

Catchacoma Forest Species Inventory: 2022 Field Season

Research Report No. 45

by Jesse Mihevc and Lia Le Brun Robles Gil

Ancient Forest Exploration & Research

(ancientforest.org; peterborougholdgrowth.ca; contact: info@ancientforest.org)

Powassan, Ontario



Pickerelweed, Catchacoma Forest, 2022

February 2023

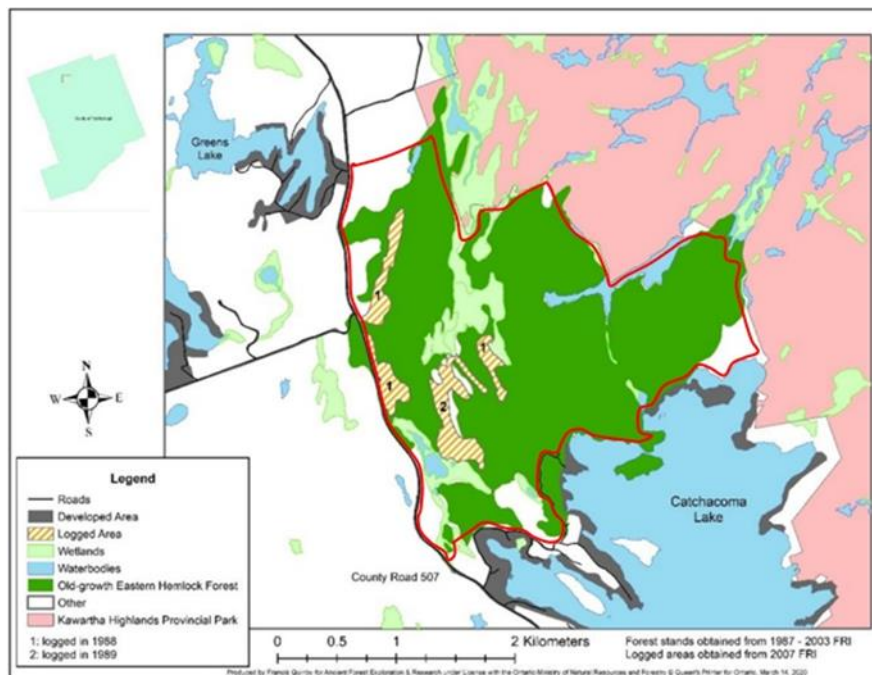
1. Introduction

The results of the 2022 field work in the Catchacoma Forest significantly increased the known number of species in the Forest relative to first species inventory report (Quinby 2020) increasing the total to 547 species. All surveys occurred within the areas of the Catchacoma Forest delineated by the red line on the map in Figure 1, which is situated on the traditional territories of the Mississauga Anishinaabeg. The increase in species count is due to more intensive searching for plants and vertebrate animals and expanding the surveys to include invertebrates, fish, non-vascular plants and fungi (Table 1, Figure 2, Figure 3).

Like the 2020 species inventory report, our list highlights species at risk (SAR) that total to 14. These species include the Algonquin wolf, black ash, Blanding's turtle, Canada warbler, cerulean warbler, eastern wood peewee, eastern ribbon snake, five-lined skink, hog-nosed snake, monarch butterfly, rusty blackbird, snapping turtle, wood thrush, and pink dimple lichen. They are indicated in bold on the list, with their respective SAR ranking.

This report also notes invasive species, 12 of which were found, all of them plants including creeping thistle, hoary willowherb, orange day lily, common St. John's-wort, purple loosestrife, yellow sweet clover, purple crown vetch, bittersweet nightshade, colt's foot, smooth brome, reed canary grass and the common reed. Of these 12, purple loosestrife and the common reed likely pose the most significant threat (Warne 2016, Nichols 2020). These invasive species have been bolded and noted on the list with the signifier "IN".

Figure 1. Map of the Catchacoma Old-growth Forest, Northern Peterborough County, Ontario



Species listed in the previous report but whose presence was not confirmed this year are marked with a citation from Quinby (2020). The surveys were completed during July and August; therefore, several species were likely missed that were present within the Forest only during the spring and fall seasons. Surveys during those seasons should be carried out as soon as possible. All species categories except for the plants were sorted taxonomically. The plants are sorted per the previous report, both taxonomically and by growth form (trees, shrubs, etc.).

The following list in Table 1 is by no means complete. There are many species groups that require more extensive surveys to get a better sense of the diversity of species present within the Forest. Recommendations for future surveys are noted in the *Species Lists* section.

Table 1. Species Organization

Total Number of Species = 547

135 Animals

Vertebrates (75)

14 Mammals

42 Birds

7 Reptiles

8 Amphibians

4 Fishes

Invertebrates (60)

45 Insects

1 Crustacean

9 Arachnids

1 Myriapod

1 Segmented Worm

3 Mollusks

304 Plants

Vascular Plants (283)

15 Deciduous Trees

9 Coniferous Trees

30 Shrubs and Vines

156 Herbs

49 Grasses, Sedges, and Rushes

17 Ferns and Allies

7 Clubmosses

Non-Vascular Plants (21)

101 Fungi

57 Basidiomycetes

9 Non-lichen Ascomycetes

35 Lichens

7 Slime Molds

2. Visual Breakdown of Species Diversity

Figure 2. Known Species in the Catchacoma Forest to Date by Species Group

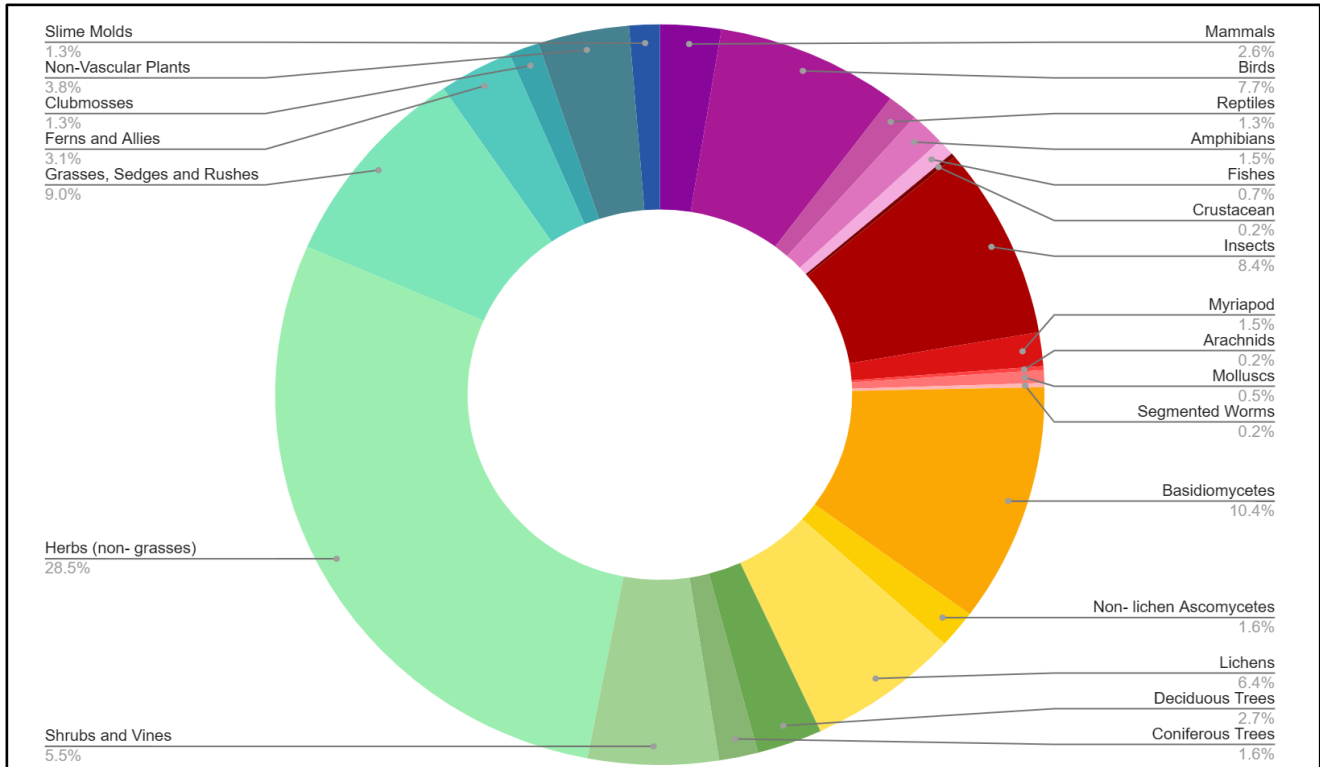
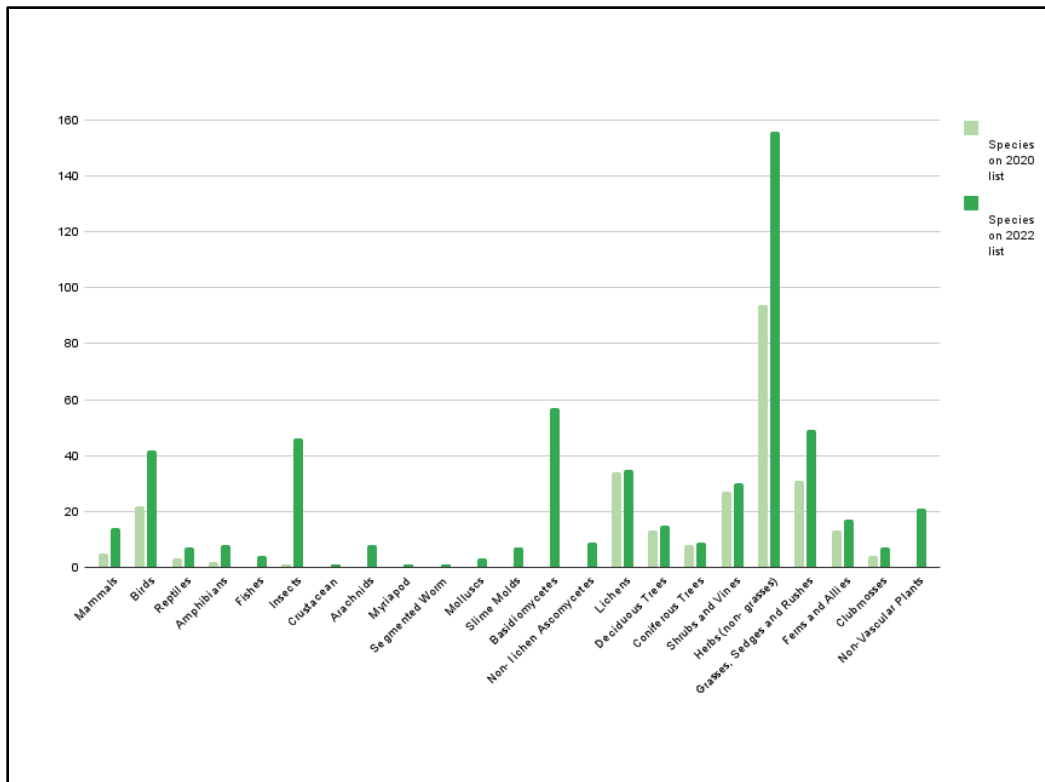


Figure 3. Comparison of Species Inventories in Catchacoma by Year and Species Group



3. Species Lists

3a. Animals - 135 species

Mammals - 14 species (*alphabetical by scientific name*)

The number of mammal species has more than doubled since the previous 2020 report, in part due to more rigorous field observations, the employment of camera traps, and the use of bat detection software. The presence of the two bat species within the Catchacoma Forest was confirmed with the *EchoMeter Touch Bat Detector* (Wildlife Acoustics 2022). Neither the Big Brown Bat (*Eptesicus fuscus*) nor the Silver-haired Bat (*Lasionycteris noctivagans*) is listed as a species at risk in Ontario, however, it is still important to note their presence. Even though these two species seem to be more resistant to white-nosed fungus than many other native species, their slow reproductive rate puts them at risk of threats such as wind turbine collisions and habitat loss (Friedenberg and Frick 2021). Future monitoring of bats within the Forest is essential to understanding the ecology of the Forest and to assess for additional bat species that are likely there.

Moose (*Alces alces*)

Northern Short-Tailed Shrew (*Blarina brevicauda*)

Algonquin Wolf (*Canis lupus lycaon*) (Threatened) (Quinby 2020)

North American Beaver (*Castor canadensis*)

Big Brown Bat (*Eptesicus fuscus*)

North American Porcupine (*Erethizon dorsatum*)

Silver-haired bat (*Lasionycteris noctivagans*)

Snowshoe hare (*Lepus americanus*)

White-Tailed Deer (*Odocoileus virginianus*)

Raccoon (*Procyon lotor*)

Eastern Gray Squirrel (melanistic) (*Sciurus carolinensis*)

Eastern Chipmunk (*Tamias striatus*)

North American Red Squirrel (*Tamiasciurus hudsonicus*)

Black Bear (*Ursus americanus*) (Quinby 2020)

Birds - 42 species (*alphabetical by scientific name*)

There are five bird SARs in the Catchacoma Forest including Canada warbler, cerulean warbler, eastern wood pee-wee, rusty blackbird and wood thrush. Species such as the wood thrush were more common within the old-growth areas of the Forest, highlighting the need to protect this area. Since the list of birds has expanded significantly since the previous 2020 report, we recommend that bird surveys continue and specifically concentrate efforts near bodies of water to monitor for migrating waterfowl.

Red-winged Blackbird (*Agelaius phoeniceus*)

Wood Duck (*Aix sponsa*)

Ruby Throated Hummingbird (*Archilochus colubris*)

Great Blue Heron (*Ardea herodias*)

Canada Goose (*Branta canadensis*)

Broad-Winged Hawk (*Buteo platypterus*)

American Goldfinch (*Carduelis tristis*) (Quinby 2020)

Turkey Vulture (*Cathartes aura*)

Hermit Thrush (*Catharus guttatus*)

Swainson's Thrush (*Catharus ustulatus*)

Northern Flicker (*Colaptes auratus*)

Eastern Wood Pewee (*Contopus virens*) (Special Concern)

American Crow (*Corvus brachyrhynchos*)

Common Raven (*Corvus corax*)

Blue Jay (*Cyanocitta cristata*)

Cerulean Warbler (*Dendroica cerulea*) (Threatened) (Quinby 2020)

Blackburnian Warbler (*Dendroica fusca*) (Quinby 2020)

Pine Warbler (*Dendroica pinus*) (Quinby 2020)

Black-throated Green Warbler (*Dendroica virens*) (Quinby 2020)

Pileated Woodpecker (*Dryocopus pileatus*) (Quinby 2020)

Rusty Blackbird (*Euphagus carolinus*) (Special Concern) (Quinby 2020)

Common Loon (*Gavia immer*)

Wood Thrush (*Hylocichla mustelina*) (Special Concern)

Hairy Woodpecker (*Leuconotopicus villosus*)

Red Crossbill (*Loxia curvirostra*)

Song Sparrow (*Melospiza melodia*)

Black-and-white Warbler (*Mniotilta varia*)

Great Crested Flycatcher (*Myiarchus crinitus*)

Black-capped Chickadee (*Poecile atricapillus*)

Ovenbird (*Seiurus aurocapilla*) (Quinby 2020)

Northern Parula (*Setophaga americana*)

Yellow-rumped Warbler (*Setophaga coronata*)

Blackpoll Warbler (*Setophaga striata*)

Red-breasted Nuthatch (*Sitta canadensis*)

Yellow-bellied Sapsucker (*Sphyrapicus varius*) (Quinby 2020)

Winter Wren (*Troglodytes hiemalis*)

American Robin (*Turdus migratorius*)

Nashville Warbler (*Vermivora ruficapilla*) (Quinby 2020)

Red-eyed vireo (*Vireo olivaceus*)

Blue-headed Vireo (*Vireo solitarius*)

Canada Warbler (*Wilsonia canadensis*) (Special Concern) (Quinby 2020)

White-throated Sparrow (*Zonotrichia albicollis*)

Reptiles - 7 species (alphabetical by scientific name)

Just over 70% of the reptile species in the Catchacoma Forest are SARs. Surveys during 2022 were conducted to locate critical habitat and nesting areas for these species. Continued work identifying more reptile species and their key habitat locations is recommended.

Common Snapping Turtle (*Chelydra serpentina*) (Special Concern)

Ring Neck Snake (*Diadophis punctatus*)

Blanding's Turtle (*Emydoidea blandingii*)

Eastern Hog-nosed Snake (*Heterodon platirhinos*) (Quinby 2020)

Five-lined Skink (*Plestiodon fasciatus*) (Special Concern)

Eastern Ribbon Snake (*Thamnophis sauritus*) (Special Concern)

Garter Snake (*Thamnophis sirtalis*)



Five-lined Skink (*Plestiodon fasciatus*)

(Photo: J. Mihevc)

Amphibians - 8 species *(alphabetical by scientific name)*

The fact that none of the amphibians listed are a SAR may be misleading. Amphibians are inherently vulnerable due to their sensitivity to pollution and habitat loss (Ontario Nature 2023). Furthermore, the status of several of these species, such as the blue-spotted salamander (*Ambystoma laterale*), was last assessed internationally over 13 years ago (Ontario Nature 2023). The number of salamander species encountered may not be a true reflection of the species diversity present as surveying was done in the summer, not the early spring, when salamanders are mating (Ontario Nature 2023).

Blue-spotted Salamander (*Ambystoma laterale*)
American Toad (*Anaxyrus americanus*)
Grey Tree Frog (*Dryophytes versicolour*)
Green Frog (*Lithobates clamitans*)
Northern Leopard Frog (*Lithobates pipiens*)
Mink Frog (*Lithobates septentrionalis*)
Red Backed Salamander (*Plethodon cinereus*)
Spring Peeper (*Pseudacris crucifer*)



Mink Frog (*Lithobates septentrionalis*)
(Photo: J. Mihevc)

Fishes - 4 species *(alphabetical by scientific name)*

We are the first to report on the presence of fish species in the water bodies found within the Catchacoma Forest. Surveying for fish could have been more extensive, as we only used minnow traps and dip nets. We recommend more comprehensive, higher-cost surveys involving seine nets and underwater trail cameras that would likely confirm the presence of more fish species.

Northern Redbelly Dace (*Chrosomus eos*)
Brook Stickleback (*Culaea inconstans*)
Unknown Sunfish spp. (*Lepomis spp.*)
Eastern Blacknose Dace (*Rhinichthys atratulus*)

Insects - 46 species *(alphabetical by scientific name)*

The insect species listed here reflect the least invasive survey techniques possible. All insect species on the list were identified using active visual surveys and confirmed with photographs taken in the field. This survey does not reflect any of the data from pan traps. While active visual surveys require fewer resources and labour than trapping methods, many smaller, cryptic species may have gone unnoticed. Furthermore, several species could not be discerned to the species level, as many of their distinguishing characteristics are microscopic.

Comparisons with future insect surveys involving more rigorous trapping methods, such as pan traps and malaise traps, can test how effective initial visual surveys were at assessing insect diversity within the Forest. These visual surveys have not identified any invasive or pest insects in the Catchacoma Forest, although there is a possibility that some are present. Specifically, the spread of hemlock woolly adelgid (HWA) northward in Ontario from the U.S. is of significant concern (Limbu et al. 2018). Initial surveys specifically for HWA in the Catchacoma Forest have yet to reveal their presence. We suggest that future studies continue to monitor for this pest.

Unknown Robust Ground Cricket spp. (*Allonemobius spp.*)
Forked Fungus Beetle (*Bolitotherus cornutus*)
Silver-bordered Fritillary (*Boloria selene*)
Two-spotted Bumblebee (*Bombus bimaculatus*)

Common Eastern Bumblebee (*Bombus impatiens*)
 Tricoloured Bumble Bee (*Bombus ternarius*)
 Reticulated Net-winged Beetle (*Calopteron reticulatum*)
 Ebony Jewelwing (*Calopteryx maculata*)
 Yellow-banded Underwing (*Catocala cerogama*)
 Unknown Holarctic Azure (*Celastrina* spp.)
 Tree Cattle (*Cerastipsocus venosus*)
 Goldenrod Soldier Beetle (*Chauliognathus pennsylvanicus*)
 Common Field Grasshopper (*Chorthippus brunneus*)
 Deerfly spp. (*Chrysops* spp.)
 Seven-spotted Lady Beetle (*Coccinella septempunctata*)
 Eastern Dobsonfly (*Corydalus cornutus*)
 Brown Hooded Owlet (*Cucullia convexipennis*)
 Polished Lady Beetle (*Cycloneda munda*)
Monarch Butterfly (*Danaus plexippus*) (Special Concern)
 Carolina Grasshopper (*Dissosteira carolina*)
 Black Blister Beetle (*Epicauta pennsylvanica*)
 Unknown Duskywing Butterfly (*Erynnis* spp.)
 Goldenrod Gall Fly (*Eurosta solidaginis*)
 Unknown Jagged Ambush Bug (*Phyma* spp.)
 Milkweed Leaf Beetle (*Labidomera clivicollis*)
 Chalk Fronted Corporal (*Ladona julia*)
 Short Horned Meadow Ant (*Lasius brevicornis*)
 Eyed Brown (*Lethe eurydice*)
 Frosted Whiteface (*Leucorrhinia frigida*)
 Hudsonian Whiteface (*Leucorrhinia hudsonica*)
 Twelve Spotted Skimmer (*Libellula pulchella*)
 Pitcher Plant Midge (*Metriocnemus knabi*)
 Common European Scorpionfly (*Panorpa communis*)
 Polymorphic Pondweed Moth (*Parapoynx maculalis*)
 Unknown Crescent Butterfly (*Phyciodes* spp.)
 Eastern Comma (*Polygonia comma*)
 Marsh Snipefly (*Rhagio tringarius*)
 Northern Bush Katydid (*Scudderia septentrionalis*)
 Great Spangled Fritillary (*Speyeria cybele*)
 Laurel Sphinx (*Sphinx kalmiae*)
 Virginian Tiger Moth (*Spilosoma virginica*)
 Unknown Meadowhawk spp. (*Sympetrum* spp.)
 Bee Mimic Beetle (*Trichiotinus assimilis*)
 Banded longhorn beetle (*Typocerus velutinus*)
 Pitcher Plant Mosquito (*Wyeomyia smithii*)



Ebony Jewelwing (*Calopteryx maculata*)
 (Photo: J. Mihevc)



Silver-bordered Fritillary (*Boloria selene*)
 (Photo: J. Mihevc)

Non-insect Invertebrates

The non-insect invertebrates were not surveyed specifically; they were found either during reptile and amphibian surveys or they were bycatch in the initial fish surveys. Their presence suggests that more species of these groups will be found if efforts are made to do wetland-specific surveys or surveys specific to these invertebrate taxa. To date, no invasive or pest invertebrates have been identified in the Catchacoma Forest, although there is the possibility that some are present. Future surveys should be on the lookout for invasive and pest invertebrates, specifically in aquatic ecosystems.

Crustaceans - 1 species

Allegheny Crayfish (*Faxonius obscurus*)

Arachnids - 8 species (alphabetical by scientific name)

"Aculus minutissimus" (*Aculus minutissimus*)
Striped Fishing Spider (*Dolomedes scriptus*)
Dark Fishing Spider (*Dolomedes tenebrosus*)
Orchard Spider (*Leucauge venusta*)
Arabesque Orbweaver (*Neoscona arabesca*)
Goldenrod Crab Spider (*Misumena vatia*)
Canestrini's Harvestman (*Opilio canestrinii*)
Unkn.Thin-legged Wolf Spider sp. (*Pardosa spp.*)
American Nursery Web Spider (*Pisaurina mira*)



Goldenrod Crab Spider (*Misumena vatia*)
(Photo: J. Mihevc)

Diplopod - 1 species

American Millipede (*Narceus americanus*)

Segmented Worm - 1 species

North American Medicinal Leech (*Macrobdella decora*)

Molluscs - 3 species (alphabetical by scientific name)

Flamed Tigersnail (*Anguispira alternata*)
Acute Bladder Snail (*Physa acuta*)
Common European Amber Snail (*Succinea putris*)

3b. Plants - 304 species

Plants make up most of the species on the Catchacoma Forest species list. They are also the only taxa to contain invasives found thus far. Although only one species is listed as a SAR, the diversity of uncommon and specialist plants is also notable. The Forest contains ten species of orchids, three parasitic mycoheterotrophic plants, and four carnivorous plants. Many plants on this list are also wetland indicators, an ecosystem type under significant threat in the Province of Ontario (Sanchez 2023).

Deciduous Trees - 14 species (alphabetical by scientific name)

Striped Maple (*Acer pensylvanicum*)
Red Maple (*Acer rubrum*)
Sugar Maple (*Acer saccharum*)
Yellow Birch (*Betula alleghaniensis*)
White Birch (*Betula papyrifera*)
American Beech (*Fagus grandifolia*)
Black Ash (*Fraxinus nigra*) (Endangered)
Red Ash (*Fraxinus pennsylvanica*) (Quinby 2020)
American Hophornbeam (*Ostrya virginiana*)
Balsam Poplar (*Populus balsamifera*)

Large-tooth Aspen (*Populus grandidentata*)
Trembling Aspen (*Populus tremuloides*)
White Oak (*Quercus alba*)
Northern Red Oak (*Quercus rubra*)
American Basswood (*Tilia americana*) (Quinby 2020)

Coniferous Trees - 9 species (alphabetical by scientific name)

Balsam Fir (*Abies balsamea*)
Common Juniper (*Juniperus communis*)
Tamarack (*Larix laricina*)
White Spruce (*Picea glauca*)
Black Spruce (*Picea mariana*)
Red Pine (*Pinus resinosa*)
Eastern White Pine (*Pinus strobus*)
Eastern White Cedar (*Thuja occidentalis*)
Eastern Hemlock (*Tsuga canadensis*)

Shrubs and Vines - 30 species (alphabetical by scientific name)

Mountain Maple (*Acer spicatum*)
Black Chokeberry (*Aronia melanocarpa*)
Buttonbush (*Cephalanthus occidentalis*)
Leatherleaf (*Chamaedaphne calyculata*)
Sweetfern (*Comptonia peregrina*)
Beaked Hazelnut (*Corylus cornuta ssp. cornuta*)
Bush Honeysuckle (*Diervilla lonicera*)
Eastern Leatherwood (*Dirca palustris*)
Creeping Snowberry (*Gaultheria hispidula*)
Eastern Teaberry (*Gaultheria procumbens*)
Mountain Holly (*Ilex mucronata*) (Quinby 2020)
Winterberry (*Ilex verticillata*)
Swamp Laurel (*Kalmia polifolia*)
Twinflower (*Linnaea borealis ssp. longiflora*)
American Fly Honeysuckle (*Lonicera canadensis*)
Glaucous Honeysuckle (*Lonicera dioica*) (Quinby 2020)
Pin Cherry (*Prunus pennsylvanica*)
Skunk Currant (*Ribes glandulosum*)
Prickly Rose (*Rosa acicularis ssp. sayi*)
Allegheny Blackberry (*Rubus allegheniensis*)
Wild Red Raspberry (*Rubus idaeus ssp. melanolasius*)
Purple Flowering Raspberry (*Rubus odoratus*)
Dwarf Raspberry (*Rubus pubescens*) (Quinby 2020)
Red-berried Elderberry (*Sambucus racemosa ssp. pubens*) (Quinby 2020)
White Meadowsweet (*Spiraea alba*)
Steeplebush (*Spiraea tomentosa*)
Low Sweet Blueberry (*Vaccinium angustifolium*)
Velvet-leaf Blueberry (*Vaccinium myrtilloides*) (Quinby 2020)
Northern Wild Raisin (*Viburnum cassinoides*)
Hobblebush (*Viburnum lantanoides*) (Quinby 2020)



Buttonbush (*Cephalanthus occidentalis*)
(Photo: J. Mihevc)



Black Chokeberry (*Aronia melanocarpa*)
(Photo: J. Mihevc)

Herbs (non-grasses) - 157 species (alphabetical by scientific name)

Common Yarrow (*Achillea millefolium*)
White Baneberry (*Actaea pachypoda*)
Red Baneberry (*Actaea rubra*)
Tall Hairy Agrimony (*Agrimonia gryposepala*)
Pearly Everlasting (*Anaphalis margaritacea*) (Quinby 2020)
Wild Rosemary (*Andromeda polifolia*)
Tall Thimbleweed (*Anemone virginiana*)
Spreading Dogbane (*Apocynum androsaemifolium*)
Red Columbine (*Aquilegia canadensis*)
Bristly Sarsaparilla (*Aralia hispida*)
Wild Sarsaparilla (*Aralia nudicaulis*)
American Spikenard (*Aralia racemosa*)
Common Burdock (*Arctium minus ssp. minus*) (Quinby 2020)
Swamp Milkweed (*Asclepias incarnata*)
Common Milkweed (*Asclepias syriaca*)
Large-leaved Aster (*Aster macrophyllus*) (Quinby 2020)
Flat-top White Aster (*Aster umbellatus var. umbellatus*) (Quinby 2020)
Watershield (*Brasenia schreberi*)
Wild Calla (*Calla palustris*)
Narrow- fruited Water-starwort (*Callitriche palustris*)
Tuberous Grass Pink (*Calopogon tuberosus*)
Marsh Bellflower (*Campanula aparinoides*)
Common Harebell (*Campanula rotundifolia*)
Rock Harlequin (*Capnoides sempervirens*)
Blue Cohosh (*Caulophyllum thalictroides*)
Pipsissewa (*Chimaphila umbellata ssp. cisatlantica*)
Ox-eye Daisy (*Chrysanthemum leucanthemum*)
Chicory (*Cichorium intybus*)
Bulblet-bearing Water Hemlock (*Cicuta bulbifera*)
Broadleaf Enchanter's Nightshade (*Circaea canadensis*)
Enchanter's Nightshade (*Circaea lutetiana*)
Creeping Thistle (*Cirsium arvense*) (IN)
Bull Thistle (*Cirsium vulgare*)
Wild Basil (*Clinopodium vulgare*)
Bluebead Lily (*Clintonia borealis*)
Marsh Cinquefoil (*Comarum palustre*)
Field Bindweed (*Convolvulus arvensis*) (Quinby 2020)
Threeleaf Goldthread (*Coptis trifolia*)
Canadian Bunchberry (*Cornus canadensis*)
Pink Lady's Slipper (*Cypripedium acaule*)
Showy Lady's Slipper (*Cypripedium reginae*)
Queen Anne's Lace / Wild Carrot (*Daucus carota*)
Swamp Loosestrife (*Decodon verticillatus*)
Northern Bush Honeysuckle (*Diervilla lonicera*)
Spoonleaf Sundew (*Drosera intermedia*)
Round Leaved Sundew (*Drosera rotundifolia*)
Vipers Bugloss (*Echium vulgare*)
Beech-drops (*Epifagus virginiana*) (Quinby 2020)

Trailing Arbutus (*Epigaea repens*)

Hoary Willowherb (*Epilobium parviflorum*) (IN)

Fireweed (*Erechtites hieraciifolius*)

Robin's Plantain (*Erigeron pulchellus*) (Quinby 2020)

Daisy Fleabane (*Erigeron strigosus*) (Quinby 2020)

Hairy Rocket (*Erucastrum gallicum*) (Quinby 2020)

Perfoliate Thoroughwort (*Eupatorium perfoliatum*) (Quinby 2020)

Flat-topped Goldenrod (*Euthamia graminifolia*)

Spotted Joe-Pye Weed (*Eutrochium maculatum*)

Fringed Bindweed (*Fallopia cilinodis*)

Fragrant Bedstraw (*Galium triflorum*)

Marsh Cudweed (*Gnaphalium uliginosum*)

Checkered Rattlesnake Plantain (*Goodyera tessellata*)

Orange Day Lily (*Hemerocallis fulva*) (IN)

Glaucous King Devil (*Hieracium piloselloides*) (Quinby 2020)

Unkn Hawkweed (*Hieracium sp.*)

Fraser's Marsh St. John's-wort (*Hypericum fraseri*)

Dwarf St John's Wort (*Hypericum mutilum*)

Common St. John's-wort (*Hypericum perforatum*) (IN)

Spotted Touch-me-not (*Impatiens capensis*)

Multi-coloured Blue-flag (*Iris versicolor*) (Quinby 2020)

Canada Wild Lettuce (*Lactuca canadensis*)

Cardinal Flower (*Lobelia cardinalis*)

Indian Tobacco (*Lobelia inflata*)

Water Purslane (*Ludwigia palustris*)

Cut-leaved Water-horehound (*Lycopus americanus*) (Quinby 2020)

Northern Bugleweed (*Lycopus uniflorus*)

Starflower (*Lysimachia borealis*)

Swamp Candles (*Lysimachia terrestris*)

Purple Loosestrife (*Lythrum salicaria*) (IN)

Canada Mayflower (*Maianthemum canadense*)

Pineapple Weed (*Matricaria discoidea*)

Indian Cucumber Root (*Medeola virginiana*)

Black Medic (*Medicago lupulina*)

Narrowleaf Cow Wheat (*Melampyrum lineare*)

White Sweetclover (*Melilotus albus*)

Yellow Sweetclover (*Melilotus officinalis*) (IN)

Bog Buckbean (*Menyanthes trifoliata*)

Partridgeberry (*Mitchella repens*)

Pinesap (*Monotropa hypopitys*)

Ghost Pipes (*Monotropa uniflora*)

Wall Lettuce (*Mycelis muralis*)

Catnip (*Nepeta cataria*)

Bullhead Pond-lily (*Nuphar variegata*)

Fragrant Water-lily (*Nymphaea odorata*)

Evening Primrose (*Oenothera biennis*)

Common Woodsorrel (*Oxalis acetosella*)

Mountain Woodsorrel (*Oxalis montana*)

Upright Yellow Woodsorrel (*Oxalis stricta*)

Water Smartweed (*Persicaria amphibia*)



Spoonleaf Sundew (*Drosera intermedia*)
(Photo: L. Robles)



Ghost Pipes (*Monotropa uniflora*)
(Photo: J. Mihevc)

Spotted Lady's Thumb (*Persicaria maculosa*)
 Orange Hawkweed (*Pilosella aurantiaca*)
 Mouse-eared Hawkweed (*Pilosella officinarum*)
 Greater Plantain (*Plantago major*)
 Rugel's Plantain (*Plantago rugelii*) (Quinby 2020)
 White Fringed Orchid (*Platanthera blephariglottis*)
 Small Green Wood Orchid (*Platanthera clavellata*)
 White Bog Orchid (*Platanthera dilatata*)
 Rose Pogonia (*Pogonia ophioglossoides*)
 Hairy Solomon's Seal (*Polygonatum pubescens*) (Quinby 2020)
 Fringed Black Bindweed (*Polygonum cilinode*) (Quinby 2020)
 Pickerelweed (*Pontederia cordata*)
 Cinquefoil (*Potentilla norvegica* ssp. *norvegica*) (Quinby 2020)
 Sulphur Cinquefoil (*Potentilla recta*)
 Tall White Rattlesnake-root (*Prenanthes altissima*) (Quinby 2020)
 Marsh Mermaidweed (*Proserpinaca palustris*)
 Common Selfheal (*Prunella vulgaris* ssp. *lanceolate*)
 Shinleaf (*Pyrola elliptica*)
 Kidney-leaf Buttercup (*Ranunculus abortivus*) (Quinby 2020)
 Hooked Buttercup (*Ranunculus recurvatus* var. *recurvatus*) (Quinby 2020)
 Virginia Meadowbeauty (*Rhexia virginica*)
 Bog Labrador Tea (*Rhododendron groenlandicum*)
 Bog Yellowcress (*Rorippa palustris*)
 Dewdrop (*Rubus dalibarda*)
 Swamp Dewberry (*Rubus hispidus*)
 Black-eyed susan (*Rudbeckia hirta*)
 Sheep Sorrel (*Rumex acetosella* ssp. *acetosella*) (Quinby 2020)
 Broadleaf Arrowhead (*Sagittaria latifolia*)
 Purple Pitcher Plant (*Sarracenia purpurea*)
 Marsh Skullcap (*Scutellaria galericulata*)
 Side-flowering Skullcap (*Scutellaria lateriflora*)
Purple Crownvetch (*Securigera varia*) (IN)
 Bladder Campion (*Silene vulgaris*)
Bittersweet Nightshade (*Solanum dulcamara*) (IN)
 Gray Goldenrod (*Solidago nemoralis* ssp. *nemoralis*) (Quinby 2020)
 Common Wrinkle-leaved Goldenrod (*Solidago rugosa* ssp. *rugosa*)
 Bog Goldenrod (*Solidago uliginosa*)
 Slender Lady's Tresses (*Spiranthes lacera*)
 Hooded Lady's Tresses (*Spiranthes romanzoffiana*)
 Rose Twisted Stalk (*Streptopus roseus*)
 Swamp Aster (*Symphyotrichum puniceum*)
 Common Dandelion (*Taraxacum officinale*)
 Tall Meadow Rue (*Thalictrum pubescens*)
 Meadow Salsify (*Tragopogon pratensis*)
 Star-flower (*Trientalis borealis* ssp. *borealis*) (Quinby 2020)
 Large Hop Clover (*Trifolium aureum*)
 Red Clover (*Trifolium pratense*)
 Purple Trillium (*Trillium erectum*)
 Colt's Foot (*Tussilago farfara*) (IN)
 Intermediate Bladderwort (*Utricularia intermedia*)



Rose Pogonia (*Pogonia ophioglossoides*)
 (Photo: J. Mihevc)



Purple Pitcher Plant (*Sarracenia purpurea*)
 (Photo: J. Mihevc)

American Cranberry (*Vaccinium macrocarpon*)
 Great Mullein (*Verbascum thapsus*)
 Blue Vervain (*Verbena hastata*)
 White Vervain (*Verbena urticifolia*)
 Heath Speedwell (*Veronica officinalis*)
 White Bog Violet (*Viola lanceolata*)
 Barren Strawberry (*Waldsteinia fragarioides*)
 Carolina Yellow-eyed Grass (*Xyris caroliniana*)

Grasses, Sedges, Rushes and allies - 49 species (alphabetical by scientific name)

Smooth Brome (*Bromus inermis*) (IN)

Blue-joint Grass (*Calamagrostis canadensis*) (Quinby 2020)
 Drooping Wood Sedge (*Carex arctata*) (Quinby 2020)
 Bebb's Sedge (*Carex bebbii*) (Quinby 2020)
 Fringed Sedge (*Carex crinita*) (Quinby 2020)
 Dewey's Sedge (*Carex deweyana*) (Quinby 2020)
 Soft-leaved Sedge (*Carex disperma*) (Quinby 2020)
 Yellow-green sedge (*Carex flava*)
 Graceful Sedge (*Carex gracillima*) (Quinby 2020)
 Lake Sedge (*Carex lacustris*) (Quinby 2020)
 Sallow Sedge (*Carex lurida*)
 Few-seeded Sedge (*Carex oligosperma*)
 Long-stalked Sedge (*Carex pedunculata*)
 Pennsylvania Sedge (*Carex pennsylvanica*) (Quinby 2020)
 Necklace Sedge (*Carex projecta*) (Quinby 2020)
 Cyperus Sedge (*Carex pseudocyperus*)
 Pointed Broom Sedge (*Carex scoparia*)
 Three-seeded Sedge (*Carex trisperma* var. *trisperma*) (Quinby 2020)
 Broad-leaved Reed Grass (*Cinna latifolia*) (Quinby 2020)
 Smooth Saw-sedge (*Cladium mariscoides*)
 Orchard Grass (*Dactylis glomerata*) (Quinby 2020)
 Poverty Oat Grass (*Danthonia spicata*) (Quinby 2020)
 Common Hairgrass (*Deschampsia flexuosa*) (Quinby 2020)
 Unkn. Rosette Grass (*Dichanthelium* sp.)
 Three-way Sedge (*Dulichium arundinaceum*)
 Barnyardgrass (*Echinochloa crus-galli*)
 Blunt Spikerush (*Eleocharis obtusa*)
 Common Pipewort (*Eriocaulon aquaticum*)
 Tawny Cottongrass (*Eriophorum virginicum*)
 Rattlesnake Mannagrass (*Glyceria canadensis*)
 Fowl Meadow Grass (*Glyceria striata*) (Quinby 2020)
 Canada Rush (*Juncus canadensis*) (Quinby 2020)
 Soft Rush (*Juncus effusus*)
 Brown-fruited Rush (*Juncus pelocarpus*) (Quinby 2020)
 Path Rush (*Juncus tenuis*) (Quinby 2020)
 Tall Fescue (*Lolium arundinaceum*)
 White-grained Mountain-rice (*Oryzopsis asperifolia*) (Quinby 2020)
 Broad-leaved Panic Grass (*Panicum latifolium*) (Quinby 2020)



Tawny Cottongrass (*Eriophorum virginicum*) (Photo: L. Robles)



Pointed Broom Sedge (*Carex scoparia*) (Photo: J. Mihevc)

Reed Canary Grass (*Phalaris arundinacea*) (Quinby 2020) (IN)

Common Reed (*Phragmites australis*) (IN)

Fowl Meadow Grass (*Poa palustris*) (Quinby 2020)

White Beak-sedge (*Rhynchospora alba*)

Brownish Beaked-rush (*Rhynchospora capitellata*)

False Melic Grass (*Schizachne purpurascens* ssp. *purpurascens*) (Quinby 2020)

Soft-stemmed Bulrush (*Schoenoplectus tabernaemontani*)

Dark-green Bulrush (*Scirpus atrovirens*)

Woolgrass (*Scirpus cyperinus*)

Prairie Dropseed (*Sporobolus heterolepis*)

Broad-leaved Cattail (*Typha latifolia*)

Ferns and Allies - 17 species (alphabetical by scientific name)

Northern Lady Fern (*Athyrium filix-femina* var. *angustum*) (Quinby 2020)

Hay-scented Fern (*Dennstaedtia punctilobula*)

Spinulose Wood Fern (*Dryopteris carthusiana*)

Crested Wood Fern (*Dryopteris cristata*)

Intermediate Wood Fern (*Dryopteris intermedia*)

Evergreen Wood Fern (*Dryopteris intermedia*) (Quinby 2020)

Marginal Wood Fern (*Dryopteris marginalis*)

Field Horsetail (*Equisetum arvense*)

Water Horsetail (*Equisetum fluviatile*)

Sensitive Fern (*Onoclea sensibilis*)

Interrupted Fern (*Osmunda claytoniana*)

European Royal Fern (*Osmunda regalis* var. *spectabilis*)

Cinnamon Fern (*Osmundastrum cinnamomeum*)

New York Fern (*Parathelypteris noveboracensis*)

Rock Polypody (*Polypodium virginianum*)

Common Bracken (*Pteridium aquilinum* var. *latiusculum*)

Marsh Fern (*Thelypteris palustris* var. *pubescens*)

Club mosses - 7 species (alphabetical by scientific name)

Prickly Tree-Clubmoss (*Dendrolycopodium dendroideum*)

Ground-pine (*Dendrolycopodium obscurum*) (Quinby 2020)

Northern Running-pine (*Diphasiastrum complanatum*) (Quinby 2020)

Shining Firmoss (*Huperzia lucidia*)

Inundated Bog Clubmoss (*Lycopodiella inundata*)

Stag's Horn Clubmoss (*Lycopodium clavatum*)

Interrupted Clubmoss (*Spinulum annotinum*)

Non-Vascular Plants - 20 species (alphabetical by scientific name)

Non-vascular plants were also a new grouping on the list this year. More extensive surveys of the wetlands will likely reveal more species in this group.

Greater Whipwort (*Bazzania trilobata*)

Snakewort (*Conocephalum salebrosum*)

Waxleaf Moss (*Dicranum polysetum*)

Broom Moss (*Dicranum scoparium*)
 Willow Moss (*Fontinalis antipyretica*)
 New York Scalewort (*Frullania eboracensis*)
 Stairstep Moss (*Hylocomium splendens*)
 Brocade moss (*Hypnum imponens*)
 Pincushion Moss (*Leucobryum glaucum*)
 Shingle Moss (*Neckera pennata*)
 Unkn. 'Pellia' Liverwort (*Pellia sp.*)
 Red-stemmed Feather Moss (*Pleurozium schreberi*)
 Common Haircap Moss (*Polytrichum commune*)
 Bristly Haircap Moss (*Polytrichum piliferum*)
 Tree Ruffle Liverwort (*Porella navicularis*)
 Wall Scalewort (*Porella platyphylla*)
 Fan Moss (*Rhizomnium glabrescens*)
 Magellan's Peatmoss (*Sphagnum magellanicum*)
 Crome Sphagnum (*Sphagnum squarrosum*)
 Delicate Fern Moss (*Thuidium delicatulum*)
 Crisped Pincushion (*Ulota crispa*)



Greater Whipwort (*Bazzania trilobata*)
 (Photo: L. Robles)



Snakewort (*Conocephalum salebrosum*)
 (Photo: J. Mihevc)

3c. [Fungi - 101 species](#)

No non-lichen fungi on this list are classified as SARs. This is not necessarily due to all species being common and thriving. In particular, fungi are difficult to assess as SARs, and very few have been evaluated (Lughadha et al. 2020). It should be noted that many ectomycorrhizal fungi are regionally specific and face significant threats from climate change (Steidinger et al. 2020). Some species may also be at risk with the rise of foraging trends (Thomas et al. 2020).

Basidiomycetes - 57 species (alphabetical by scientific name)

Eastern North American Destroying Angel (*Amanita bisporigera*)
 Yellow Patches (*Amanita flavoconia*)
 Tawny Grisette (*Amanita fulva*)
 Golden Chanterelle (*Cantharellus cibarius*)
 Mossy Maze Polypore (*Cerrena unicolor*)
 Silverleaf Fungus (*Chondrostereum purpureum*)
 White Coral Fungus (*Clavulina coralloides*)
 Golden Spindles (*Clavulinopsis fusiformis*)
 Northern Tooth (*Climacodon septentrionalis*)
 Brown Funnel Polypore (*Coltricia perennis*)
 Eastern Black Trumpet (*Craterellus fallax*)
 Yellowfoot (*Craterellus tubaeformis*)
 Thin-walled Maze Polypore (*Daedaleopsis confragosa*)
 Salmon Pinkgill (*Entoloma quadratum*)
 Unknown *Exidia* spp. (*Exidia* spp.)
 Hoof Fungus (*Fomes fomentarius*)
 Birch Polypore (*Fomitopsis betulina*)
 Red Belted Polypore (*Fomitopsis pinicola*)
 Artist's Bracket (*Ganoderma applanatum*)
 Hemlock Shelf Varnish (*Ganoderma tsugae*)
 Conifer Mazegill (*Gloeophyllum sepiarium*)



Golden Spindles (*Clavulinopsis fusiformis*)
 (Photo: J. Mihevc)

Chrome-footed Bolete (*Harrya chromapes*)
 Orange Gilled Waxcap (*Humidicutis marginata*)
 Goblet Waxcap (*Hygrocybe cantharellus*)
 Golden Waxy Cap (*Hygrocybe flavescens*)
 False Chanterelle (*Hygrophoropsis aurantiaca*)
 Common Funnel (*Infundibulicybe gibba*)
 Milk-white Toothed Polypore (*Irpex lacteus*)
 Resinous Polypore (*Ischnoderma resinosum*)
 Amethyst Deceiver (*Laccaria amethystina*)
 Deceiver (*Laccaria laccata*)
 Red-capped Scaber Stalk (*Leccinum aurantiacum*)
 Stump Puffball (*Lycoperdon pyriforme*)
 Collared Parachute (*Marasmius rotula*)
 Eastern American Platterful Fungus (*Megacollybia rodmanii*)
 Red Stinkhorn (*Mutinus ravenelii*)
 Bleeding Fairy Helmet (*Mycena haematopus*)
 Orange Mycena (*Mycena leaiana*)
 Goldenhaired Inkcap (*Parasola auricoma*)
 Dyer's Polypore (*Phaeolus schweinitzii*)
 Shaggy Scalycap (*Pholiota squarrosa*)
 Angel's Wings (*Pleurocybella porrigens*)
 Yellow Tipped Coral (*Ramaria formosa*)
 Orange Moss Agaric (*Rickenella fibula*)
 Unknown Russula Mushroom (*Russula sp.*)
 Splitgill Mushroom (*Schizophyllum commune*)
 Crowded Parchment (*Stereum complicatum*)
 Painted Suillus (*Suillus spraguei*)
 Velvet-footed Pax (*Tapinella atrotomentosa*)
 Gilled Polypore (*Trametes betulina*)
 Turkey Tail (*Trametes versicolour*)
 Witch's Butter (*Tremella mesenterica*)

 Violet Toothed Polypore (*Trichaptum biforme*)
 Decorated Mop (*Tricholomopsis decora*)
 Scaly Chanterelle (*Turbinellus floccosus*)
 Bitter Bolete (*Tylopilus felleus*)
 Pinewood Gingertail (*Xeromphalina campanella*)

Non-lichen Ascomycetes - 9 species (alphabetical by scientific name)

Poor Man's Licorice (*Bulgaria inquinans*)
 Green Wood Cup (*Chlorociboria aeruginascens*)
 "Fuscidea arboricola" (*Fuscidea arboricola*)
 Glutinous Earthtongue (*Glutinoglossum glutinosum*)
 Ochre Jelly Club (*Leotia lubrica*)
 "Lepraria caesiella" (*Lepraria caesiella*)
 Palomino Cup (*Peziza repanda*)
 Common Eyelash (*Scutellinia scutellata*)
 Dead Man's Fingers (*Xylaria polymorpha*)

Lichens - 35 species (alphabetical by scientific name)



Hemlock Shelf Varnish (*Ganoderma tsugae*)
(Photo: J. Mihevc)



Green Wood Cup
(*Chlorociboria aeruginascens*)
(Photo: J. Mihevc)

Burred Horsehair lichen (*Bryoria furcellata*) (Quinby 2020)
 Frosted Comma Lichen (*Chrysothrix caesia*)
 Madame's Cup Lichen (*Cladonia coccifera*) (Quinby 2020)
 British Soldier Lichen (*Cladonia cristatella*)
 Gray's Cup Lichen (*Cladonia grayi*) (Quinby 2020)
 Smooth-footed Powderhorn (*Cladonia ochrochlora*) (Quinby 2020)
 Pebbled Pixie Cup (*Cladonia pyxidata*) (Quinby 2020)
 Gray Reindeer Lichen (*Cladonia rangiferina*) (Quinby 2020)
 Dragon Horn (*Cladonia squamosa*) (Quinby 2020)
 Star-tipped Reindeer Lichen (common chemotype) (*Cladonia stellaris*)
 Star-tipped Reindeer Lichen (rare psoromic acid chemotype) (*Cladonia stellaris*)
 Crazy Scale Lichen (*Cladonia turgida*) (Quinby 2020)
 "*Cladonia uncialis ssp. uncialis*" (*Cladonia uncialis ssp. uncialis*) (Quinby 2020)
 Pink Dimple Lichen (*Coenogonium pineti*)
 Boreal Oakmoss (*Evernia mesomorpha*)
 Common Greenshield Lichen (*Flavoparmelia caperata*) (Quinby 2020)
 Hooded Tube Lichen (*Hypogymnia physodes*)
 Salted Sunburst Lichen (*Imshaugia aleurites*) (Quinby 2020)
 Common Rim Lichen (*Lecanora pulicaris*) (Quinby 2020)
 Tree Lungwort (*Lobaria pulmonaria*)
 Abraded Camouflage Lichen (*Melanelixia subaurifera*) (Quinby 2020)
 Bottlebrush Shield Lichen (*Parmelia squarrosa*)
 Shield Lichen (*Parmelia sulcata*)
 Rosette Lichen spp. (*Physcia spp.*)
 Crumpled Rag Lichen (*Platismatia tuckermanii*)
 Rough Speckled Shield Lichen (*Punctelia rudecta*)
 Yellow Map lichen (*Rhizocarpon geographicum*)
 Rock Foam (*Stereocaulon cf. saxatile*) (Quinby 2020)
 Granular Mottled-disk Lichen (*Trapeliopsis granulosa*) (Quinby 2020)
 Fringed Wrinkle Lichen (*Tuckermannopsis americana*) (Quinby 2020)
 "Tuckermannopsis ciliaris" (*Tuckermannopsis ciliaris*) (Quinby 2020)
 Smooth Rock Tripe (*Umbilicaria mammulata*)
 Lesser Rocktripe (*Umbilicaria muehlenbergii*) (Quinby 2020)
 Yellow Ribbon Lichen (*Usnocetraria oakesiana*) (Quinby 2020)
 Cumberland Rock Shield (*Xanthoparmelia cumberlandia*) (Quinby 2020)



Common Eyelash (*Scutellinia scutellata*)
(Photo: J. Mihevc)

3d. [Slime Moulds - 7 species](#) (alphabetical by scientific name)

Tapioca Slime Mold (*Brefeldia maxima*)
 Honeycomb Coral Slime Mold (*Ceratiomyxa fruticulosa*)
 Salmon-eggs (*Hemitrichia decipiens*)
 Insect-egg Slime (*Leocarpus fragilis*)
 Wolf's Milk (*Lycogala epidendrum*)
 Chocolate Tube Slime (*Stemonitis splendens*)
 Red Raspberry Slime Mold (*Tubifera ferruginosa*)

4. Acknowledgements

AFER respectfully acknowledges that our field research activities for this project took place on the traditional territory of the Mississauga Anishinaabeg. We are grateful to the local First Nations for their teachings about and care for the Earth and our relationships with it. Financial support for this work was provided by a Canada Summer Jobs Grant, Nadurra Wood Corporation and the Windover Forest. We thank the Catchacoma Forest Stewardship Committee for their continued support and encouragement. Thanks to Jacob Bowman and Sammy Tangir for assisting with the Bioblitz. Peter Quinby provided editorial input and review.

5. AFER's Mission and Guiding Principles

AFER is a non-profit scientific organization with a mission to carry out research and education that leads to the identification, description and protection of ancient (pristine) forested landscapes, including old-growth forests. The earth-stewardship principles that guide our work include the following.

- Many forest ecosystem types are now endangered. We consider these ecosystems and other ancient forests to be non-renewable resources, which is not consistent with the practice of mining or logging them.
- We consider biodiversity conservation needs at local, provincial, federal and international scales.
- We support the Government of Canada's commitment to increase protected areas to 30% of the Canadian land base by the year 2030.
- We support the *New York Declaration on Forests* to end natural forest loss by 2030.

6. References Cited

Friedenberg, N. A. and W. F. Frick. 2021. Assessing fatality minimization for hoary bats amid continued wind energy development. *Biological Conservation* 262, doi: 10.1016/j.biocon.2021.109309.

Limbu, S., M. A. Keena and M. C. Whitmore. 2018. Hemlock Woolly Adelgid (Hemiptera: Adelgidae): A Non-Native Pest of Hemlocks in Eastern North America. *Journal of Integrated Pest Management* 9, doi: 10.1093/jipm/pmy018.

Lughadha, E. N. et al. 2020. Extinction risk and threats to plants and fungi. *Plants, People, Planet* 2, doi: 10.1002/ppp3.10146.

Nichols, G. 2020. *Invasive Phragmites (Phragmites australis) best management practices in Ontario: Improving species at risk habitat through the management of invasive Phragmites*. Ontario Invasive Plant Council, Peterborough, ON. Available at https://www.ontarioinvasiveplants.ca/wp-content/uploads/2021/05/OIPC_BMP_Phragmites_April302021_D10_WEB.pdf. Accessed February 8th, 2023.

Ontario Nature. 2008. *Species of Ontario Crayfish*. Available at https://ontarionature.org/wp-content/uploads/2017/10/crayfish_apr08.pdf. Accessed February 8th, 2023.

Ontario Nature. 2023. *Ontario Reptile and Amphibian Atlas*. Available at <https://ontarionature.org/programs/community-science/reptile-amphibian-atlas/>. Accessed February 8th, 2023.

Quinby, P. 2020. The Catchacoma Ancient Forest Landscape: An Inventory of Species and Habitats. *Research Report* No. 39, Ancient Forest Exploration & Research, Powassan, Ontario. Available at [1eacb5c97f95269cd4dec94a001a664183b4f.pdf](https://www.peterborougholdgrowth.ca/wp-content/uploads/2020/05/1eacb5c97f95269cd4dec94a001a664183b4f.pdf) (peterborougholdgrowth.ca). Accessed February 8th, 2023.

Sanchez, A. M. 2023. Wetlands under threat. *Waterloo News: University Relations*. Available at <https://uwaterloo.ca/news/science/wetlands-under-threat>. Accessed February 8th, 2023.

Steidinger, B. S. et al. 2020. Ectomycorrhizal fungal diversity predicted to substantially decline due to climate changes in North American *Pinaceae* forests. *Journal of Biogeography* 47, doi: 10.1111/jbi.13802.

Thomas, P. W., W. A. Elkhateed and G. M. Daba. 2020. Chaga (*Inonotus obliquus*): a medical marvel but a conservation dilemma? *Sydowia* 72, doi: 10.12905/0380.sydowia72-2020-0123.

Warne, A. 2016. **Purple Loosestrife (*Lythrum salicaria*) Best Management Practices in Ontario**. Ontario Invasive Plant Council, Peterborough, ON. Available at https://www.ontarioinvasiveplants.ca/wp-content/uploads/2020/10/PurpleLoosestrife_BMP.pdf. Accessed February 8th, 2023.

Wildlife Acoustics. 2022. **Echo Meter Touch Bat Detector**. Available at <https://www.wildlifeacoustics.com/products/echo-meter-touch-2-android-2>. Accessed February 8th, 2023.

7. Field Guides Consulted

EDDMapS Ontario. 2023. Available at <https://www.eddmaps.org/ontario/>. Accessed February 8th, 2023.

iNaturalist. 2023. Available at <https://www.inaturalist.org>. Accessed February 8th, 2023.

Lincoff, G. H. 1981. **National Audubon Society Field Guide to North American Mushrooms**. Chanticleer Press, Inc., New York.

Little, E. L. 1980. **National Audubon Society Field Guide to North American Trees**. Chanticleer Press, Inc., New York.

Marshall, S. A. 2017. **Insects: Their Natural History and Diversity with a Photographic Guide to Insects of Eastern North America**, 2nd Edition. Firefly Books, Inc., New York, NY.

Merlin Bird ID. 2023. Available at <https://merlin.allaboutbirds.org/>. Accessed February 8th, 2023.

Niering, W. A. and N. C. Olmstead. 1979. **The National Audubon Society Field Guide to North American Wildflowers**. Chanticleer Press, Inc., New York.

Ontario Government. 2022. **Ontario Wetland Evaluation System (OWES) Southern Manual**. 4th Edition. King's Printer of Ontario. Available at <https://www.ontario.ca/files/2023-02/mnrf-pd-rpdpb-ontario-wetlands-evaluation-system-southern-manual-2022-en-2023-02-02.pdf>. Accessed February 6, 2023.

Ontario Government. 2023. **Species at Risk in Ontario**. Available at <https://www.ontario.ca/page/species-risk-ontario>. Accessed February 2, 2023.

Ontario Ministry of Natural Resources and Forestry. 2023. **Ontario GeoHub: Wetlands**. Available at <https://geohub.lio.gov.on.ca/datasets/mnrf::wetlands/explore?location=44.772661%2C-78.332520%2C12.81>. Accessed February 7th, 2023.

Ontario Nature. 2008. **Species of Ontario Crayfish**. Available at https://ontarionature.org/wp-content/uploads/2017/10/crayfish_apr08.pdf. Accessed February 8th, 2023.

Ontario Nature. 2023. **Ontario Reptile and Amphibian Atlas**. Available at <https://ontarionature.org/programs/community-science/reptile-amphibian-atlas/>. Accessed February 8th, 2023.

Page, L. M. and B. M. Burr. 2011. **Peterson Field Guide to Freshwater Fishes of North America North of Mexico**, 2nd Edition. Houghton Mifflin Harcourt Publishing Company, New York, NY.

Powell, R., R. Conant and J. T. Collins. 2016. **Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America**, 4th Edition. Houghton Mifflin Harcourt Publishing Company, New York, NY.

Reid, F. 2006. **Peterson Field Guide to Mammals of North America**, 4th Edition. Houghton Mifflin Harcourt Publishing Company, New York, NY.

Voshell, J. R., Jr. and A. B. Wright. 2002. **A Guide to Common Freshwater Invertebrates of North America**. The McDonald & Woodward Publishing Company, Virginia.

White, R. E. 1998. **Peterson First Guide to Insects of North America**. Houghton Mifflin Harcourt Publishing Company, New York, NY.