnopsida
- *Sphagnum fibriatum*
- *Sphagnum subsecundum*
- *Sphagnum palustre*
- *Sphagnum fallax*
- *Sphagnum russowii*
- *Sphagnum magellanicum*
- *Sphagnum contortum*
- *Sphagnum subfulvum***
- *Sphagnum angustifolium*
- *Sphagnum flavicomans*
- *Sphagnum bartlettianum*
- *Sphagnum flexuosum*
- *Sphagnum squarrosum*

Class Musci Subclass Bryidae
- *Drepanocladus aduncus*
- *Pleurozium schreberi* (Brid.) Mitt.
- *Dicranum scoparium* (Hedw.)
- *Dicranum polysetum*
- *Hygrohypnum ochraceum*
- *Polia nutans*
- unknown moss

Class Hepaticae
- *Scapania paludicola*

Order Jungermanniales
- *Mylia anomola*

Order Metzgeriales
- unknown thallose liverwort

** Rare

Homburger, J. 1994. Class notes from Environmental Regulation, Biology Department, State University of New York at Oneonta, Oneonta.

Lehmkuhl, D. M. 1979. How to Know the Aquatic Insects. Wm. C. Brown Company Publishers, Dubuque.

McQueen, C. B. 1990. Field guide to the peat mosses of boreal North America. University press of New England, Hanover.

Mitsch, W. J. and J. G. Gosselink. 1993. Wetlands, 2nd ed. Van Nostrand Reinhold, New York.

Niering, W. A. and N. C. Olmstead. 1979. The Audubon Society field guide to North American wildflowers. Alfred A. Knopf, New York.

Pagan, R. and C. Ferluge. In Prep. Bathymetric Map of Cranberry Bog.

Peterson, R. T. 1980. The Peterson field guide series: A field guide to the birds east of the Rockies, 4th ed. Houghton Mifflin Company, Boston.

Peterson, R. T. and M. McKenny. 1968. Peterson field guides: A field guide to the wildflowers of northeastern and north-central North America. Houghton Mifflin Company, Boston.

Petrides, G. A. 1972. The Peterson field guide series: A field guide to trees and shrubs. Houghton Mifflin Company, Boston.

Reschke, C. 1990. Ecological communities of New York State. New York Natural Heritage Program, Latham.

Note: References not listed in the body of the paper were used for identification of specimens.