Appendices

Appendix A

Glossary

Glossary

Active River Area The area along a stream that is dynamically involved with the physical and ecological processes that drive and sustain the stream (Smith et al. 2008).

asl Above sea level.

alluvium Material, such as sand, silt, clay, and gravel, deposited on land by moving water.

"ancient forest" Forest areas that may never have been cleared for agriculture and other purposes, even though they may have been grazed or selectively cut for firewood or timber. These are not equivalent to "old growth" forests.

argillite A fine-grained compact rock derived from mudstone or shale.

aquifer A water-bearing formation, e.g., in bedrock fractures or solution cavities, or in unconsolidated surficial material such as sands and gravels.

area-sensitive wildlife Wildlife species require large contiguous habitat areas to meet their life history needs and maintain local populations. Some of these species have large home ranges, some require a complex of habitats distributed over the landscape, some are especially sensitive to human disturbance or are vulnerable to predators or nest parasites that frequent habitat edges.

base flow (of a stream) The sustained flow of a stream in the absence of direct precipitation or surface runoff. Natural base flow is sustained largely by groundwater discharges (https://water.usgs.gov/edu/dictionary.html).

biodiversity All the variety of plants, animals, and other living things. The term encompasses diversity at all scales, including landscapes, ecosystems, ecological communities, species, and their genes. From a conservation standpoint, ecologists are mainly concerned about native biodiversity—the biota that have established and developed in the region over millennia, but not the recent introductions since European settlement.

borrow pit A place where surficial material (e.g., sand or gravel) is excavated for use as fill elsewhere. The term is often used for small excavations of material for onsite or nearby use.

calcareous Calcium-rich; containing high concentrations of calcium salts. The term is generally applied to water, soils, and bedrock. The source of calcium in this region is usually calcium carbonate (e.g., limestone), and thus calcareous environments are generally circumneutral or alkaline.

carbon sequestration Capture and long-term storage of atmospheric carbon dioxide or other forms of carbon. Carbon sequestration, whether occurring artificially or by natural biological, chemical, and physical processes (such as the growth of a tree, or the accumulation of peat in a wetland), is a means of mitigating or deferring global warming.

circumneutral Having a pH at or near 7.0 (approximately 6.6–7.3).

conifer forest A forest dominated by conifer trees; i.e., where conifer tree species constitute ≥75% of the forest canopy. Conifers are cone-bearing trees such as white pine, eastern hemlock, tamarack, and eastern red cedar. The native conifers in this region have needle-like or scale-like leaves and are evergreen—that is, they maintain their leaves year-round. An exception is tamarack, which sheds its leaves in the fall. See "deciduous forest" for comparison.

conservation easement A voluntary legal agreement drawn up by a landowner and a qualified public or private agency (such as a land trust) that ensures permanent protection of the land. The landowner retains ownership with many of its rights and responsibilities (including property taxes), and can live on, use, or sell the land or pass it on to heirs, but the conservation easement remains attached to the land in perpetuity. The easement is designed to serve the conservation goals of the landowner and easement holder (e.g., the land trust), and describes permissible and impermissible land uses and land management.

dolomite The mineral calcium magnesium carbonate ($CaMg(CO_3)_2$).

dolostone A durable sedimentary rock composed primarily of dolomite (calcium magnesium carbonate); similar to limestone in appearance, hardness, solubility, and human uses.

NYSDEC New York State Department of Environmental Conservation

deciduous forest (Also called a "hardwood forest.") A forest dominated by deciduous trees; i.e., where deciduous tree species constitute ≥75% of the forest canopy. Deciduous trees are those that shed their leaves annually. In this region, deciduous trees include oaks, maples, ashes, cherries, beech, and many others. See "conifer forest" for comparison. (Tamarack is the unusual case of a deciduous conifer.)

drumlin A low, elongated hill of compact glacial till, with the long axis parallel to the path of the glacier (Case 1989)

ecological community A group of plants and animals occupying a habitat and interacting with each other and with the non-biological components (such as sunlight, air, water, and bedrock) of the habitat.

ecosystem services The resources and services provided by the natural environment that benefit the human community, such as purification of water and air, cycling of nutrients, mitigation of floods, dispersal of seeds, pollination of agricultural crops, control of agricultural pests and human disease organisms, production of timber, fish, wild game, and other wild foods.

edge effects The influences of habitat edges on interior habitats and species. These may include the effects of noise, light (natural or artificial), wandering pets, accessibility to predators and nest parasites, and pollution introduced from human activities at the habitat edges. Certain edge effects occur at the edges between natural habitats as well as those between natural habitats and human-disturbed areas.

enduring features The hills, valleys, bedrock, glacial deposits, and other parts of the landscape that resist change; these are the foundational features that are substantially unaffected by human land uses, wildfires, droughts, floods, hurricanes, climate change, and other significant events that alter the land surface.

Farmland Soils of Statewide Importance A designation of the Natural Resource Conservation Service for soils that are nearly as productive as "prime farmland soils" and that produce high yields of crops when properly managed.

fen As used in the NRCP, the term "fen" refers to an open, herb- and low shrub-dominated wetland fed by calcareous groundwater seepage. This habitat has a distinctive plant community that, in this region, often includes such species as shrubby cinquefoil (*Dasiphora fruticosa*), grass-of-parnassus (*Parnassia glauca*), bog goldenrod (*Solidago uliginosa*), and woolly-fruit sedge (*Carex lasiocarpa*).

flood attenuation The effects of storing and retaining floodwater and slowly releasing it to the groundwater, a stream, or other water body, thereby reducing the peak downstream flows.

floodplain The area bordering a stream that is subject to flooding.

forb A broad-leaved herbaceous (non-woody) plant. (Compare to "graminoid.")

gabion (As used here) a rock-filled wire container used as a building block for stabilizing slopes and stream banks.

glacial outwash Mineral material (gravel, sand, and silt) deposited by the melting ice of a glacier.

glacial till Mixed mineral material (clay, silt, sand, rocks) transported and deposited by glacial ice, or by streams flowing from a melting glacier.

graminoid A grass-like plant. Graminoids includes grasses (Poaceae), sedges (Cyperaceae), and rushes (Juncaceae).

graywacke An impure gray sandstone.

green infrastructure An approach to water management that incorporates natural systems (and mimicry of natural systems), sometimes in combination with engineered systems to protect, restore, or maintain water resources and ecosystem functions. Some examples are protection or restoration of floodplains, wetlands, or forests, as well as use of urban rain gardens, permeable pavement, green roofs, rainwater barrels, graywater retrieval systems, and vegetated swales.

groundwater The water that resides beneath the soil surface in spaces between sediment particles and in rock fissures and seams.

groundwater recharge The process by which water flows or percolates from the ground surface to an aquifer—an underground water-bearing formation in bedrock or loose material such as sand or gravel.

habitat The place or environment where an organism normally spends all or part of its life. A habitat is defined by both the biological (e.g., plants and animals) and the non-biological (soil, bedrock, water, sunlight, temperatures, etc.) components.

headwaters The upper reaches of a stream, near the stream's origin.

hydric soils Soils formed under conditions of saturation for long enough during the growing season to develop anaerobic (oxygen-free) conditions near the ground surface. The presence of hydric soils is one of the three features necessary (along with wetland hydrology and hydrophytic vegetation) for identifying an area as wetland.

hydroperiod The seasonal pattern of inundation or soil saturation.

impervious surface Surfaces such as roofs, pavement, or compacted soils that impedes or prevents the local infiltration of water to the soils or underlying substrate.

intermittent stream A stream that typically flows for only part of the year.

intermittent woodland pool A vernal pool (see below) in a forested setting.

invertebrate An animal that lacks a spinal column. Invertebrates include insects, mollusks, crustaceans, nematodes, spiders, centipedes, protozoans, and a host of other macroscopic and microscopic organisms.

kame An irregular hill or short ridge composed of mineral material deposited by a glacier.

kettle A depression in the ground surface formed by the melting of a stranded block of glacial ice that was buried or partially buried by outwash drift.

limestone A fine-grained sedimentary rock composed of calcium carbonate.

mainstem The primary segment of a river or stream, as contrasted to the tributaries that feed the stream.

marble A medium-grained metamorphic rock of interlocking calcite crystals derived from limestone.

marsh A wetland that typically has standing water for a prolonged period during the growing season, and is dominated by herbaceous (non-woody) vegetation with species such as cattail, bur-reed, pond-lily, and arrowhead.

microhabitat A very localized habitat characteristics distinct from those of the larger surrounding habitat; for example, a tree cavity within a deciduous forest, or a woody hummock within a swamp.

NGO Non-governmental organization.

non-point source pollution Pollution emanating from a diffuse source such as unchannelized runoff from a paved parking lot or an agricultural field.

NYNHP New York Natural Heritage Program, an agency that serves as a repository and clearinghouse for information on the occurrence, distribution, and status of plants, animals, and natural communities in the state.

old growth forest A forest ecosystem that has attained great age (e.g., 150+ years) without significant disturbance from human activities such as cutting, soil disturbance, or intentional burning. These systems are variable in appearance, structure, and development history, but are often distinguished by old trees, diverse vertical and horizontal vegetation structure, and accumulations of large standing snags and downwood.

organic duff The accumulation of organic matter on the forest floor, usually in many stages of decay.

palustrine The term applied to nontidal wetlands, and tidal wetlands with salinity less than 0.5 parts per thousand.

perennial stream A stream that typically flows year-round.

phyllite A fine-grained metamorphic rock intermediate in grade between slate and schist (Fisher 2006).

pioneering plant species Plant species that are the first to colonize areas of stripped, disturbed, or damaged soils or other substrate.

point source pollution Pollution emanating from a single *point*, such as an industrial chimney or discharge pipe from a sewage treatment plant. (See non-point source pollution.)

Prime Farmland Soils A designation of the Natural Resources Conservation Service for soils that have the best combination of physical and chemical characteristics for producing crops.

quartzite A hard and durable medium-grained metamorphic rock derived from sandstone.

reach (as in "stream reach") A segment of stream or river defined by geographic markers, such as river miles, natural features, or political boundaries.

resiliency As used in this document, the capacity to withstand, recover from, and adapt to stresses such as those imposed by floods or climate change.

riparian Within or adjacent to a stream or river.

riprap Layer of rock placed along streambanks or shoreline to prevent erosion.

sandstone A sedimentary rock composed of sand-size grains of cemented mineral and rock particles.

schist A medium-grained, layered metamorphic rock derived from shale.

seep Diffuse groundwater discharge to the ground surface. (Compare with "spring.")

SGCN Species of Greatest Conservation Need: a list drawn up by the DEC that includes 1) species on the federal list of endangered or threatened species that occur in New York; 2) species listed as NYS endangered, threatened, or special concern; 3) species with 20 or fewer elemental occurrences in the New York Natural Heritage Program database, and 4) other species deemed by the DEC to be of greatest conservation need due to their status, distribution, and vulnerability.

shale A fine-grained thinly layered sedimentary rock derived from silt and clay.

slate A fine-grained metamorphic rock derived from shale.

spring Concentrated groundwater discharge to the ground surface (Compare with "seep.")

spring ephemeral wildflower A perennial wildflower of forests that blooms in the spring before deciduous trees have developed leaves.

surficial deposits Loose material transported and deposited over bedrock. Material may be transported by glaciers (glacial till, glacial outwash) or by moving water (alluvium).

talus Loose rock debris that accumulates below an exposed bedrock ledge.

thatch Undecomposed, dead plant material that accumulates on the soil surface of a meadow or lawn.

tributary A stream that flows into a larger stream, river, or lake.

unconsolidated aquifer Groundwater stored in saturated sand and gravel deposits.

upland In this document, "upland" is equivalent to "non-wetland." The term implies nothing about elevation; upland areas can be at any elevation, low or high or anywhere in between.

vernal pool A wetland—usually small—that is isolated from other wetlands or streams, and that typically holds water in winter and spring, but typically dries up at some time during the growing season. (See "intermittent woodland pool" for comparison.)

viewshed The entire area visible from a specified location and, conversely, the entire area from which that location is visible.

watershed The entire land area that drains to a particular place such as a stream, wetland, or pond.

wetland "[An area that is] inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances [does] support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (definition of wetlands regulated under the federal Clean Water Act: at 33 CFR 328.3[c][4]).

wet meadow A wetland that typically has little or no standing water for most of the growing season, and is dominated by herbaceous (non-woody) vegetation.

Appendix B

Plants and Animals of Columbia County and New Lebanon

Table B-1. Plants of conservation concern in New Lebanon. Observations are from the Farmscape Ecology Program, Hudsonia, and McVaugh (1957). Scientific nomenclature primarily follows Weldy et al. (2017).

Common Name	**Scientific Name**	**Regional Rank[1]**	**NYNHP State Rank[2]**
aster, late purple	*Symphyotrichum patens* var. *patens*	U	
avens, spring	*Geum vernum*	U	S2S3
avens, water	*Geum rivale*	U	
azalea, rosebud	*Rhododendron prinophyllum*	R?	
baneberry, red	*Actaea rubra*	S	
bartonia	*Bartonia virginica*	U	
bedstraw, bog	*Galium labradoricum*	U	
bedstraw, northern	*Galium boreale*	R?	
bellwort, large-flowered	*Uvularia grandiflora*	S?	
bladderwort, common	*Utricularia vulgaris* ssp. *macrorhiza*	R?	
bladderwort, hidden-fruit	*Utricularia geminiscapa*	U	S3
bladderwort, lesser	*Utricularia minor*	U	S3
bloodroot	*Sanguinaria canadensis*	U	
breeches, Dutchman's	*Dicentra cucullaria*	S?	
buckthorn, alderleaf	*Rhamnus alnifolia*	R	
bunchberry	*Cornus canadensis*	U	
bur-reed, narrowleaf	*Sparganium angustifolium*	U	S3S4
bush-clover, hairy	*Lespedeza hirta*	U	
bush-clover, violet	*Lespedeza frutescens*	U	S3
butternut	*Juglans cinerea*	U	
calla, wild	*Calla palustris*	R?	
cancer-root	*Orobanche uniflora*	R	
carpenter's-square	*Scrophularia marilandica*	U	
chestnut, American	*Castanea dentata*	U	
cinquefoil, shrubby	*Dasiphora fruticosa* ssp. *floribunda*	U	
clematis, purple	*Clematis occidentalis* var. *occidentalis*	R?	
clubmoss, stiff	*Spinulum annotinum*	U	
cohosh, blue	*Caulophyllum thalictroides*	S	
coneflower, cutleaf	*Rudbeckia laciniata* var. *laciniata*	S	
coontail, spiny	*Ceratophyllum echinatum*	U	S3
coral-root, early	*Corallorhiza trifida*	U	
corydalis, pale	*Corydalis sempervirens*	U	
cranberry, highbush	*Viburnum opulus* var. *americanum*	R	
cranberry, large	*Vaccinium macrocarpon*	S	
cranberry, small	*Vaccinium oxycoccos*	R?	
dogwood, alternate-leaf	*Cornus alternifolia*	U	
dogwood, roundleaf	*Cornus rugosa*	R?	

(continued)

Table B-1. (cont.)

Common Name	Scientific Name	Regional Rank[1]	NYNHP State Rank[2]
everlasting, sweet	*Pseudognaphalium obtusifolium*	U	
false-foxglove, smooth yellow	*Aureolaria flava* var. *flava*	U	
fern, bog	*Thelypteris simulata*	U	S3S4
fern, broad beech	*Phegopteris hexagonoptera*	S	
fern, fragile	*Cystopteris fragilis*	U	
fern, glade	*Diplazium pycnocarpon*	U	
fern, Goldie's wood	*Dryopteris goldiana*	U	
fern, long beech fern	*Phegopteris connectilis*	R	
fern, maidenhair	*Adiantum pedatum*	U	
fern, oak	*Gymnocarpium dryopteris*	R?	
fern, ostrich	*Matteuccia struthiopteris*	U	
fern, silvery glade	*Deparia acrostichoides*	R	
fern, walking	*Asplenium rhizophyllum*	S	
gentian, greater fringed	*Gentianopsis crinita*	S	
ginseng, American	*Panax quinquefolius*	R	S3S4
goldenrod, showy	*Solidago speciosa*	R	
goldthread	*Coptis trifolia*	U	
gooseberry, hairystem	*Ribes hirtellum*	S	
grapefern, cutleaf	*Botrychium dissectum*	R?	
grapefern, lanceleaf	*Botrychium lanceolatum* ssp. *angustisegmentum*	U	
green-violet	*Hybanthus concolor*	U	S3S4
hawthorn, fleshy	*Crataegus succulenta*	U	
hawthorn, scarlet	*Crataegus coccinea*	U	
hawthorn, waxyfruit	*Crataegus pruinosa*	U	
hawthorn, dotted	*Crataegus punctata*	U	
hedge-nettle, smooth	*Stachys tenuifolia*	U	
hickory, mockernut	*Carya alba*	U	
hobblebush	*Viburnum lantanoides*	R?	
honeysuckle, American fly	*Lonicera canadensis*	R	
honeysuckle, glaucous	*Lonicera dioica* var. *dioica*	S?	
honeysuckle, hairy	*Lonicera hirsuta*	U	
honeysuckle, mountain	*Lonicera villosa*	U	S3?
honeysuckle, trumpet	*Lonicera sempervirens*	R?	
horse-gentian, orangefruit	*Triosteum aurantiacum*	U	
horsetail, woodland	*Equisetum sylvaticum*	S	
jewelweed, pale	*Impatiens pallida*	U	
Joe-Pye weed, sweet-scented	*Eutrochium purpureum* var. *purpureum*	U	
Labrador-tea	*Rhododendron groenlandicum*	R	
lady's-slipper, greater yellow	*Cypripedium parviflorum* var. *pubescens*	R	S3
leatherleaf	*Chamaedaphne calyculata*	U	

(continued)

Table B-1. (cont.)

Common Name	Scientific Name	Regional Rank[1]	NYNHP State Rank[2]
leatherwood	*Dirca palustris*	R	
lily, Canada	*Lilium canadense* ssp. *canadense*	S	
lobelia, great blue	*Lobelia siphilitica*	U	
loosestrife, tufted	*Lysimachia thyrsiflora*	U	
lopseed	*Phryma leptostachya*	R	
mannagrass, American	*Glyceria grandis* var. *grandis*	R	
maple, mountain	*Acer spicatum*	S	
may-apple	*Podophyllum peltatum*	S	
melic, false	*Schizachne purpurascens*	U	
mermaidweed, false	*Floerkea proserpinacoides*	R	
milkkwort, purple	*Polygala sanguinea*	S?	
milkweed, poke	*Asclepias exaltata*	R?	
mountain-holly	*Nemopanthus mucronatus*	S	
orchid, fen	*Liparis loeselii*	U	
orchid, green fringed	*Platanthera lacera*	R?	
orchid, lesser purple fringed	*Platanthera psycodes*	R	
orchid, northern green	*Platanthera aquilonis*	U	
orchid, showy	*Galearis spectabilis*	R?	
orchid, small green wood	*Platanthera clavellata*	U	
pepper-bush, sweet	*Clethra alnifolia*	U	
pine, red	*Pinus resinosa*	U	
pinesap	*Monotropa hypopithys*	U	
pipsissewa	*Chimaphila umbellata* ssp. *cisatlantica*	S	
pogonia, rose	*Pogonia ophioglossoides*	R	
pondweed, bluntleaf	*Potamogeton obtusifolius*	U	
pondweed, ribbonleaf	*Potamogeton epihydrus*	U	
poplar, balsam	*Populus balsamifera* ssp. *balsamifera*	U	
rattlesnake-plantain, downy	*Goodyera pubescens*	S?	
rush, toad	*Juncus bufonius* var. *bufonius*	R?	
saxifrage, golden	*Chrysosplenium americanum*	U	
saxifrage, swamp	*Saxifraga pensylvanica*	U	
scouring-rush, variegated	*Equisetum variegatum* ssp. *variegatum*	U	
sedge, American woolly-fruit	*Carex lasiocarpa* ssp. *americana*	U	
sedge, cattail	*Carex typhina*	U	S2
sedge, Crawford's	*Carex crawfordii*	U	
sedge, Dewey	*Carex deweyana* var. *deweyana*	U	
sedge, drooping	*Carex prasina*	U	
sedge, fescue	*Carex festucacea*	U	
sedge, hairy-fruit	*Carex trichocarpa*	O?	
sedge, hay	*Carex argyrantha*	U	

(continued)

Table B-1. (cont.)

Common Name	Scientific Name	Regional Rank[1]	NYNHP State Rank[2]
sedge, Hitchcock's	*Carex hitchcockiana*	U	S3
sedge, inland	*Carex interior*	U	
sedge, Muhlenberg's	*Carex muehlenbergii* var. *muehlenbergii*	R?	
sedge, New England	*Carex novae-angliae*	U	
sedge, parasol	*Carex umbellata*	O?	
sedge, plantain-leaf	*Carex plantaginea*	R	
sedge, softleaf	*Carex disperma*	U	
sedge, Sprengel's	*Carex sprengelii*	R?	
sedge, three-seeded	*Carex trisperma*	U	
sedge, troublesome	*Carex molesta*	U	S2S3
sedge, twisted	*Carex torta*	U	
serviceberry, roundleaf	*Amelanchier sanguinea*	U	
snowberry, creeping	*Gaultheria hispidula*	R	
Solomon's-seal, giant	*Polygonatum biflorum*	S	
Solomon's-seal, starry	*Maianthemum stellatum*	U	
spikenard, American	*Aralia 4anadens* ssp. *racemosa*	R	
spleenwort, maidenhair	*Asplenium trichomanes* ssp. *trichomanes*	U	
spring-beauty, Carolina	*Claytonia caroliniana*	U	
squirrel-corn	*Dicentra canadensis*	U	
St. Johnswort, Fraser's marsh	*Triadenum fraseri*	U	
St. Johnswort, shrubby	*Hypericum prolificum*	U	S2
stitchwort, longleaf	*Stellaria longifolia*	U	
sumac, poison	*Toxicodendron vernix*	U	
sundew, roundleaf	*Drosera rotundifolia* var. *rotundifolia*	U	
sweetflag, American	*Acorus americanus*	U	
tamarack	*Larix laricina*	S	
toadflax	*Nuttallanthus canadensis*	U	
toothwort, large	*Cardamine maxima*	U	
twisted-stalk, rosy	*Streptopus lanceolatus*	U	
violet	*Viola blanda/pallens*	U	
violet, alpine	*Viola labradorica*	U	S3S5
violet, arrowleaf	*Viola sagittata* var. *ovata*	U	
violet, Canadian white	*Viola 4anadensis* var. *canadensis*	U	
violet, roundleaf yellow	*Viola rotundifolia*	R?	
violet, white	*Viola renifolia*	U	
watermeal, Columbian	*Rhododendron groenlandicum*	U	
water-willow	*Decodon verticillatus*	U	
wedgescale, slender	*Sphenopholis intermedia*	U	
wheatgrass, slender	*Elymus trachycaulus* ssp. *subsecundus*	U	
wild-rye, hairy	*Elymus villosus* var. *villosus*	U	

(continued)

Table B-1. (cont.)

Common Name	Scientific Name	Regional Rank[1]	NYNHP State Rank[2]
wild-rye, Virginia	*Elymus virginicus* var. *virginicus*	U	
willow, autumn	*Salix serissima*	S	
willow, bog	*Salix pedicellaris*	U	
willow, meadow	*Salix petiolaris*	U	
willow, silky	*Salix sericea*	U	
wintergreen, one-flowered	*Moneses uniflora*	U	
wintergreen, one-sided	*Orthilia secunda*	U	
wintergreen, spotted	*Chimaphila maculata*	U	
wood-sorrel, mountain	*Oxalis montana*	U	
yew, Canada	*Taxus canadensis*	S	

[1] Regional status assigned by Hudsonia and the Farmscape Ecology Program: U = regionally uncommon; S = regionally scarce; R = regionally rare (see Appendix C).
[2] New York Natural Heritage Program ranks (see Appendix C].

Table B-2. Butterflies of Columbia County, New York.

Compiled by the Hawthorne Valley Farmscape Ecology Program (FEP), with input from Harry Zirlin and others. All butterflies listed here have been observed by FEP or their collaborators, except for those marked as "unseen but possible" or "regionally extinct" or "rare*"; the latter (rare with an asterisk) indicates those that are listed at the Butterflies and Moths of North America website (www.butterfliesandmoths.org) as recorded from Columbia County, but have not been observed by FEP and colleagues. Flight time and foods are from Cech and Tudor (2005); habitat is from Cech and Tudor and FEP's own observations. Species that seem to have experienced a net regional increase over the last 150 years are indicated by "up"; those which have apparently experienced a decline are indicated by "down"; the remaining species have shown no obvious trends. These assessments of population dynamics are based upon recently published butterfly faunas from the Northeast and a review of historical literature dating back to 1853.

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY HESPERIIDAE						
broken-dash, northern		rare		early June-mid Aug	panic grasses	oldfields
cloudywing, northern		occasional		late May - early July	clovers, other legumes	"scrubby fields"
cloudywing, southern		rare*	up	early June-mid July	legumes	open areas
dash, black		occasional		late April - early June	sedges	sedgy wetlands
dash, long		occasional		early June-early July; Aug	grasses	open grassy often moist
duskywing, Columbine		unseen but possible	down	May-June, July	columbine	alcareous ledges
duskywing, dreamy		rare*		mid-May - June	willows, aspen, black locust	open forest & edges
duskywing, Horace's		rare*		May, June, Sept	oaks	dry, open oak woods
duskywing, Juvenal's		common		late April-early June	oaks	open upland habitats, usually undisturbed
duskywing, mottled	S1, SGCN[HP†]	rare*	down	May-June, July-August	New Jersey tea	open, dry forest

(continued)

Table B-2. (cont.)

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY HESPERIIDAE (cont.)						
duskywing, sleepy		unseen but possible		May	scrub oak	rocky balds, barrens
duskywing, wild indigo		occasional	up	May-Aug	wild indigo and vetch	in or near alfalfa fields
edge, hoary		rare*		June-July	legumes, e.g., tick trefoil	oldfield and field edges
glassywing, little		occasional	up	late June-July	purple top & ?? other grasses	oldfield, pasture
sachem		rare		vagrant; observed. once in Sept	wide range of grasses	In and near disturbed grassy area
skipper, arctic		rare		late May to Mid-June	grasses	grasses near forest
skipper, broadwing	S3	occasional	up	mid-July - Aug	reeds, sedges, wild rice	wet areas with *Phragmites*
skipper, cobweb		rare		May - June	bluestem	dry fields
skipper, common checkered		occasional	up	mid May - Sept	mallows	short, sparse fields & lawns
skipper, crossline		occasional		late June-early Aug	grasses	dry and moist fields
skipper, Delaware		rare	up	mainly July	little bluestem, switch grass, other grasses?	open habitats, dry or wet
skipper, dion		rare		July	sedges	wetlands
skipper, dun		occasional		July-Aug	sedges, maybe grasses	oldfields
skipper, dusted	S2S3	unseen but possible		May - June	bluestems	dry, open habitats
skipper, European		common	up	June-July	timothy, other introd grasses	fields

(continued)

Table B-2. (cont.)

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY HESPERIIDAE (cont.)						
skipper, fiery		unseen but possible		Sept-Oct	grasses	sunny open uplands
skipper, Hobomok		common		late May - early July	grasses	oldfields
skipper, Indian		rare	up	May - June	grasses, including bluestem	dry, often shrubby, fields
skipper, least		common		June - Oct	grasses	Wet meadow, grassy marsh
skipper, Leonard's		rare	down	end of Aug/early Sept	native grasses such as little bluestem	dry upland grassland near wet area
skipper, Peck's		common		late May - Sept	grasses	fields
skipper, pepper & salt		rare		May - June	grasses	forest openings
skipper, roadside		rare*	down	late May-mid June	grasses	forest openings
skipper, silver-spotted		common		June-Aug	black locust	shrubby fields
skipper, tawny-edged		common	up	late May -mid July; early Aug - Sept	grasses	Grassy, often moist
skipper, two spotted		unseen but possible		late June-July	sedges, esp. hairy-fruited sedge	wetlands
skipper, Zabulon		rare		late May-mid June; mid Aug-mid Sept	grasses	shrubby fields, roadside
sootywing, common		common		mid-May - mid June; late July-Aug	lamb's quarters & others	open habitats
wing, mulberry		rare		mid July - early Aug	sedges	sedgy wetlands

(continued)

Table B-2. (cont.)

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY LYCAENIDAE						
azure, spring-summer		common		April-Sept	(lots)	mainly fields
blue, eastern tailed		common		May-Sept	legumes	open, disturbed low growth
blue, silvery		rare		April-June	legumes	openings in moist forest
copper, American		common		May-Sept	dock species	drier fields
copper, bog		unseen but possible	down	late June-July	cranberries	acidic wet meadows
copper, bronze		occasional		mid June-mid July; early Aug - mid Sept	docks	wetlands around ponds or streams
elfin, brown		unseen but possible	down	May	heath family (Ericaceae)	barrens, dry forest
elfin, eastern pine		rare		May-June	pines	near pine woods
hairstreak, Acadian		unseen but possible		July	willows	shrubby wet meadows and swamps
hairstreak, banded		occasional		May-Aug	oaks, hickories	edges, open habitats
hairstreak, coral		rare	up	June	cherries, plums	oldfield, second growth
hairstreak, early		unseen but possible	down	May-June, July-August	beechnuts	beech forests
hairstreak, Edward's	S3S4	unseen but possible		July	scrub oak	scrub oak forest, rocky barrens

(continued)

Table B-2. (cont.)

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY LYCAENIDAE (cont.)						
hairstreak, gray		occasional		early May - mid June	various field/brush plants	open, weedy, disturbed habitats
hairstreak, hickory		occasional		late June-early Aug	hardwood trees	edges of rich, deciduous forests
hairstreak, juniper		rare		mid May - June; Aug	eastern red cedar	open uplands with red cedar
hairstreak, northern oak	S2S4, SGCN^{HP}	unseen but possible		June-July	oaks	oak forest
hairstreak, red-banded		rare	up	May-June; Aug-Sept	rotting leaves	open habitats
hairstreak, striped		rare		late June - mid July	roses, cherries, hawthorn, Ericacaeae, American hornbeam	forest openings and edges
hairstreak, white m	SU	rare	up	May, Sept	oaks	oak forest
harvester		rare		May-Sept	alder aphids	alder swamp
FAMILY NYMPHALIDAE						
admiral, red		occasional		May-Oct	nettles	moist forest and meadow, esp. floodplain forest
admiral, white		rare		mid June-early Aug; mid Aug-mid Sept	cherry	forests, edges, shrublands
brown, Appalachian		occasional		late June-Aug	sedges	forested wet areas, near sedges
brown, eyed		rare	down	late June-early Aug	sedges	sedgy habitats

(continued)

Table B-2. (cont.)

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY NYMPHALIDAE (cont.)						
buckeye, common		occasional		July-Sept	plantains, Scrophulariaceae, vervains	open habitats with some bare ground
checkerspot, Baltimore		common		mid June-mid July	Turtlehead, English plantain	meadow
checkerspot, Harris'		rare*	down	June-July	flat-topped white aster	wet, open habitats
checkerspot, silvery		unseen but possible		July	sunflowers	edges, stream banks
cloak, mourning		common		year around; most common in summer	willows, other trees	wanders among many habitats
comma, eastern		common	up	3 flights, April – Sept?	elms, nettles	forest, especially floodplain forest
comma, green		unseen but possible		3 flights, April – Sept?	gooseberry, currant	"boreal woodlands"
comma, grey		rare		3 flights, April – Sept	gooseberry, currant	forest clearings
crescent, pearl		common		mid May-early Sept	asters	meadow
crescent, tawny	SH, SC	regionally extinct?	down	June-July	certain asters	rocky, scrubby areas
emperor, hackberry		rare	down	July-Aug	hackberry	floodplains with hackberry
emperor, tawny	S2S4	unseen but possible	down	July-Aug	hackberry	where hackberry

(continued)

Table B-2. (cont.)

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY NYMPHALIDAE (cont.)						
eye, northern pearly		common		late June-early Aug	grasses	forests, often near water
fritillary, Aphrodite		rare		late June-early Sept	violets	Habitats on upland acidic soils, moist grasslands
fritillary, Atlantis		rare*	down	mid June-mid Sept	northern blue violet	forest openings
fritillary, great spangled		common		late June-early Sept	violets	forest edges
fritillary, meadow		common	down	May-Sept	violets	moist fields
fritillary, regal		regionally extinct?	down	late June-mid Sept	violets	extensive open areas with some wettness
fritillary, silver-bordered		rare*		June-Sept	wetland violets	overgrowing wet areas, marshes, bogs
fritillary, variegated		rare		July-Oct	violet, thyme, plaintain, purslane, others	open habitats
lady, American		occasional		mid May-late Oct	composites (asters, goldenrods, and related plants)	circa anywhere
lady, painted		common		May-Oct	various field plants	open habitats
mark, question		occasional		late June-Oct	elms	forests and edges
monarch		common		mid June-Sept	milkweeds	oldfields, edges
nymph, common wood		common		July-early Sept	grasses	meadows with shrubs or other tall vegetation
purple, red-spotted		occasional		mid June-early Aug; mid Aug-mid Sept	cherries	near deciduous, often moist forest

(continued)

Table B-2. (cont.)

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY NYMPHALIDAE (cont.)						
ringlet, common		common	up	late May-early July; late July-Aug	grasses	oldfields
satyr, little wood		common		late May-early Aug	grasses	edges, forest openings
snout, American		rare		late June-mid Oct	hackberry	wooded stream edges
tortoiseshell, Compton		occasional		March-fall	birches, willows	forest openings and edges
tortoiseshell, Milbert's		occasional		mid June-Oct?	nettles	wet/moist habitats near forest
viceroy		common		late May-early Oct	willow	moist, shrubby habitats
FAMILY PAPILIONIDAE						
swallowtail, black		common	down	May-Sept	parsley, carrot, and related plants	mainly open meadows
swallowtail, Canada		unseen but possible		May-early June?	birch, aspen, cherry	near deciduous trees
swallowtail, eastern tiger		common		late May-Oct	black cherry, tuliptree, ash	near deciduous trees
swallowtail, giant		rare		May –Sept	rue family (Rutaceae)	various or semi-open habitats
swallowtail, pipevine		unseen but possible		June-early Oct	pipevine	gardens, rocky forested uplands
swallowtail, spicebush		occasional		May-Aug	spicebush	varied open habitats, usually near forest

(continued)

Table B-2. (cont.)

Common Name	Statewide Status†	Apparent Status in County*	Regional Trend	Flight Time	Caterpillar Food	Habitat
FAMILY PIERIDAE						
orange-tip, falcate		unseen but possible	down	May	mustards, rock cresses, two-leaved toothwort	"trap rock hills"
sulphur, clouded		common	up	May-mid Oct	legumes	open habitats
sulphur, cloudless		unseen but possible		Aug-Oct migrant	legumes	open habitats
sulphur, orange		common		mid May - early Oct	alfalfa, other legumes	open habitats, weedy, alfalfa fields
white, cabbage		common	up	May-Oct	Brassicaceae	pastures or cultivated meadows
white, checkered	S1, SC	unseen but possible	down	late Aug-Sept	Brassicaceae	weedy, open habitats
white, mustard		unseen but possible	down	as early as late April - Aug	mustards, e.g., *Dentaria, Arabis, Cardamine*	edges, streamside habitats, oldfields
white, West Virginia		rare	down	early April-late May	mainly *Dentaria, Arabis, Cardamine*	rich moist woods
yellow, little		rare	down	mid Aug-early Sept	legumes	meadows and waste areas
FAMILY RIONIDAE						
metalmark, northern		unseen but possible		July	round-leaved ragwort	limestone outcrops

† SGCN = NYS Species of Greatest Conservation Need; SC = NYS Species of Special Concern; S1, S2, S3, S4, SH SU= NYNHP ranks; see Appendix C for explanation of all..

Table B-3. Dragonflies and damselflies of New Lebanon and Columbia County.

Data are from the NYSDEC 2005-2009 statewide survey (White et al. 2010) and from observations by the Hawthorne Valley Farmscape Ecology Program (FEP). Statewide rarity ranks are explained in Appendix C. An asterisk indicates countywide rarity assigned by FEP. Shading indicates species observed by FEP in New Lebanon.

Common Name	Scientific Name	Statewide status	Columbia Co rare or uncommon[1]
amber-winged spreadwing	*Lestes eurinus*	S3S4	
American emerald	*Cordulia shurtleffii*		
American rubyspot	*Hetaerina americana*	S3	*
arrow clubtail	*Stylurus spiniceps*	SGCN, S3	*
ashy clubtail	*Gomphus lividus*		*
aurora damselfly	*Chromagrion furcillata*		
azure bluet	*Enallagma aspersum*		
banded pennant	*Celithemis fasciata*	S3	*
band-winged meadowhawk	*Sympetrum semicinctum*		
beaverpond baskettail	*Epitheca canis*		*
big bluet	*Enallagma durum*	S3	
black saddlebags	*Tramea lacerata*		
black-shouldered spinyleg	*Dromogomphus spinosus*		*
black-tipped darner	*Aeshna tuberculifera*		*
blue dasher	*Pachydiplax longipennis*		
blue-fronted dancer	*Argia apicalis*	S3	
boreal snaketail	*Ophiogomphus colubrinus*	SGCN[HP], S1	*
brook snaketail	*Ophiogomphus aspersus*	SGCN, S3	
brush-tipped emerald	*Somatochlora walshii*	S3	*
calico pennant	*Celithemis elisa*		
Canada darner	*Aeshna canadensis*		
chalk-fronted corporal	*Ladona julia*		
cherry-faced meadowhawk	*Sympetrum internum*		*
clamp-tailed emerald	*Somatochlora tenebrosa*		*
comet darner	*Anax longipes*	SGCN, S2S3	*
common baskettail	*Epitheca cynosura*		
common green darner	*Anax junius*		
common spreadwing	*Lestes disjunctus*		*
common whitetail	*Plathemis lydia*		
delta-spotted spiketail	*Cordulegaster diastatops*		*
dot-tailed whiteface	*Leucorrhinia intacta*		
double-striped bluet	*Enallagma basidens*	S3	

(continued)

Table B-3 (cont.)

Common Name	Scientific Name	Statewide status	Columbia Co rare or uncommon[1]
dragonhunter	*Hagenius brevistylus*		*
dusky clubtail	*Gomphus spicatus*		*
eastern amberwing	*Perithemis tenera*		
eastern forktail	*Ischnura verticalis*		
eastern pondhawk	*Erythemis simplicicollis*		
eastern red damselfly	*Amphiagrion saucium*		*
ebony jewelwing	*Calopteryx maculata*		
elegant spreadwing	*Lestes inaequalis*		*
familiar bluet	*Enallagma civile*		
fawn darner	*Boyeria vinosa*		*
four-spotted skimmer	*Libellula quadrimaculata*		*
fragile forktail	*Ischnura posita*		
frosted whiteface	*Leucorrhinia frigida*		*
green-striped darner	*Aeshna verticalis*		*
Hagen's bluet	*Enallagma hageni*		
Halloween pennant	*Celithemis eponina*		
harlequin darner	*Gomphaeschna furcillata*		*
harpoon clubtail	*Gomphus descriptus*	S3	*
Illinois river cruiser	*Macromia illinoiensis*		
Kennedy emerald	*Somatochlora kennedyi*	SNA	*
lancet clubtail	*Gomphus exilis*		
lance-tipped darner	*Aeshna constricta*		
least clubtail	*Stylogomphus albistylus*		
lilypad clubtail	*Arigomphus furcifer*	*	*
marsh bluet	*Enallagma ebrium*		*
mocha emerald	*Somatochlora linearis*	SGCN, S1	*
mustached clubtail	*Gomphus adelphus*	S2S3	*
northern bluet	*Enallagma annexum*		*
northern pygmy clubtail	*Lanthus parvulus*	S3	*
orange bluet	*Enallagma signatum*		
painted skimmer	*Libellula semifasciata*		
powdered dancer	*Argia moesta*		*
prince baskettail	*Epicordulia princeps*		*
racket-tailed emerald	*Dorocordulia libera*		*
red-waisted whiteface	*Leucorrhinia proxima*		*
riffle snaketail	*Ophiogomphus carolus*	S2S3	*
river jewelwing	*Calopteryx aequabilis*		*

(continued)

Table B-3 (cont.)

Common Name	Scientific Name	Statewide status	Columbia Co rare or uncommon[1]
ruby meadowhawk	*Sympetrum rubicundulum*	S3	
russet-tipped clubtail	*Stylurus plagiatus*	SGCN, S1	*
rusty snaketail	*Ophiogomphus rupinsulensis*		*
sedge sprite	*Nehalennia irene*		
shadow darner	*Aeshna umbrosa*		
skimming bluet	*Enallagma geminatum*		
slaty skimmer	*Libellula incesta*		
slender spreadwing	*Lestes rectangularis*		
southern spreadwing	*Lestes australis*	S2S3	*
spangled skimmer	*Libellula cyanea*		
sphagnum sprite	*Nehalennia gracilis*		*
spine-crowned clubtail	*Gomphus abbreviatus*	SGCN, S1	*
spotted spreadwing	*Lestes congener*		
spot-winged glider	*Pantala hymenaea*		*
stream bluet	*Enallagma exsulans*		
stream cruiser	*Didymops transversa*		*
superb jewelwing	*Calopteryx amata*	S3	*
swamp darner	*Epiaeschna heros*	S3	*
swamp spreadwing	*Lestes vigilax*		
sweetflag spreadwing	*Lestes forcipatus*		
tule bluet[2]	*Enallagma carunculatum*		*
turquoise bluet	*Enallagma divagans*	S3	*
twelve-spotted skimmer	*Libellula pulchella*		
twin-spotted spiketail	*Cordulegaster maculata*		*
umber shadowdragon	*Neurocordulia obsoleta*	SGCN, S1	*
unicorn clubtail	*Arigomphus villosipes*		*
variable dancer	*Argia fumipennis violacea*		
vesper bluet	*Enallagma vesperum*	S4	*
wandering glider	*Pantala flavescens*		
white-faced meadowhawk	*Sympetrum obtrusum*		*
widow skimmer	*Libellula luctuosa*		
yellow-legged meadowhawk	*Sympetrum vicinum*		*
zebra clubtail	*Stylurus scudderi*	S3	*

[1] An asterisk indicates a species known from five or fewer locations in the county (Conrad Vispo, pers. comm.).

[2] Occurrence of tule bluet in New Lebanon is uncertain.

Table B-4. Amphibians and reptiles of Columbia County, New York.

Occurrence data are from the New York State Reptile and Amphibian Atlas. Rarity ranks: E = NYS Endangered; T = NYS Threatened; SC = NYS Special Concern; SGCN = NYS Species of Greatest Conservation Need. (SGCN rank is noted only for species not assigned E, T, or SC.) Rarity ranks are explained in Appendix C.

Common Name	Scientific Name	Statewide Status	Habitats
SALAMANDERS			
mudpuppy	*Necturus maculosus*	SC	perennial stream
Jefferson salamander	*Ambystoma jeffersonianum*	SC	vernal pool, upland forest
blue-spotted salamander	*Ambystoma laterale*	SC	swamp, vernal pool, upland forest
spotted salamander	*Ambystoma maculatum*		vernal pool, upland forest
marbled salamander	*Ambystoma opacum*	SC	vernal pool, upland forest
eastern newt	*Notophthalmus viridescens*		perennial pond, other wetland, upland forest
northern dusky salamander	*Desmognathus fuscus*		cool stream
Allegheny mountain dusky salamander	*Desmognathus ochrophaeus*		cool stream
northern two-lined salamander	*Eurycea bislineata*		small forested stream
spring salamander	*Gyrinophilus porphyriticus*		rocky stream, forested seep
four-toed salamander	*Hemidactylium scutatum*	$SGCN^{HP}$	swamp, upland forest
eastern red-backed salamander	*Plethodon cinereus*		upland forest
northern slimy salamander	*Plethodon glutinosus*		talus, upland forest
TOADS & FROGS			
American toad	*Bufo americanus*		everywhere
Fowler's toad	*Bufo fowleri*	SGCN	sandy or rocky forest
gray treefrog	*Hyla versicolor*		shallow pool, upland forest
spring peeper	*Pseudacris crucifer*		upland forest, wetland
bullfrog	*Rana catesbeiana*		forest, meadow
green frog	*Rana clamitans*		pond, marsh
pickerel frog	*Rana palustris*		meadow, forest, wetland
northern leopard frog	*Rana pipiens*		pond, marsh, meadow
wood frog	*Rana sylvatica*		vernal pool, upland forest

(continued)

Table B-4. (cont.)

Common Name	Scientific Name	Statewide Status	Habitats
TURTLES			
snapping turtle	*Chelydra serpentina*	SGCN	pond, lake, wetland, meadow
musk turtle (stinkpot)	*Sternotherus odoratum*	SGCN^{HP}	stream, lake
painted turtle	*Chrysemys picta*		pond, marsh, stream
spotted turtle	*Clemmys guttata*	SC	wetland, upland forest
wood turtle	*Glyptemys insculpta*	SC	perennial stream, upland forest, meadow
bog turtle	*Glyptemys muhlenbergii*	E	fen, nearby wetland
northern map turtle	*Graptemys geographica*	SGCN	Hudson River
eastern box turtle	*Terrapene carolina*	SC	upland forest, meadow
SNAKES			
eastern racer	*Coluber constrictor*	SGCN	forest, meadow, ledge, talus
ring-necked snake	*Diadophis punctatus*		forest, forest opening
eastern ratsnake	*Elaphe alleghaniensis*	SGCN	forest, ledge, talus
milksnake	*Lampropeltis triangulum*		meadow, forest, barnyard
smooth greensnake	*Liochlorophis vernalis*	SGCN	wet meadow, other wetland, open forest
northern watersnake	*Nerodia sipedon*		pond, lake, wetland, stream
Dekay's brownsnake	*Storeria dekayi*		forest, meadow, wetland, yard
red-bellied snake	*Storeria occipitomaculata*		forest, meadow, wetland, yard
eastern ribbonsnake	*Thamnophis sauritus*	SGCN	open wetland
common gartersnake	*Thamnophis sirtalis*		everywhere
copperhead	*Agkistrodon contortrix*	SGCN	forest, ledge, meadow
timber rattlesnake	*Crotalus horridus*	T	forest, meadow, ledge, talus

Table B-5. Inland fishes of Columbia County, New York.

Data are mainly from the New York State Fish Atlas, 1934-2011, reviewed and updated by Robert E. Schmidt. Hudson River fishes are excluded unless they also inhabit non-tidal waterbodies of Columbia County. NYS Species of Greatest Conservation Need (SGCN) listing is explained in Appendix C. Columbia County status assigned by Hudsonia: C = common; U = uncommon; R = rare; E = extirpated.

Common Name	Scientific Name	Native? (Yes/No)	Statewide Status	County Status	Streams	Ponds/ Lakes
alewife	*Alosa pseudoharengus*	Y	SGCN	U	x	x
American eel	*Anguilla rostrata*	Y	SGCN[HP]	C	x	x
banded killifish	*Fundulus diaphanus*	Y		U	x	x
black crappie	*Pomoxis nigromaculatus*	N		U	x	x
blueback herring	*Alosa aestivalis*	Y	SGCN	U		
bluegill	*Lepomis macrochirus*	N		U	x	x
bluntnose minnow	*Pimephales notatus*	Y		U	x	x
bridle shiner	*Notropis bifrenatus*	Y	SGCN	E	x	x
brook silverside	*Labidesthes sicculus*	N		R	x	
brook trout	*Salvelinus fontinalis*	Y		U	x	x
brown bullhead	*Ameiurus nebulosus*	Y	SGCN	U	x	x
brown trout	*Salmo trutta*	N		C	x	x
central mudminnow	*Umbra limi*	N		R	x	
chain pickerel	*Esox niger*	Y		U	x	x
channel catfish	*Ictalurus punctatus*	N		U		x
cisco	*Coregonus artedi*	N	SGCN	R		x
common carp	*Cyprinus carpio*	N		U	x	x
common shiner	*Luxilus cornutus*	Y		C	x	x
creek chub	*Semotilus atromaculatus*	Y		C	x	x
cutlip minnow	*Exoglossum maxillingua*	Y		U	x	
eastern blacknose dace	*Rhinichthys atratulus*	Y		C	x	x
eastern creek chubsucker	*Erimyzon oblongus*	Y		R	x	x
eastern silvery minnow	*Hybognathus regius*	Y		R	x	
emerald shiner	*Notropis atherinoides*	N		R	x	x
fallfish	*Semotilus corporalis*	Y		C	x	x
fathead minnow	*Pimephales promelas*	N		U	x	x
fourspine stickleback	*Apeltes quadracus*	Y	SGCN[HP]	U	x	x
gizzard shad	*Dorosoma cepedianum*	N		U	x	
golden shiner	*Notemigonus crysoleucas*	Y		C	x	x
goldfish	*Carassius auratus*	N		U	x	x
grass carp	*Ctenopharyngodon idella*	N		U		x

(continued)

Table B-5. (cont.)

Common Name	Scientific Name	Native (Yes/No)	Statewide Status	County Status	Streams	Ponds/ Lakes
green sunfish	*Lepomis cyanellus*	N		U	x	x
largemouth bass	*Micropterus salmoides*	N		U	x	x
longnose dace	*Rhinichthys cataractae*	Y		U	x	
longnose sucker	*Catostomus catostomus*	Y	SGCN	R	x	
mummichog	*Fundulus heteroclitus*	Y	SGCN	C	x	x
northern hog sucker	*Hypentelium nigricans*	Y		U	x	
northern pike	*Esox lucius*	N		R	x	x
pumpkinseed	*Lepomis gibbosus*	Y		U	x	x
rainbow trout	*Oncorhynchus mykiss*	N		R	x	x
redbreast sunfish	*Lepomis auritus*	Y		C	x	x
redfin pickerel	*Esox americanus americanus*	Y		U	x	
rock bass	*Ambloplites rupestris*	N		U	x	x
rudd	*Scardinius erythrophthalmus*	N		R	x	x
satinfin shiner	*Cyprinella analostana*	Y		R	x	
sea lamprey	*Petromyzon marinus*	Y		R	x	
slimy sculpin	*Cottus cognatus*	Y		R	x	
smallmouth bass	*Micropterus dolomieu*	N		C	x	x
splake	*Salvelinus fontinalis* x *namaycush*	N		C		x
spotfin shiner	*Cyprinella spiloptera*	Y		U	x	x
spottail shiner	*Notropis hudsonius*	Y		C	x	
tadpole madtom	*Noturus gyrinus*	Y		E	x	
tessellated darter	*Etheostoma olmstedi*	Y		C	x	x
tiger musky	*Esox lucius* x *masquinongy*	N		C		x
walleye	*Sander vitreus*	N		R	x	x
white catfish	*Ameiurus catus*	Y		R		x
white crappie	*Pomoxis annularis*	N		R		x
white perch	*Morone americana*	Y		U	x	x
white sucker	*Catostomus commersonii*	Y		C	x	x
yellow bullhead	*Ameiurus natalis*	Y		C	x	x
yellow perch	*Perca flavescens*	Y		U	x	x

Table B-6. Columbia County breeding birds of conservation concern.

Data are from the NYS Breeding Bird Atlas (BBA) (Andrle and Carroll 1988, McGowan and Corwin 2008). Bird species reported in either BBA survey from survey blocks that were more than 50% in New Lebanon are shaded. Rarity ranks (NYNHP and NYS) and the Audubon New York Hudson Valley Priority Bird List are explained in Appendix C.

Group	Species	NYNHP rank[1]	NYS rank[2]	Audubon Priority List (A)	BBA 1980-85[3]	BBA 2000-05[3]	Trend[4]
GREBES	pied-billed grebe	S3B, S1N	T	A	y	y	s
HERONS	American bittern		SC	A	y	y	s
	least bittern	S3B, S1N	T	A	y	y	i
WATERFOWL	American black duck		SGCN[HP]		y	y	d
	blue-winged teal		SGCN		y	n	d
RAPTORS	bald eagle	S2S3B, S2N	T	A	n	y	i
	northern harrier	S3B, S3N	T	A	y	y	s
	sharp-shinned hawk			A	y	y	s
	Cooper's hawk			A	y	y	i
	northern goshawk		SC	A	n	y	s
	red-shouldered hawk		SC	A	n	y	s
	broad-winged hawk			A	y	y	s
	American kestrel		SGCN	A	y	y	d
	peregrine falcon	S3B	E	A	n	y	i
GALLINACEOUS BIRDS	ruffed grouse		SGCN		y	y	d
	northern bobwhite		SGCN[HP]		y	y	s
	American woodcock		SGCN	A	y	y	d
CUCKOOS	black-billed cuckoo		SGCN	A	y	y	s
OWLS	barn owl	S1S2	SGCN[HP]		y	n	d
	northern saw-whet owl			A	y	n	d
NIGHTJARS	whip-poor-will	S3B	SC	A	y	y	d
SWIFTS	chimney swift			A	y	y	s
KINGFISHERS	belted kingfisher			A	y	y	s

(continued)

Table B-6. (cont.)

Group	Species	NYNHP[1]	NYS rank[2]		BBA 1980-85[3]	BBA 2000-05[3]	Trend[4]
WOODPECKERS	red-headed woodpecker	S2?B	SC	A	n	y	i
	downy woodpecker			A	y	y	s
	northern flicker			A	y	y	s
PERCHING BIRDS	eastern wood-pewee			A	y	y	s
	willow flycatcher			A	y	y	i
	eastern kingbird			A	y	y	s
	blue-headed vireo			A	y	y	s
	yellow-throated vireo			A	y	y	s
	horned lark		SC	A	y	n	d
	purple martin			A	y	n	d
	marsh wren			A	y	y	s
	veery			A	y	y	s
	wood thrush		SGCN	A	y	y	s
	brown thrasher		SGCN[HP]	A	y	y	d
	blue-winged warbler		SGCN	A	y	y	s
	golden-winged warbler		SC	A	y	y	d
	magnolia warbler			A	y	y	i
	black-throated blue warbler		SGCN	A	y	y	i
	black-throated green warbler			A	y	y	i
	Blackburnian warbler			A	y	y	s
	prairie warbler		SGCN	A	y	y	s
	cerulean warbler		SC	A	n	y	i
	black-and-white warbler			A	y	y	s
	American redstart			A	y	y	s
	worm-eating warbler		SGCN	A	y	y	i
	Louisiana waterthrush		SGCN	A	y	y	s

(continued)

Table B-6. (cont.)

Group	Species	NYNHP[1]	NYS rank[2]		BBA 1980-85[3]	BBA 2000-05[3]	Trend[4]
PERCHING BIRDS (cont.)	hooded warbler			A	n	y	i
	Canada warbler		SGCN^{HP}	A	y	y	d
	scarlet tanager		SGCN	A	y	y	s
	eastern towhee			A	y	y	s
	field sparrow			A	y	y	d
	vesper sparrow		SC	A	y	y	d
	savannah sparrow			A	y	y	s
	grasshopper sparrow		SC	A	y	y	s
	white-throated sparrow			A	y	y	d
	rose-breasted grosbeak			A	y	y	s
	indigo bunting			A	y	y	s
	bobolink		SGCN^{HP}	A	y	y	s
	eastern meadowlark		SGCN^{HP}	A	y	y	d
	Baltimore oriole			A	y	y	d
	purple finch			A	y	y	s

[1] New York Natural Heritage Program ranks are explained in Appendix C.

[2] New York State ranks

E = endangered; T = threatened; SC = special concern (Environmental Conservation Law 6NYCRR Part 182.[g]
SGCN = Species of Greatest Conservation Need
SGCN^{HP} = Highest Priority Species of Greatest Conservation Need (http://www.dec.ny.gov/animals/9406.html)
(The SGCN rank also applies to all species ranked as E, T, or SC .)

[3] NYS Breeding Bird Atlas data for survey periods 1980-85 and 2000-05: y = recorded in Columbia County; n = not recorded in Columbia County

[4] Trend in BBA data between the two survey periods: I = increasing; d = declining; s = similar; ? = trend uncertain

Table B-7. Mammals of Columbia County, New York.

Occurrence data from Whitaker (in prep), Hawthorne Valley Farmscape Ecology Program, and Hudsonia Ltd.

Common Name	Scientific Name	Statewide Status[1]
MARSUPIALS		
Virginia opossum	*Didelphis virginiana*	
INSECT-EATERS		
masked shrew	*Sorex cinereus*	
northern short-tailed shrew	*Blarina brevicauda*	
smoky shrew	*Sorex fumeus*	
water shrew[2]	*Sorex palustris*	
eastern mole	*Scalopus aquaticus*	
hairy-tailed mole	*Parascalops breweri*	
star-nosed mole	*Condylura cristata*	
BATS		
big brown bat	*Eptesicus fuscus*	
eastern red bat	*Lasiurus borealis*	SGCN
eastern small-footed bat[2]	*Myotis leibii*	SC
hoary bat	*Lasiurus cinereus*	SGCN
Indiana bat[1]	*Myotis sodalis*	E
little brown bat	*Myotis lucifugus*	SGCN[HP]
northern long-eared bat	*Myotis septentrionalis*	T
silver-haired bat	*Lasionycteris noctivagans*	SGCN
tri-colored bat	*Perimyotis subflavus*	SGCN[HP]
CARNIVORES		
black bear	*Ursus americanus*	Reg-S
raccoon	*Procyon lotor*	
ermine	*Mustela erminea*	
fisher	*Martes pennanti*	
long-tailed weasel	*Mustela frenata*	
mink	*Mustela vison*	
river otter	*Lutra canadensis*	Reg-U
striped skunk	*Mephitis mephitis*	
eastern coyote	*Canis latrans*	
gray fox	*Urocyon cinereoargenteus*	
red fox	*Vulpes vulpes*	
bobcat	*Lynx rufus*	

(continued)

Table B-7. (cont.)

Common Name	Scientific Name	Status[1]
RODENTS		
woodchuck	*Marmota monax*	
northern flying squirrel[2]	*Glaucomys sabrinus*	
southern flying squirrel	*Glaucomys volans*	
eastern gray squirrel	*Sciurus carolinensis*	
red squirrel	*Tamiasciurus hudsonicus*	
eastern chipmunk	*Tamias striatus*	
American beaver	*Castor canadensis*	
deer mouse	*Peromyscus maniculatus gracilis*	
white-footed mouse	*Peromyscus leucopus*	
southern bog lemming[2]	*Synaptomys cooperi*	Reg-R
meadow vole	*Microtus pennsylvanicus*	
southern red-backed vole	*Clethrionomys gapperi*	Reg-S
woodland vole	*Microtus pinetorum*	
muskrat	*Ondatra zibethicus*	
Norway rat	*Rattus norvegicus*	
black rat	*Rattus rattus*	
house mouse	*Mus musculus*	
meadow jumping mouse	*Zapus hudsonius*	
woodland jumping mouse	*Napaeozapus insignis*	Reg-R
common porcupine	*Erethizon dorsatum*	Reg-U
HARES & RABBITS		
snowshoe hare	*Lepus americanus*	Reg-U
eastern cottontail	*Sylvilagus floridanus*	
New England cottontail	*Sylvilagus transitionalis*	SC
HOOFED MAMMALS		
white-tailed deer	*Odocoileus virginianus*	
moose[3]	*Alces alces*	SGCN

[1] Rarity status in New York State or the Hudson Valley region: E=NYS Endangered; T=NYS Threatened; SC=NYS Special Concern; SGCN= NYS Species of Greatest Conservation Need (HP = high priority SGCN); Reg=regional rank: R=rare; S=scarce; U=uncommon. (See Appendix C for explanation of rarity ranks.)

[2] Occurrence in Columbia County is uncertain.

[3] Not known to breed in Columbia County.

Table B-8. Vascular plants mentioned in the Natural Resource Conservation Plan. Scientific nomenclature follows Weldy et al. 2017.

Common Name	Scientific Name	Common Name	Scientific Name
alder	*Alnus*	cliffbrake, purple-stemmed	*Pellaea atropurpurea*
arrow-arum	*Peltandra virginica*	cliffbrake, smooth	*Pellaea glabella* ssp. *glabella*
arrowhead, broadleaved	*Sagittaria latifolia*	cohosh, blue	*Caulophyllum thalictroides*
ash	*Fraxinus*	columbine, wild	*Aquilegia canadensis*
ash, black	*Fraxinus nigra*	corydalis, pale	*Corydalis sempervirens*
ash, green	*Fraxinus pennsylvanica*	cranberry, large	*Vaccinium macrocarpon*
ash, white	*Fraxinus americana*	dodder, field	*Cuscuta campestris*
aster, late purple	*Symphyotrichum patens* var. *patens*	dogbanes	*Apocynum*
avens, spring	*Geum vernum*	duckweed	*Lemna* or *Spirodela*
barberry, Japanese	*Berberis thunbergii*	elder, red-berried	*Sambucus racemosa* var. *racemosa*
basswood, American	*Tilia americana* var. *americana*	fern, fragile	*Cystopteris fragilis*
bee-balm, domestic	*Monarda*	fern, northern maidenhair	*Adiantum pedatum*
beech, American	*Fagus grandifolia*	fern, walking	*Asplenium rhizophyllum*
beech-drops	*Epifagus virginiana*	gaywings	*Polygala paucifolia*
birch	*Betula*	ginger, wild	*Asarum canadense*
birch, yellow	*Betula alleghaniensis*	ginseng, American	*Panax quinquefolius*
bladdernut	*Staphylea trifolia*	golden-saxifrage, American	*Chrysosplenium americanum*
bladderwort, hidden-fruit	*Utricularia geminiscapa*	goldenseal	*Hydrastis canadensis*
bloodroot	*Sanguinaria canadensis*	hairgrass, common	*Avenella flexuosa*
blueberry, early lowbush	*Vaccinium angustifolium*	hemlock, eastern	*Tsuga canadensis*
blueberry, late lowbush	*Vaccinium pallidum*	hepatica	*Hepatica*
bluestem, little	*Schizachyrium scoparium* var. *scoparium*	hickory, shagbark	*Carya ovata*
breeches, Dutchman's	*Dicentra cucullaria*	hobblebush	*Viburnum lantanoides*
buckthorn, common	*Rhamnus cathartica*	honeysuckle, Bell's	*Lonicera* × *bella*
bur-reed	*Sparganium*	horsetail, variegated	*Equisetum variegatum*
bush-clover, violet	*Lespedeza frutescens*	knotweed, Japanese	*Fallopia japonica*
bush-honeysuckle, northern	*Diervilla lonicera*	knotweed, slender	*Polygonum tenue*
butternut	*Juglans cinerea*	lady's-slipper, yellow	*Cypripedium parviflorum* var. *pubescens*
buttonbush, common	*Cephalanthus occidentalis*	leatherleaf	*Chamaedaphne calyculata*
canary-grass, reed	*Phalaris arundinacea*	leatherwood, eastern	*Dirca palustris*
cattail	*Typha*	locust, black	*Robinia pseudoacacia*
cedar, eastern red	*Juniperus virginiana* var. *virginiana*	loosestrife, purple	*Lythrum salicaria*
chestnut, American	*Castanea dentata*	maple, mountain	*Acer spicatum*

(continued)

Table B-8. (cont.)

Common Name	Scientific Name	Common Name	Scientific Name
maple, red	*Acer rubrum* var. *rubrum*	sedge, Davis'	*Carex davisii*
maple, striped	*Acer pensylvanicum*	sedge, false hop	*Carex lupuliformis*
maple, sugar	*Acer saccharum* var. *saccharum*	sedge, Pennsylvania	*Carex pensylvanica*
marsh-marigold	*Caltha palustris*	sedge, tussock	*Carex stricta*
may-apple	*Podophyllum peltatum*	Solomon's seal, starry	*Maianthemum stellatum*
mile-a-minute-weed	*Persicaria perfoliata*	spikenard, American	*Aralia racemosa* ssp. *racemosa*
milkweeds	*Asclepias*	spleenwort, ebony	*Asplenium platyneuron* var. *platyneuron*
milkwort, purple	*Polygala sanguinea*	spleenwort, maidenhair	*Asplenium trichomanes* ssp. *trichomanes*
nettle, American stinging	*Urtica dioica* ssp. *gracilis*	spleenwort, mountain	*Asplenium montanum*
oak	*Quercus*	spring-beauty, Virginia	*Claytonia virginica* var. *virginica*
oak, chestnut	*Quercus montana*	squirrel-corn	*Dicentra canadensis*
oak, red	*Quercus rubra*	stiltgrass, Japanese	*Microstegium vimineum*
oak, scrub	*Quercus ilicifolia*	sundew, round-leaved	*Drosera rotundifolia* var. *rotundifolia*
pine	*Pinus*	swallow-wort, black	*Cynanchum louiseae*
pine, eastern white	*Pinus strobus*	tamarack	*Larix*
pinweed, slender	*Lechea tenuifolia*	toothwort, cut-leaved	*Cardamine concatenata*
pitcher-plant	*Sarracenia purpurea*	toothwort, two-leaved	*Cardamine diphylla*
pogonia, rose	*Pogonia ophioglossoides*	tree-of-heaven	*Ailanthus altissima*
polypody, rock	*Polypodium virginianum*	twayblade, Loesel's	*Liparis loeselii*
pond-lily	*Nuphar* or *Nymphaea*	violet, Canada	*Viola canadensis* var. *canadensis*
prickly-ash, American	*Zanthoxylum americanum*	wall-rue	*Asplenium ruta-muraria*
ragweed, common	*Ambrosia artemisiifolia*	water-chestnut	*Trapa natans*
rattlebox	*Crotalaria sagittalis*	water-lily, fragrant	*Nymphaea odorata* ssp. *odorata*
reed, European common	*Phragmites australis*	watermilfoil, Eurasian	*Myriophyllum spicatum*
rose, multiflora	*Rosa multiflora*	water-plantain, broad-leaved	*Alisma subcordatum*
sarsaparilla, bristly	*Aralia hispida*	water-shield	*Brasenia schreberi*
sedge, brome-like	*Carex bromoides* ssp. *bromoides*	water-willow	*Decodon verticillatus*
sedge, cattail	*Carex typhina*	witch-hazel, American	*Hamamelis virginiana*
sedge, clustered	*Carex cumulata*	yew, Canada	*Taxus canadensis*

Appendix C

Explanation of Rarity Ranks

Explanation of Rarity Ranks

This section explains the federal, state, and regional rarity ranks used in the Natural Resources Conservation Plan. The New York legal status information is reproduced here from the New York Natural Heritage Program website at http://www.acris.nynhp.org/ranks.php, accessed in March 2017. The SGCN information was obtained from the Hudson River Estuary Wildlife and Habitat Conservation Strategy (Penhollow et al. 2005), and updated with the revised list in the New York State Wildlife Action Plan (NYSDEC 2015). The regional status information was obtained from Kiviat and Stevens (2001). The Audubon New York priority bird list was obtained from the Audubon New York website at (http://ny.audubon.org/conservation/hudson-river-valley-conservation)

NY LEGAL STATUS - Animals
Categories of Endangered and Threatened species are defined in New York State Environmental Conservation Law section 11-0535. Endangered, Threatened, and Special Concern species are listed in regulation 6NYCRR 182.5.

E - Endangered Species: any species which meet one of the following criteria:

- Any native species in imminent danger of extirpation or extinction in New York.
- Any species listed as endangered by the United States Department of the Interior, as enumerated in the Code of Federal Regulations 50 CFR 17.11.

T - Threatened Species: any species which meet one of the following criteria:

- Any native species likely to become an endangered species within the foreseeable future in NY.
- Any species listed as threatened by the U.S. Department of the Interior, as enumerated in the Code of the Federal Regulations 50 CFR 17.11.

SC - Special Concern Species: those species which are not yet recognized as endangered or threatened, but for which documented concern exists for their continued welfare in New York.

P - Protected Wildlife (defined in Environmental Conservation Law section 11-0103): wild game, protected wild birds, and endangered species of wildlife.

U - Unprotected (defined in Environmental Conservation Law section 11-0103): the species may be taken at any time without limit; however a license to take may be required.
G - Game (defined in Environmental Conservation Law section 11-0103): any of a variety of big game or small game species as stated in the Environmental Conservation Law; many normally have an open season for at least part of the year, and are protected at other times.

(continued)

NY LEGAL STATUS – Plants
The following categories are defined in regulation 6NYCRR part 193.3 and apply to NYS Environmental Conservation Law section 9- 1503.

E – Endangered Species: listed species are those with:
- 5 or fewer extant sites, or
- fewer than 1,000 individuals, or
- restricted to fewer than 4 U.S.G.S. 7 ½ minute topographical maps, or
- species listed as endangered by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

T – Threatened: listed species are those with:
- 6 to fewer than 20 extant sites, or
- 1,000 to fewer than 3,000 individuals, or
- restricted to not less than 4 or more than 7 U.S.G.S. 7 and ½ minute topographical maps, or
- listed as threatened by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

R – Rare: listed species have:
- 20 to 35 extant sites, or
- 3,000 to 5,000 individuals statewide.

V – Exploitably Vulnerable: listed species are likely to become threatened in the near future throughout all or a significant portion of their range within the state if causal factors continue unchecked.

U – Unprotected: no state status.

NYS SPECIES OF GREATEST CONSERVATION NEED (SGCN) - ANIMALS
Species that meet one or more of the following criteria (New York State Department of Environmental Conservation 2015):
- Species on the current federal list of endangered or threatened species that occur in New York.
- Species that are currently state-listed as endangered, threatened, or of special concern.
- Species with 20 or fewer elemental occurrences in the New York Natural Heritage Program database.
- Estuarine and marine species of greatest conservation need as determined by the DEC Bureau of Marine Resources staff.
- Other species determined by the DEC to be in great conservation need due to status, distribution, vulnerability, or disease.

(continued)

For those on the "high priority" SGCN list, the status of the species is known and conservation action is needed in the next ten years. These species are experiencing a population decline, or have identified threats that may put them in jeopardy, and are in need of timely management intervention or they are likely to reach critical population levels in New York.

For those on the rest of the SGCN list, the status of the species is known and conservation action is needed. These species are experiencing some level of population decline, have identified threats that may put them in jeopardy, and need conservation actions to maintain stable population levels or sustain recovery.

For those on the list of Species of Potential Conservation Need, the status of the species is poorly known, but there is an identified threat to the species or features of its life history that make it particularly vulnerable to threats. The species may be declining or begin to experience declines within the next ten years, and studies are needed to determine their actual status.

REGIONAL STATUS (HUDSON VALLEY) – ANIMALS AND PLANTS

Hudsonia has compiled lists of native plants and animals that are rare in the Hudson Valley but do not appear on statewide or federal lists of rarities (Kiviat and Stevens 2001). We use ranking criteria similar to those used by the NYNHP, but we apply those criteria to the Hudson Valley below the Troy Dam. Our regional lists are based on the extensive field experience of biologists associated with Hudsonia and communications with other biologists working in the Hudson Valley. These lists are subject to change as we gather more information about species occurrences in the region. Species that have been assigned federal, state, or Natural Heritage Program (S1 or S2) rarity ranks are also presumed to be regionally rare, but are not assigned a regional rank. For birds, the regional rank sometimes refers specifically to their breeding status in the region.

AUDUBON NEW YORK – HUDSON RIVER VALLEY PRIORITY BIRDS

Audubon New York has compiled a list of "priority birds" that are experiencing considerable threats, population declines, and/or have very small populations or limited ranges. The species were identified by assessing from continental, national, and regional bird planning initiatives and state and federal lists of threatened and endangered species.

A species is included on the Hudson River Valley Priority Bird list if it is found in the Hudson Valley and on one of the following priority lists: State-listed Endangered, Threatened, or Special Concern; Audubon Watchlist (2007); Partners In Flight (PIF, 2005) - Continental Concern, Regional Concern, Continental Stewardship, Regional Stewardship in any of the Bird Conservation Regions in the Hudson Valley (BCRs 13, 14, 28, and 30); North Atlantic Shorebird Plan - Highly Imperiled or Species of High Concern; Mid-Atlantic, New England, Maritime Waterbird Working Group - High Concern, Moderate Concern.

(http://ny.audubon.org/conservation/hudson-river-valley-conservation)

Appendix D

Summary of Conservation Measures

General Measures for Water Resource Conservation

Landowner Actions

- M**aintain forests** with intact vegetation and undisturbed forest floors wherever possible to promote infiltration of rainwater and snowmelt to the soils.
- **Minimize applications of polluting substance**s, such as de-icing salts to driveways, and pesticides and fertilizers to lawns, gardens, and agricultural fields. Any of those substances might end up in streams, ponds, or groundwater.
- On land development sites, **minimize impervious surfaces and manage stormwater** in ways that maintain pre-development patterns and volumes of surface runoff and infiltration to the soils.
- **Direct runoff from agricultural fields into basins and well-vegetated swales**, instead of directly into streams or wetlands, to maximize infiltration to the soils, and prevent the introduction of excess nutrients and toxins to streams and wetlands.
- **Consider the 100-year floodplain** when considering land management and land uses along streams. (Consider the 500-year floodplain once the data become available from FEMA.)
- **Keep floodplain meadows well-vegetated**. Minimize tillage in floodplains; seed immediately after tilling; leave abundant thatch to cover exposed soils; use cover crops in winter.
- **Remove structures, pavement, and hazardous materials** from floodplains wherever possible.
- In floodplains, **shift to resilient land use**s that can withstand moderate to severe flooding; for example, pastures, hayfields, or forests.

Municipal Actions

- Adopt local legislation to **protect small and isolated wetlands** that are unprotected by state and federal wetland regulatory programs.
- Adopt local legislation to **protect streams (including intermittent streams)** from direct disturbance, and establish **broad buffer zones** of undisturbed vegetation and soils along streams.
- Adopt local legislation to **protect unconsolidated aquifers**.
- **Redesign and retrofit roadside ditches** and other stormwater systems to maximize water infiltration to the soils, and minimize rapid and direct runoff into streams, ponds, and wetlands.

Municipal Actions (cont.)

- Design any new culverts and bridges and retrofit existing ones to **accommodate storms of 100-year intensity** or greater, in anticipation of more frequent and severe storms in coming decades.

- **Design, install, and retrofit culverts** to maintain the **continuity of stream gradients and substrates**.

- In floodplains, **shift to resilient land uses**; i.e., uses that can withstand moderate to severe flooding, such as parks, ballfields, hiking trails, picnic areas, fishing access sites, pastures, hayfields, or undisturbed buffer zones.

- **Prohibit the building of new structures in 100-year floodplains**. (Upgrade this to 500-year floodplains when the FEMA data becomes available.)

- On land development sites, **minimize impervious surfaces and manage stormwater** in ways that maintain pre-development patterns and volumes of surface runoff and infiltration to the soils.

- **Minimize applications of polluting substance**s, such as de-icing salts to roads and parking lots and pesticides and fertilizers to lawns. Any of those substances might end up in streams, ponds, or groundwater.

- In areas of coarse glacial deposits (sand and gravel) or carbonate bedrock (marble or limestone), **avoid siting land uses with potential for contaminating soils and water.** Educate landowners in those areas about the vulnerability of groundwater resources.

- **Regulate and monitor extractive commercial uses of water** to ensure that water withdrawals from groundwater or surface water sources do not exceed sustainable levels.

(continued)

General Measures for Biological Resource Conservation

- For townwide planning, consider ways to protect areas **representing all significant landforms** and the full array of elevations, bedrock geology, and surficial geology that occur in New Lebanon.
- **Direct human uses toward the least sensitive areas**, and minimize alteration of natural features, including vegetation, soils, bedrock, and waterways.
- Protect habitat areas in **large, broad configurations** wherever possible, with broad connections to other habitat areas.
- Maintain and restore **landscape connectivity** between large habitat areas wherever possible.
- **Avoid fragmentation of large forest patches** by roads, driveways, clearings, and other disturbances that open the forest canopy.
- **Avoid fragmentation of large meadow and contiguous farmland** by roads, driveways, or other non-farm uses.
- **Maintain broad buffer zones** of undisturbed vegetation and soils around ecologically sensitive areas.
- **Protect habitat complexes for species of conservation concern** wherever possible.
- **Minimize impervious surfaces** and design new land uses (and retrofit existing uses wherever possible) to ensure that surface runoff of precipitation and snowmelt does not exceed pre-development patterns and volumes of runoff.
- **Concentrate new development along existing roads**; discourage construction of new roads in undeveloped areas.
- In working forests, **employ sustainable forestry practices that promote tree species diversity and structural diversity**, protect soils from erosion, and protect streams from direct disturbance or siltation.
- **Employ sustainable agricultural practices that build living soils and conserve water**.
- **Where possible, promote wildlife-friendly agricultural practices**, such as late mowing to accommodate ground-nesting grassland birds, leaving unmowed strips and fallow rotations to support pollinators and other invertebrates, and minimizing applications of pesticides and fertilizers.
- **Consider environmental concerns early in the planning process** for new development projects, and incorporate conservation principles into the choice of development sites, site design, stormwater management, and construction practices.

General Measures for Farmland Resource Conservation

Municipal Actions

- Adopt **farm-friendly policies** and programs; for example, lowering tax assessments for active farmland, and allowing density bonuses for cluster designs that permanently protect farmland.
- Revise the Use Table (205 Sect 2 of the Zoning Law) to **allow wind turbines** for on-farm electricity use.
- Require that new subdivisions and development sites be designed in ways that **preserve the areas of best farmland soils intact and unfragmented** as much as possible.
- **Appoint farmers** to serve on the Planning Board, Zoning Board of Appeals, Zoning Rewrite Committee, and other town commissions dealing with land use policy and regulations.
- Establish a **Community Preservation Fund** to protect important agricultural lands, funded through grants, donations, budget appropriations, bond allocations, and a real estate transfer tax (through the Community Preservation Act).
- **Promote local markets for agricultural products**, including uses by restaurants and institutions such as schools.

Farmers' Actions

- **Join municipal agencies and commissions** (Planning Board, Zoning Board of Appeals, Zoning Rewrite Committee, etc.) dealing with land use policy and regulations.
- Where possible, **shift tilled land in floodplains to other uses** (such as pastures, hayfields, or perennial crops) more resilient to flooding.
- Adopt farm practices that **conserve water, prevent soil erosion and soil loss, and build living soils.**
- **Minimize applications of fertilizers and pesticides**, and especially in the more sensitive areas such as floodplain fields and near wetlands and streams.
- **Maintain cover crops and thatch** to reduce soil loss during heavy precipitation or flood events.
- **Maintain intact habitats** in and near hayfields, cropland, orchards, and pastures where possible, and adopt farm practices (such as mowing schedules and patterns) that accommodate the needs of native pollinators, birds, and other wildlife.

General Measures for Scenic Resource Conservation

- **Complete an inventory and map** of scenic resources throughout the town.
- When reviewing site plans and subdivision proposals, and the location and design of any new structure or new land use in the town, **consider the impacts on the entire viewshed** of those features.
- **Maintain intact natural areas and farmland visible from public roads and public-access lands** wherever possible.
- **Maintain intact (undeveloped) hilltops and sideslopes** wherever possible.
- **Minimize outdoor lighting,** and design any necessary outdoor lighting to minimize visibility of lights in nearby habitat areas and offsite areas throughout the viewshed.
- Develop town policies that **support working landscapes and land-dependent uses** (e.g., farming, logging, recreation) that employ sustainable practices.
- Adopt environmental review standards that consider impacts on scenic resources.

General Measures for Expansion of Recreation Resources

- Promote the **extension of the Corkscrew Rail Trail** through agreements with willing landowners.
- Adopt the **Complete Streets** approach to enhancing the quality and safety of New Lebanon's roads for biking, walking, and other uses.
- Develop additional **public access sites for fishing** on New Lebanon's streams.
- Collaborate with the Shaker Swamp Conservancy in efforts to develop **public access to Shaker Swamp**.