

# Biological Survey for Invasive Species in Loon Lake and the Surrounding Watershed, Steuben County, New York.

## Summer 2014



image credit: Bruce Gilman

Project Leader: Dr. Bruce Gilman  
Finger Lakes Community College  
3325 Marvin Sands Drive  
Canandaigua, New York 14424  
585-785-1255  
[bruce.gilman@flcc.edu](mailto:bruce.gilman@flcc.edu)

Collaborator: John Foust  
Finger Lakes Community College  
3325 Marvin Sands Drive  
Canandaigua, New York 14424  
585-785-1599  
[john.foust@flcc.edu](mailto:john.foust@flcc.edu)

Student Assistants: Tyler Barber, Jason Hanselman, Ryan Niemiec



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It has also been a pleasure to work with the Loon Lake Watershed Improvement Alliance, and to share preliminary findings at their lake meetings. Local neighbors Jeff Gutterman, John Hayden, Alice Publow and Dale Vargason shared their knowledge of the Loon Lake watershed and assisted in gaining access to certain properties. Launching of the college electro-shocking boat occurred with the gracious cooperation of the owner of the Laf-A-Lot Restaurant, Ray Young.

Previous lake studies by the Citizens Statewide Lake Assessment Program (CSLAP) and the Region 8 Office of NYS DEC provided important insight on lake ecology and helped to focus some aspects of this research. Background watershed charts were available from the Steuben County Water Quality Coordinating Committee within the Steuben County Planning Department.

Field work contributed by student assistants was notable. Their willingness to work into the evening for fisheries surveys, to wade through shallow waters and soft bottom sediment without complaint, to photographically document their work, and to help analyze data and produce charts made this invasive species survey project even more enjoyable.

## **ABSTRACT**

Managing invasive species first requires knowledge of their local presence, frequency of occurrence and population abundance. With limited existing information available for Loon Lake and its watershed, this project was undertaken to fill gaps in knowledge by surveying the fish and littoral communities in the lake, and terrestrial plants in the surrounding upland landscape. Fieldwork was conducted during fall 2014 therefore invasive species with an earlier phenology may not have been detected, so these survey results should be considered a working inventory.

Lake fisheries were assessed through afternoon and evening electro-shocking and detected 13 species with yellow perch (*Perca flavescens*) being most common. A regionally uncommon species, the creek chubsucker (*Erimyzon oblongus*) was present. The only invasive fish species detected was the common or European carp (*Cyprinus carpio*).

Lake macrophytes and other littoral organisms were documented by raking in deeper waters and hand collecting while wading in shallower areas. Thirty macrophytes were present, including submerged (n=15), floating leaved (n=10) and emergent (n=5) species. Invasive macrophytes included Eurasian water milfoil (*Myriophyllum spicatum*), curly leaf pondweed (*Potamogeton crispus*) and yellow iris (*Iris pseudoacorus*). Invasive dreissenid mussels, including regionally abundant zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena bugensis*), were not detected in Loon Lake but the introduced banded mystery snail (*Viviparus georgianus*) was common.

Visual survey of the watershed from municipal roads, farm lanes and otherwise accessible areas helped determine the extent of terrestrial invasive plants. Notable invasive species observed included velvet leaf (*Abutilon theophrasti*), Norway maple (*Acer platanoides*), goutweed (*Aegopodium podagraria*), garlic mustard (*Alliaria petiolata*), common mugwort (*Artemisia vulgaris*), European barberry (*Berberis vulgaris*), spotted knapweed (*Centaurea stoebe*), greater celandine, (*Chelidonium majus*), Canada thistle (*Cirsium arvense*), crown vetch (*Coronilla varia*), autumn olive (*Elaeagnus umbellata*), burning bush (*Euonymus alata*), Japanese knotweed (*Fallopia japonica*), cleavers (*Galium aparine*), English ivy (*Hedera helix*), dame's rocket (*Hesperis matronalis*), European larch (*Larix decidua*), everlasting pea (*Lathyrus latifolius*), common privet (*Ligustrum vulgare*), Tartarian honeysuckle (*Lonicera tatarica*), moneywort (*Lysimachia nummularia*), forget-me-not (*Myosotis scorpioides*), wild parsnip (*Pastinaca sativa*), reed canary grass (*Phalaris arundinacea*), ox-tongue (*Picris hieracioides*), Scotch pine (*Pinus sylvestris*), creeping buttercup (*Ranunculus repens*), European buckthorn (*Rhamnus cathartica*), black locust (*Robinia pseudoacacia*), sweetbrier rose (*Rosa eglanteria*), multiflora rose (*Rosa multiflora*), corkscrew willow (*Salix matsudana*), bittersweet nightshade (*Solanum dulcamara*), narrow-leaf cat-tail (*Typha angustifolia*), Siberian elm (*Ulmus pumila*), garden valerian (*Valeriana officinalis*), European wayfaring tree (*Viburnum lantana*), and common myrtle (*Vinca minor*). Invasive plant species were typically associated with disturbed and domesticated portions (i.e., cultural land uses) of the local watershed. Natural land covers had fewer invasive species.

## **INTRODUCTION**

### **Watershed and Lake Background**

Loon Lake is located in northern Steuben County, Town of Wayland (FIGURE 1). The surrounding watershed lands are also located in Steuben County and include portions of the Towns of Wayland, Dansville and Cohocton. The study site is mapped on United States Geological Survey (USGS) 7½ minute series topographic quadrangles Wayland, NY and Haskinville, NY. Aerial images are available to the general public on the Google Earth© website. The watershed area is nearly 1500 acres. Decades ago, a small stream near the north end of the lake that once supported water powered mills and flowed northward into Moon Hollow is said to have been diverted into the lake, thereby enlarging the watershed and raising the lake level by several feet (Vargason, personal communication). Today, the land surrounding the lake supports agricultural practices, residential activity and natural plant communities. Human land uses and natural land cover (i.e., habitats) described in this report are based on the classification scheme developed by the New York Natural Heritage Program (Edinger et al. 2002). Thorough descriptions of land use and land cover are presented in their classification manual.

The watershed topography (FIGURE 2) consists of gently to moderately sloped landscape features trapped within a larger scale glacially eroded trough (the Springwater Valley) that arises to the north at Hemlock Lake (elevation 906 feet) and continues southward through Wayland (elevation 1372 feet) and eventually to Loon Lake (elevation 1698 feet). The trough likely functioned as a south flowing subglacial drainage channel, and later as a marginal meltwater outlet channel for the ice sheet at the end of the Wisconsin Stage of the Pleistocene.

Approaching the lake from the north, State Route 21 rises over 200 feet in the last mile before the lake comes into view. This sudden topographic rise traverses the surface of a hummocky morainic dump, deposits of sand and gravel that sloughed off the retreating glacial ice sheet margin. Recessional moraines like this are common throughout the region and often form modern drainage divides. A gravel pit north of the lake along State Route 21 cuts into the interior of the recessional moraine and reveals the cross-bedded stratigraphy of the gravel and sand deposits. The Loon Lake basin was created when an ice block broke free of the ice sheet margin and came to rest atop this recessional moraine. Lakes formed by this glacial process are known as kettle-hole lakes. Several similarly formed kettle basins north and west of the lake are not water filled but instead contain poorly drained wetland communities.

Bathymetric features of Loon Lake are presented in FIGURE 3. The lake has an estimated surface area of 166 acres and a mean depth of 19 feet. The maximum depth of about 40 feet occurs along the eastern shore where basin slope is steep. Much of the remaining lake basin is gradually sloped to the shoreline. Several small shoals, locally referred to as “mud islands”, are found along the western shoreline and are prominently marked for boating safety. The hydraulic retention time for Loon Lake is estimated at 1.8 years but its calculation is complicated by the lack of reliable discharge data. There are no surface outlets for the lake so drainage must be through subterranean seepage. Unpublished reports and local conversations often suggest northward seepage with groundwater emergence through springs into streams that ultimately drain into the Genesee River but others suggest seepage to the south into

streams that flow to the Susquehanna River. Perhaps both possibilities operate to control lake level. Levels will also depend on water input including in-lake precipitation, overland flow from the landscape and tributary stream discharge as well as water loss through evaporation from the lake surface.

### **Previous Scientific Studies**

Through the efforts of the NYS DEC Citizens Statewide Lake Assessment Program (CSLAP), the limnology of Loon Lake has been studied since 1994 and annually summarized. The 2013 report (NYS DEC 2013) places Loon Lake on the New York Priority Waterbody List as a threatened resource due to recreational impairment and habitat modification caused by invasive aquatic plant species, notably Eurasian water milfoil (*Myriophyllum spicatum*). The report also indicates a suspected problem with excessive algal growth but other lake sampling and monitoring results suggest non-impacted water quality. Three water quality measures are used as eutrophication indicators. Water clarity in 2013 averaged 2.91 meters, a slight drop from the long-term average of 4.29 meters. Chlorophyll *a*, an index of algal abundance, averaged 11.83 µg/L in 2013, nearly double the long-term average of 6.56 µg/L. Total phosphorus, the limiting nutrient for plant production, averaged 14 µg/L in 2013, quite close to the long-term average of 13 µg/L. Overall Loon Lake is classified as mesotrophic, a transitional status between oligotrophic (nutrient limited with exceptionally clear water) and eutrophic (nutrient enriched with turbid water).

Additional water quality data is found in the 2013 CSLAP report. The lake water is slightly alkaline (pH=7.62) and intermediate in buffer capacity (specific conductance=125 µmho/cm). Analysis of algal samples did not detect harmful levels of blue green (cyanobacterial) toxins. Calcium levels were low at 14 mg/L, but potentially high enough to support invasive dreissenid mussels, however, none were found in the lake during this survey. No zooplankton, macro-invertebrate, fishery or invasive species sampling was conducted in 2013 by NYS DEC or CSLAP volunteers. Additionally, water quality profiles (i.e., through the water column, from top to bottom at regular measurement intervals) are not part of their monitoring protocol but would be valuable in better understanding the mixing status of the lake. Spring turnover occurs following ice out, but due to the shallow nature of the lake, it is unclear how strongly stratified lake temperatures become during the summer. Like other nearby shallow lakes, it is possible that Loon Lake will mix periodically during the summer when strong winds across the surface overcome the resistance to mixing of a weak thermocline. This would have implications on the distribution of dissolved oxygen within the lake as well as the importance of internal nutrient loading. Changes in both factors can strongly influence lake biology as well as altering residential perception of water quality.

### **METHODS**

An assessment of lake fisheries was accomplished on September 19 and 26 by boat electro-shocking along the lake shoreline. Work commenced during the afternoon and continued into the evening. One water quality profile from the surface to a depth of 7 meters was conducted in the late afternoon on September 26 with a Yellow Springs Instrument (YSI) model 6200 data logger and sonde. Water quality parameters included temperature, specific conductance, dissolved oxygen, % oxygen saturation and pH. Lake macrophyte communities were examined during two days (September 24, October 1) of hand

raking in the deeper waters of the littoral zone and wading in the shallower areas. Voucher specimens of all macrophytes were collected, pressed and placed into the Finger Lakes Herbarium (FLH) at the college. A three day (August 30, October 22, October 31) visual survey of the watershed from municipal roads, farm lanes and otherwise accessible areas was conducted to determine the extent of terrestrial invasive plants. All occurrences were associated with a cover type following the classification procedure found in the New York Natural Heritage Program's Ecological Communities manual (Edinger et al. 2002).

Searches for existing natural resource information were conducted in NYS DEC files in the Region 8 office, in CSLAP reports, on the combined website of the Loon Lake Association and Loon Lake Watershed Improvement Alliance, in the reports of the Steuben County Water Quality Coordinating Committee posted on the Steuben County Planning Department website, and from interviews with watershed residents.

## **INVASIVE SPECIES RESULTS AND DISCUSSION**

### **Fisheries**

During seven shoreline sampling runs on September 19, a total of 560 fish were captured, identified and returned to the lake. Thirteen different species were detected. These sampling runs began at the southern tip of the point of land located halfway across the north shore of the lake and ended at the southeast corner of the lake near the seasonal boat launch ramp for the macrophyte harvester. The remainder of the shoreline was sampled on September 26 through six runs. This portion of the lake basin is a shallower environment when compared to the section sampled on the first day (FIGURE 3). On the second day, 263 fish representing 14 species were captured, identified and returned to the lake. In total, 863 fish were sampled from Loon Lake. Individual sample run results and summaries are presented in TABLE 1. Based on these data, the Loon Lake supports at least 14 fish species with yellow perch being most abundant. Relative species composition for the entire lake is presented in FIGURE 4. A regionally uncommon species, the creek chubsucker, known to be in the lake from unpublished NYS DEC reports was found in this survey and accounted for 7% of the capture. The only invasive fish detected was the European carp.

European carp (*Cyprinus carpio*) - The European or common carp is native to Asia but extensive introductions have helped to distribute it across the globe. Their history as a farmed fish dates back to Roman times. Carp were brought to the United States in the early to mid-1800s. By the late 1800s, native fish stocks had declined as a result of overharvest and habitat pollution, so Federal and State fish commissions began an intensive effort to encourage the public to cultivate carp, a fish that could thrive in poor quality waters, as a food fish.

An opportunistic bottom-feeder, European carp uproot aquatic vegetation, increasing the turbidity (muddiness) of shallow lake zones thereby reducing the opportunity for native predatory fish to see their prey. Submerged aquatic plant growth may also be reduced under these murky conditions. This can negatively affect waterfowl that depend on plants as food. Carp can also quickly out-compete other fish through their high fecundity and the rapid growth rate of fingerlings. Due to these ecological impacts, European carp are considered an invasive species that can degrade the fisheries of small lakes.

Millions of dollars are spent annually by natural resource agencies to manage European carp populations. Eradication of established carp populations is nearly impossible. However, there is little concern of the carp having detrimental impacts to the Loon Lake fishery due to the very low population.

### **Other Aquatic Organisms**

Reports describing the invasive nature of individual species are common in the scientific literature and have become increasingly available on the Internet. Information presented here is derived from an excellent summary article on the history of Great Lakes invasions (Mills et al. 1994) and the knowledge acquired by the authors through local research experiences (e.g., Gilman and Foust 2008, Gilman et al. 2015).

Yellow iris (*Iris pseudacorus*) – This ornamental plant was introduced to the United States in the 1870s and quickly spread along the edges of waterways, especially utilizing manmade ditches and canals. It establishes in natural cover types along lakes as well as in cultural lake habitats like residential shorelines. It was observed sporadically along the water's edge at Loon Lake. Recent NYS environmental legislation (NYS DEC and NYS A&M 2014) lists yellow iris as a prohibited invasive species.

moneywort (*Lysimachia nummularia*) – Native to Europe, moneywort was introduced to North America and aggressively spreads along low, moist ground. At Loon Lake, it was commonly observed in moist woodlands and occasionally in roadside drainage swales. It is a vigorous, creeping perennial plant with large yellow flowers. Varieties of moneywort may be ornamentally sold as a groundcover.

forget-me-not (*Myosotis scorpioides*) - An ornamental introduction from the 1870s, this garden escape has outcompeted the native forget-me-nots in moist sites. An attractive, five petaled blue flower, the plant was frequently observed in wildflower gardens of several residents and had naturalized into adjacent locations including shaded lawns.

Eurasian water milfoil (*Myriophyllum spicatum*) - Widely established across a range of water depths in Loon Lake, Eurasian water milfoil is a perennial plant with a slender stem that supports multiple whorls of four, finely dissected, feathery leaves. Monoecious flower spikes (male above, female below) are produced in early summer. When reaching the top of the water column, it will continue to grow laterally across the water surface effectively shading out native submerged aquatic plants. It causes environmental damage by out-competing native plants, disrupting food-web relationships and simplifying community structure. It also has negative economic impacts where dense growth will interfere with recreational activities. Eurasian water milfoil can grow from broken off stems (fragmentation) which increases the rate in which the plant can spread and grow. Management is difficult and eradication is virtually impossible. Introduced to New York in the 1950s, this milfoil is recognized as one of the top ten most invasive plant species.

reed canary grass (*Phalaris arundinacea*) – This perennial bunchgrass has successfully invaded ditches, wet meadows and shallow emergent marshes throughout the Loon Lake watershed. Growing to a height of six feet, it often forms monospecific stands where more biologically diverse, mixed sedge/grass

communities once existed. Reed canary grass invasion results in a loss of wildlife food resources. It propagates by seed and rhizome, and once established, it is difficult to control and eliminate.

Curly-leaf pondweed (*Potamogeton crispus*) – Native to Eurasia, this submerged perennial pondweed was introduced as an aquarium plant in the 1870s. It is easily recognized by its oblong leaves with a wavy edge and finely serrate margin. Tolerant of nutrient-rich muddy substrates, curly-leaf pondweed can be found in most shallow waters of Loon Lake. It grows best in the cool water temperatures of spring and early summer, and by July it produces turions (vegetative propagules) at stem tips and within leaf axils. Mid-summer dieback is common. Shed turions may germinate in the fall, with leafy sprouts overwintering beneath the ice, ready for rapid spring growth the following year. Curly-leaf pondweed interferes with recreational activities especially early season fishing.

bittersweet nightshade (*Solanum dulcamara*) - This semi-woody perennial vine was introduced to North America in the 1840s. At Loon Lake, it prefers to grow in shaded, moist soil surrounding wetlands but it also occurs in shaded, upland sites along roadsides, in successional old fields and occasionally in flower beds. It sprawls over other plants but can also be supported by fences (Lakeside Cemetery). Five petaled, purple flowers followed by small tomato-like fruits and unusual lobed leaves make it easy to recognize. Alkaloids in the soft fleshy berries are reported to be poisonous suggesting this plant has potential negative impacts on human health.

narrow-leaf cat-tail (*Typha angustifolia*) - Found growing in ditches and deep emergent marshes throughout the Loon Lake watershed, the tall, narrow growth form of this plant allows for dense stands without self-shading. Only a few additional plant species grow beneath narrow-leaf cat-tail so patches of this plant support low biological diversity. Narrow-leaf cat-tail is distinguished from the native species by the separation of male flower spikes (above) from female flower spikes (below) with a gap of about one inch.

banded mystery snail (*Viviparus georgianus*) – Native to North America but introduced into the northeastern United States, this small snail (shell height ≈ 1.5 inch) was first observed along the Erie Canal system in the early 1860s, but now occurs throughout the state. The shell is conical in shape with four to five whorls, light tan in color with darker reddish brown bands. It tolerates nutrient-rich muddy bottoms and is usually considered a filter-feeding detritivore but it will also eat fish embryos. Many snails also serve as vectors for aquatic diseases. The banded mystery snail was commonly observed in the shallow waters of Loon Lake. It's more troublesome larger relative, the Chinese mystery snail (*Cipangopaludina chinensis*), was not detected in this survey, nor were any dreissenid mussels (zebra mussel and quagga mussel).

### **Terrestrial Plants**

velvet leaf (*Abutilon theophrasti*) - Named after the “father of botany” (the Greek naturalist Theophrastus), this North American plant is, ironically, an agricultural weed in croplands, especially corn fields but it can also establish along roadsides, in successional fields and in gardens. It successfully competes for nutrients and moisture and can reduce crop yields by one third. Velvet leaf will grow to five feet in height and produces yellow, five petaled mallow-like flowers followed by stout, cylindrical



seed capsules. Its heart-shaped leaves are covered with fine soft hairs. It was observed along Antler's Inn Road in the northern part of the Loon Lake watershed. Most cropland had already been harvested making it difficult to assess the possibly larger distribution of this weed in the watershed.

Norway maple (*Acer platanoides*) - A popular landscape tree, Norway maple escapes to the wild and displaces several native shade tolerant trees that otherwise would grow in a successional northern hardwood forest. This invasive species, including several cultivars, was present in many mowed lawns and was also observed in hedgerows and forests. The tree has opposite branches and leaf arrangement. Leaves have seven palmate lobes and vary in color from green to deep maroon. Thousands of winged seeds (samaras) are produced early in the season on a single tree. Tree sap is milky. Recent NYS environmental legislation lists Norway maple as a regulated invasive species.

goutweed (*Aegopodium podagraria*) – Frequently grown as a groundcover, goutweed (aka, snow-on-the-mountain) readily spreads over large areas by underground rhizomes. It is highly competitive, reducing the diversity of the herbaceous layer and it may interfere with the establishment of woody seedlings. Management is difficult because it is nearly impossible to remove all rhizome fragments from affected soil. Several roadside goutweed patches were observed south of the Laf-A-Lot restaurant.

garlic mustard (*Alliaria petiolata*) – Garlic mustard is an herbaceous biennial plant that has invaded forested habitat throughout the region. It was observed in forests along the eastern side of the Loon Lake watershed but should be expected elsewhere. Substantial growth of garlic mustard occurs before canopy forest trees leaf out. A basal rosette of garlic-scented, triangular leaves develop in the first year, they overwinter, then during the second year they develop a terminal cluster of four petaled white flowers. Slender, erect pods containing hundreds of seeds develop from each flower. It can persist and spread into undisturbed areas making management difficult. For that reason, garlic mustard is listed as a prohibited invasive plant in New York.

common mugwort (*Artemisia vulgaris*) - This is a tall herbaceous perennial plant growing from a woody root. Foliage is delicately dissected, somewhat wooly on the underside and when crushed has a faint scent of sage. Flowers are very small, green to red-brown in color and are clustered in loose panicles at the top of the six foot tall plants. Mugwort thrives in disturbed roadsides and waste places, and was especially common along the Route 21 corridor. It is also a prohibited invasive plant in New York.

European barberry (*Berberis vulgaris*) – A popular landscape shrub, this barberry is a prohibited invasive plant for economic and health reasons. It is the alternate host for wheat rust fungus (*Puccinia graminis*), a serious disease of wheat and related grain crops. Some parts of the thorny plant are reported to be poisonous, but in its native range of southern Europe, northern Africa and western Asia, culinary uses of the berries are common. The shrub has small oval leaves, a drooping panicle of yellow flowers followed by red berries. It was found growing in forest edges along Lindendale Drive.

spotted knapweed (*Centaurea stoebe*) – A relative of the garden plant “bachelor buttons”, the spotted knapweed tolerates poor soil conditions and was most abundant near the gravel pit north of Loon Lake. The inflorescence head is composed of delicate blue branched ray flowers. Leaves are finely dissected

into narrow segments. Spotted knapweed aggressively out-competes native plants otherwise to be expected in dry soils. It is a prohibited invasive plant in New York.

greater celandine (*Chelidonium majus*) - Greater celandine is an erect perennial herb with pinnately lobed leaves. Clusters of four petaled yellow flowers appear from late spring to summer. A cut stem exudes a yellow to orange latex that may cause contact dermatitis in some individuals. Other human health concerns are based on toxicity of the whole plant, if consumed in moderate to large quantities, as it contains a range of isoquinoline alkaloids, the most common being coptisine. Greater celandine will grow at residential lawn and garden edges.

Canada thistle (*Cirsium arvense*) – The common name is a misnomer because this plant is a native of Europe and northern Asia, where it is known as creeping thistle. It is a noxious perennial weed that forms extensive colonies from wide spreading roots. Stems are lax, leaves are very spiny, and inflorescences are pink-purple in color. Control is difficult and eradication virtually impossible. Canada thistle thrives in landscape mulches, moist roadsides and drainage swales throughout the watershed. It is a prohibited invasive species in New York.

crown vetch (*Coronilla varia*) – Well suited for erosion control, bank stabilization and soil rehabilitation due to its nitrogen-fixing, tenacious fibrous roots, crown vetch will spread and establish in successional old fields. Originally native to Africa, Europe and Asia, crown vetch is a sprawling legume vine that is considered invasive in many eastern states. Crown vetch produces small ½ inch pink and white flowers in spherical clusters. It was observed sporadically in open sites within the watershed, especially along banks where it may have been intentionally planted.

autumn olive (*Elaeagnus umbellata*) – This small deciduous shrub can be recognized by its fragrant spring flowers, sharp spur branches, green alternate leaves with minute silvery scales, and red fruit covered with silver dots. This shrub is aggressive in successional old fields and shrublands, and may persist in young successional northern hardwood forests until it is eventually shaded out. Birds dine on the fruit and spread seeds. The negative ecological impact involves the domination of successional habitats, replacement of many valuable wildlife shrubs that collectively produce fruit over a much longer time period. Autumn olive is listed as a prohibited invasive plant in New York, and was observed in many locations in the Loon Lake watershed.

burning bush (*Euonymus alata*) – A common landscape shrub with brilliant fall foliage and interesting corky winging along the twigs. It has escaped to the wild in warmer hardiness zones of New York, out-competing native shrubs within open canopy forests and along forest edges. It is listed as a regulated invasive plant in New York and was only observed in residential lawns at Loon Lake. Recognizing its potential to invade, future landscape use should be discouraged.

Japanese knotweed (*Fallopia japonica*) – This large herbaceous perennial is often mistaken for either an unknown shrub or bamboo due to its segmented stems. It is in fact a member of the smartweed family. It is considered one of the world's worst invasive plants! Significant patches of Japanese knotweed occur along the Loon Lake shoreline, and massive colonies along Loon Lake Road. Deep roots and rhizomes make removal by excavation difficult. Plants fragments produced by highway mowing or

natural disturbances are viable propagules. It tolerates a wide range of soil conditions and forms thick dense colonies to the exclusion of other species. It is a prohibited invasive plant in New York.

cleavers (*Galium aparine*) – A noxious annual bedstraw, this creeping plant is covered with stiff bristles that cling to everything. Small four petaled white flowers are followed by a tiny bur-like seed. Small linear leaves surround the square stem in whorls of six to eight leaves. In some instances, contact with the plant has produced a localized skin rash. This plant was seen in several gardens and along many roadsides at Loon Lake.

English ivy (*Hedera helix*) – Native to Europe and western Asia, this ivy is a common groundcover and climbing evergreen vine on building exteriors and tree trunks. The flowers produce a rich nectar that is an important autumnal food for bees and the berries are consumed by many species of birds. Despite these positive attributes, English ivy can form such dense growth that few if any native plants can grow and native habitat for wildlife is destroyed. In western states, English ivy is considered a noxious weed and its sale or import is banned. It was observed in several shoreline and residential gardens along Loon Lake.

dame's rocket (*Hesperis matronalis*) – An attractive, tall, biennial mustard, dame's rocket was found growing along forest edges and in successional old fields. The flower is large and composed of four petals with color ranging from white to pink to lavender. Leaves display an alternate arrangement. It is often confused with garden phlox which has similar flower color but bearing five petals in each flower and having opposite leaves. It can form monospecific stands, successfully excluding native plants.

European larch (*Larix decidua*) – This deciduous conifer is often used in reforestation plantations, but it frequently escapes and naturalizes in surrounding sites. It may outcompete and choke out native woody species involved in the successional from field to forest. Larch needles are produced in false whorls, radiating outward from small peg-like projections along the twig. Cones are slightly over one inch long and feature recurved cone scales. Larch plantations were observed along the western edge of the watershed.

everlasting pea (*Lathyrus latifolius*) – A spreading herbaceous legume vine that climbs over other plants and up fences through the use of grasping tendrils. Large unscented pink flowers are produced during the summer followed by three inch legume seed pods. A native of Europe, the plant is considered a weed throughout North America. It was conspicuous at the Lakeside Cemetery and occasional at other locations in the watershed.

common privet (*Ligustrum vulgare*) – A former, favorite landscape hedge plant, common privet easily establishes along hedgerows and forest edges. Thick stands preclude other plants and inhibit the establishment of native tree seedlings. A native of Europe, northern Africa and western Asia, privet has stiff upright branches with narrow, semi-evergreen, lanceolate leaves and clusters of small white flowers. The black berries are poisonous to humans. Common privet was observed in residential lawns and forest edges.

Tartarian honeysuckle (*Lonicera tatarica*) – One of the Asiatic bush honeysuckles, this invasive plant was introduced as an ornamental in the 1750s. Today, it is widely established in successional shrublands. Slightly irregular pink and white flowers are followed by red to orange colored paired axillary berries that are a poor quality wildlife food. The Tartarian honeysuckle tolerates disturbed sites and is widespread in the Loon Lake watershed where it out-competes native shrubs. Hand-pulling of small bushes is an easy management technique due to the shallow root system of the shrub. Five Asiatic honeysuckles including Tartarian are listed as prohibited invasive plants in New York.

wild parsnip (*Pastinaca sativa*) – Like other members of the carrot family (e.g., giant hogweed), sunlight sensitive chemicals in the plant sap can cause a blistering skin rash, a medical condition known as phytophotodermatitis. Burns are moderate to severe, and can last for up to two years. Persons should avoid contact with stems and leaves, especially on bright sunny days. This tall biennial weed produces large umbels of tiny yellow flowers in its second year of growth. Leaves are moderately large and dissected into segments. It was a common plant of roadsides in the Loon Lake watershed.

ox-tongue (*Picris hieracioides*) – A perennial native of Europe and Asia, the ox-tongue has a yellow inflorescence resembling a hawkweed, and alternate leaves covered on the upper surface with hooked bristles that cause the leaf to stick to clothing. It is common in the Loon Lake watershed in disturbed soils as well as successional old fields. Hair-like pappus contributes to widespread wind dispersal of the tiny seeds.

Scotch pine (*Pinus sylvestris*) – This European conifer has 3 inch long evergreen needles that are produced in bundles of two. Young bark has a distinct orange color and peels from the trunk in thin flakes. Older bark thickens, turns brown and becomes furrowed. Scotch pine was planted extensively as a timber species but, unfortunately, escapes to the wild and interferes with natural succession. It was observed across the Loon Lake watershed, now established well beyond its original plantations.

creeping buttercup (*Ranunculus repens*) – Often growing in residential “country” lawns, this perennial, stoloniferous herbaceous plant was introduced from Europe and northwestern Africa. Five petaled flowers and short stature are diagnostic for this buttercup. It was especially common in moist depressions in lawns and may also establish in old fields and pastures in the watershed. Close mowing is not an effective control as many leaves occur at ground level.

European buckthorn (*Rhamnus cathartica*) – An extremely aggressive shrub in slightly alkaline soils, buckthorn was introduced in the early 1800s from European, northern Africa and western Asia for ornamental use. This tall shrub has dark gray, cherry-like bark, oval leaves that are opposite to sub-opposite in arrangement, sharp tipped branchlets, and small pale yellow four petaled flowers. Fruits consist of small black drupes. This plant has both negative ecological and human health effects. Fruits are toxic to humans (although birds eat them and spread seed in their droppings) causing stomach cramps and a laxative effect. The shrub serves as an alternate host of rust fungi of important grain crops, and the primary overwintering host of the soybean aphid. Buckthorn is also associated with invasive European earthworms! Allelopathic effects of exudates from decaying buckthorn parts are germination inhibitors for other plant species. This shrub leafs out before native woody plants, and

gains a competitive jumpstart in its growth. It is difficult to manage by cutting as stump re-sprouting is vigorous. Seeds remain viable in the soil for several years creating an ongoing problem even where buckthorn has been successfully removed.

black locust (*Robinia pseudoacacia*) – A native North American tree but not indigenous to the southern tier region of New York. Valued for its rot resistant wood, black locust was frequently grown for fence and vineyard posts. This tree can be recognized by its once pinnately compound leaves, fragrant white flower clusters and rough furrowed bark. It propagates by seed as well as root suckers. Once established, root suckering makes it difficult to control even when large main stems are cut. Black locust tolerates dry, infertile soils, assisted by nitrogen-fixing bacteria inhabiting root nodules. It is considered a regulated invasive plant in New York and was widespread in the Loon Lake watershed.

multiflora rose (*Rosa multiflora*) – Once recommended as a beneficial planting for wildlife food and cover, the negative attributes of multiflora rose were soon recognized and today it is no longer intentionally planted. A bushy shrub with long arching stems, this rose can grow in the open as well as climb up other woody plants. Recognized by its 5 white petaled flowers, small ruby red hips, pinnately compound leaves, fringed stipules and sharp prickles, multiflora rose is difficult to manage as woody branches close to the ground are an impediment to reaching and cutting the multiple stems. It was observed throughout the Loon Lake watershed.

sweetbrier rose (*Rosa rubiginosa*) – Native to Europe and western Asia, this thorny deciduous shrub is the lesser known cousin of the multiflora rose, and is nearly as common in the Loon Lake watershed growing in brushy hedgerows, successional shrublands and old fields. Long, arching stems, pinnately compound leaves with solid stipules, 5 petaled pink flowers and larger, red-orange hips distinguish it from the multiflora rose. Management is equally as difficult. It has been declared a prohibited invasive plant species in other parts of the world and may be deserving of that status in New York State.

corkscrew willow (*Salix matsudana* cv. 'tortuosa') – Originally from northeastern China, this small tree was likely traded along the Silk Road and introduced into Europe centuries ago. Closely related to the similarly introduced weeping willow (*Salix babylonica*), the corkscrew willow has become a popular landscape tree due to its peculiar, spirally contorted branches and twigs. It occasionally escapes to the wild and competes with native shrubs in upland soils and may possibly contribute to detrimental habitat change. More importantly, it readily hybridizes with other willows, altering their genetics. Corkscrew willow was observed as a landscape tree in yards along the Loon Lake shoreline.

Siberian elm (*Ulmus pumila*) – Decades ago, after Dutch elm disease had killed most mature native elms in the northeast, Siberian elm was promoted as a substitute tree for homeowners. It had previously been introduced by the USDA in the midwest as a shelter belt tree that successfully tolerated drought and cold winters. It will occasionally spread from lawns into sunlit woodlot edges and successional shrublands. It features alternate leaves with doubly serrate margins and an oblique base. The leaves are considerably smaller than our native elms. Flowers are precocious, seeds are a circular winged samara. Siberian elm is no longer recommended for planting in many states.

garden valerian (*Valeriana officinalis*) – This is a perennial herbaceous plant introduced from Europe where it has been cultured for herbal medicines and fragrances. It is uncertain when it first arrived in North America, possibly more than 200 years ago. It will grow several feet tall with opposite, pinnately dissected leaves and terminal clusters of white to pinkish-white flowers. It easily invades moist soils and replace native plants. It was found growing along the road from Cohocton, at the intersection of Loon Lake Road and Rte. 21, and should be expected elsewhere. From experience in nearby regions, garden valerian rapidly establishes following initial introduction suggesting it produces large numbers of widely dispersed seeds.

European wayfaring tree (*Viburnum lantana*) – Earning the honor of “weed of the week” from the US Forest Service in August 2006, this multiple stemmed tall shrub produces opposite, thick textured leaves and a flat cluster of tiny five petaled flowers. Berries change color from red to a deep blue by autumn. The fruit is mildly toxic, and may cause vomiting or diarrhea if consumed in large quantities. Showing some shade tolerance, the European wayfaring tree will grow in open fields, forest edges and within the forest. Its invasive ecology is similar to common privet. It was observed sporadically growing in the forest s near Lindenwood Drive.

common myrtle (*Vinca minor*) – Also known as common periwinkle, this plant is a trailing vine with opposite, evergreen leaves and 5 petaled violet-purple flowers produced during the summer months. The waxy leaf surface sheds most water-based herbicide sprays making the plant difficult to eradicate. Most management involves digging out the freely rooting, creeping stems to contain spread of the plant to unwanted areas. It was well established on roadside banks near the Laf-A-Lot restaurant.

### **Additional Information**

To promote a regional understanding of invasive species in the Finger Lakes, a poster describing the project (FIGURE 4) was presented at the Fall Papers Day of the Rochester Academy of Science and at the Finger Lakes Research Conference.

While electro-shocking the fish community, one water quality profile was collected from the boat using a YSI Model 6920 sonde and data-logger. Deepwater anoxia was detected (TABLE 2). If multiple bouts of anoxia occur during any given year in Loon Lake, internal nutrient loading may significantly contribute to the overall plant productivity, and associated problems (e.g., excessive weed growth, blue-green algae blooms), perceived by local residents.

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## **FIGURE HEADINGS**

FIGURE 1 – Watershed boundaries (red line) for Loon Lake as mapped by the Steuben County Planning Department, Water Quality Coordinating Committee. Base image presents a cultural land use and natural land cover “snap shot” at the time of the image. Agricultural land uses (e.g., cropland, pasture and rural structure exterior) and natural forest cover (e.g., Appalachian oak-hickory, hemlock-northern hardwood and successional northern hardwood) comprise most of the watershed.

FIGURE 2 – Watershed contours (yellow lines at 20 foot intervals) for Loon Lake as mapped by the Steuben County Planning Department, Water Quality Coordinating Committee. Based on topography, Loon Lake has no surface outlets but must have subterranean drainage through the underlying coarse glacial gravels. It is possible that said drainage leads to larger Genesee River watershed to the north and/or the larger Cohocton River watershed to the east.

FIGURE 3 – Bathymetry for Loon Lake as mapped by the New York State Department of Environmental Conservation, Region 8 Office. Loon Lake is a glacial kettle-hole lake formed at the end of the Wisconsin stage of the Pleistocene Ice Age when a large block of the glacial margin was sloughed off and deposited on a superglacial morainic dump.

FIGURE 4 – Relative species composition of the Loon Lake fish community in fall 2014 based on two electro-fishing survey days. Each day consisted of an afternoon and evening timeframe, and was conducted with multiple sample runs. The European carp was the only invasive species detected. A regionally uncommon fish, the creek chubsucker, was present.

FIGURE 5 – Poster presentation of findings of this biological survey for invasive species in Loon Lake and its surrounding watershed. Displayed at Fall Paper Session of the Rochester Academy of Science (November 15, 2014) and the Finger Lakes Research Conference (November 21, 2014).

## **TABLE HEADINGS**

TABLE 1 – Fish community composition by sample run for two survey days at Loon Lake, Steuben County, New York. Clumped population numbers for individual species likely reflect schooling behavior as well as changes in substrate type and bottom plant community structure.

TABLE 2 – Water quality profile for Loon Lake. Data collected near deepest point on September 26, 2014 at 3:50pm with a YSI Model 6920 sonde and data-logger. Wind speed was estimated at less than five mph and cloud cover was estimated at ten percent.



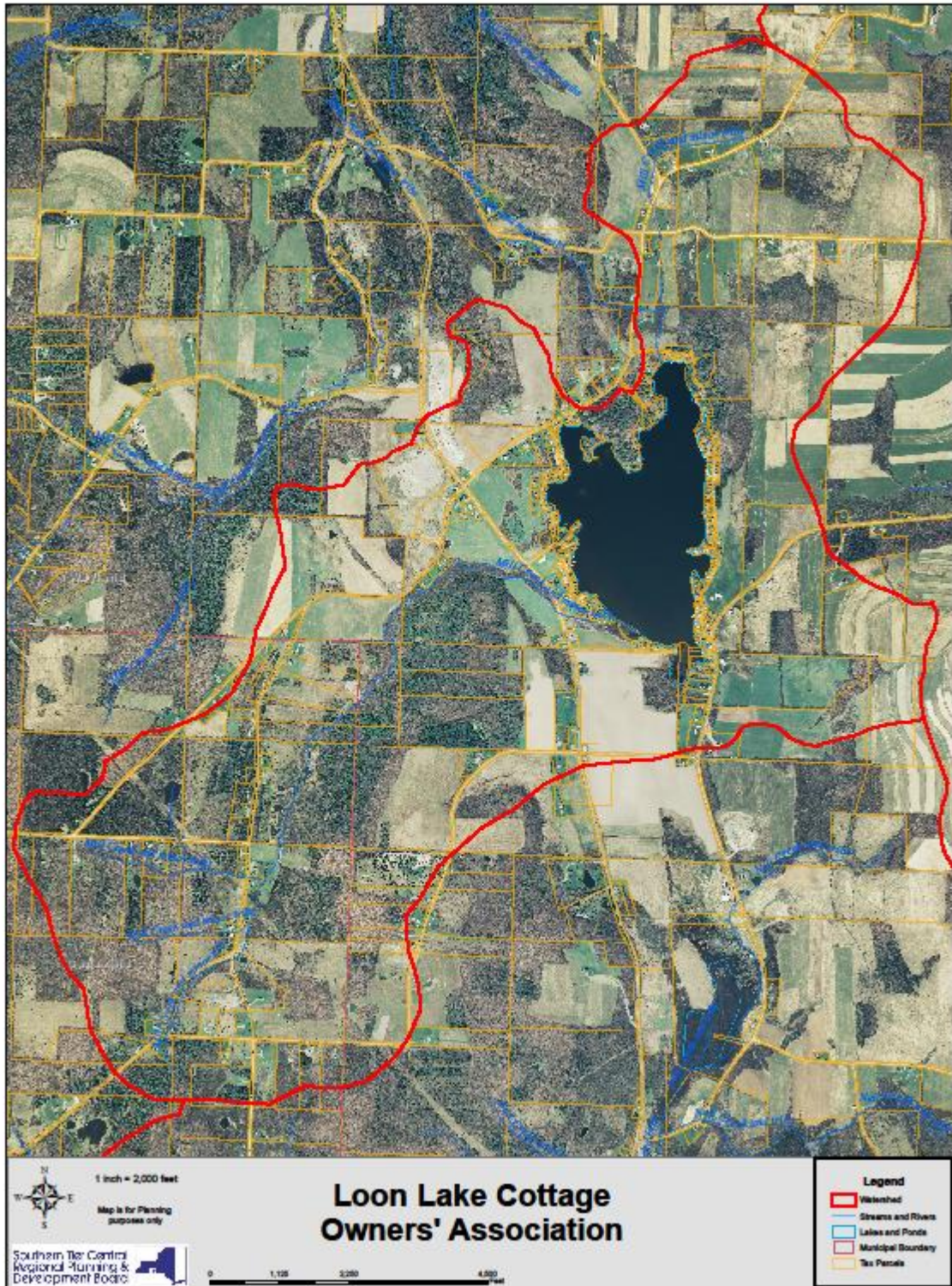


FIGURE 1

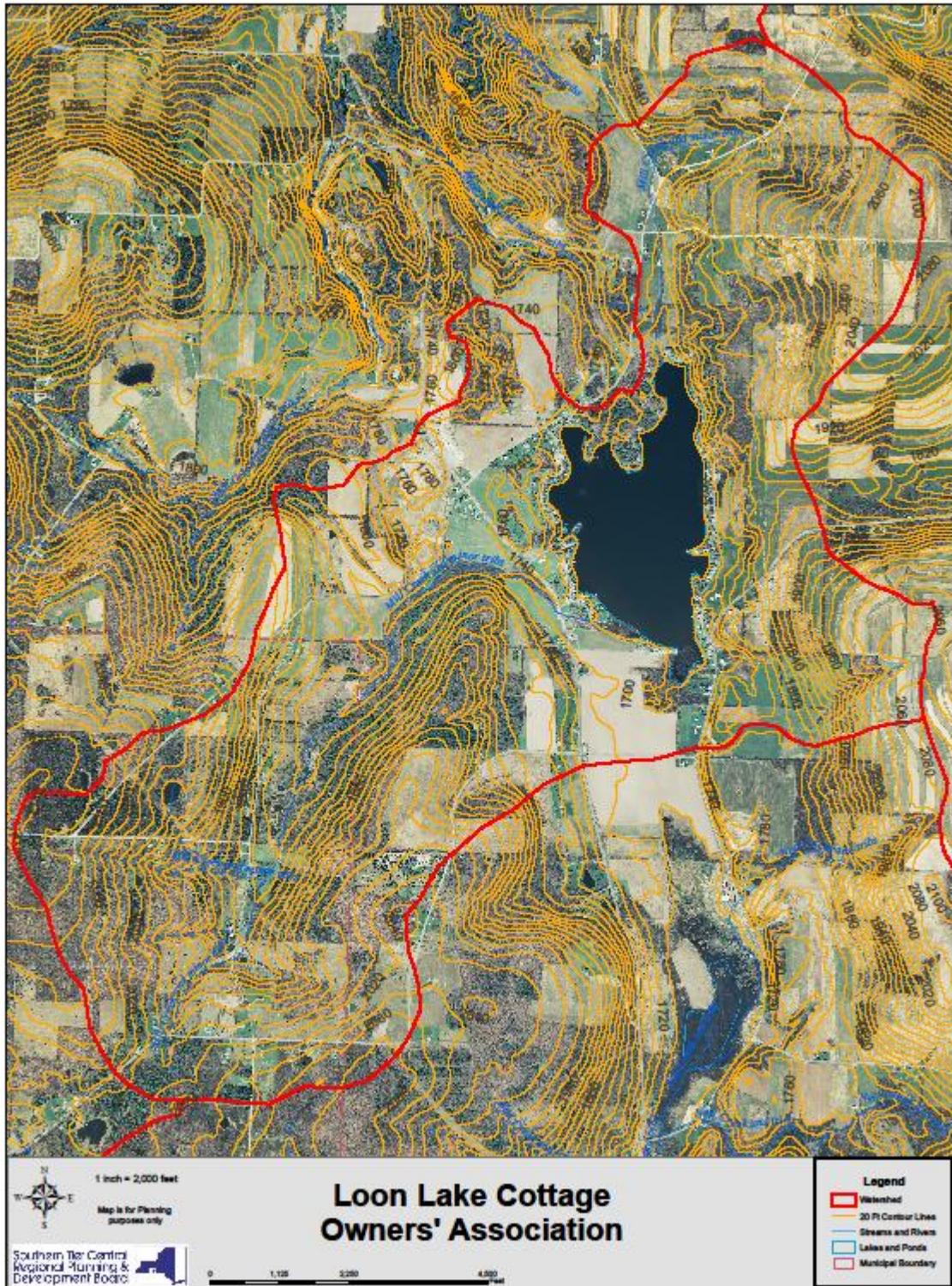


FIGURE 2

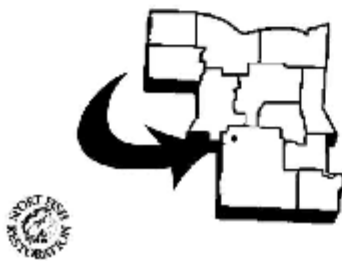


## Region 8

# Loon Lake



Not For Use in Navigation



### Loon Lake

County: Steuben

Town: Wayland

Surface Area: 161 Acres

Fish Species Present: Tiger Musclicunge, Largemouth Bass,  
Yellow Perch, White Sucker

Scale: 0 ————— 670 ft

FIGURE 3

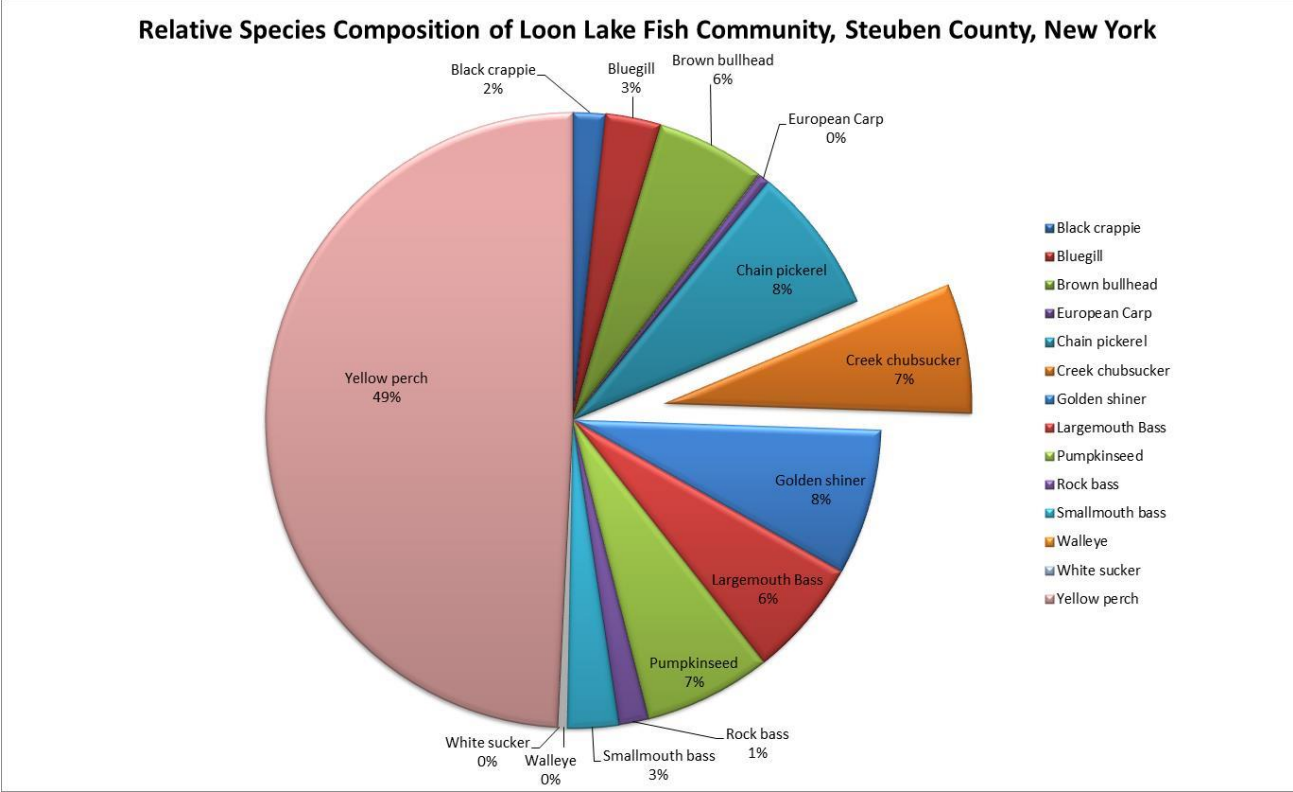


FIGURE 4

# BIOLOGICAL SURVEY FOR INVASIVE SPECIES IN LOON LAKE AND THE SURROUNDING WATERSHED, STEUBEN COUNTY, NEW YORK.

Bruce Gilman, John Foust, Tyler Barber, Jason Hanselman and Ryan Niemiec.  
 Department of Environmental Conservation and Horticulture, Finger Lakes Community College, 3325 Marvin Sands Drive, Canandaigua, New York 14424.

## Aquatic and Wetland Invasive Species



Research supported by the Finger Lakes Partnership for Regional Invasive Species Management (FL-PRISM).

Managing invasive species first requires knowledge of their local presence, frequency of occurrence and population abundance. With limited existing information available for Loon Lake and its watershed, this project was undertaken to fill gaps in knowledge by surveying the fish and littoral communities in the lake, and terrestrial plants in the surrounding upland landscape. Fieldwork was conducted during fall 2014. Invasive species with an earlier phenology may not have been detected, so these survey results should be considered a working inventory.

Invasive species not illustrated:  
 common mugwort (*Artemisia vulgaris*)  
 Japanese barberry (*Berberis thunbergii*)  
 Canada thistle (*Cirsium arvense*)  
 Japanese knotweed (*Fallopia japonica*)  
 dame's rocket (*Hesperis matronalis*)  
 everlasting pea (*Lathyrus latifolius*)  
 sweetbrier rose (*Rosa eglanteria*)  
 garden valerian (*Valeriana officinalis*)



## Terrestrial Invasive Species



FIGURE 5

TABLE 1

Species	Day 1 Run #							Day 1 Total
	1	2	3	4	5	6	7	
Black crappie	1	0	1	4	1	1	0	8
Bluegill	1	12	3	0	3	0	0	19
Brown bullhead	2	2	5	0	0	11	3	23
European Carp	0	0	0	0	0	1	0	1
Chain pickerel	9	6	3	5	5	2	9	39
Creek chubsucker	1	7	2	2	3	8	10	33
Golden shiner	9	4	22	0	0	0	1	36
Largemouth Bass	6	9	3	2	6	8	3	37
Pumpkinseed	4	15	5	1	10	2	1	38
Rock bass	2	2	2	1	2	2	0	11
Smallmouth bass	2	0	0	4	7	3	0	16
Walleye	0	0	0	0	1	1	0	2
White sucker	0	0	0	0	0	0	0	0
Yellow perch	68	70	44	17	77	7	14	297

Species	Day 2 Run #						Day 2 Total	Grand Total
	1	2	3	4	5	6		
Black crappie	1	1	0	0	2	2	6	14
Bluegill	3	1	1	0	0	0	5	24
Brown bullhead	5	5	2	9	2	1	24	47
European Carp	0	2	2	0	0	0	4	5
Chain pickerel	5	4	1	7	3	5	25	64
Creek chubsucker	7	4	4	4	3	1	23	56
Golden shiner	0	0	0	3	24	0	27	63
Largemouth Bass	4	4	2	1	1	2	14	51
Pumpkinseed	4	3	1	4	3	2	17	55
Rock bass	0	0	0	0	0	2	2	13
Smallmouth bass	0	2	0	1	0	3	6	22
Walleye	0	0	0	0	0	0	0	2
White sucker	0	0	0	0	2	0	2	2
Yellow perch	53	30	11	10	1	3	108	405

TABLE 2

Depth (m)	Temperature (C°)	Conductivity	Dissolved oxygen (mg/L)	% oxygen saturation	pH
0	18.6	122	8.24	88.2	7.75
1	17.4	118	8.26	86.2	7.83
2	16.8	116	8.19	84.5	7.87
3	16.6	116	7.72	79.7	7.90
4	15.9	116	7.52	77.9	7.87
5	15.7	114	5.99	61.2	7.88
6	15.5	114	5.45	55.1	7.87
7		156	1.13	15.7	8.15

## APPENDIX

### **Loon Lake and Watershed, Preliminary Botanical Checklist**

Initial nomenclature according to Mitchell and Tucker (1997) with taxonomic revisions based on the Flora of North America (1993+) and the New York Flora Atlas (2015).

Plants arranged alphabetically by botanical family, genus and species, respectively, within major plant groups.

Introduced plant species are denoted with an asterisk (\*) preceding the scientific binomial name. A subset of the introduced plant species are considered invasive (i.e., a non-native plant species that causes, or is likely to cause, environmental harm, or economic harm, or poses a threat to human health).

	<u>Macro-Algae</u>
CHARACEAE	
<i>Nitella flexilis</i> (L.) C. Agardh.	Slender stonewort
	<u>Bryophytes</u>
<i>Bazzania trilobata</i>	Liverwort
<i>Fontinalis sphagnifolia</i>	Rolled water moss
<i>Polytrichum communis</i>	Common hair-cap moss
<i>Riccia fluitans</i> L.	Slender riccia
<i>Ricciocarpos natans</i> (L.) Corda	Purple-fringed riccia
<i>Sphagnum</i> sp.	Peat moss
	<u>Pteridophytes</u>
DENNSTAEDTIACEAE (BRACKEN FAMILY)	
<i>Dennstaedtia punctilobula</i> (Michx.) Moore	Hay-scented fern
<i>Pteridium aquilinum</i> (L.) Kuhn ex Decken	Bracken fern
DRYOPTERIDACEAE (WOOD FERN FAMILY)	
<i>Athyrium filix-femina</i> (L.) Roth ex Mertens	Lady fern
<i>Dryopteris carthusiana</i> (Vill.) Fuchs	Spinulose wood fern
<i>Dryopteris goldiana</i> (Hooker ex Goldie) A. Gray	Goldie's wood fern
<i>Dryopteris intermedia</i> (Muhl. ex Willd.) A. Gray	Fancy fern, common wood fern
<i>Onclea sensibilis</i> L.	Sensitive fern
<i>Polystichum acrostichoides</i> (Michx.) Schott.	Christmas fern
EQUISETACEAE (HORSETAIL FAMILY)	
<i>Equisetum arvense</i> L.	Field horsetail
OSMUNDACEAE (ROYAL FERN FAMILY)	
<i>Osmunda cinnamomea</i> L.	Cinnamon fern
THELYPTERIDACEAE (MARSH FERN FAMILY)	
<i>Thelypteris noveboracensis</i> (L.) Nieuwl.	New York fern
<i>Thelypteris palustris</i> Schott.	Marsh fern



## Gymnosperms

### CUPRESSACEAE (CYPRESS FAMILY)

*Thuja occidentalis* L.

Northern white cedar

### PINACEAE (PINE FAMILY)

\* *Larix decidua* Mill.

European larch

\* *Picea abies* (L.) Karst.

Norway spruce

*Pinus resinosa* Soland.

Red pine

*Pinus strobus* L.

Eastern white pine

\* *Pinus sylvestris* L.

Scotch pine

*Tsuga canadensis* (L.) Carr.

Eastern hemlock

## Dicots

### ACERACEAE (MAPLE FAMILY)

*Acer negundo* L.

Box-elder, ash-leaf maple

\* *Acer platanoides* L.

Norway maple

*Acer rubrum* L.

Red maple

*Acer saccharum* Marsh.

Sugar maple

### AMARANTHACEAE (AMARANTH FAMILY)

*Amaranthus retroflexus* L.

Pigweed, redroot

### ANACARDIACEAE (SUMAC FAMILY)

*Rhus hirta* (L.) Sudworth

Staghorn sumac, velvet sumac

*Toxicodendron radicans* (L.) Kuntze

Poison ivy

### APIACEAE (CARROT FAMILY)

\* *Aegopodium podagraria* L.

Goutweed

*Cicuta bulbifera* L.

Bulb-bearing water hemlock

\* *Daucus carota* L.

Queen Anne's lace, wild carrot

\* *Pastinaca sativa* L.

Wild parsnip

### APOCYNACEAE (DOGBANE FAMILY)

\* *Vinca minor* L.

Myrtle, periwinkle

### AQUIFOLIACEAE (HOLLY FAMILY)

*Ilex verticillata* (L.) A. Gray

Winterberry

### ARALIACEAE (GINSENG FAMILY)

\* *Hedera helix* L.

English ivy

### ASCLEPIADACEAE (MILKWEED FAMILY)

*Asclepias incarnata* L.

Swamp milkweed

*Asclepias syriaca* L.

Common milkweed

ASTERACEAE (ASTER FAMILY)

- |  |                             |
|--|-----------------------------|
| * <i>Achillea millefolium</i> L.                                   | Common Yarrow               |
| <i>Ageratina altissima</i> (L.) R.M. King & H. Rob.                | White snakeroot             |
| <i>Ambrosia artemisiifolia</i> L.                                  | Common ragweed              |
| * <i>Anthemis cotula</i> L.  | Mayweed, stinking chamomile |
| * <i>Arctium minus</i> (Hill) Bernh.                               | Common burdock              |
| * <i>Artemisia vulgaris</i> L.                                     | Common mugwort              |
| <i>Bidens cernua</i> L.  | Nodding bur-marigold        |
| * <i>Centaurea stoebe</i> L.                                       | Spotted knapweed            |
| * <i>Cichorium intybus</i> L.                                      | Chicory                     |
| * <i>Cirsium arvense</i> (L.) Scop.                                | Canada thistle              |
| * <i>Cirsium vulgare</i> (Savi) Tenore                             | Bull thistle                |
| <i>Erigeron annuus</i> (L.) Pers.                                  | Daisy-fleabane              |
| <i>Eurybia divaricata</i> L.                                       | White wood aster            |
| <i>Euthamia graminifolia</i> (L.) Nutt. ex Cass.                   | Grass-leaf goldenrod        |
| <i>Eutrochium maculatum</i> L.                                     | Spotted Joe-Pye-weed        |
| * <i>Hieracium caespitosum</i> Dumort.                             | King-devil hawkweed         |
| * <i>Leucanthemum vulgare</i> Lam.                                 | Ox-eye daisy                |
| <i>Oclemena acuminata</i> (Michx.) Greene                          | Whorled wood aster          |
| * <i>Picris hieracioides</i> L.                                    | Ox-tongue                   |
| <i>Prenanthes alba</i> L.  | Tall white lettuce          |
| <i>Prenanthes trifoliolata</i> (Cass.) Fern.                       | Gall-of-the-earth           |
| * <i>Rudbeckia hirta</i> L.  | Black-eyed Susan            |
| * <i>Senecio vulgaris</i> L.                                       | Common groundsel            |
| <i>Solidago caesia</i> L.  | Blue-stem goldenrod         |
| <i>Solidago canadensis</i> L.                                      | Canada goldenrod            |
| <i>Solidago flexicaulis</i> L.                                     | Zig-zag goldenrod           |
| <i>Solidago juncea</i> Ait.  | Early goldenrod             |
| <i>Solidago nemoralis</i> Ait.                                     | Gray goldenrod              |
| <i>Solidago rugosa</i> Mill.                                       | Rough goldenrod             |
| * <i>Sonchus arvensis</i> L.                                       | Sow thistle                 |
| <i>Symphotrichum lanceolatum</i> (Willd.) G.L. Nesom               | Tall white aster            |
| <i>Symphotrichum lateriflorum</i> Á. Löve & D. Löve                | Calico aster                |
| <i>Symphotrichum novae-angliae</i> (L.) G.L. Nesom                 | New England aster           |
| <i>Symphotrichum prenanthoides</i> (Muhl. ex Willd.)<br>G.L. Nesom | Crooked stem aster          |
| <i>Symphotrichum urophyllum</i> (Lindl.) G.L. Nesom                | Arrow-leaf aster            |
| * <i>Taraxacum officinale</i> Weber ex Wiggers                     | Common dandelion            |
| * <i>Tussilago farfara</i> L.                                      | Coltsfoot                   |

BALSAMINACEAE (TOUCH-ME-NOT FAMILY)

- |                                  |                      |
|----------------------------------|----------------------|
| <i>Impatiens capensis</i> Meerb. | Spotted touch-me-not |
|----------------------------------|----------------------|

BERBERIDACEAE (BARBERRY FAMILY)

- |                               |                   |
|-------------------------------|-------------------|
| * <i>Berberis vulgaris</i> L. | European barberry |
|-------------------------------|-------------------|

BETULACEAE (BIRCH FAMILY)

*Betula alleghaniensis* Britt.

*Betula lenta* L.

*Betula populifolia* Marsh.

*Carpinus caroliniana* Walt.

*Ostrya virginiana* (Mill.) Koch

Yellow birch

Black birch, cherry birch

Gray birch

Musclewood, blue beech

Eastern hop hornbeam, ironwood

BORAGINACEAE (BORAGE FAMILY)

\* *Myosotis scorpioides* L.

Forget-me-not

BRASSICACEAE (MUSTARD FAMILY)

\* *Alliaria petiolata* (Bieb.) Cav. & Grande

\* *Barbarea vulgaris* R. Br. ex Ait.

\* *Capsella bursa-pastoris* (L.) Medik.

\* *Hesperis matronalis* L.

\* *Lepidium campestre* (L.) R. Br. ex Ait.

\* *Rorippa nasturtium-aquaticum* (L.) Hayek

\* *Sinapis arvensis* L.

Garlic mustard

Yellow rocket, winter-cress

Shepard's-purse

Dame's rocket

Field peppergrass

Watercress

Charlock

CABOMBACEAE (WATER-SHIELD FAMILY)

*Brasenia schreberi* Gmel.

Water-shield

CALLITRICHACEAE (WATER-STARWORT FAMILY)

*Callitriche heterophylla* Pursh

Water-starwort

CAPRIFOLIACEAE (HONEYSUCKLE FAMILY)

\* *Lonicera tatarica* L.

*Sambucus nigra* L.

*Sambucus racemosa* L.

*Viburnum acerifolium* L.

*Viburnum dentatum* L.

\* *Viburnum lantana* L.

Tartarian honeysuckle

Black elderberry

Red elderberry

Maple-leaf viburnum

Southern arrowwood

European wayfaring tree

CARYOPHYLLACEAE (PINK FAMILY)

\* *Cerastium arvense* L.

\* *Silene vulgaris* (Moench) Garcke

\* *Spergula arvensis* L.

\* *Stellaria media* (L.) Vill.

Field chickweed

Bladder-campion

Corn-spurry

Common chickweed

CELASTRACEAE (STAFF-TREE FAMILY)

*Celastrus scandens* L.

American bittersweet

CERATOPHYLLACEAE (HORNWORT FAMILY)

*Ceratophyllum demersum* L.

Coontail

CHENOPODIACEAE (GOOSEFOOT FAMILY)

\* *Chenopodium album* L.

\* *Chenopodium foliosum* (Moench) Aschers.

Lamb's-quarters

Strawberry-blight

CLUSIACEAE (MANGOSTEEN FAMILY)

- \* *Hypericum perforatum* L.
- Triadenum virginicum* (L.) Raf.

Common St. John's wort  
Marsh St. John's wort

CORNACEAE (DOGWOOD FAMILY)

- Cornus alternifolia* L. f.
- Cornus amomum* Mill.
- Cornus florida* L.
- Cornus foemina* Mill.
- Cornus sericea* L.

Alternate-leaf dogwood  
Silky dogwood  
Flowering dogwood  
Gray dogwood  
Red-osier dogwood

CRASSULACEAE (SEDUM FAMILY)

- Penthorum sedoides* L.

Ditch-stonecrop

DIPSACACEAE (TEASEL FAMILY)

- \* *Dipsacus fullonum* L.

Common teasel

ELAEAGNACEAE (OLEASTER FAMILY)

- \* *Elaeagnus umbellata* Thunb.

Autumn olive

ERICACEAE (HEATH FAMILY)

- Vaccinium corymbosum* L.

Highbush blueberry

FABACEAE (BEAN FAMILY)

- \* *Coronilla varia* L.
- \* *Lathyrus latifolius* L.
- \* *Lotus corniculata* L.
- \* *Medicago lupulina* L.
- \* *Medicago sativa* L.
- \* *Melilotus alba* Desr. ex Lam.
- \* *Melilotus officinalis* (L.) Pallas
- \* *Robinia pseudo-acacia* L.
- \* *Trifolium pratense* L.
- Vicia cracca* L.
- \* *Vicia sativa* L.

Crown vetch  
Everlasting-pea, sweet pea  
Bird's-foot trefoil  
Black medick  
Alfalfa  
White sweet clover  
Yellow sweet clover  
Black locust  
Red clover  
Cow vetch  
Narrow-leaf vetch

FAGACEAE (BEECH FAMILY)

- Castanea dentata* (Marsh.) Borkh.
- Fagus grandifolia* Ehrh.
- Quercus alba* L.
- Quercus rubra* L.
- Quercus velutina* Lam.

American chestnut  
American beech  
White oak  
Red oak  
Black oak

HALORAGACEAE (WATER MILFOIL FAMILY)

- \* *Myriophyllum spicatum* L.

Eurasian water milfoil

JUGLANDACEAE (WALNUT FAMILY)

*Juglans nigra* L.

Black walnut

LAMIACEAE (MINT FAMILY)

- \* *Glechoma hederacea* L.
- Lycopus uniflorus* Michx.
- \* *Mentha x piperita* L.
- \* *Nepeta cataria* L.
- \* *Prunella vulgaris* L.

Gill-over-the-ground, ground-ivy  
Water-horehound, bugle-weed  
Peppermint  
Catnip  
Heal-all, self-heal

LYTHRACEAE (LOOSESTRIFE FAMILY)

*Decodon verticillatus* (L.) Ell.

Water-willow

MAGNOLIACEAE (MAGNOLIA FAMILY)

*Liriodendron tulipifera* L.

Tulip tree, yellow poplar

MALVACEAE (MALLOW FAMILY)

- \* *Abutilon theophrasti* Medik.
- \* *Malva neglecta* Wallr.

Velvet-leaf  
Common cheeses

MORACEAE (MULBERRY FAMILY)

*Morus rubra* L.

Red mulberry

NYMPHAEACEAE (WATERLILY FAMILY)

*Nuphar variegata* Engelm. ex Durand in Clinton  
*Nymphaea odorata* Dryand. ex Ait.

Yellow waterlily, spatterdock  
White waterlily

NYSSACEAE (TUPELO FAMILY)

*Nyssa sylvatica* Marsh.

Black gum, tupelo

OLEACEAE (OLIVE FAMILY)

- Fraxinus americana* L.
- Fraxinus nigra* Marsh.
- Fraxinus pennsylvanica* Marsh.
- \* *Ligustrum vulgare* L.

White ash  
Black ash  
Red ash, green ash  
Common privet, hedge privet

ONAGRACEAE (EVENING-PRIMROSE FAMILY)

*Circaea lutetiana* L.  
*Epilobium ciliatum* Raf.  
*Oenothera biennis* L.

Enchanter's nightshade  
Willow-herb  
Common evening-primrose

OROBANCHACEAE (BROOM-RAPE FAMILY)

*Epifagus virginiana* (L.) Bartr.

Beech-drops, cancer-root

OXALIDACEAE (WOOD SORREL FAMILY)

*Oxalis montana* Raf.  
*Oxalis stricta* L.

Common wood-sorrel  
Lady's-sorrel

PAPAVERACEAE (POPPY FAMILY)

- \* *Chelidonium majus* L.
- Sanguinaria canadensis* L.

Greater celandine  
Bloodroot

PHYTOLACCACEAE (POKEWEED FAMILY)

- Phytolacca americana* L.

Pokeweed

PLANTAGINACEAE (PLANTAIN FAMILY)

- \* *Plantago lanceolata* L.
- \* *Plantago major* L.

English plantain  
Common plantain

POLYGONACEAE (BUCKWHEAT FAMILY)

- Fallopia japonica* (Houtt.) Ronse Decr.
- Persicaria amphibia* (L.) S. Gray
- Persicaria hydropiperoides* (Michx.) Small
- Persicaria hydropiper* (L.) Opiz.
- \* *Rumex crispus* L.
- Rumex verticillatus* L.

Japanese Knotweed  
Water smartweed  
Mild water pepper  
Water pepper  
Curly dock  
Swamp dock, water dock

PRIMULACEAE (PRIMROSE FAMILY)

- \* *Lysimachia nummularia* L.

Moneywort, creeping-jenny

RANUNCULACEAE (CROWFOOT FAMILY)

- Actaea pachypoda* Ell.
- Caltha palustris* L.
- Clematis virginiana* L.
- Coptis trifolia* (L.) Salisb.
- \* *Ranunculus acris* L.
- \* *Ranunculus ficaria* L.
- Ranunculus longirostris* Godr.
- \* *Ranunculus repens* L.

White baneberry, doll's-eyes  
Marsh marigold, cowslip  
Virgin's-bower  
Goldthread  
Tall buttercup  
Lesser celandine buttercup  
Stiff white water-buttercup  
Creeping buttercup

RHAMNACEAE (BUCKTHORN FAMILY)

- \* *Rhamnus cathartica* L.

European buckthorn

ROSACEAE (ROSE FAMILY)

- Amelanchier arborea* (Michx. f.) Fern.
- Crataegus* sp.
- Geum canadense* Jacq.
- Geum laciniatum* Murr.
- Geum rivale* L.
- Fragaria virginiana* Dcne.
- \* *Malus pumila* Mill.
- \* *Prunus avium* (L.) L.
- Prunus serotina* Ehrh.
- Prunus virginiana* L.
- \* *Rosa eglanteria* L.
- \* *Rosa multiflora* Thunb. ex Murr.

Shadbush, serviceberry, Juneberry  
Hawthorn, thorn-apple  
White avens  
Rough avens  
Water avens  
Wild strawberry  
Common apple  
Sweet cherry  
Black cherry  
Choke cherry  
Sweetbrier, eglantine rose  
Multiflora rose

<i>Rosa palustris</i> Marsh.	Swamp rose
<i>Rubus allegheniensis</i> Porter ex Bailey	Northern blackberry
<i>Rubus hispidus</i> L. <i>sensu lato</i>	Swamp dewberry
<i>Rubus idaeus</i> L.	Red raspberry
<i>Rubus occidentalis</i> L.	Black raspberry, black-cap
<i>Rubus odoratus</i> L.	Purple flowering raspberry
<i>Spiraea alba</i> DuRoi	Meadow-sweet
<b>RUBIACEAE (MADDER FAMILY)</b>	
<i>Cephalanthus occidentalis</i> L.	Buttonbush
<i>Galium aparine</i> L.	Cleavers
<i>Galium</i> sp.	Bedstraw
<i>Mitchella repens</i> L.	Partridge-berry
<b>SALICACEAE (WILLOW FAMILY)</b>	
<i>Populus deltoides</i> Bartr. ex Marsh.	Eastern cottonwood
<i>Populus tremuloides</i> Michx.	Trembling aspen
* <i>Salix matsudana</i> Koidz.	Corkscrew willow
<i>Salix eriocephala</i> Michx.	Stiff willow
<b>SAXIFRAGACEAE (SAXIFRAGE FAMILY)</b>	
<i>Chrysosplenium americanum</i> Schwein. ex Hooker	Golden saxifrage, water carpet
<b>SCROPHULARIACEAE (FIGWORT FAMILY)</b>	
* <i>Linaria vulgaris</i> Mill.	Butter-and-eggs
<i>Mimulus ringens</i> L.	Common monkeyflower
* <i>Verbascum thapsus</i> L.	Common mullein, flannel mullein
<b>SOLANACEAE (NIGHTSHADE FAMILY)</b>	
<i>Physalis heterophylla</i> Nees	Clammy ground-cherry
* <i>Solanum dulcamara</i> L.	Bittersweet nightshade
<b>ULMACEAE (ELM FAMILY)</b>	
<i>Ulmus americana</i> L.	American elm
* <i>Ulmus pumila</i> L.	Siberian elm, dwarf elm
<b>URTICACEAE (NETTLE FAMILY)</b>	
<i>Boehmeria cylindrica</i> (L.) Sw.	False nettle
<i>Pilea pumila</i> (L.) A. Gray	Clearweed
<i>Urtica dioica</i> L.	Stinging nettle
<b>VALERIANACEAE (VALERIAN FAMILY)</b>	
* <i>Valeriana officinalis</i> L.	Garden valerian
<b>VITACEAE (VINE FAMILY)</b>	
<i>Parthenocissus quinquefolia</i> (L.) Planch. ex DC.	Virginia creeper
<i>Vitis riparia</i> Michx.	Riverbank grape

## Monocots

### ALISMATACEAE (WATER-PLANTAIN FAMILY)

*Sagittaria rigida* Pursh

Arrowhead, arrowleaf

### ARACEAE (ARUM FAMILY)

*Acorus americanus* (Raf.) Raf.

Sweetflag

### CYPERACEAE (SEDGE FAMILY)

*Carex plantaginea* Lam.

Plantain-sedge

*Carex comosa* Boott

Sedge

*Carex hystericina* Muhl. Ex Willd.

Sedge

*Dulichium arundinaceum* (L.) Britt.

Three-way sedge

*Eleocharis acicularis* (L.) R. & S.

Slender spikerush

*Scirpus atrovirens* Willd.

Dark brown bulrush

*Scirpus cyperinus* (L.) Kunth.

Woolgrass bulrush

*Scirpus validus* Vahl.

Soft-stem bulrush

### HYDROCHARITACEAE (FROG'S-BIT FAMILY)

*Elodea canadensis* L. Rich. Ex Michx.

Elodea, waterweed

*Vallisneria americana* Michx.

Eelgrass, tapegrass, wild celery

### IRIDACEAE (IRIS FAMILY)

\* *Iris pseudacorus* L.

Yellow iris

### LEMNACEAE (DUCKWEED FAMILY)

*Lemna minor* L.

Lesser duckweed

*Wolffia columbiana* Karst.

Watermeal

### LILIACEAE (LILY FAMILY)

*Trillium grandiflorum* (Michx.) Salisb.

White trillium

### NAJADACEAE (NAIAD FAMILY)

*Najas flexilis* (Willd.) Rostk. & Schmidt

Slender naiad

*Najas guadalupensis* (Spreng.) Magnus

Southern naiad

### ORCHIDACEAE (ORCHID FAMILY)

\* *Epipactis helleborine* (L.) Crantz

Weed orchid

### POACEAE (GRASS FAMILY)

\* *Bromus inermis* Leyss.

Smooth Brome

\* *Dactylis glomerata* L.

Orchard grass

\* *Digitaria ciliaris* (Retz.) Koel.

Tall crabgrass

\* *Echinochloa crusgalli* (L.) Beauv.

Barnyard grass

\* *Elytrigia repens* (L.) Nevski

Quackgrass

*Glyceria striata* (Lam.) Hitchc.

Fowl mannagrass

*Leersia oryzoides* (L.) Sw.

Rice cutgrass

*Panicum* sp.

Panic grass

\* *Phalaris arundinacea* L.

Reed canary-grass



* <i>Phleum pratense</i> L.	Timothy
* <i>Setaria pumila</i> (Poir.) Schultes	Foxtail grass
PONTEDERIACEAE (PICKEREL-WEED FAMILY)	
<i>Heteranthera dubia</i> (Jacq.) MacM.	Water stargrass
<i>Pontederia cordata</i> L.	Pickerel-weed
POTAMOGETONACEAE (PONDWEED FAMILY)	
<i>Potamogeton amplifolius</i> Tuckerm.	Large-leaf pondweed, water cabbage
<i>Potamogeton crispus</i> L.	Curly-leaf pondweed
<i>Potamogeton epihydrus</i> Raf.	Ribbon-leaf pondweed
<i>Potamogeton gramineus</i> L.	Grass-leaf pondweed
<i>Potamogeton natans</i> L.	Floating-leaf pondweed
<i>Potamogeton praelongus</i> Wulfen	White-stem pondweed
<i>Potamogeton pusillus</i> L.	Small pondweed
<i>Potamogeton richardsonii</i> (Benn.) Rydb.	Clasping-leaf pondweed
<i>Potamogeton robbinsii</i> Oakes	Robbin's pondweed
SMILACACEAE (GREENBRIER FAMILY)	
<i>Smilax herbacea</i> L.	Greenbrier, carrion-flower
SPARGANIACEAE (BUR-REED FAMILY)	
<i>Sparganium eurycarpum</i> Engelm. Ex A. Gray	Giant bur-reed
TYPHACEAE (CAT-TAIL FAMILY)	
* <i>Typha angustifolia</i> L.	Narrow-leaf cat-tail