TOWN OF VICTOR
Inventory of Land Use and Land Cover

Prepared for:

Ontario County Water Resources Council
20 Ontario Street, 3rd Floor
Canandaigua, New York 14424

and

Town of Victor
85 East Main Street
Victor, New York 14564

Prepared by:

Dr. Bruce Gilman
Department of Environmental Conservation and Horticulture
Finger Lakes Community College
3325 Marvin Sands Drive
Canandaigua, New York 14424-8395

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Cover image: Black Chokeberry (*Aronia melanocarpa* (Michx.) Ell.) growing in a rich shrub fen plant community along Log Cabin Road, Town of Victor, New York.

Acknowledgments:

The Ontario County Planning Department has long supported a partnership between local towns and the Department of Environmental Conservation and Horticulture at Finger Lakes Community College that involves inventory and mapping of natural land cover and cultural land use. Previous reports have been completed for the Canandaigua Lake watershed, the Honeoye Lake watershed, and the woodlots, wetlands and riparian corridors in the Towns of Seneca, Phelps and Geneva. This report summarizes the latest land use/land cover study conducted in the Town of Victor. Terry Saxby, Ontario County Planning Department, is thanked for his assistance with landowner information, his patience as the fieldwork was slowly completed, and his noteworthy help transcribing the field maps to geographic information system (GIS) shape files. Sheri Norton, Ontario County Information Services, assisted with map production, shape file maintenance and data summaries. The format of this data will allow for easy retrieval, immediate use during project review, and it will create a template for future updating of the Town of Victor's natural resources database, a vital component of their comprehensive plan. Funding for this work was provided through a special project grant from the Ontario County Water Resources Council, the water quality coordinating committee for the County. John Palomaki and P.J. Emerick have served as recent chairpersons for the Council and they are acknowledged for their leadership efforts in overseeing the Council's activities and the special projects grant selection committee. I am also grateful to the many practicum students at the college that joined me on my fieldwork throughout the Town of Victor. And, of course, none of this would have been possible without the cooperation of numerous landowners I met along the way and who graciously gave permission to inventory the plant communities on their properties.

Project Description:

Brief History: Development in the Town of Victor contributes significantly to the economic growth of Ontario County but the domestication of the natural landscape has not been free of environmental concerns. To better understand the current status of the landscape, the Town sought technical assistance from the Ontario County Planning Department. Specifically, the Town requested detailed information on the nature, quality and connectivity among remaining natural communities. Such information could be incorporated into the latest rendition of the Town's comprehensive plan, and might guide development decisions in the near future. Then County Planning Director Kris Hughes, being familiar with recent land use/land cover mapping initiatives in neighboring towns, contracted with Dr. Bruce Gilman, faculty member in the Department of Environmental Conservation and Horticulture at Finger Lakes Community College (FLCC), to conduct natural and cultural vegetation assessment in the Town of Victor. Current County Planning Director Tom Harvey encouraged the completion of the project by assigning Terry Saxby to the arduous task of creating the GIS land use/land cover overlay.

Goals of the Study: Discussions among board members in the Town of Victor, staff at the Ontario County Planning Department, and Bruce Gilman at Finger Lakes Community College established the following goals:

1. Inventory the vegetation patterns in the Town of Victor. These patterns will include natural plant communities (land cover) and cultural plant communities (land use). All patterns will be ground-truthed except where property access was denied. For those exceptions, interpretation of Pictometry © images will be used to recognize vegetation and establish boundaries with neighboring features. Vegetation polygons as small as an approximate size of one acre will be inventoried. Linear patterns (e.g., hedgerows, intermittent stream) and point features (e.g., springs, cell towers) will not be mapped.

2. Using the classification hierarchy developed by the New York Natural Heritage Program (NYNHP), assign a community cover type name to the vegetation. Where vegetation is a complex mosaic of cover types, a combined cover type name (e.g., deep emergent marsh//floodplain forest) will be used. Four cover type names not found in the NYNHP classification manual, gravel mine (abandoned), sand mine (abandoned), outdoor recreation and parking area, will be used as cover type names in this inventory.

3. Create maps of the vegetation patterns in the Town of Victor using ESRI ArcView © geographic information system software. With Pictometry © images as the base map, shape files will be developed by heads-up digitizing in the County Planning Department. Quality control will be assured by using topology to remove inadvertent slivers in the shape files. All vegetation polygons will be color-coded and attributed with the NYNHP community cover type names.

4. Evaluate the ecological significance of natural plant communities in the Town of Victor. Using the global and state ranking approach described in the NYNHP classification manual, a local ranking will be developed to recognize special natural areas

at the smaller scale of the Town of Victor. The design of the local ranking will incorporate rarity and frequency of occurrence, both derived from this inventory, into a numerical score ranging from 1 (locally rare) to 5 (locally secure).

5. Recommend opportunities to conserve remaining natural areas in the Town of Victor. Town officials will be encouraged to recognize special natural areas and include them in open space protection guidelines. Public and private landowners will be encouraged to reconnect fragmented natural areas through appropriate management strategies.

Additional Activities: By request to the New York Natural Heritage Program, a review of their database for occurrences of rare plants, rare animals and significant natural communities in the Town of Victor will be conducted. Field checking sites described in these database records will be completed during this land use/land cover study.

Results:

Field data was summarized using the classification scheme and cover type categories found in the NYNHP classification manual, Ecological Communities of New York State (2002). This publication is the primary reference for plant community classification in the State. Its success and acceptance by a wide range of users is driven by its lofty goal to be an all-inclusive classification; it contains small to large natural communities as well as plant communities created by humans. Each community belongs to one of seven major systems. The systems are divided into two to five subsystems. Within each subsystem are many community cover types. Their characteristic species are described and their rarity and vulnerability are presented at a global and state scale. In this organized approach, significant natural communities can be designated as priorities for conservation thereby assuring that future generations can enjoy the full array of biological diversity found within New York State.

The field inventories in the Town of Victor detected five major systems, ten subsystems and 39 community cover types. Fifteen combined cover types were also noted. The classification, frequency of occurrence (count) and total acreage for all cover types and combinations is presented in TABLE 1. Full community cover type descriptions and scientific study references are found in the APPENDIX.

The NYNHP ranking system presented in TABLE 1 reflects an element's rarity and vulnerability. An element may be a plant or animal species, or a natural community. The ranks carry no legal weight but are believed to accurately reflect their relative rarity. In our case, the global rank suggests the rarity of the community throughout the world while the state rank suggests the rarity within New York State. As new data become available, the ranks may be revised to reflect the most current information. The following explanations are used for elements ranked by the New York Natural Heritage Program:

GLOBAL RANK

G1 = critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining acres, or miles of stream) or especially vulnerable to extinction because of some factor of its biology.

G2 = imperiled globally because of rarity (6-20 occurrences, or few remaining acres, or miles of stream) or very vulnerable to extinction throughout its range because of other factors.

G3 = either rare and local throughout its range (21-100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extinction throughout its range because of other factors.

G4 = apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery

G5 = demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery

GH = historically known, with the expectation that it might be rediscovered

GX = species believed to be extinct

GU = status unknown

STATE RANK

S1 = typically 5 or fewer occurrences, very few remaining individuals, acres, miles of stream, or some factor of its biology making it especially vulnerable in New York State.

S2 = typically 6-20 occurrences, few remaining individuals, acres, miles of stream, or factors demonstrably making it very vulnerable in New York State

S3 = typically 21-100 occurrences, limited acreage, or miles of stream in New York State.

S4 = apparently secure in New York State.

S5= demonstrably secure in New York State.

SH = historically known from New York State, but not seen in the last 15 years.

SX = apparently extirpated from New York State.

SE = exotic, not native to New York State.

SR = state report only, no verified specimens known from New York State.

SU = status unknown.

TABLE 1 – Land use/land cover in the Town of Victor, New York.

System	Subsystem	Community Cover Type	Count	Acres	NYNHP Ranks
Riverine	Natural streams	Confined river	14	37.6	G4 S4
Lacustrine	Natural lakes and ponds	Eutrophic pond	47	44.3	G4 S4
	Lacustrine cultural	Farm pond/artificial pond	187	118.7	G5 S5
Palustrine	Open mineral soil wetlands	Deep emergent marsh	84	230.6	G5 S5
		Deep emergent marsh// Floodplain forest	1	16.6	
		Deep emergent marsh// Red maple-tamarack peat swamp	1	7.9	
		Deep emergent marsh// Successional old field	1	2.8	
		Deep emergent marsh// Shrub swamp	1	1.3	
		Deep emergent marsh// Successional shrubland	1	4.5	
		Shallow emergent marsh	45	74.4	G5 S5
		Shallow emergent marsh// Floodplain forest	4	16.2	
		Shallow emergent marsh// Shrub swamp	1	1.1	
		Shrub swamp	24	53.3	G5 S5
		Shrub swamp// Successional northern hardwoods	1	1.5	
	Open peatlands	Rich shrub fen	3	4.7	G3G4 S1S2
	Forested mineral soil wetlands	Floodplain forest	56	328.9	G3G4 S2S3
		Silver maple-ash swamp	30	519.9	G3G4 S2S3
		Vernal pool	1	1.6	G4 S3S4
		Hemlock-hardwood swamp	1	26.2	G4G5 S4
	Forested	Red maple-tamarack peat	5	35.6	G3G4 S2S3

	peatlands	swamp			
		Northern white cedar swamp	8	61.1	G3G4 S2S3
Terrestrial	Open uplands	Successional old field	326	2021.3	G4 S4
		Successional old field// Conifer plantation	5	37.8	
		Successional old field// Successional northern hardwoods	1	3.9	
		Successional old field// Successional southern hardwoods	3	1.3	
		Successional old field// Successional shrubland	30	289.9	
		Successional shrubland	270	1080.6	G4 S4
		Successional shrubland// Conifer plantation	2	2.6	
		Successional shrubland// Successional northern hardwoods	28	176.2	
		Successional shrubland// Successional southern hardwoods	2	4.9	
	Forested uplands	Appalachian oak-hickory forest	19	926.9	G4G5 S4
		Beech-maple mesic forest	1	62.3	G4 S4
		Successional northern hardwood forest	238	3871.2	G5 S5
		Successional southern hardwood forest	49	794.5	G5 S5
	Terrestrial cultural	Cropland	137	3401.9	G5 S5
		Pastureland	81	412.7	G5 S5
		Flower/herb garden	9	75.4	G5 S5
		Orchard	6	78.4	G5 S5
		Conifer plantation	232	330.8	G5 S5
		Mowed lawn with trees	208	471.4	G5 S5
		Mowed lawn	515	4741.1	G5 S5

		Herbicide-sprayed roadside/pathway	4	35.3	G5 S5
		Unpaved road/path	1	0.8	G5 S5
		Paved road/path	4	316.6	G5 S5
		Gravel mine	6	266.2	G5 S5
		Gravel mine (abandoned)	2	8.3	Unranked
		Sand mine	1	8.9	G5 S5
		Sand mine (abandoned)	1	2.1	Unranked
		Construction/road maintenance spoils	12	20.2	G5 S5
		Landfill/dump	2	23.3	G5 S5
		Urban structure exterior	453	272.5	G5 S5
		Rural structure exterior	71	102.4	G5 S5
		Parking area	200	654.9	Unranked
		Outdoor recreation	41	969.3	Unranked

Paper copies of the land use/land cover map or electronic GIS shape files of the data presented in TABLE 1 may be obtained by contacting Sheri Norton at Ontario County Information Services.

Based on total acreage, the top three most abundant cultural land uses were mowed lawn (4741.1 acres), cropland (3401.9 acres) and outdoor recreation (969.3 acres). The top three most abundant natural land covers were successional northern hardwood forest (3871.2 acres), successional old field (2021.3 acres) and successional shrubland (1080.6 acres).

Six of the natural communities surveyed in the Town of Victor had S1, S2 or S3 rankings. The rich shrub fen (S1S2) is uncommon in New York and it is noteworthy that it was encountered in the Town of Victor. Unfortunately, the quality of this occurrence is only fair. The site has been extensively disturbed by human activities including adjacent residential development, roadside ditching that has drained the sites, and introduction of invasive plant species. The floodplain forest (S2S3) is located along the riparian corridor of large streams, especially Irondequoit Creek, and is in good condition. These corridors provide connectivity among several natural areas stretching across the Town. Efforts should continue to encourage conservation of stream corridors and their floodplain forests. Silver maple-ash swamps (S2S3) were most often observed as isolated "islands" in an agricultural landscape mosaic. They typically lacked natural connectivity to other forested landscapes; at best there may be only artificial ditches between them. It will be challenging to link silver maple-ash swamps to other natural communities. Hedgerow restoration may be a viable strategy. The silver maple-ash swamps ranged in age from very young (probably less than 25 years) to rather old (perhaps approaching 150 years). Several silver maples had a diameter at breast height exceeding 60 inches! Vernal pools (S3S4) are usually very small in size, and embedded within a larger forest cover type. Despite their small size, they are critically important for amphibian breeding, providing a springtime breeding area free of fish predators. The red maple-tamarack peat swamps (S2S3) have been recently decimated by insects and most mature tamaracks were dead. The sites near Willis Hill Road were particularly damaged. It is unknown how these sites might recover in the coming years. The northern white cedar swamps (S2S3) are in poor condition, especially those located along the southern side of the Route 96 corridor west of the village of Victor. Filling followed by development appears to have altered the original hydrology to the detriment of this forest cover type. Abundant white-tailed deer may be limiting natural recruitment of cedar through their browsing activities.

Based on local rarity (acreage) and frequency of occurrence (count), the six natural plant communities in TABLE 2 are ranked as special and significant within the Town of Victor. If possible, all should be candidates for immediate conservation protection. It is noteworthy that all six community cover types are classified in the palustrine system, underscoring the historic loss of wetland acreage to development that happened in the Town of Victor as well as in virtually every populated location in the State. The general human disregard for the ecological functioning of wetlands (flood control, nutrient absorption, biologically diverse habitats, etc.) in the past will hopefully be replaced by recognition of the natural capital they provide for modern societies. The modern cultural movement towards green infrastructure and wetland creation is promising.

TABLE 2 – Locally significant natural plant communities in the Town of Victor, New York.

System	Subsystem	Community Cover Type	Count	Acres	Local Ranks
Palustrine	Open peatlands	Rich shrub fen	3	4.7	L1
	Forested mineral soil wetlands	Floodplain forest	56	328.9	L2
		Silver maple-ash swamp	30	519.9	L2
		Vernal pool	1	1.6	L1
	Forested peatlands	Red maple-tamarack peat swamp	5	35.6	L1
		Northern white cedar swamp	8	61.1	L1

Two additional natural plant communities are also locally significant (TABLE 3) and ranked L3, equivalent to a special concern status, that is, a watch list for future conservation efforts. The Beech-maple mesic forest is common to the north along the Lake Ontario plain, but only one occurrence was detected in the Town of Victor. The site was in good condition and contained within it a large vernal pool. The Hemlock-hardwood swamp is abundant in the Adirondack foothills but only one occurrence was detected in the Town of Victor. Fortunately the core of that site is already in conservation ownership (The Nature Conservancy) but efforts might still be taken to encourage additions to that nature preserve.

TABLE 3 – Special concern natural plant communities in the Town of Victor, New York.

System	Subsystem	Community Cover Type	Count	Acres	Local Ranks
Palustrine	Forested mineral soil wetlands	Hemlock-hardwood swamp	1	26.2	L3
Terrestrial	Forested uplands	Beech-maple mesic forest	1	62.3	L3

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APPENDIX

These natural and cultural plant communities occur within the Town of Victor. The classification scheme and cover type descriptions are based on Edinger et al. (2002). Because the source document presents a state-wide perspective, local plant species dominance may be expected to show some variability from the state-wide information given below. Where appropriate, specific modifying comments about the Town of Victor cover types has been provided in blue text.

RIVERINE SYSTEM

The riverine system consists of linear aquatic communities of flowing, non-tidal waters with a discrete channel, with persistent emergent vegetation sparse or lacking, but may include areas with abundant submerged or floating-leaved aquatic vegetation. The riverine communities in this classification are distinguished primarily by position of the stream in the watershed and water flow characteristics. These communities are broadly defined, and may include two or more finer scale habitats (i.e., "microhabitats"), such as *riffles* (which include waterfalls), *runs*, and *pools;* these habitats usually have distinctive species assemblages (i.e., "associations"). A *riffle* is a part of the stream that is shallow and has a comparatively fast current; the water surface is disturbed by the current and may form standing waves (i.e., it is "turbulent"). A *run* is a part of the stream that has a moderate to fast current; the water is deep enough that the water surface is smooth and unbroken by the water current (although it may be disturbed by wind). A *pool* is a part of the stream that is deep and has a comparatively slow current; the water surface is calm unless disturbed by wind. The riverine communities are also distinguished by size of the stream. Large streams have an average width greater than about 30 m (100 ft), medium streams are from about 3 to 30 m (10 ft to 100 ft) wide, and small streams have an average width less than about 3 m (10 ft). This classification of riverine communities is based on a combination of NYNHP field surveys, literature review and discussions with aquatic ecologists. To date about 46 plots have been sampled statewide by NYNHP in riverine communities. Bob Daniels of the New York State Museum provided much of the initial information on fish communities. Although the Heritage program has focused inventory work on streams since 1995; we do not currently have sufficient field data for confidently undertaking any major restructuring of the 1990 riverine classification. However, field work has suggested that this classification works well for representing the coarse scale distinctions between both abiotic and biotic features of river types. Although physically based, it is meant to serve as a coarse filter emphasizing resident stream biota. Two new coarse-scale physical-based types have been added to the classification, segregated out from other more broadly defined types of the 1990 classification: spring and deepwater river, the former a very small perennial stream, the latter a very large stream with profundal areas. Further refinement of the riverine classification to distinguish regional variants will likely be based on additional field surveys and analysis of existing data collected by various aquatic scientists and agencies statewide. Regional variation in many of the designated riverine communities is evident, but we do not currently have enough information or have undertaken analyses to confidently split common and widespread stream types into more specific regional variants. A finer scale classification of streams that distinguishes types according to ecoregion and/or watershed

is being evaluated. Preliminary conclusions suggest that vascular plant, bryophyte, algae, fish, mollusk, insect and plankton assemblages may follow different distribution patterns, some more closely correlated with ecoregion boundaries, some more closely with major ecological drainage units. The fish and mollusk assemblages in the riverine communities (especially in unconfined rivers and deepwater rivers) generally vary according to the watershed.

A. NATURAL STREAMS

This subsystem includes streams in which the stream flow, morphometry, and water chemistry have not been substantially modified by human activities, or the native biota is dominant. The biota may include some introduced species (for example, stocked or accidentally introduced fishes), however the introduced species are not usually dominant in the stream community as a whole.

1. Confined river: the aquatic community of relatively large, fast flowing sections of streams with a moderate to gentle gradient. The name of this community has been changed from "midreach stream" to better reflect the concept. These streams have well-defined pattern of alternating pools, riffles, and runs. Confined rivers usually have poorly defined meanders (i.e., low sinuosity), occur in confined valleys and are most typical of the midreaches of stream systems. These streams are typically of moderate depth, width and low flow discharge and usually represent a network of 3rd to 4th order stream segments. Most of the erosion is lateral, creating braids, channel islands, and bars, and deposition is moderate with a mix of coarse rocky to sandy substrate. Waterfalls are typically present; these are here treated as features of the more broadly defined community. The predominant source of energy is generated in the stream (these are autochthonous streams). These streams have high water clarity and are well oxygenated. They are typically surrounded by open upland riverside communities including riverside sand/gravel bar, cobble shore or one of the shoreline outcrop communities.

Species assemblages' characteristic of riffles and rocky bottoms dominate the community. Fish diversity is typically high to moderate. Characteristic fishes include creek chub (*Semotilus atromaculatus*), pumpkinseed (*Lepomis gibbosus*), common shiner (*Luxilus cornutus*), and trout-perch (*Percopsis omiscomaycus*) in pools; rosyface shiner (*Notropis rubellus*) at the head of pools; tessellated darter (*Etheostoma olmstedi*), longnose dace (*Rhinichthys cataractae*), slimy sculpin (*Cottus cognatus*) or mottled sculpin (*C. bairdi*), and stonecat (*Noturus flavus*) in riffles; and bluntnose minnow (*Pimephales notatus*) and northern hogsucker (*Hypentelium nigricans*) in runs. Other characteristic fishes may include blacknose dace (*Rhinicthys atratulus*) and fantail darter (*Etheostoma flabellare*). Common introductions are rainbow trout (*Salmo gairdneri*), brown trout (*S. trutta*), and (in streams where it is not native) smallmouth bass (*Micropterus dolomieui*). Characteristic mollusks include eastern elliptio (*Elliptio complanta*), eastern floater (*Pyganodon cataracta*), fingernail clams (*Sphaerium* spp.). Other macroinvertebrates are diverse; characteristic macroinvertebrates include riffle and rocky bottom specialists as well as algae shredders such as crayfish (Cambaridae), mayflies (Ephemeroptera including Ephemeridae, Heptageniidae, *Isonychia* sp.), stoneflies (Plecoptera including Chloroperlidae, *Acroneuria* sp., *Neoperla* sp.), caddisflies (Trichoptera including Hydropsychidae, *Helicopsyche* sp., *Dolophilodes* sp.,

Rhyacophila sp.), cranefly (*Hexatoma* sp.), beetles (*Oulimnius* sp., *Psephenus* sp.), dobsonflies (Corydalidae), midge (*Polypedilum* sp.), craneflies (Tipulidae), and blackflies (Simulidae). Odonate (Odonata including Calopteryidae) larvae may be characteristic of runs. True bugs (Gerridae, Vellidae, Mesovellidae) are characteristic of pools).

Epilithic algae are the predominate plant. Aquatic macrophytes are usually sparse; typical aquatic macrophytes include waterweed (*Elodea canadensis*) and linear-leaved pondweeds such as sago pondweed (*Potamogeton pectinatus*). An additional characteristic vascular plant may be *Podostemum ceratophyllum*. Bryophytes are often confined to shallows and the intermittently exposed channel perimeter.

Four to six variants associated with a combination of ecoregions (including Northern Appalachian, Great Lakes, Lower New England and Alleghany Plateau ecoregions) or major watersheds (including Great Lakes, Hudson River, Alleghany River, Susquehanna/Delaware Rivers) are suspected to differ substantially in dominant and characteristic vascular plants, fishes, mollusks, insects, and algae as well as water chemistry (especially alkalinity and color), water temperature, underlying substrate type, and surrounding forest type. In addition, biota is suspected to differ among streams of moderate size (roughly 3rd to 4th order streams) and large size (roughly 5th to 6th order streams). Aquatic connectivity factors are thought to strongly influence the fish and mollusk composition. Species characteristic of Northern Appalachian streams may include the fishes brook trout (*Salvelinus fontinalis*), cutlips minnow (*Exoglossum maxillingua*), longnose sucker (*Catostomus catostomus*), and white sucker (*C. commersoni*); and the macroinvertebrates eastern pearlshell (*Margaritifera margaritifera*), and odonates (*Gomphus* spp., *Progomphus obscurus*).

Species characteristic of streams in the Saint Lawrence River and Lake Champlain Valley may include a diverse assemblage of mollusks such as heelsplitters (*Potamilus* sp. and *Lasmigona* sp.), lampmussels (*Lampsilus* spp. including *L. cariosa*), *Leptodea* sp., triangle floater (*Alasmidonta undulata*), creekmussel (*Strophitus* sp.), pondmussel (*Ligumia* sp.), *Anodontoides* sp., and pea clams (*Pisidium* spp.). Other macroinvertebrates characteristic of streams in this region may include beetles (*Promeresia* sp., *Stenelmis* sp., *Dubiraphia* sp.), caddisflies (*Chimara* sp., *Phylocentropus* sp.), mayfly (*Hexagenia* sp.), amphipod (*Gammarus* sp.), and true flies (*Sphaeromias* sp., *Culicoides* sp.).

Species characteristic of Alleghany Plateau and Great Lakes streams may include the fishes greenside darter (*E. blennioides*) and rainbow darter (*Etheostoma caeruleum*), central stoneroller (*Campostoma anomalum*), silverjaw minnow (*Ericymba buccata*), spotted darter (*Etheostoma maculatum*), golden redhorse (*Moxostoma erythrurum*) and shorthead redhorse (*M. macrolepidotum*); the mollusks mucket (*Actinonaias ligmentina*), Ohio pigtoe (*Pleurobema cordatum*), kidneyshell (*Ptychobranchus fasciolaris*), fluted-shell (*Lasmigona costata*), lampmussels (*Lampsilis fasciola, L. ventricosa*), and spike (*Elliptio dihtata*); and the other macroinvertebrates mayfly (*Stenonema* spp.), and caddisfly (*Cheumatopsyche* sp.).

More data on regional variants are needed.

Distribution: throughout New York State.

Rank: G4 S4

Examples: French Creek, Chautauqua County; Moose River, Herkimer, Lewis and Oneida Counties; Middle Branch Oswegatchie River, St. Lawrence, Herkimer and Lewis Counties; Hudson River, Essex, Warren and Saratoga Counties; East Branch Fish Creek, Lewis County; Rondout Creek; Ulster County; Shawangunk Kill, Ulster County; Hoosic River, Rensselaer County.

Sources: C. L. Smith 1985; NYNHP field surveys.

Other natural riverine cover types were considered to be a very narrow linear feature (e.g., rocky headwater stream, marsh headwater stream, intermittent stream) or a very small point feature (e.g., spring) so they were not mapped in this field inventory. Similarly, cultural riverine cover types such as roadside ditches and artificial agricultural channels for drainage or irrigation were not mapped.

RIVERINE REFERENCES

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LACUSTRINE SYSTEM

The lacustrine system consists of ponded waters situated in topographic depressions or dammed river channels, with persistent emergent vegetation sparse or lacking, but including any areas with abundant submerged or floating-leaved aquatic vegetation. The lacustrine communities in this classification are distinguished primarily by trophic state, alkalinity, annual cycles of thermal stratification, circulation, morphometry (size and shape of the lake basin and drainage area; water permanence), and water chemistry (including salinity). The communities are described in terms of the free-floating organisms of the open water, or the limnetic or pelagic zone (including plankton and fish), the aquatic macrophytes and fish near the shore or littoral zone, and the bottom-dwelling organisms or benthos. The limnetic (pelagic) zone may be divided into the epilimnion (upper lake zone), which is sunny, mixed by the wind, and comparatively rich in oxygen, and the hypolimnion (lower lake zone), which is darker, and comparatively rich in carbon dioxide from respiration and decay. The transition between the epilimnion and hypolimnion is called the thermocline (or the metalimnion). The lake bottom or benthic zone may be divided into the peripheral, well-lit shallows or littoral zone, the slightly deeper and darker sublittoral zone, and (in summer-stratified lakes) the deep, cold region where currents are minimal and light is much reduced, called the profundal zone. Benthic zones may each have a distinctive resident biota; however, many of the plankton and fish move between pelagic zones on a regular basis. Deep lakes have an average depth greater than about 60 m (200 ft), moderately deep lakes are from about 6 to 60 m (20 ft to 200 ft) deep, and shallow lakes have an average depth less than about 6 m (20

ft). Large lakes are greater than about 80 ha (200 acres) and small lakes are less than this size. This classification of lacustrine communities is based on a combination of NYNHP field surveys, literature review, and discussions with aquatic scientists. To date about 42 plots have been sampled statewide by NYNHP in lacustrine communities. Although the Heritage Program has focused inventory work on lakes since 1995; we do not currently have sufficient field data for confidently undertaking any major restructuring of the 1990 lacustrine classification. However, field work has suggested that this classification works well for representing the coarsest scale distinctions between both biotic and abiotic features of lacustrine community types. The classification is intended to represent entire lake "macrohabitats". Although physically based, it is meant to serve as a coarse filter emphasizing resident lake biota. It is recognized that lakes may contain numerous pelagic and benthic associations and that there is often much overlap in association distribution across lake macrohabitat types. For now, NYNHP is maintaining this macrohabitat classification while evaluating the utility and feasibility of replacing or supplementing this classification with an association classification. Further evaluation of the macrohabitat classification is underway to compare trophic state versus alkalinity as a factor more important in driving the distribution of biota and more resistant to human alteration of water chemistry. Tentatively, it is thought that alkalinity is a stronger driving force, thus suggesting a switch of the 1990 classification of common pond types from oligotrophic and eutrophic to acidic and alkaline, and common dimictic lake types from oligotrophic, mesotrophic, and eutrophic to acidic and alkaline, perhaps with trophic state as a secondary modifier. Lastly, addition of three "intermittent pond" types to the 1990 classification is also recommended: vernal pool and pine barrens vernal pond (both previously treated under the palustrine system) and sinkhole pond (split from sinkhole wetland in the palustrine system). Other types under evaluation include "flow-through" or "fluvial pond," a potential split from the currently recognized oligotrophic pond and eutrophic pond, closely associated with riverine complexes rather than in the typical isolated basin setting. Further refinement of the lacustrine classification to distinguish regional variants will likely be based on additional field surveys and analysis of data collected by various aquatic scientists and agencies statewide. Regional variation in many of the designated lacustrine communities is evident, but we do not currently have in our files enough information or have undertaken analyses to confidently split common and widespread lake types into more specific regional variants. A finer scale classification of lakes that distinguishes types according to ecoregion and/or watershed is being evaluated. Preliminary conclusions suggest that vascular plant, bryophyte, algae, fish, mollusk, insect, and plankton assemblages may follow different distribution patterns, some more closely correlated with ecoregion boundaries, some more closely with major ecological drainage units.

A. NATURAL LAKES AND PONDS

This subsystem includes the Great Lakes, and inland lakes and ponds in which the trophic state,

morphometry, and water chemistry have not been substantially modified by human activities, or the native biota are dominant. The biota may include some introduced species (for example, non-native macrophytes, stock or accidentally introduced fishes),

however the introduced species are not usually dominant in the lake or pond community as a whole.

1. Eutrophic pond: the aquatic community of a small, shallow, nutrient-rich pond. The water is usually green with algae, and the bottom is mucky. Eutrophic ponds are too shallow to remain stratified throughout the summer; they are winter-stratified, monomictic ponds. Additional characteristic features of a eutrophic pond include the following: water that is murky, with low transparency (Secchi disk depths typically less than 4 m); water rich in plant nutrients (especially high in phosphorus, nitrogen, and calcium), high primary productivity (inorganic carbon fixed = 75 to 250 $g/m^2/yr$);, and a weedy shoreline. Alkalinity is typically high (greater than 12.5 mg/l calcium carbonate). A name change, and slight conceptual change to alkaline pond is being evaluated.

Species diversity is typically high. Aquatic vegetation is abundant. Littoral, and epilimnion species assemblages usually predominate. Characteristic plants include coontail (*Ceratophyllum demersum*), duckweeds (*Lemna minor, L. trisulca*), waterweed (*Elodea canadensis*), pondweeds (*Potamogeton* spp.), water starwort (*Heteranthera dubia*), bladderworts (*Utricularia* spp.) naiad (*Najas flexilis*), tapegrass (*Vallisneria americana*), algae (*Cladophora* spp.), yellow pond-lily (*Nuphar luteum*), and white water-lily (*Nymphaea odorata*). Characteristic fishes are usually warmwater fishes. Characteristic macroinvertebrates may include several types of odonates (*Aeshna* spp., *Ischnura* spp., *Gomphus* spp., and *Basiaeschna* spp.), and leeches (Hirundinae). Characteristic, and dominant plankton may include the phytoplankton *Chrysosphaerella longispina*, and *Ceratium* spp., and the zooplankton nauplii, rotifers such as *Keratella*, cyclopoids, and cladocerans.

Three to seven ecoregional variants (including Northern Appalachian, Great Lakes, and Lower New England types) are suspected to differ in dominant, and characteristic vascular plants, fishes, mollusks, and insects. Flow-through or fluvial pond might be a distinct variant worthy of recognition as a separate community type, but needs further evaluation. Flow-through ponds are closely associated with riverine complexes (e.g., large natural widenings of rivers or large beaver impoundments of river channels), and have a high flushing rate. Characteristic animals of flow-through ponds may include beaver (*Castor canadensis).* More data on this community are needed.

Distribution: throughout New York State, and is more common at low elevations, especially in the Great Lakes Plain ecozone, and St. Lawrence River Valley.

Rank: G4 S4

Examples: Black Pond, Jefferson County; Deer Pond, Essex County; Lima Ponds, Livingston County; Rogers Pond, Essex County; Sullivan Pond, Warren County; White Lily Pond, Rensselaer County.

Sources: Gilman 1976; NYNHP field surveys.

B. LACUSTRINE CULTURAL

This subsystem includes communities that are either created, and maintained by human activities, or are modified by human influence to such a degree that the trophic state, morphometry, water chemistry, or biological composition of the resident community are substantially different from the character of the lake community as it existed prior to human influence.

1. Farm pond/artificial pond: the aquatic community of a small pond constructed on agricultural or residential property. These ponds are often eutrophic, and may be stocked with panfish such as bluegill (*Lepomis macrochirus*) and yellow perch (*Perca flavescens*). The biota are variable (within limits), reflecting the species that were naturally or artificially seeded, planted, or stocked in the pond.

Distribution: throughout New York State.

Rank: G5 S5

Several natural ponds/lakes within the Town of Victor were not accessible by boat, so it was not possible to determine if they could be classified as a bog lake or a meromictic lake. At the present time they are all mapped as eutrophic ponds.

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PALUSTRINE SYSTEM

The palustrine system consists of non-tidal, perennial wetlands characterized by emergent vegetation. The system includes wetlands permanently saturated by seepage, permanently flooded wetlands, and wetlands that are seasonally or intermittently flooded (these may be seasonally dry) if the vegetative cover is predominantly hydrophytic and soils are hydric. Wetland communities are distinguished by their plant composition (hydrophytes), substrate (hydric soils), and hydrologic regime (frequency of flooding) (Cowardin 1979). Peatlands are a special type of wetland in which the substrate primarily consists of accumulated peat (partially decomposed plant material such as mosses, sedges, and shrubs) or marl (organically derived calcium carbonate deposits), with little or no mineral soil. Stable water levels or constant water seepage allow little aeration of the substrate in peatlands, slowing decomposition of plant litter, and resulting in peat or marl accumulation. In this classification, peatlands are characterized by their hydrologic regime; water source and water chemistry are important factors. Minerotrophic peatlands (fens) are fed by groundwater that contains minerals obtained during passage through or over mineral soils or aquifers. Ombrotrophic peatlands (bogs) are fed primarily by direct rainfall, with little or no groundwater influence (Damman and French 1987). The vegetation of ombrotrophic peatlands is depauperate; plants in the families *Sphagnaceae* and *Ericaceae* are prominent. The vegetation of minerotrophic peatlands is comparatively rich in species; plants in the families *Cyperaceae* and *Poaceae* are prominent (Heinselman 1970). In a natural landscape there are continuous gradients from ombrotrophic to strongly minerotrophic wetlands; there are also continuous gradients in soils from mineral soils to peat soils. The boundaries between different types of wetlands are not always discrete. Several different types of wetlands may occur together in a complex mosaic.

A. OPEN MINERAL SOIL WETLANDS

This subsystem includes wetlands with less than 50% canopy cover of trees. In this classification, a tree is defined as a woody plant usually having one principal stem or trunk, a definite crown shape, and characteristically reaching a mature height of at least 16 ft (5 m) (Driscoll et al. 1984). The dominant vegetation may include shrubs or herbs. Substrates range from mineral soils or bedrock to well-decomposed organic soils (muck). Fluctuating water levels allow enough aeration of the substrate to allow plant litter to decompose, so there is little or no accumulation of peat.

1. Deep emergent marsh: a marsh community that occurs on mineral soils or fine-grained organic soils (muck or well-decomposed peat); the substrate is flooded by waters that are not subjective to violent wave action. Water depths can range from 6 in to 6.6 ft (15 cm to 2 m); water levels may fluctuate seasonally, but the substrate is rarely dry, and there is usually standing water in the fall.

The most abundant emergent aquatic plants are cattails (*Typha angustifolia, T. latifolia*), wild rice (*Zizania aquatica*), bur-weeds (*Sparganium eurycarpum, S. androcladum*), pickerel weed (*Pontederia cordata*), bulrushes (*Scirpus tabernaemontani, S. fluviatilis, S. heterochaetus, S. acutus, S. pungens, S. americanus*), arrowhead (*Sagittaria latifolia*), arrowleaf (*Peltandra virginica*), rice cutgrass (*Leersia oryzoides*),

bayonet rush (*Juncus militaris*), water horsetail (*Equisetum fluviatile*) and bluejoint grass (*Calamagrostis canadensis*).

The most abundant floating-leaved aquatic plants are fragrant water lily (*Nymphaea odorata*), duckweeds (*Lemna minor, L. trisulca*), pondweeds (*Potamogeton natans, P. epihydrus, P. friesii, P. oakesianus, P. crispus, P. pusillus, P. zosteriformis, P. strictifolius*), spatterdock (*Nuphar variegata*), frog's-bit (*Hydrocharis morus-ranae*), watermeal (*Wolffia* spp.), water-shield (*Brasenia schreberi*), and water-chestnut (*Trapa natans*).

The most abundant submerged aquatic plants are pondweeds (*Potamogeton richardsonii, P. amplifolius, P. spirillus, P. crispus, P. zosteriformis*), coontail (*Ceratophyllum demersum*), chara (*Chara globularis*), water milfoils (*Myriophyllum spicatum, M. sibericum*), pipewort (*Eriocaulon aquaticum*), tapegrass (*Vallisneria americana*), liverwort (*Riccia fluitans*), naiad (*Najas flexilis*), water lobelia (*Lobelia dortmanna*), waterweed (*Elodea canadensis*), water stargrass (*Heteranthera dubia*), and bladderworts (*Utricularia vulgaris, U. intermedia*).

Animals that may be found in deep emergent marshes include red-winged blackbird (*Agelaius phoeniceus*), marsh wren (*Cistothorus palustris*), bullfrog (*Rana catesbeiana*), and painted turtle (*Chrysemys picta*). Rare species in some deep emergent marshes include American bittern (*Botaurus lentiginosus*), Virginia rail (*Rallus limicola*), and pied-billed grebe (*Podilymbus podiceps*).

Marshes that have been disturbed are frequently dominated by aggressive weedy species such as purple loosestrife (*Lythrum salicaria*) and reedgrass (*Phragmites australis*). Deep emergent marshes also occur in excavations that contain standing water (e.g., roadside ditches, gravel pits).

Distribution: throughout New York State.

Rank: G5 S5

Examples: Lake Champlain South Basin, Washington County; Lake Lila, Hamilton County; Chippewa Creek Marsh, St. Lawrence County; Upper and Lower Lakes, St. Lawrence County, Big Bay Swamp, Oswego County.

Sources: Bray 1915; Cowardin 1979; Gilman 1976; NYNHP field surveys.

Where deep emergent marshes border highways and railroads, disturbances alter composition leading to an abundance of a tall invasive grass, *Phragmites australis*. This is common along the Route 96 road corridor. Because it gradually transitions to typical cattail dominated emergent marsh, these areas were not mapped as a separate cover type.

2. Shallow emergent marsh: a marsh meadow community that occurs on mineral soil or deep muck soils (rather than true peat), that are permanently saturated and seasonally flooded. This marsh is better drained than a deep emergent marsh; water depths may range from 6 in to 3.3 ft (15 cm to 1 m) during flood stages, but the water level usually drops by mid to late summer and the substrate is exposed during an average year.

Most abundant herbaceous plants include bluejoint grass (*Calamagrostis canadensis*), cattails (*Typha latifolia, T. angustifolia, T. x glauca*), sedges (*Carex* spp..), marsh fern (*Thelypteris palustris*), manna grasses (*Glyceria pallida, G. canadensis*), spikerushes (*Eleocharis smalliana, E. obtusa*), bulrushes (*Scirpus cyperinus, S. tabernaemontani, S. atrovirens*), three-way sedge (*Dulichium arundinaceum*), sweetflag (*Acorus americanus*), tall meadow-rue (*Thalictrum pubescens*), marsh St. John's-wort (*Triadenum virginicum*), arrowhead (*Sagittaria latifolia*), goldenrods (*Solidago rugosa, S. gigantea*), Joe Pye weed (*Eupatorium maculatum, E. perfoliatum*), smartweeds (*Polygonum coccineum, P. amphibium, P. hydropiperoides*), marsh bedstraw (*Galium palustre*), jewelweed (*Impatiens capensis*), loosestrifes (*Lysimachia thyrsiflora, L. terrestris, L. ciliata*). Frequently in degraded examples reed canary grass (*Phalaris arundinacea*) and/or purple loosestrife (*Lythrum salicaria*) may become abundant.

Sedges (*Carex* spp.) may be abundant in shallow emergent marshes, but are not usually dominant. Marshes must have less than 50% cover of peat and tussock-forming sedges such as tussock sedges (*Carex stricta*), otherwise it may be classified as a sedge meadow. Characteristic shallow emergent marsh sedges include *Carex stricta, C. lacustris, C. lurida, C. hystricina, C. alata, C. vulpinoidea, C. comosa, C. utriculata, C. scoparia, C. gynandra, C. stipata*, and *C. crinita*.

Other plants characteristic of shallow emergent marshes (most frequent listed first) include blue flag iris (*Iris versicolor*), sensitive fern (*Onoclea sensibilis*), common skullcap (*Scutellaria galericulata*), beggar ticks (*Bidens* spp.), water-horehounds (*Lycopus uniflorus, L. americanus*), bur-weeds (*Sparganium americanum, S. eurycarpum*), swamp milkweed (*Asclepias incarnata*), water-hemlock (*Cicuta bulbifera*), asters (*Aster umbellatus, A. puniceus*), marsh bellflower (*Campanula aparinoides*), water purslane (*Ludwigia palustris*), royal and cinnamon ferns (*Osmunda regalis, O. cinnamomea*), marsh cinquefoil (*Potentilla palustris*), rushes (*Juncus effusus, J. canadensis*), arrowleaf (*Peltandra virginica*), purple-stem angelica (*Angelica atropurpurea*), water docks (*Rumex orbiculatus, R. verticillatus*), turtlehead (*Chelone glabra*), water parsnip (*Sium suave*), and cardinal flower (*Lobelia cardinalis*).

Shallow emergent marshes may have scattered shrubs including rough alder (*Alnus incana* ssp. *rugosa*), waterwillow (*Decodon verticillatus*), shrubby dogwoods (*Cornus amomum, C. sericea*), willows (*Salix* spp.), meadow sweet (*Spiraea alba* var. *latifolia*), and buttonbush (*Cephalanthus occidentalis*). Areas with greater than 50% shrub cover are classified as shrub swamps.

Amphibians that may be found in shallow emergent marshes include frogs such as eastern American toad (*Bufo a. americanus*), northern spring peeper (*Pseudoacris c. crucifer*), green frog (*Rana clamitans melanota*), and wood frog (*Rana sylvatica*); and salamanders such as northern redback salamander (*Plethodon c. cinereus*) (Hunsinger 1999). Birds that may be found include red-winged blackbird (*Agelaius phoeniceus*), marsh wren (*Cistothorus palustris*), and common yellowthroat (*Geothlypis trichas*) (Levine 1998).

Shallow emergent marshes typically occur in lake basins and along streams often intergrading with deep emergent marshes, shrub swamps and sedge meadows, and they may occur together in a complex mosaic in a large wetland..

Distribution: throughout New York State.

Rank: G5 S5

Examples: South Branch Grass River Colton, St. Lawrence County; West Branch Oswegatchie River Diana, Lewis County; East Branch Fish Creek, Lewis County; Jordan River, St. Lawrence/Franklin Counties; Lakeview Marshes, Jefferson County.

Sources: Bray 1915; Gilman 1976; Hotchkiss 1932; Hunsinger 1999; Levine 1998; Metzler and Tiner 1992; Tiner 1985; NYNHP field surveys.

3. Shrub swamp: an inland wetland dominated by tall shrubs that occurs along the shore of a lake or river, in a wet depression or valley not associated with lakes, or as a transition zone between a marsh, fen, or bog and a swamp or upland community. The substrate is usually mineral soil or muck. This is a very broadly defined type that includes several distinct communities and many intermediates. Shrub swamps are very common and quite variable. They may be co-dominated by a mixture of species, or have a single dominant shrub species.

In northern New York many shrub swamps are dominated by alder (*Alnus incana* ssp. *rugosa*); these swamps are sometimes called *alder thickets*. A swamp dominated by red osier dogwood (*Cornus sericea*), silky dogwood (*C. amomum*) and willows (*Salix* spp.) may be called a shrub carr. Along the shores of some lakes and ponds there is a distinct zone dominated by water-willows (*Decodon verticillatus*) and/or buttonbush (*Cephalanthus occidentalis*) which can sometimes fill a shallow basin.

Characteristic shrubs that are common in these and other types of shrub swamps include meadow-sweet (*Spiraea alba* var. *latifolia*), steeple-bush (*Spiraea tomentosa*), gray dogwood (*Cornus foemina* ssp. *racemosa*), swamp azalea (*Rhododendron viscosum*), highbush blueberry (*Vaccinium corymbosum*), male-berry (*Lyonia ligustrina*), smooth alder (*Alnus serrulata*), spicebush (*Lindera benzoin*), willows (*Salix bebbiana, S. discolor, S. lucida, S. petiolaris*), wild raisin (*Viburnum cassinoides*), and arrowwood (*Viburnum recognitum*). More documentation and research is needed to distinguish the different types of shrub swamps in New York.

Birds that may be found in shrub swamps include common species such as common yellowthroat (*Geothlypis trichas*), and rare species such as American bittern (*Botarus lentiginosus*), alder flycatcher (*Empidonax alnorum*), willow flycatcher (*E. trallii)*, and Lincoln's sparrow (*Passerella lincolnii*) (Levine 1998).

Distribution: throughout New York State.

Rank: G5 S5

Examples: West Branch Oswegatchie River Diana, Lewis County; West Branch Sacandaga River, Hamilton County; Jordan River, St. Lawrence/Franklin Counties; Shingle Shanty Brook, Hamilton County, East Branch Fish Creek, Lewis County.

Sources: Bray 1915; Levine 1998; McVaugh 1958; Metzler and Tiner 1992; Shanks 1996; Tiner 1985; NYNHP field surveys.

B. OPEN PEATLANDS

This subsystem includes peatlands with less than 50% canopy cover of trees. The dominant vegetation may include shrubs, herbs, or mosses. Substrates range from coarse fibrous or woody peat, to fine-grained marl and organic muck. Peat layer should be at least 20 cm deep.

1. Rich shrub fen: a strongly minerotrophic peatland in which the substrate is a woody peat, which may or may not be underlain by marl or limestone bedrock. Rich fens are fed by waters that have high concentrations of minerals and high pH values, generally from 6.0 to 7.8.

The dominant species in rich shrub fens are shrubs, which form a canopy and overtop most herbs. Some rich shrub fens are dominated by low shrubs (under 4 ft or 1.2 m) that collectively have 80 to 90% cover in the community. Other rich shrub fens are dominated by taller shrubs (over 4 ft or 1.2 m) that collectively have 50 to 70% cover in the community with low shrubs and graminoids locally dominant in openings. The rich shrub fen community is somewhat broadly defined to include both the low shrub and taller shrub examples as well as regional variants distinguished by variations in their flora such as the lack of shrubby cinquefoil (*Potentilla fruticosa*) in northern examples. More data could lead to the elevation of these variants to community types. In rich shrub fens, *Sphagnum* is either absent, or a minor component, with only most minerotrophic species present. Other mosses may be common.

Characteristic shrubs include red maple (*Acer rubrum*), red osier dogwood (*Cornus sericea*), speckled alder (*Alnus incana* ssp. *rugosa*), sweet-gale (*Myrica gale*), shrubby cinquefoil (*Potentilla fruticosa*), swamp fly honeysuckle (*Lonicera oblongifolia*), black chokeberry (*Aronia melanocarpa*), alder-leaf buckthorn (*Rhamnus alnifolia*), and poison sumac (*Toxicodendron vernix*). Other shrubs found in rich shrub fens include hoary willow (*Salix candida*), dwarf raspberry (*Rubus pubescens*), tamarack (*Larix laricina*), highbush blueberry (*Vaccinium corymbosum*), bog birch (*Betula pumila*), bayberry (*Myrica pensylvanica*), meadow-sweet (*Spiraea alba*), and northern white cedar (*Thuja occidentalis*).

Characteristic herbs include marsh fern (*Thelypteris palustris*), royal fern (*Osmunda regalis*), the sedges *Carex stricta* and *C. interior*, common cat-tail (*Typha latifolia*), bluejoint grass (*Calamagrostis canadensis*), tall meadow-rue (*Thalictrum pubescens*), water horsetail (*Equisetum fluviatile*), and marsh St. John's wort (*Triadenum virginicum*). Other herbs found in rich shrub fens include the sedge (*Carex aquatilis*, skunk-cabbage (*Symplocarpus foetidus*), flat-top white aster (*Aster umbellatus*), spreading goldenrod (*Solidago patula*), blue flag (*Iris versicolor*), and spike muhly (*Muhlenbergia glomerata*).

Characteristic non-vascular species include the mosses *Calliergonella cuspidata, Aulacomnium palustre, Thuidium delicatulum, Campylium stellatum, Fissidens adianthoides, Sphagnum warnstorfii,* and *S. fimbriatum*.

Data on characteristic animals are needed.

Distribution: Scattered throughout upstate New York north of the Coastal Lowlands ecozone in the Appalachian Plateau, Great Lakes Plain, Mohawk Valley, Hudson Valley, Taconic Highlands, Tug Hill and St. Lawrence, and Adirondacks ecozones.

Rank: G3G4 S1S2

Examples: Bear Swamp Sempronius, Cayuga County; Bonaparte Swamp, Lewis County; Great Swamp Pawling; Dutchess County; Lisbon Swamp, Saint Lawrence County; Summit Lake Swamp, Otsego County.

Sources: Andrus 1980; Godwin *et al*. 2000; Johnson and Leopold 1994; Motzkin 1994; Olivero 2001; Reschke *et al*. 1990; NY Natural Heritage field surveys.

C. FORESTED MINERAL SOIL WETLANDS

This subsystem includes seasonally flooded forests, and permanently flooded or saturated swamps. These forests and swamps typically have at least 50% canopy cover of trees. For the purposes of this classification, a tree is defined as a woody plant usually having one principal stem or trunk, a definite crown shape, and characteristically reaching a mature height of at least 16 ft (5 m) (Driscoll *et al.* 1984).

1. Floodplain forest: a hardwood forest that occurs on mineral soils on low terraces of river floodplains and river deltas. These sites are characterized by their flood regime; low areas are annually flooded in spring, and high areas are flooded irregularly. Some sites may be quite dry by late summer, whereas other sites may be flooded again in late summer or early autumn (these floods are caused by heavy precipitation associated with tropical storms). This is a broadly defined community; floodplain forests are quite variable and may be very diverse.

The most abundant trees include silver maple (*Acer saccharinum*), ashes (*Fraxinus pensylvanica, F. nigra, F. americana*), cottonwood (*Populus deltoides*), red maple (*Acer rubrum*), box elder (*Acer negundo*), elms (*Ulmus americana, U. rubra*), hickories (*Carya cordiformis, C. ovata, C. laciniosa*), butternut and black walnut (*Juglans cinerea, J. nigra*), sycamore (*Platanus occidentalis*), oaks (*Quercus bicolor, Q. palustris*), and river birch (*Betula nigra*). Other less frequently occurring trees include hackberry (*Celtis occidentalis*), tulip tree (*Liriodendron tulipifera*), basswood (*Tilia americana*), and sugar maple (*Acer saccharum*). Introduced trees, such as white willow (*Salix alba*) and black locust (*Robinia pseudo-acacia*), have become established in some floodplain forests.

The most abundant shrubs include spicebush (*Lindera benzoin*), ironwood (*Carpinus carolinianus*), bladdernut (*Staphylea trifoliata*), speckled alder (*Alnus incana* spp. *rugosa*), dogwoods (*Cornus sericea, C. foemina* spp. *racemosa, C. amomum*), viburnums (*Viburnum cassinoides, V. prunifolium, V. dentatum, V. lentago*), and sapling canopy trees. Invasive exotic shrubs that may be locally abundant include shrub honeysuckles (*Lonicera tatarica, L. morrowii*), and multiflora rose (*Rosa multiflora*). Other less frequently occurring shrubs include meadowsweet (*Spiraea alba* var. *latifolia*) and winterberry (*Ilex verticillata*).

The most abundant vines include poison ivy (*Toxicodendron radicans*), wild grapes (*Vitis riparia, Vitis* spp.), Virginia creeper (*Parthenocissus quinquefolia*), virgin's bower (*Clematis virginiana*), and less frequently, moonseed (*Menispermum canadense*). Vines may form a dense liana in tree canopy and/or dominate the groundcover.

The most abundant herbs include sensitive fern (*Onoclea sensibilis*), jewelweeds (*Impatiens capensis, I. pallida*), ostrich fern (*Matteuccia struthiopteris*), white snakeroot (*Eupatorium rugosum*), wood nettle (*Laportea canadensis*), false nettle (*Boehmeria cylindrica*), goldenrods (*Solidago gigantea, S. canadensis, Solidago* spp.), lizard's tail (*Saururus cernuus*), and jumpseed (*Polygonum virginianum*). Invasive exotic herbs that may be locally abundant include moneywort (*Lysimachia nummularia*), garlic mustard (*Alliaria petiolata*), dame's rockets (*Hesperis matronalis*), and stilt grass (*Microstegium vimineum*). Other less frequently occurring herbs include skunk cabbage (*Symplocarpus foetidus*), enchanter's nightshade (*Circaea lutetiana* ssp. *canadensis*), bluejoint grass (*Calamagrostis canadensis*), white avens (*Geum canadense*), clearweed (*Pilea pumila*), jack-in-the-pulpit (*Arisaema triphyllum*), rice cutgrass (*Leersia oryzoides*), sedges (*Carex lacustris, C. intumescens, C. lupulina*), and many others.

Characteristic birds include yellow-throated vireo (*Vireo flavifrons*), tufted titmouse (*Parus bicolor*), red-bellied woodpecker (*Melanerpes carolinus*), and pileated woodpecker (*Dryocopus pileatus*).

The composition of the forest apparently changes in relation to flood frequency and elevation of floodplain terraces along larger rivers. Neighboring states recognize several floodplain forest variants based on dominant plants, flood regime, and topographic position (Fike 1999, Kearsley 1999, Sorenson et al. 1998). The composition of floodplain forests in New York State has not been studied in sufficient detail to characterize compositional variations and how they correlate with flood regime and terrace elevation.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G3G4 S2S3

Examples: Raquette River, Franklin County; Howland Island, Cayuga County; Catskill Creek, Greene County; Doyles Islands, Delaware County; South Bay Creek Wetlands, Washington County.

Sources: Barrett and Enser 1997; Bechtel and Sperduto 1998; Fike 1999; Gordon 1940; Kearsley 1999; Metzler and Damman 1985; Nichols et al. 2000; Sorenson et al. 1998; Veneman and Tiner 1990; NYNHP field surveys.

2. Silver maple-ash swamp: a hardwood basin swamp that typically occurs in poorly-drained depressions or along the borders of large lakes, and less frequently in poorly drained soils along rivers. These sites are characterized by uniformly wet conditions with minimal seasonal fluctuations in water levels.

The dominant trees are usually silver maple (*Acer saccharinum*) and green ash (*Fraxinus pennsylvanica*). American elm (*Ulmus americana*) is often present and probably was a co-dominant prior to the onset of Dutch elm disease and elm yellows.

Other trees include black ash (*F. nigra*), white ash (*F. americana*), swamp white oak (*Quercus bicolor*), red maple (*Acer rubrum*), and occasionally the silver maple-red maple hybrid "Freeman's maple" (*Acer x freemanii*). Many of the canopy trees occur in the subcanopy along with ironwood (*Carpinus carolinianus*).

Characteristic shrubs include winterberry (*Ilex verticillata*), spicebush (*Lindera benzoin*), various shrubby dogwoods (*Cornus foemina* ssp. *racemosa, C. amomum*, and *C. sericea*), various viburnums (*Viburnum recognitum, V. lentago*, and *V. cassinoides*), speckled alder (*Alnus incana* ssp. *rugosa*), gooseberries (*Ribes* spp.), and sapling canopy trees. Characteristic vines include Virginia creeper (*Parthenocissus quinquefolia*) and poison ivy (*Toxicodendron radicans*).

Characteristic herbs include sensitive fern (*Onoclea sensibilis*), skunk cabbage (*Symplocarpus foetidus*), false nettle (*Boehmeria cylindrica*), wood-nettle (*Laportea canadensis*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*O. regalis*), marsh fern (*Thelypteris palustris*), jewelweed (*Impatiens capensis*), manna grasses (*Glyceris striata, G. grandis*), and various sedges (*Carex lupulina, C. crinita, C. bromoides,* and *C. lacustris*). Other herbs in wetter examples include arrow arum (*Peltandra virginica*), arrowheads (*Sagittaria* spp.), wild calla (*Calla palustris*), cattail (*Typha latifolia*), and duckweeds (*Lemna* spp.). A few examples are dominated by reed canary grass (*Phalaris arundinacea*) and/or lizard's tail (*Saururus cernuus*).

Silver maple-ash swamps are often underlain by calcareous bedrock and may contain a few calciphilic species, such as northern white cedar (*Thuja occidentalis*) and alder-leaf buckthorn (*Rhamnus alnifolia*). Ash-elm dominated swamps with little or no maple are tentatively included here until more data are collected on this variant.

Data on characteristic animals are needed.

Distribution: in central and western New York in the Appalachian Plateau ecozone, and in the Champlain Valley sub-zone of the Lake Champlain ecozone.

Rank: G3G4 S2S3

Examples: Kings Bay Wetlands, Clinton County; Beaver Creek Swamp, St. Lawrence County; Black Creek Swamp, Monroe County; Cicero Swamp, Onondaga County; Conesus Wetlands, Livingston County.

Source: Huenneke 1982; NYNHP field surveys.

3. Vernal pool: an aquatic community of one or more associated intermittently to ephemerally ponded, small, shallow depressions typically within an *upland* forest, but also within various palustrine and other terrestrial communities. Vernal pools are typically flooded in spring or after a heavy rainfall, but are usually dry during summer. Many vernal pools are filled again in autumn. Substrate is typically dense leaf litter over hydric soils. Substrate type is known to vary from deep sands to loam to sandstone pavement. Vernal pools typically occupy a confined basin (i.e., a standing waterbody without a flowing outlet), but have an intermittent stream flowing out of it during high water. Several hydrologic types of vernal pools have been identified including natural

isolated basins, floodplain basins, in-stream basins, swamp pools, and marsh pools (Barbour 1999).

This community includes a diverse group of invertebrates and amphibians that depend upon temporary pools as breeding habitat. Since vernal pools cannot support fish populations, there is no threat of fish predation on amphibian eggs or invertebrate larvae. Characteristic animals of vernal pools include species of amphibians, reptiles, crustaceans, mollusks, annelids, and insects. Vernal pool species can be categorized as either obligate (species that depend upon vernal pool habitat for their survival), or facultative (species that are often found in vernal pools, but are not dependent on them and can successfully reproduce elsewhere) (Colburn 1997).

Obligate vernal pool amphibians include spotted salamander (*Ambystoma maculatum*), blue-spotted salamander (*A. laterale*), Jefferson's salamander (*A. jeffersonianum*), marbled salamander (*A. opacum*) and wood frog (*Rana sylvatica*). Fairy shrimp (*Anostraca*) are obligate vernal pool crustaceans, with *Eubranchipus* spp. being the most common.

Facultative vernal pool amphibians include four-toed salamander (*Hemidactylium scutatum*), red-spotted newt (*Notophthalmus viridescens*), spring peeper (*Pseudacris crucifer*), gray tree frog (*Hyla versicolor*), green frog (*Rana clamitans*), American toad (*Bufo americanus*), and Fowler's toad (*B. woodhousei fowleri*). Facultative vernal pool reptiles include painted turtle (*Chrysemys picta*), spotted turtle (*Clemmys guttata*), and snapping turtle (*Chelydra serpentina*). Facultative vernal pool mollusks include freshwater fingernail clams (*Sphaerium* sp., *Musculium* sp., and *Pisidium* sp.) and aquatic amphibious snails (*Physa* sp., *Lymnaea* sp., and *Helisoma* sp.). Facultative vernal pool insects include water scorpions, (), predacious diving beetles (*Dytiscidae*), whirligig beetles (*Gyrinidae*), dobsonflies (*Corydalidae*), caddisflies (*Trichoptera*), dragonflies (*Anisoptera*), damselflies (*Zygoptera*), mosquitoes (*Cuculidae*), springtails (*Collembola*) and water striders (*Gerris* sp.). Leeches (*Hirudinea*) are a facultative vernal pool annelid.

Plants are predominantly hydrophytic, typically with a combination of obligate and facultative wetland species. Floating and submergent plants may be common, but emergent plants should be sparse or lacking. Characteristic vascular plants may include manna grass (*Glyceria* sp.), spikerush (*Eleocharis acicularis*), water purslane (*Ludwigia palustris*), naiad (*Najas* sp.), duckweed (*Lemna minor*), and water-hemlock (*Cicuta maculata*). Characteristic bryophytes may include *Brachythecium rivulare*, *Calliergon* sp. and *Sphagnum* spp. A characteristic rare plant of examples on the coastal plain may be featherfoil (*Hottonia inflata*).

Five to seven ecoregional variants (including Northern Appalachian, Great Lakes, Lower New England, Alleghany Plateau and North Atlantic Coast types) are suspected to differ in characteristic and dominant vascular plants, amphibians and invertebrates, as well as water chemistry, water temperature, substrate type, and surrounding forest type. More data on regional variants are needed.

Distribution: throughout New York State.

Rank: G4 S3S4

Examples: River Road North Creek, Warren County; Shawangunk Mountains, Ulster County; Perigo Hill, Rensselaer County.

Sources: Barbour, S. 1999; Colburn, E.A. 1997; Huth and Smiley 1981; Swain and Kearsley 2000; Williams 2001; NYNHP field surveys.

4. Hemlock-hardwood swamp: a mixed swamp that occurs on mineral soils and deep muck in depressions which receive groundwater discharge, typically in areas where the aquifer is a basic or acidic substrate. These swamps usually have a fairly closed canopy (70 to 90% cover), sparse shrub layer, and low species diversity.

The tree canopy is typically dominated by hemlock (*Tsuga canadensis*), and co-dominated by yellow birch (*Betula alleghaniensis*), and red maple (*Acer rubrum*). Other less frequently occurring trees include white pine (*Pinus strobus*), black gum (*Nyssa sylvatica*), and green ash (*Fraxinus pennsylvanica*).

Characteristic shrubs include saplings of canopy trees plus highbush blueberry (*Vaccinium corymbosum*) often dominant, with great rhododendron (*Rhododendron maximum*) and sweet pepperbush (*Clethra alnifolia*) becoming more common in Lower Hudson Valley examples. Other less frequently occurring shrubs include various viburnums (*Viburnum cassinoides, V. lentago*, and *V. lantanoides*), winterberry (*Ilex verticillata*), and mountain holly (*Nemopanthus mucronatus*).

Characteristic herbs are cinnamon fern (*Osmunda cinnamomea*) and sensitive fern (*Onoclea sensibilis*). Groundcover may also be fairly sparse. Other less frequently occurring herbs include sedges (*Carex trisperma, C. folliculata*, and *C. bromoides*), goldthread (*Coptis trifolia*), Canada mayflower (*Maianthemum canadense*), mountain sorrel (*Oxalis montana*), foamflower (*Tiarella cordifolia*), and sarsaparilla (*Aralia nudicaulis*).

This is a common and widespread swamp community. Some occurrences are very small (1 to 2 acres). Water levels in these swamps typically fluctuate seasonally; they may be flooded in spring and relatively dry by late summer.

Distribution: throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G4G5 S4

Examples: Tamarack Swamp Delaware, Sullivan County; Protection Bog, Wyoming/Erie Counties; Vly Swamp, Ulster County; Tamarack Swamp Boylston, Oswego County; Harriman, Rockland County.

Sources: Bray 1915; McVaugh 1958; NYNHP field surveys.

D. FORESTED PEATLANDS

This subsystem includes peatlands with at least 50% canopy cover of trees. Substrates range from coarse woody or fibrous peat to fine-grained marl and organic muck.

1. Red maple-tamarack peat swamp: a mixed swamp that occurs on organic soils (peat or muck) in poorly drained depressions. These swamps are often spring fed or enriched

by seepage of minerotrophic groundwater resulting in a stable water table and continually saturated soil. Soils are often rich in calcium.

The dominant trees are red maple (*Acer rubrum*) and tamarack (*Larix laricina*). These species usually form an open canopy (50 to 70% cover) with numerous small openings dominated by shrubs or sedges. Other less frequently occurring trees include black spruce (*Picea mariana*), white pine (*Pinus strobus*), black ash (*Fraxinus nigra*), ironwood (*Carpinus carolinianus*), and northern white cedar (*Thuja occidentalis*).

Characteristic shrubs are alders (*Alnus incana* ssp. *rugosa, A. serrulata*), winterberry (*Ilex verticillata*), various shrubby dogwoods especially red osier dogwood (*Cornus sericea*), willows (*Salix* spp.), highbush blueberry (*Vaccinium corymbosum*), dwarf raspberry (*Rubus pubescens*), along with many rich shrub fen species such as swamp birch (*Betula pumila*), alder-leaf buckthorn (*Rhamnus alnifolia*), poison sumac (*Toxicodendron vernix*), swamp fly honeysuckle (*Lonicera oblongifolia*), and shrubby cinquefoil (*Potentilla fruticosa*). Other less frequently occurring shrubs include black chokeberry (*Aronia melanocarpa*) and mountain holly (*Nemopanthus mucronatus*).

The herb layer is often very diverse and usually includes calcium rich indicator species. Characteristic herbs are sedges such as *Carex trisperma, C. interior, C. stricta, C. lacustris,* and *C. leptalea* and ferns such as royal fern (*Osmunda regalis*), cinnamon fern (*O. cinnamomea*), marsh fern (*Thelypteris palustris*), and crested wood fern (*Dryopteris cristata*), along with skunk cabbage (*Symplocarpus foetidus*), marsh marigold (*Caltha palustris*), and water horehound (*Lycopus uniflorus*). Other less frequently occurring herbs include cattail (*Typha latifolia*), goldthread (*Coptis trifolia*), flat-topped aster (*Aster umbellatus*), fowl manna grass (*Glyceria striata*), water horsetail (*Equisetum fluviatile*), buckbean (*Menyanthes trifoliata*), starflower (*Trientalis borealis*), goldenrods (*Solidago patula, S. uliginosa*), golden ragwort (*Senecio aureus*), and marsh cinquefoil (*Potentilla palustris*).

The bryophyte layer is dominated by several species of *Sphagnum* moss, including *S. magellanicum, S. angustifolium*, and *S. warnstorfii*.

Data on characteristic animals are needed. These swamps are closely related to and often grade into rich shrub fens and rich graminoid fens.

Distribution: scattered throughout upstate New York, north of the Coastal Lowlands ecozone.

Rank: G3G4 S2S3

Examples: Deer Creek Marsh, Oswego County; Vly Swamp, Ulster County; Perch River Swamp, Jefferson County; Lisbon Swamp, St. Lawrence County; Drowned Lands Swamp, Columbia County; Brennen Beach Fen, Oswego County.

Sources: McVaugh 1958; NYNHP field surveys.

2. Northern white cedar swamp: a conifer or mixed swamp that occurs on organic soils in cool, poorly drained depressions in central and northern New York, and along lakes and streams in the northern half of the state. These swamps are often spring fed or enriched by seepage of cold, minerotrophic groundwater, resulting in a stable water table

and continually saturated soils. Soils are often rich in calcium. At some sites these soils have developed above a marl substrate.

The characteristic tree is northern white cedar (*Thuja occidentalis*), which makes up more than 30% of the canopy cover. *Thuja* may form nearly pure stands, or it may be mixed with other conifers and hardwoods, including red maple (*Acer rubrum*), hemlock (*Tsuga canadensis*), balsam fir (*Abies balsamea*), tamarack (*Larix laricina*), yellow birch (*Betula alleghaniensis*), black ash (*Fraxinus nigra*), white pine (*Pinus strobus*), and black spruce (*Picea mariana*). The shrublayer is usually sparse; characteristic species are dwarf raspberry (*Rubus pubescens*), red osier dogwood (*Cornus sericea*), swamp fly honeysuckle (*Lonicera oblongifolia*), and highbush blueberry (*Vaccinium corymbosum*). The groundlayer is typically diverse, with many bryophytes and boreal herbs. There are typically many hummocks formed by decaying downed trees or tip-up mounds.

Characteristic herbs on the hummocks are the sedges *Carex leptalea* and *C. eburnea*, oak fern (*Gymnocarpium dryopteris*), gold thread (*Coptis trifolia*), starflower (*Trientalis borealis*), bunchberry (*Cornus canadensis*), miterwort (*Mitella nuda*), Canada mayflower (*Maianthemum canadense*), blue bead lily (*Clintonia borealis*), snowberry (*Gaultheria hispidula*), and partridge berry (*Mitchella repens*). Characteristic herbs of hollows between the hummocks are the sedge *C. intumescens*, sensitive fern (*Onoclea sensibilis*), marsh fern (*Thelypteris palustris*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*O. regalis*), crested wood fern (*Dryopteris cristata*), showy lady's-slipper (*Cypripedium reginae*), yellow lady's slipper (*Cypripedium calceolus*), and golden ragwort (*Senecio aureus*).

Characteristic bryophytes are several species of *Sphagnum* moss, feathermosses such as *Hylocomium splendens* and *Ptilium crista-castrensis*, and leafy liverworts such as *Bazzania trilobata* and *Trichocolea tomentella*.

Characteristic birds include northern waterthrush (*Seiurus noveboracensis*), winter wren (*Troglodytes troglodytes*), white-throated sparrow (*Zonotrichia albicollis*), and golden-crowned kinglet (*Regulus satrapa*).

Distribution: scattered across upstate New York, extending north from the Appalachian Plateau ecozone.

Rank: G3G4 S2S3 *Revised:* 1990

Examples: Bergen Swamp, Genesee County; Toad Harbor Swamp, Oswego County; Marion River, Hamilton County; Carley Swamp, Lewis County; Dunham Bay Marsh, Warren County; Ninemile Swamp, Madison/Oneida Counties; Nelson Swamp, Madison County; Summit Lake Swamp, Otsego County.

Sources: Seischab 1984; Shanks 1966; Sorensen et al. 1998; Sperduto and Engstrom 1998; NYNHP field surveys.

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TERRESTRIAL SYSTEM

These habitats have well-drained soils that are dry to mesic (never hydric), and vegetative cover that is never predominantly hydrophytic, even if the soil surface is occasionally or seasonally flooded or saturated. In other words, this is a broadly defined system that includes everything except aquatic, wetland, and subterranean communities.

A. OPEN UPLANDS

This subsystem includes upland communities with less than 25% canopy cover of trees; The dominant species in these communities are shrubs, herbs, or cryptogammic plants (mosses, lichens, etc.). Three distinctive physiognomic types are included in this subsystem. Grasslands include communities that are dominated by grasses and sedges; they may include scattered shrubs (never more than 50% cover of shrubs), and scattered trees (usually less than one tree per acre, or 3 trees per hectare). Meadows include communities with forbs, grasses, sedges, and shrubs codominant; they may include scattered trees. Shrublands include communities that are dominated by shrubs (more than 50% cover of shrubs); they may include scattered trees.

1. **Successional old field:** a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned.

Characteristic herbs include goldenrods (*Solidago altissima, S. nemoralis, S. rugosa, S. juncea, S. canadensis,* and *Euthamia graminifolia*), bluegrasses (*Poa pratensis, P. compressa*), timothy (*Phleum pratense*), quackgrass (*Agropyron repens*), smooth brome (*Bromus inermis*), sweet vernal grass (*Anthoxanthum odoratum*), orchard grass (*Dactylis glomerata*), common chickweed (*Cerastium arvense*), common evening primrose (*Oenothera biennis*), old-field cinquefoil (*Potentilla simplex*), calico aster (*Aster lateriflorus*), New England aster (*Aster novae-angliae*), wild strawberry (*Fragaria virginiana*), Queen-Anne's-lace (*Daucus corota*), ragweed (*Ambrosia artemisiifolia*), hawkweeds (*Hieracium* spp.), dandelion (*Taraxacum officinale*), and ox-tongue (*Picris hieracioides*).

Shrubs may be present, but collectively they have less than 50% cover in the community. Characteristic shrubs include gray dogwood (*Cornus foemina* ssp. *racemosa*), silky dogwood (*Cornus amomum*), arrowwood (*Viburnum recognitum*), raspberries (*Rubus* spp.), sumac (*Rhus typhina, R. glabra*), and eastern red cedar (*Juniperus virginiana*).

A characteristic bird is the field sparrow (*Spizella pusilla*). This is a relatively short-lived community that succeeds to a shrubland, woodland, or forest community.

Distribution: throughout New York State.

Rank: G4 S4

Examples: Chippewa Creek Plains, St. Lawrence County; Finger Lakes National Forest, Schuyler County.

Sources: Mellinger and McNaughton 1975; NYNHP field surveys.

2. Successional shrubland: a shrubland that occurs on sites that have been cleared (for farming, logging, development, etc.) or otherwise disturbed. This community has at least 50% cover of shrubs.

Characteristic shrubs include gray dogwood (*Cornus foemina* ssp. *racemosa*), eastern red cedar (*Juniperus virginiana*), raspberries (*Rubus* spp.), hawthorne (*Crataegus* spp.), serviceberries (*Amelanchier* spp.), choke-cherry (*Prunus virginiana*), wild plum (*Prunus americana*), sumac (*Rhus glabra, R. typhina*), nanny-berry (*Viburnum lentago*), arrowwood (*Viburnum recognitum*), and multiflora rose (*Rosa multiflora*).

Birds that may be found in successional shrublands brown thrasher, blue-winged warbler, golden-winged warbler, chestnut-sided warbler, yellow-breasted chat, eastern towhee, field sparrow, song sparrow, and indigo bunting (Levine 1998).
Distribution: throughout New York State.

Rank: G4 S4

Examples: Chippewa Creek Plains, St. Lawrence County; Finger Lakes National Forest, Schuyler County.

Source: NYNHP field surveys.

B. FORESTED UPLANDS

This subsystem includes upland communities with more than 60% canopy cover of trees; these communities occur on substrates with less than 50% rock outcrop or shallow soil over bedrock.

1. Appalachian oak-hickory forest: a hardwood forest that occurs on well-drained sites, usually on ridgetops, upper slopes, or south- and west-facing slopes. The soils are usually loams or sandy loams. This is a broadly defined forest community with several regional and edaphic variants.

The dominant trees include one or more of the following oaks: red oak (*Quercus rubra*), white oak (*Q. alba*), and black oak (*Q. velutina*). Mixed with the oaks, usually at lower densities, are one or more of the following hickories: pignut (*Carya glabra*), shagbark (*C. ovata*), and sweet pignut (*C. ovalis*). Common associates are white ash (*Fraxinus americana*), red maple (*Acer rubrum*), and Eastern hop hornbeam (*Ostrya virginiana*).

There is typically a subcanopy stratum of small trees and tall shrubs including flowering dogwood (*Cornus florida*), witch hazel (*Hamamelis virginiana*), shadbush (*Amelanchier arborea*), and choke cherry (*Prunus virginiana*). Common low shrubs include maple-leaf virburnum (*Viburnum acerifolium*), blueberries (*Vaccinium angustifolium, V. pallidum*), red raspberry (*Rubus idaeus*), gray dogwood (*Cornus foemina* ssp. *racemosa*), and beaked hazelnut (*Corylus cornuta*). The shrublayer and groundlayer flora may be diverse.

Characteristic groundlayer herbs are wild sarsaparilla (*Aralia nudicaulis*), false Solomon's seal (*Smilacina racemosa*), Pennsylvania sedge (*Carex pensylvanica*), tick-trefoil (*Desmodium glutinosum, D. paniculatum*), black cohosh (*Cimicifuga racemosa*), rattlesnake root (*Prenanthes alba*), white goldenrod (*Solidago bicolor*), and hepatica (*Hepatica americana*).

Characteristic animals include red-bellied woodpecker (*Melanerpes carolinus*), whip-poor-will (*Caprimulgus vociferus*), and wild turkey (*Meleagris gallopavo*).

Distribution: throughout upstate New York north of the Coastal Lowlands ecozone; most common south of the Adirondacks ecozone.

Rank: G4G5 S4

Examples: Bristol Hills, Ontario County; Finger Lakes National Forest, Schuyler County; Storm King Mountain, Orange County; Long Eddy, Delaware County.

Sources: McIntosh 1972; Ross 1958; NYNHP field surveys.

2. Beech-maple mesic forest: a hardwood forest with sugar maple (*Acer saccharum*) and beech (*Fagus grandifolia*) codominant. This is a broadly defined community type

with several regional and edaphic variants. These forests occur on moist, well-drained, usually acid soils. Common associates are yellow birch (*Betula alleghaniensis*), white ash (*Fraxinus americana*), eastern hop hornbeam (*Ostrya virginiana*), and red maple (*Acer rubrum*). There are relatively few shrubs and herbs.

Characteristic small trees or tall shrubs are hobblebush (*Viburnum lantanoides*), American hornbeam (*Carpinus caroliniana*), striped maple (*Acer pensylvanicum*), witch hazel (*Hamamelis virginiana*), and alternate-leaved dogwood (*Cornus alternifolia*).

Dominant groundlayer species are star flower (*Trientalis borealis*), common wood-sorrel (*Oxalis montana*), Canada mayflower (*Maianthemum canadense*), painted trillium (*Trillium undulatum*), purple trillium (*T. erectum*), shining clubmoss (*Lycopodium lucidulum*) and intermediate wood fern (*Dryopteris intermedia*). Associated herbs include Christmas fern (*Polystichum acrostichoides*), jack-in-the-pulpit (*Arisaema triphyllum*) and false Solomon's seal (*Smilacina racemosa*). There are many spring ephemerals which bloom before the canopy trees leaf out. Typically there is also an abundance of tree seedlings, especially of sugar maple; beech and sugar maple saplings are often the most abundant "shrubs" and small trees. Hemlock (*Tsuga canadensis*) may be present at a low density. In the Adirondacks a few red spruce (*Picea rubens*) may also be present.

Characteristic birds include American redstart (*Setophaga ruticilla*), red-eyed vireo (*Vireo olivaceus*), ovenbird (*Seiurus aurocapillus*), black-throated blue warbler (*Dendroica caerulescens*), least flycatcher (*Empidonax minimus*), Acadian flycatcher (*Empidonax virescens*), and red-bellied woodpecker (*Melanerpes carolinus*).

Within extensive areas of beech-maple mesic forest, there are often associated small patches of hemlock-northern hardwood forest in steep ravines and gullies where hemlock is locally dominant.

Distribution: throughout New York State.

Rank: G4 S4

Examples: Five Ponds Wilderness Area, Herkimer and Hamilton Counties; West Canada Lakes Wilderness Area, Herkimer and Hamilton Counties; Central Tug Hill Forest, Lewis and Oswego Counties; Slide Mountain, Sullivan and Ulster Counties.

Sources: Eyre 1980; Gordon 1940; Heimburger 1934; Holmes et al. 1986; Leopold et al. 1988; McIntosh 1972; Shanks 1966; NYNHP field surveys.

3. Successional northern hardwoods: a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed.

Characteristic trees and shrubs include any of the following: quaking aspen (*Populus tremuloides*), big-tooth aspen (*P. grandidentata*), balsam poplar (*P. balsamifera*), paper birch (*Betula papyrifera*), or gray birch (*B. populifolia*), pin cherry (*Prunus pensylvanica*), black cherry (*P. serotina*), red maple (*Acer rubrum*), white pine (*Pinus strobus*), with lesser amounts of white ash (*Fraxinus americana*), green ash (*F. pensylvanica)*, and American elm (*Ulmus americana).* Northern indicators include

aspens, birches, and pin cherry. This is a broadly defined community and several seral and regional variants are known.

Characteristic birds include chestnut-sided warbler (*Dendroica pensylvanica*), Nashville warbler (*Vermivora ruficapilla*) in young forests with aspen and birch seedlings, and yellow-bellied sapsucker (*Sphyrapicus varius*) in mature aspen forests.

Distribution: throughout upstate New York north of the Coastal Lowlands ecozone.

Rank: G5 S5

Example: Chase Lake Sandplain, Lewis County.

Source: Mellinger and McNaughton 1975; NYNHP field surveys.

4. Successional southern hardwoods: a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed. Characteristic trees and shrubs include any of the following: American elm (*Ulmus americana*), slippery elm (*U. rubra*), white ash (*Fraxinus americana*), red maple (*Acer rubrum*), box elder (*Acer negundo*), silver maple (*A. saccharinum*), sassafras (*Sassafras albidum*), gray birch (*Betula populifolia*), hawthorns (*Crataegus* spp.), eastern red cedar (*Juniperus virginiana*), and choke-cherry (*Prunus virginiana*). Certain introduced species are commonly found in successional forests, including black locust (*Robinia pseudo-acacia*), tree-of-heaven (*Ailanthus altissima*), and buckthorn (*Rhamnus cathartica*). Any of these may be dominant or codominant in a successional southern hardwood forest. Southern indicators include American elm, white ash, red maple, box elder, choke-cherry, and sassafras. This is a broadly defined community and several seral and regional variants are known. A characteristic bird is chestnut-sided warbler (*Dendroica pensylvanica*).

Distribution: primarily in the southern half of New York, south of the Adirondacks.

Rank: G5 S5 *Revised:* 2001

Example: Chippewa Creek Plains, St. Lawrence County.

Sources: Eyre 1980; NYNHP field surveys

C. TERRESTRIAL CULTURAL

This subsystem includes communities that are either created and maintained by human activities, or are modified by human influence to such a degree that the physical conformation of the substrate, or the biological composition of the resident community is substantially different from the character of the substrate or community as it existed prior to human influence.

1. Cropland/row crops: an agricultural field planted in row crops such as corn, potatoes, and soybeans. This community includes vegetable gardens in residential areas.

Distribution: throughout New York State.

Rank: G5 S5

2. Cropland/field crops: an agricultural field planted in field crops such as alfalfa, wheat, timothy, and oats. This community includes hayfields that are rotated to pasture. Characteristic birds include grasshopper sparrow (*Ammodramus savannarum*), vesper sparrow (*Pooecetes gramineus*), bobolink (*Dolichonys oryzivorous*), mourning dove (*Zenaida macroura*), and upland sandpiper (*Bartramia longicauda*).

Distribution: throughout New York State.

Rank: G5 S5

Note: No distinction between cropland/row crops and cropland/field crops was made during the field work. In any given year, based on crop rotation patterns, row crops or field crops may be the cultural land use present. Cropland was the mapping attribute used here.

3. Pastureland: agricultural land permanently maintained (or recently abandoned) as a pasture area for livestock. Characteristic birds include grasshopper sparrow (*Ammodramus savannarum*), vesper sparrow (*Pooecetes gramineus*), horned lark (*Eremophila alpestris*), killdeer (*Charadrius vociferus*), and upland sandpiper (*Bartramia longicauda*).

Distribution: throughout New York State.

Rank: G5 S5

4. Flower/herb garden: residential, commercial, or horticultural land cultivated for the production of ornamental herbs and shrubs. This community includes gardens cultivated for the production of culinary herbs. Characteristic birds include American robin (*Turdus migratorius*) and mourning dove (*Zenaida macroura*).

Distribution: throughout New York State.

Rank: G5 S5

5. Orchard: a stand of cultivated fruit trees (such as apples, cherries, peaches, pears, etc.) often with grasses as a groundcover. An orchard may be currently under cultivation or recently abandoned. Staghorn sumac (*Rhus typhina*), goldenrods (*Solidago* spp.), and poison ivy (*Toxicodendron radicans*) may be common in abandoned orchards.

Characteristic birds include American robin (*Turdus migratorius*), eastern kingbird (*Tyrannus tyrannus*), mourning dove (*Zenaida macroura*), and in mature

orchards with a minimum dbh of 10 in (about 25 cm), yellow-bellied sapsucker (*Sphyrapicus varius*).

Distribution: throughout New York State at low elevations.

Rank: G5 S5

6. Conifer plantation: a stand of softwoods planted for the cultivation and harvest of timber products, or to provide wildlife habitat, soil erosion control, windbreaks, or landscaping. This is a broadly defined community that excludes stands in which pine, spruce, or fir are dominant, although they may be present at low densities. These plantings may be monocultures, or they may be mixed stands with two or more codominant species.

Softwoods that are typically planted in these plantations include European larch (*Larix decidua*), Japanese larch (*Larix kaempferi*), and northern white cedar (*Thuja occidentalis*). Groundlayer vegetation is usually sparse, apparently because of the dense accumulation of leaf litter. Speedwell (*Veronica officinalis*) is a characteristic groundlayer plant. More data on this community are needed.

Distribution: throughout New York State.

Rank: G5 S5

6. Mowed lawn with trees: residential, recreational, or commercial land in which the groundcover is dominated by clipped grasses and forbs, and it is shaded by at least 30% cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50% cover. The groundcover is maintained by mowing. Characteristic animals include gray squirrel (*Sciurus carolinensis*), American robin (*Turdus migratorius*), mourning dove (*Zenaida macroura*), and mockingbird (*Mimus polyglottos*).

Distribution: throughout New York State.

Rank: G5 S5

7. Mowed lawn: residential, recreational, or commercial land, or unpaved airport runways in which the groundcover is dominated by clipped grasses and there is less than 30% cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50% cover. The groundcover is maintained by mowing.

Characteristic birds include American robin (*Turdus migratorius*), upland sandpiper (*Bartramia longicauda*), and killdeer (*Charadrius vociferus*).

Distribution: throughout New York State.

Rank: G5 S5

8. Herbicide-sprayed roadside/pathway: a narrow strip of low-growing vegetation along the side of a road, or along utility right-of-way corridors (e.g., power lines, telephone lines, gas pipelines) that is maintained by spraying herbicides.

Distribution: throughout New York State.

Rank: G5 S5

9. Unpaved road/path: a sparsely vegetated road or pathway of gravel, bare soil, or bedrock outcrop. These roads or pathways are maintained by regular trampling or scraping of the land surface. The substrate consists of the soil or parent material at the site, which may be modified by the addition of local organic material (woodchips, logs, etc.) or sand and gravel.

One characteristic plant is path rush (*Juncus tenuis*). A characteristic bird is killdeer (*Charadrius vociferus*).

Distribution: throughout New York State.

Rank: G5 S5

10. Paved road/path: a road or pathway that is paved with asphalt, concrete, brick, stone, etc. There may be sparse vegetation rooted in cracks in the paved surface.

Distribution: throughout New York State.

Rank: G5 S5

11. Gravel mine: an excavation in a gravel deposit from which gravel has been removed. Often these are dug into glacial deposits such as eskers or kames. Vegetation may be sparse if the mine is active; there may be substantial vegetative cover if the mine has been inactive for several years. Near-vertical slopes are used by bank swallows (*Riparia riparia*) for nesting sites.

Distribution: throughout New York State.

Rank: G5 S5

12. Sand mine: an excavation in a sand deposit or sand dune from which sand has been removed. Vegetation is usually sparse. A characteristic bird is bank swallow (*Riparia riparia*).

Distribution: throughout New York State.

Rank: G5 S5

13. Construction/road maintenance spoils: a site where soil from construction work and/or road maintenance materials have been recently deposited. There is little, if any, vegetation.

Distribution: throughout New York State.

Rank: G5 S5

14. Landfill/dump: a site that has been cleared or excavated, where garbage is disposed. The bulk of the material in the landfill or dump is organic and biodegradable; although some inorganic material (plastic, glass, metal, etc.) is usually present.

Distribution: throughout New York State.

Rank: G5 S5

15. Urban structure exterior: the exterior surfaces of metal, wood, or concrete structures (such as commercial buildings, apartment buildings, houses, bridges) or any structural surface composed of inorganic materials (glass, plastics, etc.) in an urban or densely populated suburban area. These sites may be sparsely vegetated with lichens, mosses, and terrestrial algae; occasionally vascular plants may grow in cracks. Nooks and crannies may provide nesting habitat for birds and insects, and roosting sites for bats.

Characteristic birds include common nighthawk (*Chordeiles minor*) on rooftops, American robin (*Turdus migratorius*) on porches or under shelter, and exotic birds such as rock dove (*Columba livia*) and house sparrow (*Passer domesticus*).

Distribution: throughout New York State.

Rank: G5 S5

16. Rural structure exterior: the exterior surfaces of metal, wood, or concrete structures (such as commercial buildings, barns, houses, bridges) or any structural surface composed of inorganic materials (glass, plastics, etc.) in a rural or sparsely populated suburban area. These sites may be sparsely vegetated with lichens, mosses, and terrestrial algae; occasionally vascular plants may grow in cracks. Nooks and crannies may provide nesting habitat for birds and insects, and roosting sites for bats.

Characteristic birds include American robin (*Turdus migratorius*), on porches or under shelter, barn swallow (*Hirundo rustica*) under shelter, and exotic birds such as rock dove (*Columba livia*), house sparrow (*Passer domesticus*), and European starling (*Sturnus vulgaris*).

Distribution: throughout New York State.

Rank: G5 S5

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Qualifications of project staff: Dr. Bruce Gilman

Dr. Gilman has taught in the Department of Environmental Conservation and Horticulture at Finger Lakes Community College for the past 38 years. His teaching expertise includes aquatic ecology, field botany and environmental planning. He curates the Finger Lakes Herbarium, a collection of over 14,000 sheets containing plants representative of western New York, and is author of the Ontario County Flora. His wealth of botanical knowledge is regularly shared with general public through walks and lectures sponsored by The Nature Conservancy, The Finger Lakes Land Trust, the Canandaigua Botanical Society, Ontario Pathways, the Rochester Academy of Science and the college. He also serves as the curriculum advisor for the Environmental Studies Program at FLCC and Director of the Muller Field Station. Dr. Gilman received his B.S. degree from St. John Fisher College in Rochester, NY. He completed his M.S. and Ph.D. degrees at the SUNY College of Environmental Science and Forestry in Syracuse, NY.

While completing his M.S. degree in the mid-1970s, Dr. Gilman conducted extensive research in wetland plant communities along the eastern shoreline of Lake Ontario. This SEAGRANT sponsored project involved aquatic macrophyte mapping, biomass sampling, water analyses and sediment characterization. He has completed and published similar work in the aquatic macrophyte communities in Honeoye Lake, Canandaigua Lake, Hemlock Lake, Canadice Lake and Owasco Lake. He has also assessed fish utilization of the near shore lake habitat. Recently, Honeoye Lake deep water sediment was collected by core sampling and its potential role in the phosphorus budget of the lake was determined. Dr. Gilman has also completed an inventory of the macrophyte communities in the three major Wayne County Bays of Lake Ontario. Since 1996, he has been a principal investigator in limnological studies monitoring the health of Canandaigua Lake and sampling the quality of its tributary streams. Lake water is monitored April through November with a Yellow Springs Instrument Company water quality probe, and tested for chlorophyll *a* abundance and total phosphorus concentrations. Following storm events, streams are sampled for sediment loads, nutrient levels and bacterial contamination. Prepared for the New York State Federation of Lake Associations, Inc., and sponsored by the Environmental Protection Agency, Dr. Gilman completed research and published A History of Aquatic Plant Distribution in Upstate New York in 1992. The occurrence of 78 taxa in 70 water bodies was examined. Dr. Gilman serves as a scientific advisor to the Honeoye Lake Watershed Taskforce, and on two Ontario County Boards, the Water Resources Council (the County's water quality coordinating committee) and the Intermunicipal GIS Coordinating Committee.

Dr. Gilman has authored 20 technical reports that include taxonomically broad natural resource inventories and planning recommendations. Of interest is research conducted in old growth forests in the Town of Webster, work on an international conservation initiative to conserve globally rare alvar plant communities in the Great Lakes Ecoregion, and biodiversity investigations of all organisms living in the southern Honeoye Valley. These reports demonstrate his ability to complete field research and provide relevant information that is critical to the environmental decision-making process of management groups.