

2018 Annual Report

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*Adirondack Park Invasive Plant Program
The Adirondack Partnership for Regional Invasive Species Management*

*Hosted by the Adirondack Chapter of The Nature Conservancy
Keene Valley, New York*

The Adirondack Park Invasive Plant Program (APIPP) serves as the Adirondack Partnership for Regional Invasive Species Management (PRISM), one of eight partnerships across New York State (NYS) (Map 1). APIPP is a program founded by the Adirondack Chapter of The Nature Conservancy (TNC), NYS Department of Environmental Conservation (NYS DEC), NYS Department of Transportation (NYS DOT), and NYS Adirondack Park Agency (APA). APIPP is funded, in part, through the invasive species line of NYS's Environmental Protection Fund as administered by the NYS DEC. More than 30 cooperating organizations and hundreds of volunteers support APIPP in its mission. We thank all of our partners and collaborators who participate in the program and share their ideas, time, and resources.



Map 1: Jurisdictional boundaries of New York State's PRISMs

Program Mission, Projects, & Staff

The threats posed by invasive species are an issue front and center of concern in the Adirondack region. Action is underway at local, regional, and statewide scales, contributing to a comprehensive approach to address their negative impacts on ecosystems, economies, and society. APIPP joins forces with partner organizations, communities, and volunteers to put strategic and innovative solutions into place. APIPP's mission is to...

Protect the Adirondack Region from the Negative Impacts of Invasive Species

The program coordinates two regional projects; an *Aquatic Invasive Species (AIS) Project* (Aquatic Project) and a *Terrestrial Invasive Species Project* (Terrestrial Project). Staff members include Brendan Quirion, Program Manager; Erin Vennie-Vollrath, AIS Project Coordinator; Zachary Simek, Terrestrial Invasive Species Project Coordinator, and Katherine Gale, 2018's seasonal Invasive Species Educator.

Five-year Strategic Plan Goals

- *Coordination*
- *Pathway Analysis*
- *Spread Prevention & Vector Management*
- *Enforcement & Legislation*
- *Education & Outreach*
- *Early Detection, Rapid Response, & Monitoring*
- *Control & Management*
- *Information Management*
- *Restoration*
- *Research*
- *Climate Change Adaptation*
- *Resource Development & Funding*

Priority Setting Structure

In setting awareness building and prevention priorities, APIPP focuses on the primary invasive species introduction and spread pathways to and within the Adirondack PRISM. These include for AIS: the overland transport of recreational boating and fishing equipment and human-assisted movement of fish and baitfish, for terrestrial invasive plants: the movement and use of contaminated fill/construction material, sale and use of non-native ornamental plants in agriculture/horticulture, and human-assisted spread of seeds and propagules through land-based recreation activities, and for invasive forest pests and pathogens: movement of untreated firewood and use of out of region sources of trees and shrubs in landscaping, restoration, and nursery plantings.

APIPP utilizes a unified theory of invasive species management to set rapid response and ongoing management priorities (Figure 1). This unified theory includes:

1. Assessment of the relative threat of invasive species currently affecting the Adirondack PRISM;
2. Evaluation of whether high threat species are affecting one or more conservation, economic, or societal assets in the Adirondack PRISM;
3. Assessment of whether effective management tools and techniques (chemical, mechanical, biological, etc.) are available to address both the species infestation and potential sources/pathways of reintroduction; and lastly,
4. Whether sufficient resources are available to ensure project completion and that expenditure of resources will result in a high return on investment and produce tangible, lasting results over a five to ten-year time horizon.

APIPP utilizes several resources and pre-project planning tools to move through each step of this unified theory. These include NYS and Adirondack PRISM invasive plant and animal threat ranking assessments, Geographic Information Systems, conservation asset maps, climate change models, available best management practices, economic impact studies, invasive species distribution databases, evidence of human health impacts, and TNC's Invasive Plant Management Decision Analysis Tool (IPMDAT).

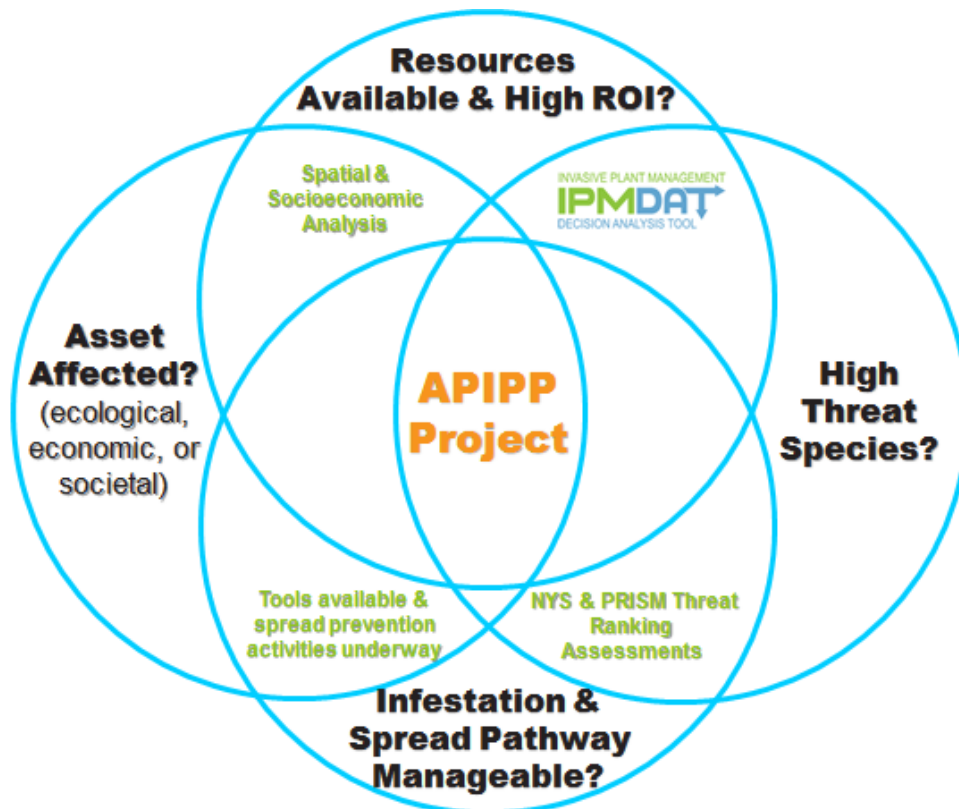


Figure 1: APIPP's Unified Theory of Invasive Species Management

2018 Highlights

- **Celebrating Twenty Years of Partnership!** APIPP celebrated its 20th year leading efforts to protect the Adirondack region from invasive species impacts. Along the way, APIPP has become a model for other invasive species programs throughout New York State and the country. With support from partners, decades of hard work are yielding impressive results. By the numbers these include:
 - 110,000+ miles of roadside and shoreline surveyed for invasive species
 - 304 of 409 lakes and ponds surveyed documented as free of aquatic invasive species
 - 5,100 infestations of high-threat invasive species mapped
 - 2,100 infestations managed
 - 1,030 infestations locally eradicated
- **Pledge to Keep Invasive Species Out!** APIPP expanded the *Keep Invasive Species Out* marketing and public awareness campaign to include a pledge agreement for individuals, organizations, and businesses. By taking the pledge, you commit to taking the necessary steps to prevent the introduction and spread of invasive species and sharing information and resources on the campaign within your circles of influence. In return, APIPP will provide you with free promotional items and print materials. You can take the pledge at: <https://keepinvasivespeciesout.com/pledge/>
- **Local Eradications on the Rise!** Upon assessment, APIPP has maintained an 87% success rate in attempted eradications of 1,130 discrete invasive species infestations since 2009. Studies indicate that fewer than 50% of attempted eradications usually succeed, highlighting the effectiveness of APIPP's approach to addressing invasive species threats to the region. APIPP has produced a new map showcasing the program's reach and progress in eradicating invasive species from the region (Map 5).
- **APIPP Takes Flight!** APIPP became the first permitted non-governmental organization to conduct unmanned aerial vehicle-assisted surveys for invasive species over the Adirondack Forest Preserve. Approximately 890 acres of vulnerable wetland habitat were surveyed for invasive common reed grass (*Phragmites australis*) with three new infestations detected. Infestations as small as 0.02 acres in size were able to be detected and took 22% less time to find than traditional on the ground surveys.
- **Sonar Technology Strengthens AIS Surveys!** APIPP expanded the use of sonar technology and the BioBase post-processing system under its AIS early detection team to generate maps of vegetation biovolume, bottom sediment hardness, and bathymetry for 31 lakes and ponds surveyed. APIPP will utilize this lake characteristic data to inform future waterbody-specific AIS vulnerability assessments to better prioritize prevention, survey, and management resources. You can access detailed maps of all lakes surveyed at: <http://adkinvasives.com/wp-content/uploads/2018/11/FINAL-2018-AIS-Report.pdf>
- **Innovations Summit Inspires Action!** Over seventy people attended APIPP's biannual summit focused on innovations in invasive species prevention, early detection, and management. Session topics included *Advancements in Biological Control & Host Resistance for Invasive Species Management* as well as *Advancements in Remote Sensing & New Technologies for Invasive Species Prevention & Early Detection*. APIPP and partners are currently in the process of advancing several of the remote sensing technologies featured during the event to detect and map invasive species infestations in the Adirondacks.

Round-up of 2018 Accomplishments by the Numbers

- APIPP's Terrestrial Project managed 727 infestations of target invasive species and documented their absence from 1,025 historically managed infestations.
- APIPP's Aquatic Project surveyed 63 Adirondack waterways for target AIS and only found two to be newly invaded.
- APIPP staff presented to at least 1,934 people at 56 different events, trainings, and professional conferences.
- APIPP's websites and social media channels engaged 15,219 unique visitors and followers.

This is just a sampling of the great work underway, thanks to the sustained commitment of APIPP staff and partners. What else have we been up to, and what is to come? Read on to find out!

Sincerely,

The APIPP Team



APIPP Staff & Partners Present at 2018 Fall Partner Meeting - The Adirondack Chapter of TNC, Keene Valley

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AQUATIC & TERRESTRIAL INVASIVE SPECIES PROJECT REPORTS

Target Species – Existing Threats

This section describes existing, high priority species threats affecting the Adirondack PRISM.

Aquatic Invasive Plants

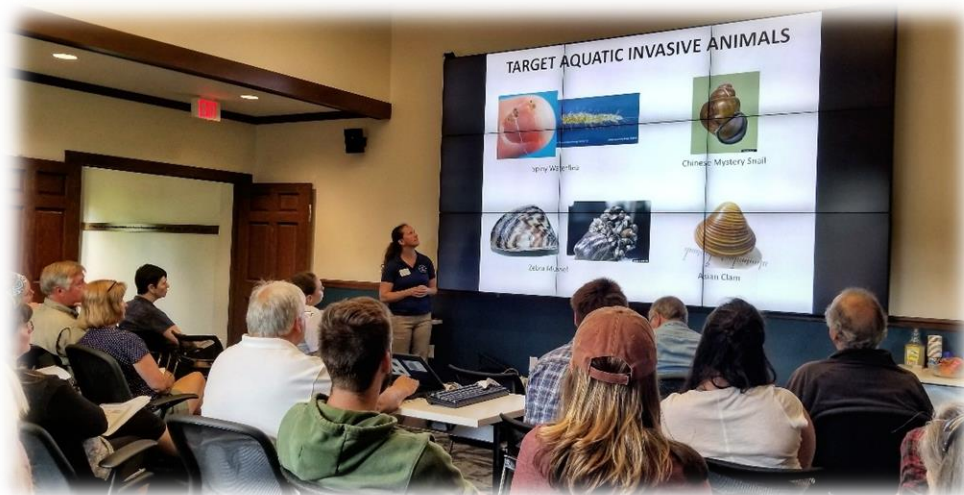
The Aquatic Project surveys for six target aquatic invasive plants known to be present in the PRISM based on their high or very high PRISM invasiveness rankings: Eurasian watermilfoil (*Myriophyllum spicatum*), variable-leaf watermilfoil (*Myriophyllum heterophyllum*), water chestnut (*Trapa natans*), curly-leaf pondweed (*Potamogeton crispus*), fanwort (*Cabomba caroliniana*), and European frog-bit (*Hydrocharis morsus-ranae*). As of 2018, 105 Adirondack lakes are known to be invaded by one or more of these target aquatic invasive plants (Map 2).

- [Eurasian watermilfoil \(PRISM Invasiveness Ranking = Very High\)](#) is a submerged perennial that grows quickly, forming dense mats that can degrade native habitat and impede recreational use. It is known to be present in 61 lakes in the PRISM. It was newly reported in two lakes in 2018, Moody Pond (Essex County) and Penfield Pond (Essex County).
- [Variable-leaf watermilfoil \(PRISM Invasiveness Ranking = Very High\)](#) is a submerged perennial that grows quickly, forming dense mats that can degrade native habitat and impede recreational use. It is known to be present in 47 lakes in the PRISM. There were no new reports of this plant in 2018.
- [European frog-bit \(PRISM Invasiveness Ranking = Very High\)](#) is a free-floating annual that forms dense mats that can limit light penetration and impede recreational use. It is known to be present in six water bodies in the PRISM. There were no new reports of this plant in 2018.
- [Water chestnut \(PRISM Invasiveness Ranking = Very High\)](#) is a floating annual which forms dense mats that cover large expanses of water and can impact water quality, native species and impede recreational use. It is known to be present in five water bodies in the PRISM: Lake Champlain, Lake George, Hadlock Pond, Loon Lake, and Lake Alice. There were no new reports of this plant in 2018.
- [Curly-leaf pondweed \(PRISM Invasiveness Ranking = High\)](#) is a submerged perennial that begins growing early in the year and can outcompete native species. It is known to be present in 17 lakes in the PRISM. There were no new reports of this plant in 2018.
- [Fanwort \(PRISM Invasiveness Ranking = High\)](#) is a submerged aquatic plant that forms dense beds that can crowd out native plant species. It is known to be present in four private lakes in the PRISM: Efner Lake, Horseshoe Pond, Jenny Lake, and Mill Pond. There were no new reports of this plant in 2018.

Small-bodied Aquatic Invasive Animals

The Aquatic Project surveys for five target small-bodied aquatic invasive animals known to be present in the PRISM based on their high or very high NYS invasiveness rankings: spiny waterflea (*Bythotrephes longimanus*), fishhook waterflea (*Cercopais pengoi*), Asian clam (*Corbicula fluminea*), zebra mussels (*Dreissena polymorpha*), and Chinese mystery snail (*Cipangopaludina chinensis*). As of 2018, 21 Adirondack lakes are known to be invaded by one or more of these target small-bodied aquatic invasive animals (Map 2).

- [Fishhook waterflea \(NYS Threat Ranking Assessment Score = Very High\)](#) is an invasive zooplankton that can alter the composition, structure, and function of the ecosystem by outcompeting native zooplankton and juvenile fish. They were first documented in Lake Champlain in 2018.
- [Zebra mussel \(NYS Threat Ranking Assessment Score = Very High\)](#) is a filter-feeding freshwater mollusk that displaces native species, attaches to and covers surfaces, and has sharp shells that are a nuisance to lake users. The majority of waterbodies in the region currently do not have sufficient calcium levels to support large populations of zebra mussels. They are only known to be present in two lakes in the PRISM, Lake Champlain and Lake George. There were no new reports of this species in 2018.
- [Chinese mystery snail \(NYS Threat Ranking Assessment Score = Very High\)](#) is a large snail that quickly reproduces and has the potential to decrease native snail populations and change water chemistry. They are known to be present in 13 lakes in the PRISM. There were no new reports of this species in 2018.
- [Spiny waterflea \(NYS Threat Ranking Assessment Score = Very High\)](#) is a macro-zooplankton that can reproduce rapidly through asexual reproduction and compete directly with juvenile fish and native zooplankton for food. Its long spines also easily attach to fishing lines creating a nuisance for anglers. They are known to be present in nine lakes in the PRISM. There were no new reports of this species in 2018.
- [Asian clam \(NYS Threat Ranking Assessment Score = High\)](#) is a filter-feeding freshwater mollusk that displaces native species, alters the food chain, and may cause algae blooms. It is also a bio-fouler, clogging industrial and commercial water systems. They are known to be present in one lake in the PRISM; Lake George. There were no new reports of this species in 2018.



Small-bodied Aquatic Invasive Animal Identification Training – Darrin Fresh Water Institute, Bolton Landing

Terrestrial Invasive Plants

The Terrestrial Project surveys for twenty-two target terrestrial invasive plants known to be present in the PRISM based on their high or very high PRISM invasiveness rankings: knotweed species (*Reynoutria spp.*), autumn olive (*Elaeagnus umbellata*), common reed grass (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), Japanese barberry (*Berberis thunbergii*), black swallow-wort (*Cynanchum louiseae*), multiflora rose (*Rosa multiflora*), pale swallow-wort (*Cynanchum rossicum*), oriental bittersweet (*Celastrus orbiculatus*), bush honeysuckles (*Lonicera spp.*), garlic mustard (*Alliaria petiolata*), Norway maple (*Acer platanoides*), winged burning bush (*Euonymus alatus*), common buckthorn (*Rhamnus cathartica*), scotch broom (*Cytisus scoparius*), cup plant (*Silphium perfoliatum*), reed canary grass (*Phalaris arundinacea*), tree-of-heaven (*Ailanthus altissima*), yellow iris (*Iris pseudacorus*), glossy buckthorn (*Frangula alnus*), lesser celandine (*Ficaria verna*) and giant hogweed (*Heracleum mantegazzianum*). As of 2018, there are 4,677 mapped infestations of these plants in the PRISM (Map 3).

- [Knotweed species \(PRISM Invasiveness Ranking = Very High\)](#) are large bamboo-like perennials that grow vigorously and quickly out-compete native species for space and resources. These plants readily invade riparian areas, cultivated lands, yards, and roadsides. There are currently 1,114 documented infestations of these plants within the PRISM. Ninety-seven new infestations of this plant were documented in 2018.
- [Autumn olive \(PRISM Invasiveness Ranking = Very High\)](#) is a large, spiny, deciduous shrub that can reach 20 feet in height and produces bright red berries that are readily consumed by birds and other animals, allowing it to spread long distances. It can form a dense layer of understory vegetation that crowds out native plants and impedes tree seedling recruitment. It readily invades areas of disturbance such as roadsides, grasslands, fields, and forest edges/openings. There are currently 21 documented infestations of this plant within the PRISM. Ten new infestations of this plant were documented in 2018.
- [Common reed grass \(PRISM Invasiveness Ranking = Very High\)](#) is a large perennial grass that aggressively invades wetlands, outcompetes native vegetation and forms dense thickets that have little value to wildlife. It readily invades wetlands, cultivated areas, and drainage ditches. There are currently 1,541 documented infestations of this plant within the PRISM. One-hundred eleven new infestations of this plant were documented in 2018.
- [Purple loosestrife \(PRISM Invasiveness Ranking = Very High\)](#) is an herbaceous perennial that invades wetlands, produces millions of seeds each year, and outcompetes surrounding native plants. It readily invades wetlands, cultivated areas, and drainage ditches. There are currently 583 documented infestations of this plant within the PRISM. One-hundred eighteen new infestations of this plant were documented in 2018.
- [Japanese barberry \(PRISM Invasiveness Ranking = Very High\)](#) is a spiny herbaceous shrub that is commonly planted as an ornamental and escapes into natural areas via bird dispersed seeds. It can dominate the forest understory, especially in areas with high deer densities, outcompetes native plants, and improves tick habitat. It readily invades forest understories, riparian corridors, roadsides, and grasslands. There are currently 45 documented infestations of this plant within the PRISM. Seven new infestations of this plant were documented in 2018.
- [Black swallow-wort \(PRISM Invasiveness Ranking = Very High\)](#) is a perennial herbaceous vine that forms dense mats that can smother native vegetation. It readily invades riparian areas, grasslands and fields, forest edges and understories, and roadsides. There are currently 45 documented infestations of this plant within the PRISM. Thirteen new infestations of this plant were documented in 2018.

- [Multiflora rose \(PRISM Invasiveness Ranking = High\)](#) is a spiny, perennial shrub that can reach 15 feet in height. Infestations can become dense and shade out native plants. It readily invades roadsides, riparian corridors, grasslands, forest edges and canopy openings. There are currently 12 documented infestations of this plant within the PRISM. Seven new infestations of this plant were documented in 2018.
- [Pale swallow-wort \(PRISM Invasiveness Ranking = High\)](#) is a perennial herbaceous vine that forms dense mats which smother native vegetation. It readily invades forested wetlands and riparian areas, cultivated lands, grasslands and fields, forest edges and understories, and roadsides. There is currently only one documented infestation of this plant within the PRISM. There were no new infestations of this plant documented in 2018.
- [Oriental bittersweet \(PRISM Invasiveness Ranking = Very High\)](#) is a perennial woody vine that can form dense mats which shade out low growing vegetation and climb into the forest canopy, girdling trees and blocking sunlight. It readily invades forested wetlands and riparian areas, cultivated lands, grasslands and fields, forests, and roadsides. There are currently 55 documented infestations of this plant within the PRISM. Twelve new infestations of this plant were documented in 2018.
- [Lesser celandine \(PRISM Invasiveness Ranking = High\)](#) is a low growing flowering perennial that forms dense monocultures that crowd out native vegetation. It readily invades wetlands and open riparian corridors. The first four infestations of this species were documented in the PRISM in 2018.
- [Bush honeysuckle species \(PRISM Invasiveness Ranking = Very High\)](#) are deciduous shrubs that can reach 20 feet in height and invade forest edges and openings. Infestations can become dense, shading out native plants and promoting tick habitat. These plants readily invade roadsides, grasslands, forest edges, and canopy openings. There are currently 106 documented infestations of these plants within the PRISM. Forty-six new infestations of these plants were documented in 2018.
- [Garlic mustard \(PRISM Invasiveness Ranking = Very High\)](#) is an herbaceous biennial that outcompetes native understory plants through allelopathy. It readily invades areas of disturbance such as campgrounds, trailheads, and roadsides and slowly expands into the surrounding forest understory. There are currently 867 documented infestations of this plant within the PRISM. Twelve new infestations of this plant were documented in 2018.
- [Norway maple \(PRISM Invasiveness Ranking = Very High\)](#) is a deciduous tree that averages 50 feet in height and establishes in forests via wind dispersed seed. Infestations can become dense and shade out native plants. It readily invades forests, riparian corridors, roadsides, and forested wetlands. There are currently nine documented infestations of this plant within the PRISM. Three new infestations of this plant were documented in 2018.
- [Winged burning bush \(PRISM Invasiveness Ranking = Very High\)](#) is a deciduous shrub that can reach 20 feet in height and escapes into natural areas via bird dispersed seeds. Infestations can become dense and outcompete native plants. It readily invades roadsides, riparian corridors, and forest understories. There are currently ten documented infestations of this plant within the PRISM. Five new infestations of this plant were documented in 2018.
- [Common buckthorn \(PRISM Invasiveness Ranking = Very High\)](#) is a deciduous shrub or small tree that can exceed 20 feet in height. It produces small glossy, black berries that are dispersed long distances by birds. Infestations can become dense and shade out native plants. It readily invades areas of disturbance such as roadsides, grasslands, forest edges and

canopy openings. There are currently nine documented infestations of this plant within the PRISM; however, this species is likely underrepresented in APIPP's database. Eight new infestations of this plant were documented in 2018. Efforts to more comprehensively document the distribution of common buckthorn in natural areas will continue in 2019.

- [Scotch broom \(PRISM Invasiveness Ranking = High\)](#) is a perennial shrub that invades fields, forest edges, roadsides, and canopy openings. It can form dense stands that crowd out native species and degrade wildlife habitat. There is currently only one documented infestation of this plant within the PRISM. There were no new infestations of this plant documented in 2018.
- [Cup plant \(PRISM Invasiveness Ranking = High\)](#) is an herbaceous perennial in the sunflower family that produces copious amounts of seed allowing it to form dense monocultures and outcompete native plants. It readily invades riparian corridors, wet meadows, open forested wetlands, and drainage ditches. There are currently 41 documented infestations of this plant within the PRISM. All infestations were mapped for the first time in 2018.
- [Reed canary grass \(PRISM Invasiveness Ranking = High\)](#) is a perennial grass that grows up to 5 feet tall. It spreads through abundant seed production and vegetative expansion via rhizomes. It readily invades moist sites where it crowds out native vegetation. There are currently six documented infestations of reed canary grass within the PRISM; however, this species is likely underrepresented in APIPP's database. Four new infestations of this plant were documented in 2018. Efforts to more comprehensively document the distribution of reed canary grass in natural areas will continue in 2019.
- [Tree-of-heaven \(PRISM Invasiveness Ranking = High\)](#) is a deciduous tree that can reach 80 feet in height, forming thick stands that crowd out native plant species. There are currently two documented infestations of tree-of-heaven in the PRISM. There were no new infestations of this plant documented in 2018.
- [Yellow iris \(PRISM Invasiveness Ranking = High\)](#) is an invasive ornamental perennial that can form dense monocultures which crowd out native plants. It readily invades riparian corridors, the shores of lakes and ponds, wetlands, and drainage ditches. There are currently 189 documented infestations of this plant within the PRISM. Ten new infestations of this plant were documented in 2018.
- [Glossy buckthorn \(PRISM Invasiveness Ranking = High\)](#) is a deciduous shrub or small tree that can exceed 20 feet in height. Much like common buckthorn, it produces small glossy, black berries that are dispersed long distances by birds. Dense infestations shade out native plants and can impact forest regeneration. It readily invades areas of disturbance such as roadsides, grasslands, forest edges and canopy openings. No infestations have been mapped to-date in the PRISM, but the species is known to be present in limited abundance. Efforts to more comprehensively document the distribution of glossy buckthorn in natural areas will commence in 2019.
- [Giant hogweed \(PRISM Invasiveness Ranking = High\)](#) is a large herbaceous biennial that can reach 15 feet in height and contains phytotoxic sap that can cause severe skin burns upon contact. It readily invades drainage ditches, grasslands/fields, and yards. There are currently 16 documented infestations of this plant within the PRISM. There were no new infestations of this plant documented in 2018.

Terrestrial Invasive Animals

The Terrestrial Project surveys for three target terrestrial invasive animals known to be present in the PRISM, based on their high or very high NYS invasiveness rankings: emerald ash borer (*Agrilus planipennis*), hemlock woolly adelgid (*Adelges tsugae*) and sirex woodwasp (*Sirex noctilio*). As of 2018, there are two mapped infestations of these animals in the PRISM (Map 3)

- [Emerald ash borer \(NYS Threat Ranking Assessment Score = Very High\)](#) is a small emerald green beetle that is extremely destructive to ash trees in the *Fraxinus* genus. Extensive larval feeding activity cuts off nutrients and water flow throughout the tree, causing mortality. Emerald ash borer was confirmed in the PRISM for the first time in 2017 in northern Franklin County. There were no new infestations of this species documented in 2018.
- [Hemlock woolly adelgid \(NYS Threat Ranking Assessment Score = High\)](#) is a small insect that inserts its piercing-sucking mouthpiece into the twig tissue near the base of hemlock needles. The hemlock tree responds by walling off the wound. When this compartmentalization action is repeated on a large scale in response to heavy adelgid infestation, nutrient and water flow is cut off within the tree, resulting in rapid mortality. The first infestation of hemlock woolly adelgid in the Adirondack PRISM was confirmed on Prospect Mountain near Lake George in 2017. There were no new infestations of this species documented in 2018.
- [Sirex wood wasp \(NYS Threat Ranking Assessment Score = High\)](#) is a pest of a wide variety of pine species and causes damage by laying its eggs underneath the bark of the host tree. Upon oviposition, the insect may also deposit a fungus that serves as a food source for its larvae but is toxic to the host tree. Comprehensive surveys for sirex woodwasp have not been completed, but the insect is presumed to be widespread in the PRISM.



APIPP's Terrestrial Project Coordinator, Zack Simek, deploys an EAB trap near Meacham Lake Campground – Brighton

Watched Species – Potential Threats

This section describes high priority species threats approaching the Adirondack PRISM

Aquatic Invasive Plants

The Aquatic Project remains vigilant for one aquatic invasive plant that is present in NYS but has not yet been documented in the PRISM, and has a very high PRISM invasiveness ranking: hydrilla (*Hydrilla verticillata*).

- [Hydrilla \(PRISM Invasiveness Ranking = Very High\)](#) is a submerged aquatic plant that can quickly form an impenetrable mat that completely clogs waterways and restricts water flow, posing significant threats to aquatic ecosystems and recreational resources. Hydrilla was first discovered in 2008 in a small pond in Orange County and has since been discovered in Broome, Cayuga, Erie, Kings, Monroe, Nassau, Niagara, Suffolk, Tioga, Tompkins, and Westchester Counties.

Small-bodied Aquatic Invasive Animals

The Aquatic Project remains vigilant for two small-bodied aquatic invasive animals that are present in NYS but have not yet been documented in the PRISM, and have high or very high NYS invasiveness rankings: rusty crayfish (*Orconectes rusticus*) and quagga mussel (*Dreissena rostriformis bugensis*).

- [Quagga mussel \(NYS Threat Ranking Assessment Score = Very High\)](#) is an invasive freshwater mussel that is an extremely efficient filter feeder, outcompeting native species for food. It also clogs water intake pipes and underwater screens. Quagga mussels were first reported in the Great Lakes in 1989 and have since been documented in multiple waterways including the Erie Canal, the St. Lawrence River, the Hudson River, Oneida Lake, and eight of the Finger Lakes.
- [Rusty crayfish \(NYS Threat Ranking Assessment Score = High\)](#) is an invasive crayfish that displaces native crustaceans and reduces native aquatic plant abundance and diversity. In 2018, rusty crayfish were discovered in two lakes southwest of the PRISM: Oneida Lake and the Delta Lake Reservoir. It is widespread throughout much of southern and central New York State.



AIS Early Detection Team Survey – East Caroga Lake, Fulton County

Terrestrial Invasive Plants

The Terrestrial Project remains vigilant for six terrestrial invasive plants that are present in NYS but have not yet been documented in the PRISM, and have high or very high PRISM invasiveness rankings: mile-a-minute vine (*Persicaria perfoliatum*), slender falsebrome (*Brachypodium sylvaticum*), wineberry (*Rubus phoenicolasius*), Japanese stiltgrass (*Microstegium vimineum*), Japanese angelica tree (*Aralia elata*), and porcelain berry (*Ampelopsis brevipedunculata*).

- [Mile-a-minute \(PRISM Invasiveness Ranking = Very High\)](#) is an herbaceous vine that, as its name suggests, grows at astonishing rates - 6 inches per day under ideal conditions. It forms dense mats that cover and shade out lower growing vegetation. Mile-a-minute is widespread in the lower Hudson Valley, with additional isolated infestations in Genesee, Cattaraugus, Livingston, Albany, and Broome Counties.
- [Slender false brome \(PRISM Invasiveness Ranking = Very High\)](#) is a perennial bunchgrass that grows up to 2.5 feet tall in dense clumps that outcompete native vegetation. Plants produce an ample quantity of seed that can be spread long distances by animals and humans. It is currently known to occur in many central and western NYS counties, with additional isolated infestations in Dutchess County.
- [Wineberry \(PRISM Invasiveness Ranking = Very High\)](#) is a spiny shrub in the raspberry family that quickly grows into dense thickets that exclude native vegetation. It is widespread in southern NYS, with isolated infestations in Niagra, Jefferson, and Tompkins County.
- [Japanese stiltgrass \(PRISM Invasiveness Ranking = Very High\)](#) is a low growing annual grass that readily invades areas of disturbance such as trailheads, recreation areas, and roadsides. The invasiveness of Japanese stiltgrass is exacerbated in areas with high deer densities where it grows in very dense mats that crowd and shade out native vegetation. Japanese stiltgrass is currently widespread throughout most of southern NYS. It occurs in close proximity to the Adirondack PRISM boundary in Saratoga County.
- [Japanese angelica tree \(PRISM Invasiveness Ranking = Very High\)](#) is a fast-growing deciduous tree that can exceed 40-feet in height. It spreads easily from ornamental plantings via animal dispersed seed, forming dense monocultures that exclude native vegetation. Japanese angelica tree is widespread throughout most of southern NYS, with isolated infestations in Delaware, Saratoga, and Chataugua Counties.
- [Porcelain berry \(PRISM Invasiveness Ranking = High\)](#) is a climbing woody vine that forms dense mats that climb into the forest canopy, shading out native vegetation. It is widespread throughout most of southern NYS, with isolated infestations in Tompkins, St. Lawrence, and Saratoga Counties.

Terrestrial Invasive Animals

The Terrestrial Project remains vigilant for two terrestrial invasive animals that are present in NYS but have not yet been documented in the PRISM, and have high or very high NYS invasiveness rankings: Eurasian Boar (*Sus scrofa*) and Asian long-horned beetle (*Anoplophora glabripennis*).

- [Eurasian boar \(NYS Threat Ranking Assessment Score = Very High\)](#) is an aggressive wild pig species that can be extremely destructive to fields and agricultural areas. Eurasian boar compete with native wildlife for food and habitat and are known to carry numerous diseases. They were previously known to occur in six counties across NYS, including an infestation

within the PRISM in Clinton County. All historic infestations within the PRISM have been deemed locally eradicated.

- [Asian long-horned beetle \(NYS Threat Ranking Assessment Score = High\)](#) is a large beetle that attacks a wide suite of hardwood trees. Adult beetles lay their eggs underneath the bark and when the larvae hatch, they feed on the cambium and heartwood, girdling and killing the tree. Asian long-horned beetle is present in NYS on Long Island.

TAKE THESE SIMPLE STEPS TO KEEP INVASIVES OUT WHEN GARDENING, LANDSCAPING OR FARMING

- ✓ Use only native or non-invasive plants in your gardens and landscaping. Most invasive plants are labeled as such. Check the label before buying.
- ✓ Use clean, weed-free mulch, topsoil and fill from local sources for gardening, landscaping, farming and construction. Bagged potting soil and mulch are usually safe.
- ✓ Be sure that plants, produce and livestock are clean and invasive-free before selling or transporting.
- ✓ Clean your tools and equipment before they are used on another farm or in someone else's yard.

Take our Pledge and learn all the steps you can take to Keep Invasive Species Out of the places you love at: KeepInvasiveSpeciesOut.com

SPECIES TO WATCH OUT FOR

THE FOLLOWING INVASIVE SPECIES HAVE BEEN FOUND IN ADIRONDACK YARDS, GARDENS AND FARMS, OR COULD BE TRANSPORTED HERE.

TO LEARN MORE ABOUT THESE INVASIVES AND HOW TO ID THEM, VISIT ADKINVASIVES.COM
TO REPORT AN INVASIVE SPECIES INFESTATION, PLEASE VISIT NYMAPINVASIVES.ORG

TAKE THESE SIMPLE STEPS TO KEEP INVASIVES OUT WHEN ENJOYING ADIRONDACK WATERS

- ✓ Clean, Drain and Dry your boat, trailer, waders and other gear after every boating or fishing trip. Find a FREE boat wash station at adkcleanboats.com.
- ✓ Do not take wild fish from one waterbody and release into another.
- ✓ Buy certified bait from a local dealer or collect bait where you are fishing. When done, release caught bait back into the same waterbody and dispose of purchased bait and worms in the trash.

Take our Pledge and learn all the steps you can take to Keep Invasive Species Out of the places you love at: KeepInvasiveSpeciesOut.com

SPECIES TO WATCH OUT FOR

THE FOLLOWING INVASIVE SPECIES HAVE ALREADY BEEN FOUND IN ADIRONDACK WATERS, OR COULD BE TRANSPORTED HERE.

TO LEARN MORE ABOUT THESE INVASIVES AND HOW TO ID THEM, VISIT ADKINVASIVES.COM
TO REPORT AN INVASIVE SPECIES INFESTATION, PLEASE VISIT NYMAPINVASIVES.ORG

TAKE THESE SIMPLE STEPS TO KEEP INVASIVES OUT WHEN ENJOYING ADIRONDACK LANDS

- ✓ Remove dirt and plant material from anything that gets dirty after every outdoor adventure. Don't forget your dogs and horses.
- ✓ Stay on the trail. Wandering off can increase your likelihood for picking up seeds you don't want to spread.
- ✓ Use local firewood to prevent tree pests and diseases from spreading to new areas.
- ✓ Use local hay to feed your horse when riding, and pick up and dispose of any leftover hay along the way to avoid spreading seeds.

Take our Pledge and learn all the steps you can take to Keep Invasive Species Out of the places you love at: KeepInvasiveSpeciesOut.com

SPECIES TO WATCH OUT FOR

THE FOLLOWING INVASIVE SPECIES HAVE ALREADY BEEN FOUND IN ADIRONDACK FORESTS AND FIELDS, OR COULD BE TRANSPORTED HERE.

TO LEARN MORE ABOUT THESE INVASIVES AND HOW TO ID THEM, VISIT ADKINVASIVES.COM
TO REPORT AN INVASIVE SPECIES INFESTATION, PLEASE VISIT NYMAPINVASIVES.ORG

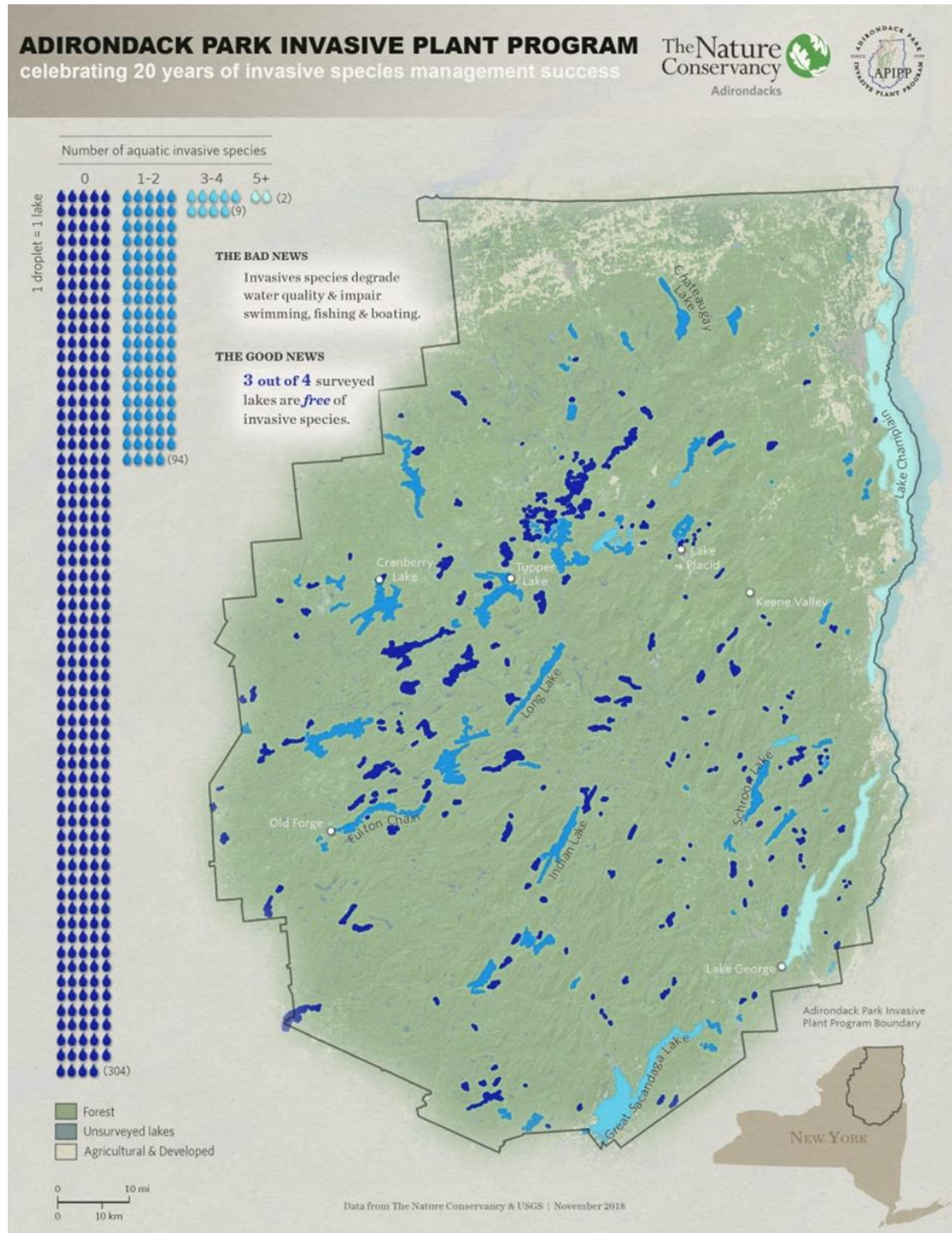
Target and Watched Species Featured in APIPP's New Keep Invasive Species Out Brochures

Regional Invasive Species Distribution

This section describes the known distribution of target invasive species in the PRISM.

Aquatic Invasive Species*

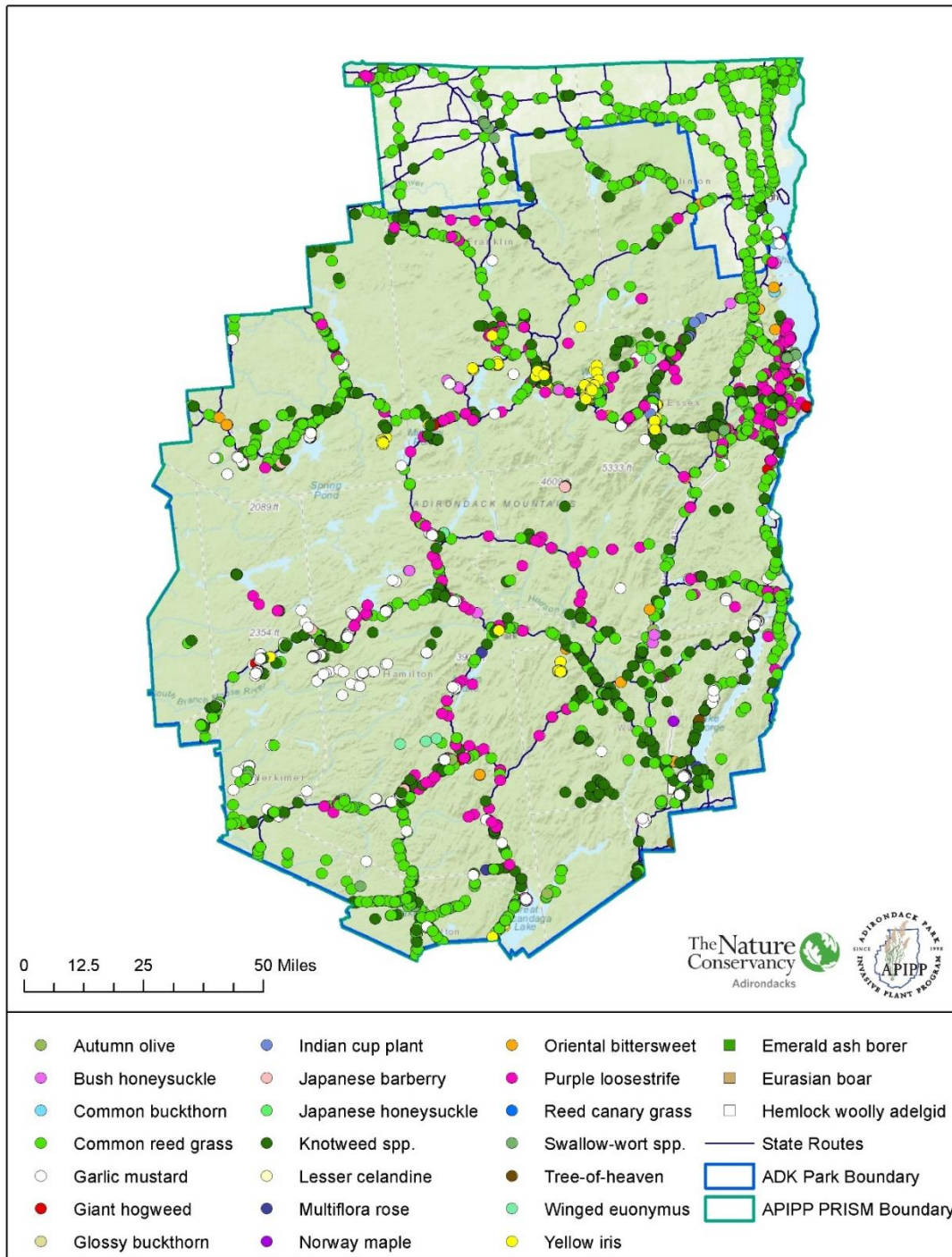
- In 17 seasons, more than 817 APIPP volunteers and response team members surveyed 409 distinct Adirondack waterways, finding 105 to contain one or more target AIS with 304 free of AIS (Map 2).



Map 2: Distribution and number of AIS in the Adirondack PRISM

Terrestrial Invasive Species*

- A total of 4,677 target terrestrial invasive species infestations have been mapped spatially as of 2018 (Map 3).



Map 3: Distribution of target terrestrial invasive species in the Adirondack PRISM.

*Lake and landscape-specific distribution information can be accessed on [APIPP's Interactive Invasive Species Distribution WebMap](#).

Prevention

This section describes efforts by APIPP staff and partners to prevent new invasions into the PRISM

Aquatic Invasive Species

- APIPP collaborated with the Paul Smith's College Adirondack Watershed Institute (AWI), NYS DEC, and other regional partners to advance the fourth year of the [Adirondack AIS Prevention Program](#) which staffed boat launch stewards at 51 priority launches and operated 27 regional boat inspection and decontamination stations. In total 98,216 courtesy watercraft inspections were performed upon launch or retrieval resulting in 4,617 visible AIS being intercepted. 3,455 decontaminations were performed on boats that visited or were referred to decontamination stations.
- APIPP collaborated with NYS DOT to begin construction of a premier boat inspection and decontamination station at the newly renovated I-87 Northway Adirondack Welcome Center in Glens Falls. The new station is set to open by Memorial Day, 2019 and will service boaters traveling north into the Adirondacks from more highly invaded southern waters. A [predictive analysis](#) conducted by Ryerson University in collaboration with APIPP in 2017 identified the Northway as the primary vector for the overland transport of AIS into the Adirondack region.

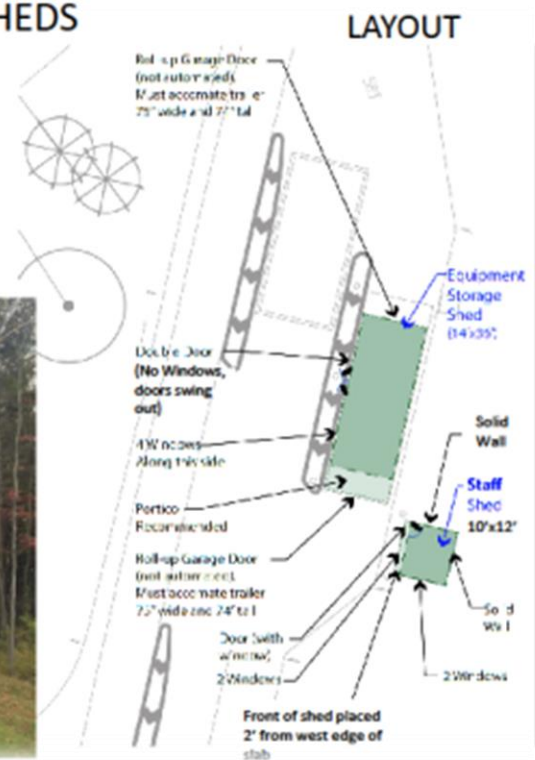
ADIRONDACK WELCOME CENTER BOAT WASH SHEDS



Shed design draws on detailing of new Center, to make the boat wash experience integral to a visit



Visualization of Equipment Storage and Staff Sheds in place



NYS DOT Design Renderings for Adirondack Welcome Center Boat Inspection & Decontamination Station – Glens Falls

Surveillance

This section describes efforts by APIPP staff and partners to detect new infestations of target and watched species

Aquatic Invasive Plants*

2018 marked the 17th season in which the Aquatic Project coordinated regional aquatic invasive plant surveillance activities. Seventy-three volunteers and two response team members surveyed 63 Adirondack waterways for aquatic invasive species (Figure 2). Since 2002, the program has retained on average 93 core volunteers and recruited 48 new volunteers each year (Figure 3). Through these combined surveillance efforts, two newly invaded lakes were documented in 2018, Moody Pond and Penfield Pond. Penfield Pond is downstream of Putnam Pond which was documented to be infested by Eurasian Watermilfoil in 2004. Neither waterbody has AIS spread prevention programming in place.

- Moody Pond (Essex County) - Eleven infestations of Eurasian watermilfoil were mapped in August, totaling approximately 0.5-acres.
- Penfield Pond (Essex County) - An established infestation of Eurasian watermilfoil was confirmed by an APIPP volunteer in 2018.

Small-bodied Aquatic Invasive Animals*

2018 marked the sixth season in which the Aquatic Project coordinated regional small-bodied aquatic invasive animal surveillance activities. APIPP's AIS early detection team, staff, and partners conducted zooplankton tows on 31 prioritized lakes and sediment sieves in 32 lakes containing sandy areas with no new infestations of small-bodied aquatic invasive animals discovered. 2018 also marked the seventh season of the lake-wide Asian clam survey conducted by the Lake George Park Commission (LGPC) on Lake George. One new infestation was confirmed this summer, bringing the total number of invaded sites in Lake George to 24.

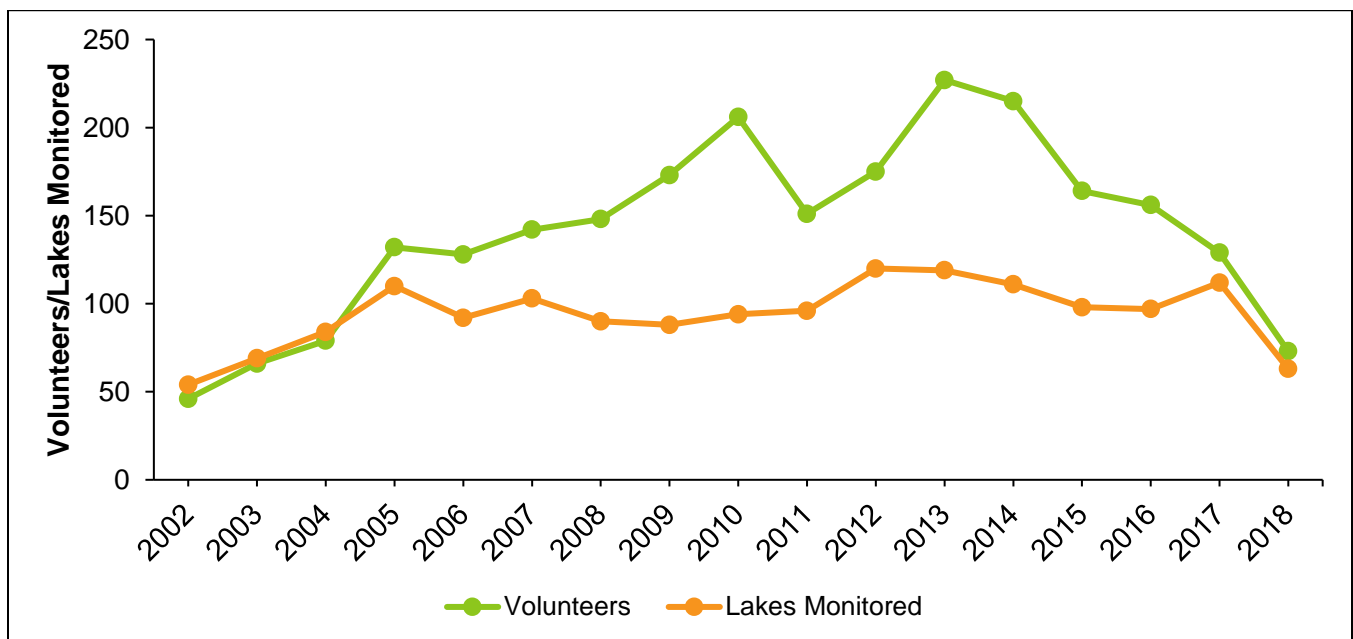


Figure 2: Number of lakes surveyed and aquatic project volunteers engaged annually

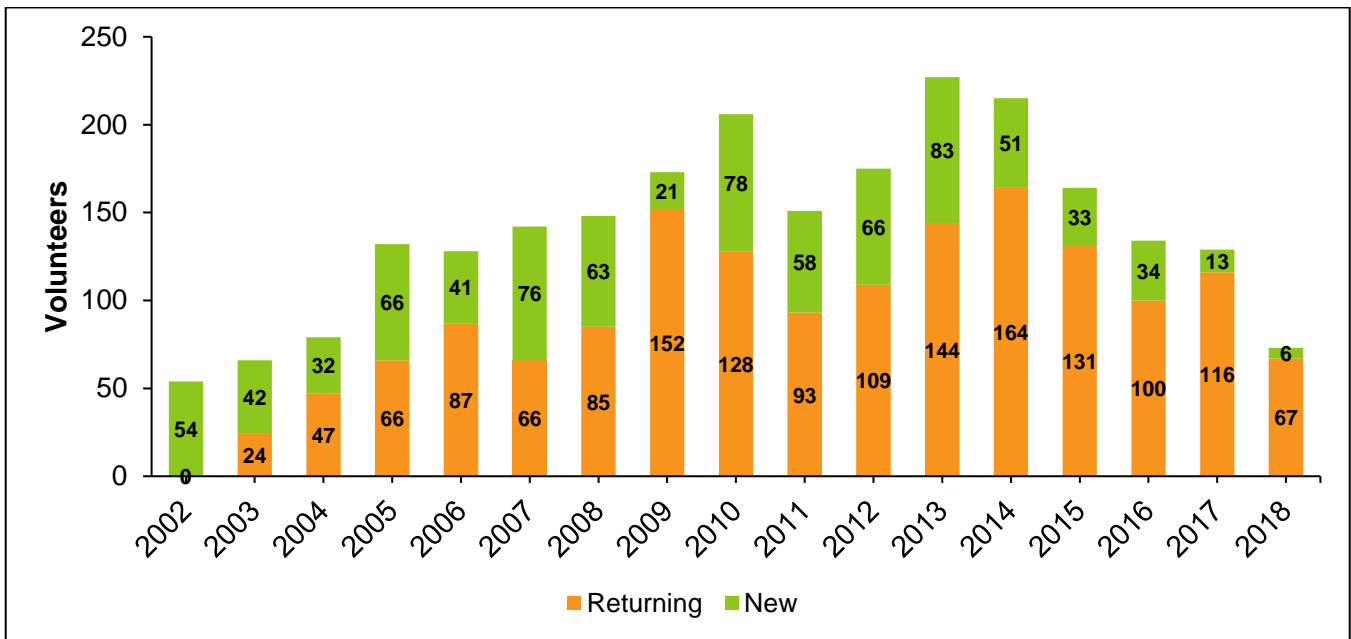


Figure 3: Number of new and returning aquatic surveillance volunteers annually

**All 2018 survey data could not be incorporated into this report by the submittal deadline due to APIPP's AIS Project Coordinator being on leave. This section will be updated with full 2018 survey metrics in the spring of 2019.*

Terrestrial Invasive Plants

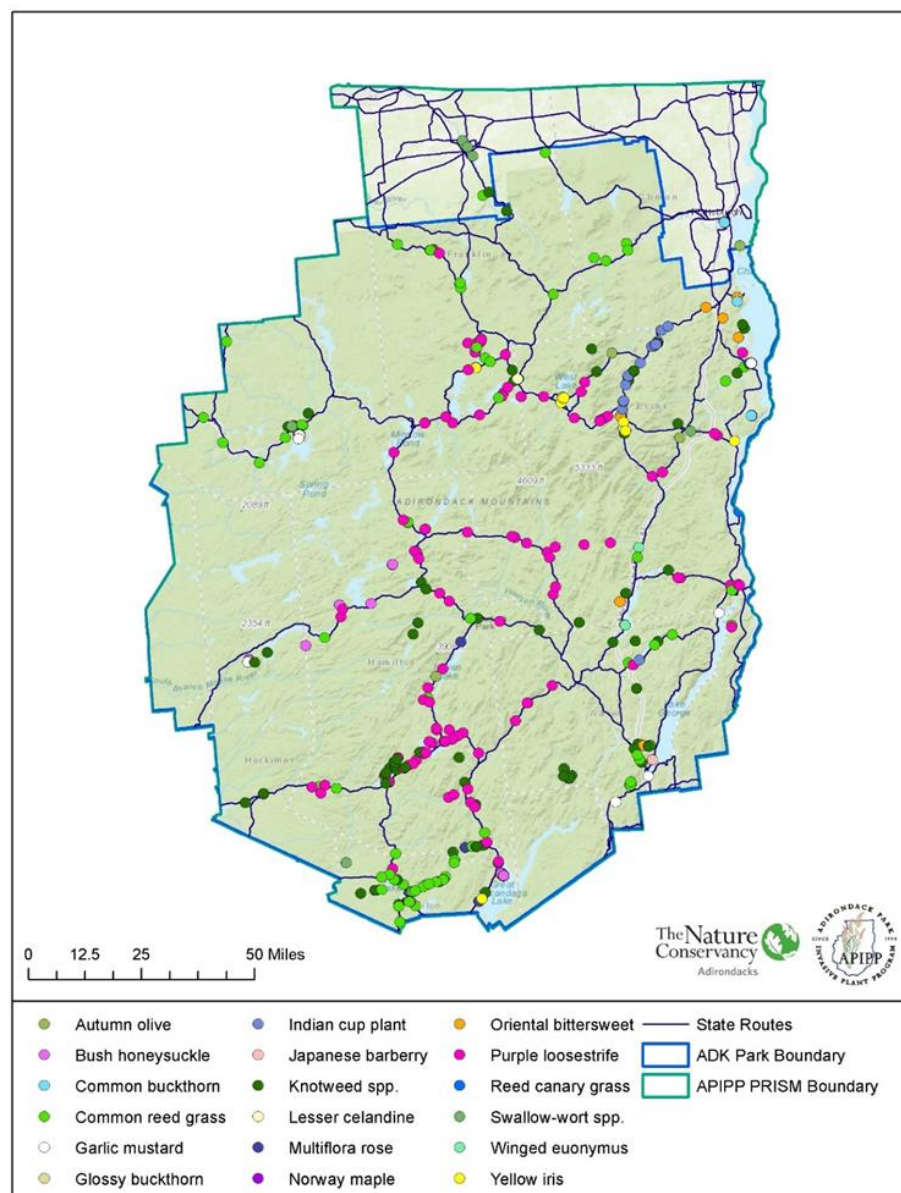
2018 marked the 8th season in which the Terrestrial Project coordinated regional terrestrial invasive plant surveillance activities. APIPP's terrestrial response team, invasive species campground manager, staff and partners surveyed 37 NYS DEC land-based campgrounds, sections of 44 Forest Preserve units, and part or all of 44 state and county road corridors within the PRISM. The total number of new target terrestrial invasive plant infestations, confirmed through these surveillance activities, are listed below (Map 4). Four new infestations of a watched invasive plant species (lesser celandine) were confirmed in 2018.

- Purple loosestrife – 118 infestations
- Common reed grass – 111 infestations
- Knotweed spp. – 97 infestations
- Bush honeysuckle – 46 infestations
- Japanese barberry – 45 infestations
- Indian cup plant – 41 infestations
- Autumn olive – 21 infestations
- Black swallow-wort – 13 infestations
- Oriental bittersweet – 12 infestations
- Garlic mustard – 12 infestations
- Multiflora rose – 12 infestations
- Common buckthorn – 8 infestations

- Yellow iris – 10 infestations
- Reed canary grass – 5 infestations
- Winged burning bush – 5 infestations
- Lesser celandine – 4 infestations
- Norway maple – 3 infestations

Terrestrial Invasive Animals

2018 marked the 4th season in which the Terrestrial Project coordinated with partners from the Adirondack Mountain Club and New York State Hemlock Initiative to train volunteers on forest pest identification, survey techniques and reporting. Volunteers, APIPP staff and partners surveyed approximately 15 forest areas for APIPP’s target and watched invasive animals. No new infestations of target invasive animals were detected in 2018 (Map 4).



Map 4: Distribution of newly detected target terrestrial invasive species infestations in the Adirondack PRISM.

Early Detection & Rapid Response

This section describes efforts by APIPP staff and partners to eradicate new infestations.

Aquatic Invasive Species

The Aquatic Project detected 136 infestations of target AIS in 2018 that were under 0.1 acres in size. None were isolated infestations to a single water body and therefore were not prioritized for management. The Aquatic Project performed follow-up management actions on one pioneer infestation of target aquatic invasive plants totaling .0008 acres. This infestation was under 0.1 acre in size upon initial discovery and had invasive plants persisting in 2018 after past management actions.

- Water Chestnut – One infestation totaling .0008 acres was managed in Lake Alice (Clinton County) via hand pulling.

Terrestrial Invasive Species

The Terrestrial Project detected 353 new infestations of target terrestrial invasive plants in 2018 that were each under 0.1 acres in size. The Terrestrial Project was able to perform rapid response management on 134 of these infestations totaling 0.7 acres having acquired the proper permissions and/or permits.

- Purple loosestrife – Sixty-two infestations were managed. Eight were treated with herbicide, one received a biocontrol release, and 53 were managed mechanically via hand-pulling or digging, totaling 0.43 acres.
- Swallow-wort spp. – Four infestations were managed. Two were treated with herbicide and two were removed via digging, totaling 0.11 acres.
- Common reed grass – Twenty-five infestations were treated with herbicide, totaling approximately 0.09 acres.
- Japanese knotweed – Thirteen infestations were managed. One infestation was managed mechanically via digging and 12 were treated with herbicide, totaling 0.03 acres.
- Garlic mustard - Ten infestations were managed mechanically via hand-pulling, totaling 0.02 acres.
- Lesser celandine – Three infestations were treated with herbicide, totaling 0.02 acres.
- Bush honeysuckle – Four infestations were managed mechanically via hand-pulling or digging, totaling 0.007 acres.
- Autumn olive – Three infestations were managed mechanically via digging, totaling 0.001 acres.
- Yellow iris – Seven infestations were managed mechanically via digging, totaling 0.001 acres.
- Japanese barberry – One infestation was managed mechanically via digging totaling 0.00004 acres.
- Reed canary grass – One infestation was managed mechanically via digging, totaling 0.00002 acres.
- Oriental bittersweet – One infestation was managed mechanically via hand-pulling, totaling 0.000002 acres.

The Terrestrial Project performed follow-up management actions on 485 pioneer infestations of target terrestrial invasive plants totaling 7.9 acres. These infestations were under 0.1 acres in size upon initial discovery and had invasive plants persisting in 2018 after past management actions.

- Common reed grass – One-hundred sixty infestations received follow-up management. Five infestations were managed mechanically via hand pulling or digging and 155 were treated with herbicide, totaling 2.1 acres.
- Knotweed spp. – One-hundred twenty-nine infestations received follow-up management via herbicide treatment, totaling 2 acres.
- Garlic mustard – One-hundred seven infestations received follow-up management via hand pulling, totaling 1.7 acres.
- Purple loosestrife – Thirty-three infestations received follow-up management. Twelve were treated with herbicide and 21 were managed mechanically via hand-pulling or digging, totaling 1.5 acres.
- Yellow iris – Thirty-eight infestations received follow-up management. Twelve were treated with herbicide and 26 were managed mechanically via hand pulling or digging, totaling 0.46 acres.
- Swallow-wort spp. – Three infestations received follow-up management via herbicide treatment, totaling 0.09 acres.
- Tree of heaven – One infestation received follow-up management via herbicide treatment, totaling 0.08 acres.
- Giant hogweed – Four infestations received follow-up management. Three were managed mechanically via digging and one was treated with herbicide, totaling 0.07 acres.
- Bush honeysuckle – Five infestations received follow-up management via digging, totaling 0.001 acres.
- Japanese barberry – Two infestations received follow-up management via digging, totaling 0.0001 acres.
- Oriental bittersweet – Two infestations received follow-up management via hand-pulling, totaling 0.0006 acres.
- Autumn olive – One infestation received follow-up management via cutting, totaling 0.00001 acres.
- Hemlock woolly adelgid – In collaboration with the NYS DEC, the Terrestrial Project completed the second year of management for the first confirmed infestation of hemlock woolly adelgid in the PRISM, located on Prospect Mountain near Lake George. APIPP and NYS DEC staff performed prophylactic basal bark insecticide applications on 116 trees over approximately seven acres to provide long-term protection against future invasion. No live adelgids were detected in 2018.

Ongoing Management

This section describes efforts by APIPP staff and partners to suppress or contain established infestations.

Aquatic Invasive Species

Ongoing mechanical and manual management for target aquatic invasive species infestations is underway throughout the region by various lake association and municipal partners. A list of water bodies receiving ongoing management by species is provided below.

- **Eurasian watermilfoil** – Augur Lake, Brant Lake, Caroga Lake, Chateaugay Lake, Chazy Lake, Fish Creek Ponds, Hadlock Pond, Kiwassa Lake, Lake Colby, Lake George, Lake Luzerne, Loon Lake, Minerva Lake, Mountain View Lake, Paradox Lake, Schroon Lake, and Upper Saranac Lake
- **Variable-leaf watermilfoil** – Fish Creek Ponds, Lake Placid, Long Lake, Raquette Lake, and Upper Saranac Lake
- **Water chestnut** – Hadlock Pond and Lake Champlain
- **Zebra mussels** – Lake George

Terrestrial Invasive Species

The Terrestrial Project performed follow-up management on 108 established infestations of target terrestrial invasive plants, totaling approximately 36.3 acres. These infestations were over 0.1 acres in size upon initial discovery and had invasive plants persisting in 2018 after past management actions. A list of infestations managed by species is provided below.

- Common reed grass – Forty-one infestations received follow-up treatment with herbicide, totaling 8.7 acres.
- Knotweed spp. – Thirty-four infestations received follow-up treatment with herbicide, totaling 5.9 acres.
- Garlic mustard - Two infestations received follow-up management via hand pulling, totaling 4.1 acres.
- Yellow iris - Six infestations received follow-up management. Five were managed mechanically via digging or hand-pulling and one was treated with herbicide, totaling approximately 8.3 acres.
- Purple loosestrife - Thirteen infestations received follow-up management. Seven were treated with herbicide and six were managed mechanically via hand-pulling or digging, totaling 3.9 acres.
- Black swallow-wort - Ten black swallow-wort infestations received follow-up treatment with herbicide, totaling 3.7 acres.
- Lesser celandine - One lesser celandine infestation was treated with herbicide, totaling 0.1 acres.
- Oriental bittersweet - One oriental bittersweet infestation received follow-up treatment with herbicide, totaling 1.6 acres.
- The Terrestrial Project completed year three of mechanical management for several lower priority invasive plants growing along the Whiteface Mountain Veterans Memorial Highway. These species are controlled at this site to protect populations of over ten rare, threatened, or endangered plants. The team removed 30 contractor bags of invasive plant material, a slight reduction from 2017.

Species Distribution & Management Trends

This section describes efforts by APIPP staff and partners to assess progress and evaluate success.

Aquatic Invasive Species Distribution Trend Analysis

- Approximately 74% of lakes and ponds surveyed by the Aquatic Project to date are free of AIS (Figure 4).
- On average four Adirondack lakes are newly documented as being invaded by AIS each year (Figure 4).

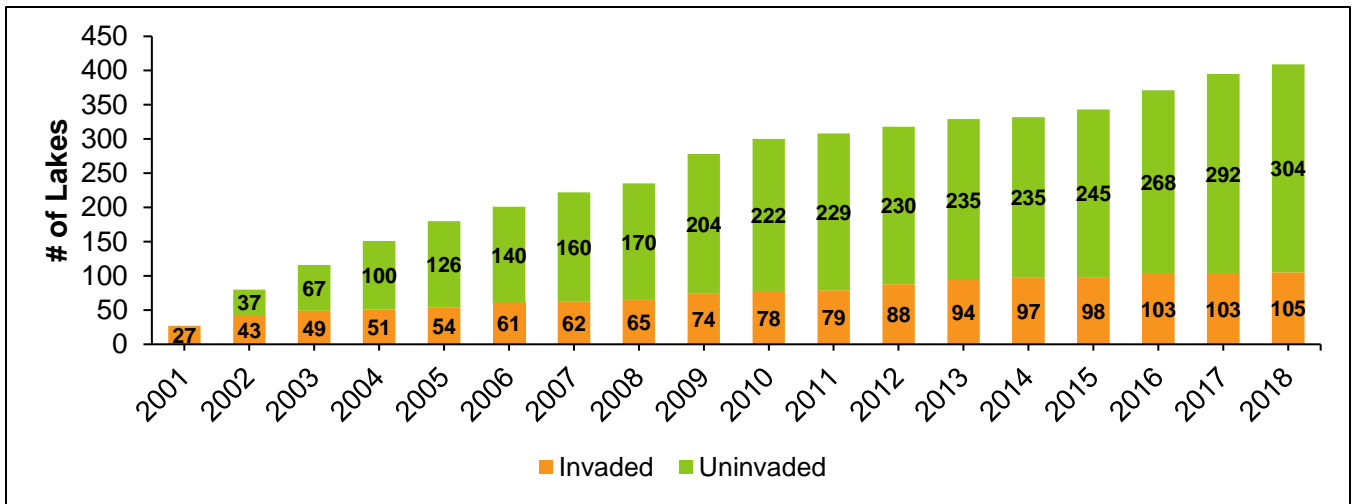


Figure 4: Lakes surveyed and confirmed to be invaded/uninvaded by AIS annually

Aquatic Invasive Species Management Trend Analysis

Water chestnut

Since the beginning of the Aquatic Project's invasive plant mapping efforts, four water chestnut infestations have been identified within the PRISM, with two prioritized for management (Lake Alice and Loon Lake). In 2018, 37 water chestnut plants were removed from Lake Alice with no plants detected in Loon Lake (Figure 5).

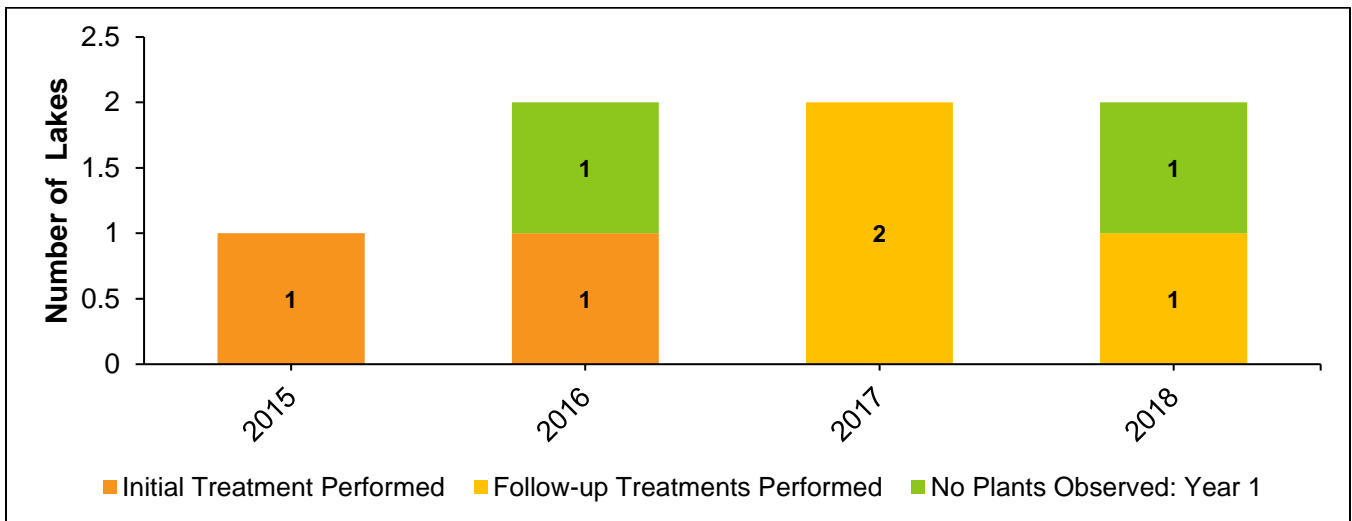


Figure 5: Progression of water chestnut management annually

Terrestrial Invasive Species Distribution Trend Analysis

- Twenty-nine of 37 surveyed land-based NYS DEC campgrounds in the Adirondacks have target terrestrial invasive plants present: 19 have garlic mustard, 18 have bush honeysuckle, 10 have purple loosestrife, while the remaining target species are present at five or fewer campgrounds (Figure 6). As of 2018, eight campgrounds had no invasive plants present.

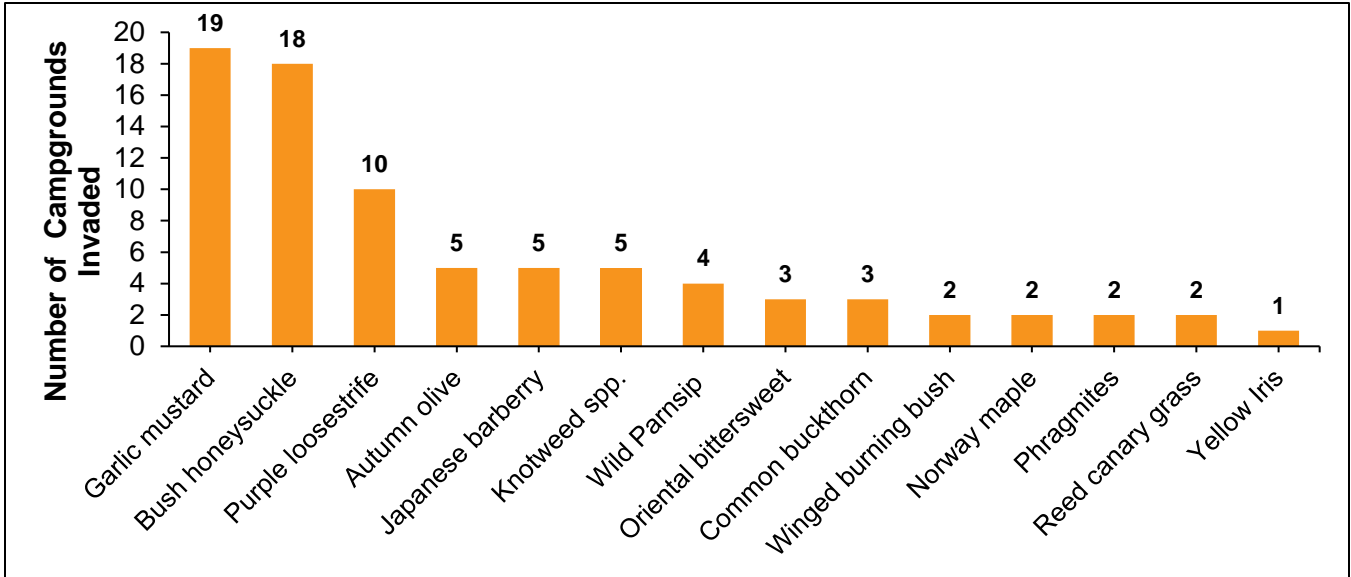


Figure 6: Number of campgrounds invaded by target terrestrial invasive species (2018).

- According to the Terrestrial Project’s invasive plant distribution database, approximately 57% of mapped target terrestrial invasive plant infestations fall within the jurisdictional right-of-ways of NYS DOT and local highway departments (Map 3).
- The extents of all target terrestrial invasive plant infestations have not been mapped; however, priority infestations are on average 0.08 acres in size upon initial discovery (Figure 7).

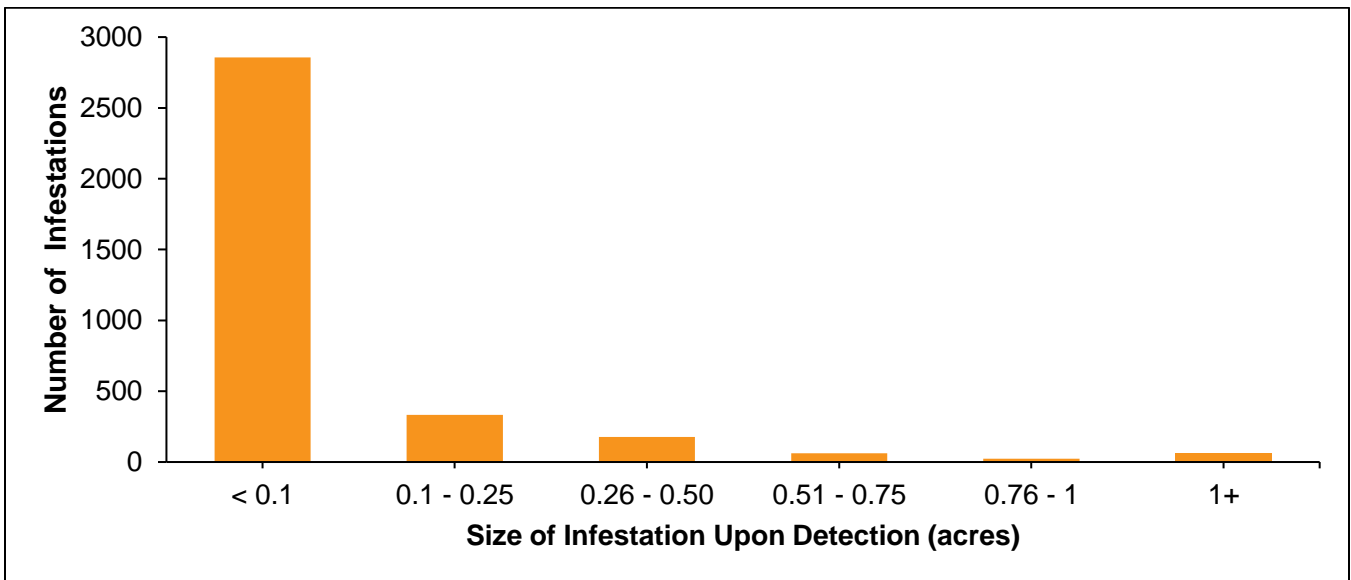


Figure 7: Acreage of target terrestrial invasive plant infestations upon detection

Terrestrial Invasive Species Management Trend Analysis

Common reed grass

Since the beginning of the Terrestrial Project's invasive plant mapping efforts, 1,541 common reed infestations have been identified within the PRISM, with 516 prioritized for management. As of 2018, 188 previously managed infestations have been deemed locally eradicated after having no common reed plants observed for at least three consecutive years. An additional 52 infestations have had no common reed plants observed for two consecutive years while 80 infestations had no plants observed for the first time in 2018 (Figure 8). To date, approximately 57% of infestations actively managed in the PRISM have no common reed observed (Figure 9).

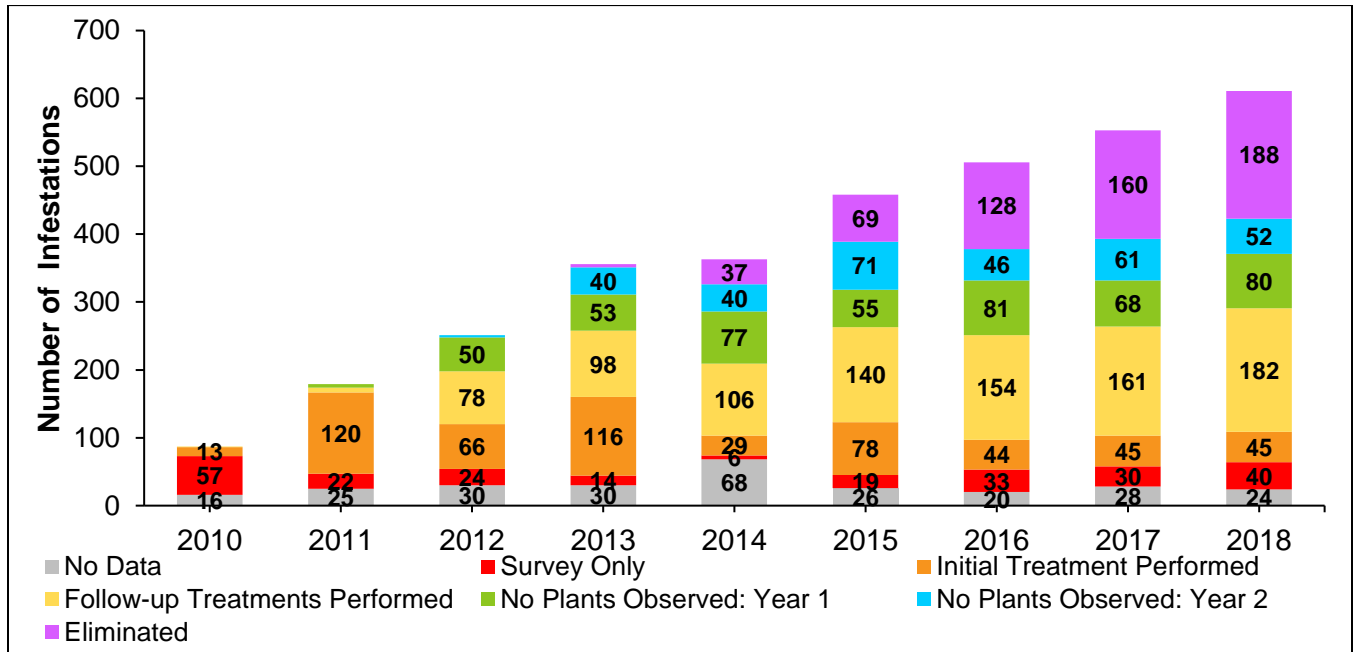


Figure 8: Progression of common reed grass management annually

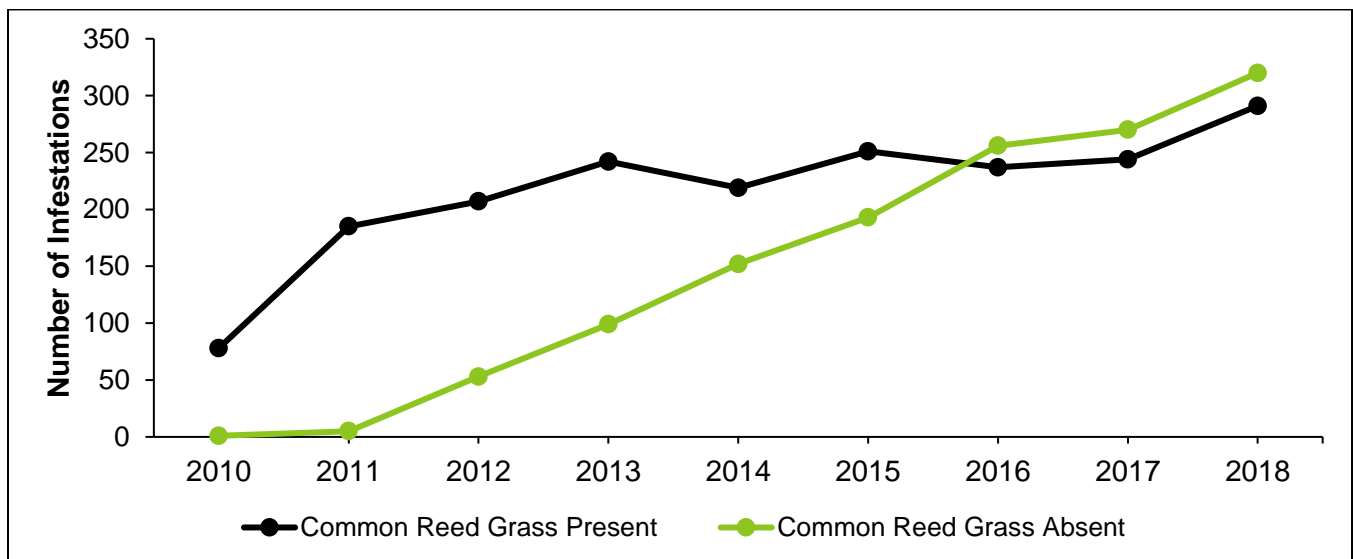


Figure 9: Management sites with common reed grass present or absent annually

Knotweed species

Since the beginning of the Terrestrial Project's invasive plant mapping efforts, 1,114 infestations of knotweed species have been identified within the PRISM, with 286 prioritized for management. As of 2018, 35 previously managed infestations have been deemed locally eradicated after having no knotweed plants observed for at least three consecutive years. An additional 15 infestations have had no knotweed plants observed for two consecutive years while 34 infestations had no plants observed for the first time in 2018 (Figure 10). To date, approximately 29% of infestations actively managed in the PRISM have no knotweed observed (Figure 11).

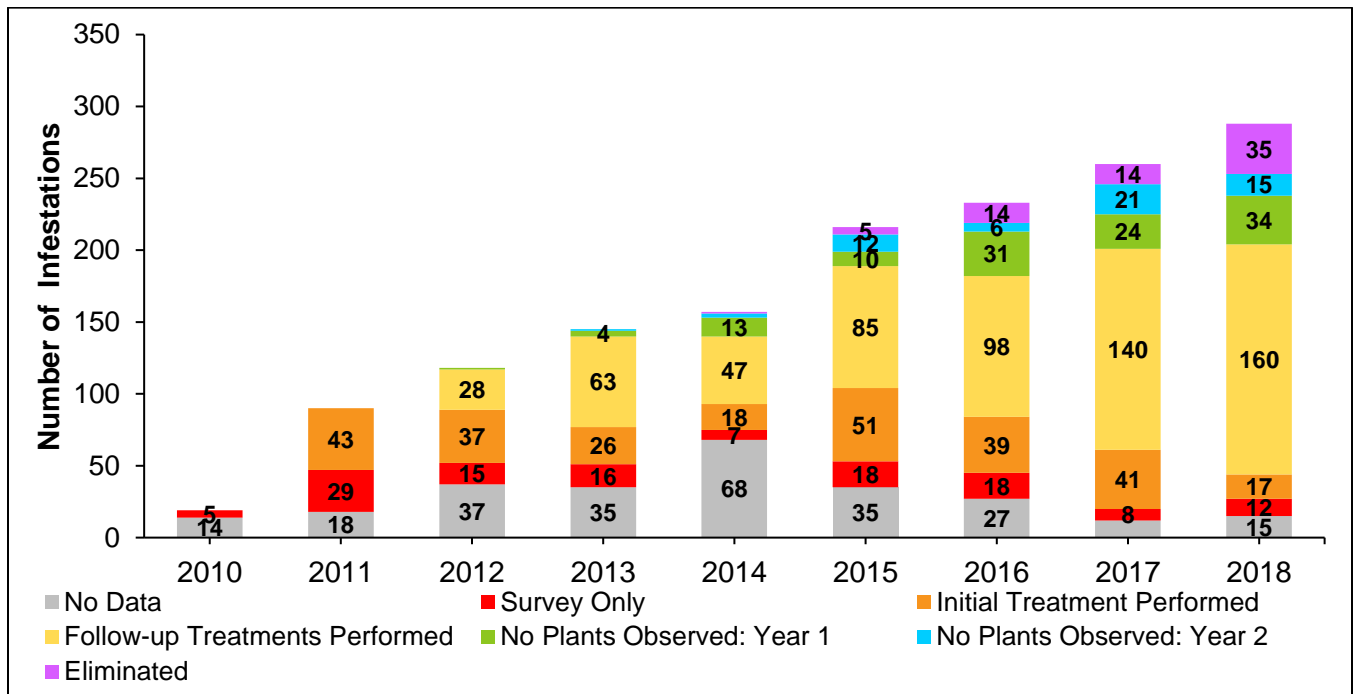


Figure 10: Progression of knotweed spp. management annually

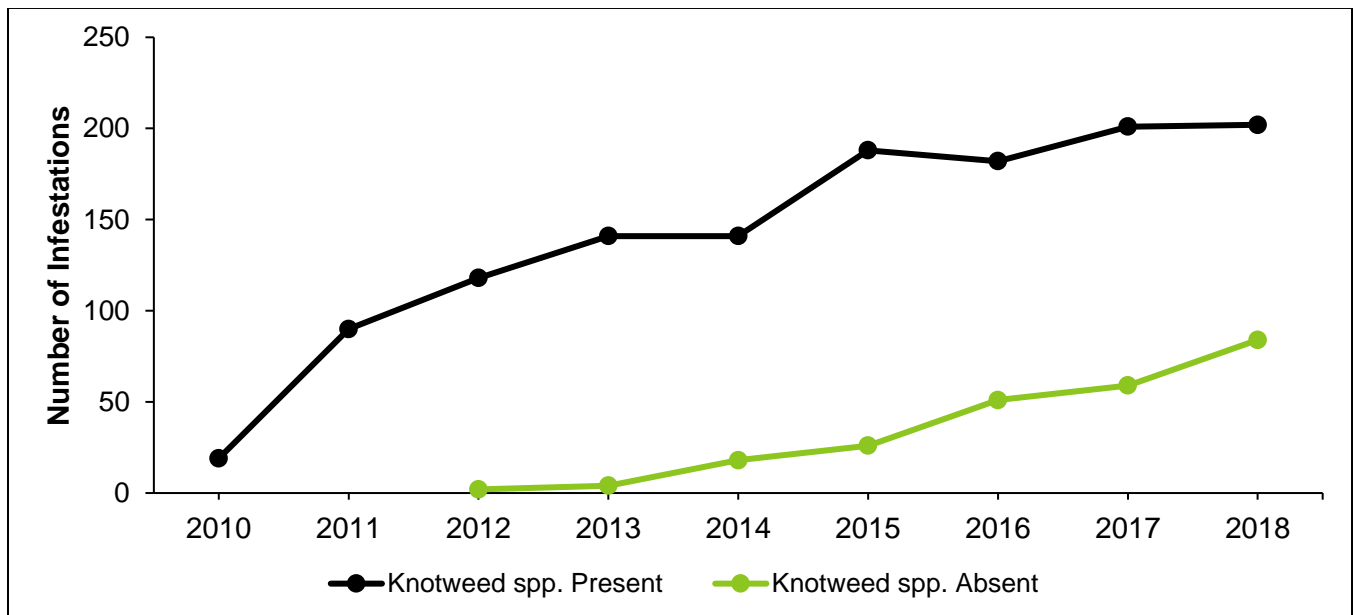


Figure 11: Management sites with knotweed spp. present or absent annually

Garlic mustard

Since the beginning of the Terrestrial Project's invasive plant mapping efforts, 867 garlic mustard infestations have been identified within the PRISM, with 601 prioritized for control at NYS DEC campgrounds and trailheads. Since 2012, the total number of garlic mustard plants removed from these facilities annually has decreased by 90%. At peak infestation levels, approximately 69% of campgrounds surveyed were invaded by garlic mustard. In 2018, only 44% of facilities visited had plants present, with most infestations significantly reduced in cover and extent. As of 2018, 485 previously managed infestations had no invasive plants observed upon follow up survey (Figure 12).

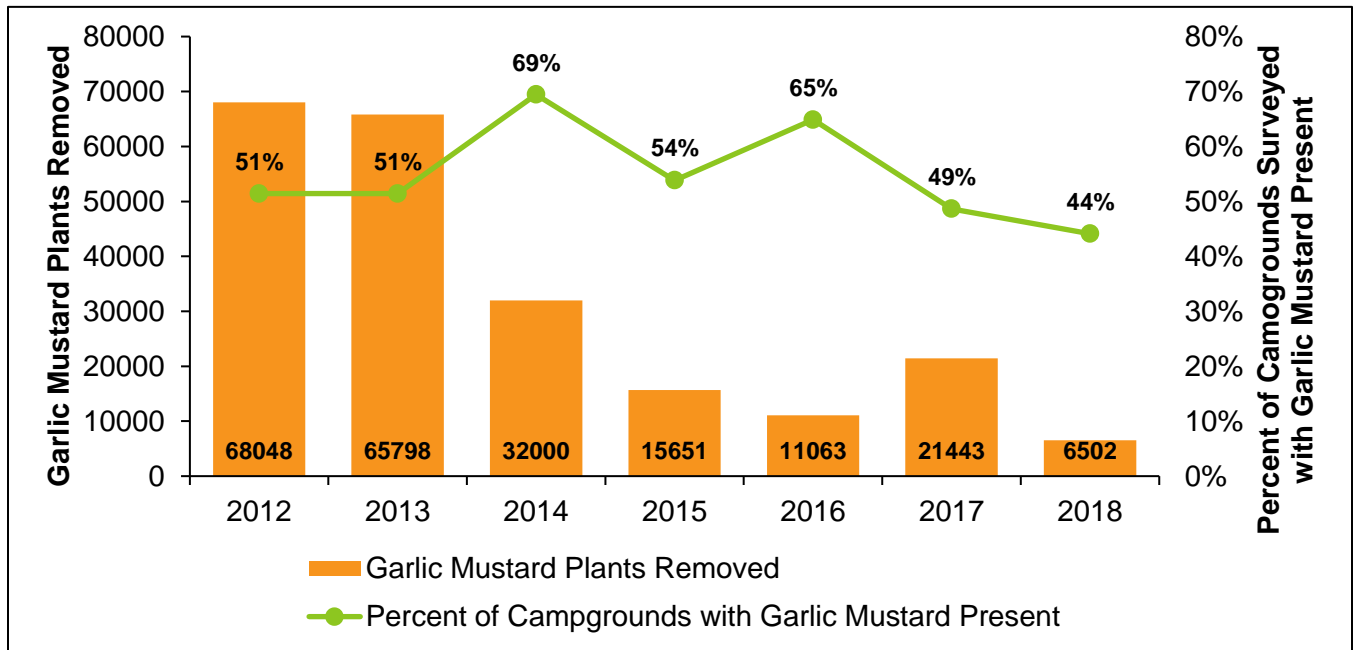


Figure 12: Progression of garlic mustard management annually at DEC campgrounds



Invasive Species Campground Steward, James Longo, removes garlic mustard from Valcour Island – Plattsburgh

Giant hogweed

Since the beginning of the Terrestrial Project's invasive plant mapping efforts, 16 giant hogweed infestations have been identified within the PRISM, with all locations prioritized for management. As of 2018, nine previously managed infestations have been deemed locally eradicated after having no giant hogweed plants observed for at least three consecutive years. One additional infestation had no giant hogweed plants observed for two consecutive years, while two sites had no plants observed for the first time in 2018. All remaining infestations were managed (Figure 13). To date, approximately 75% of infestations actively managed in the PRISM have no giant hogweed observed (Figure 14).

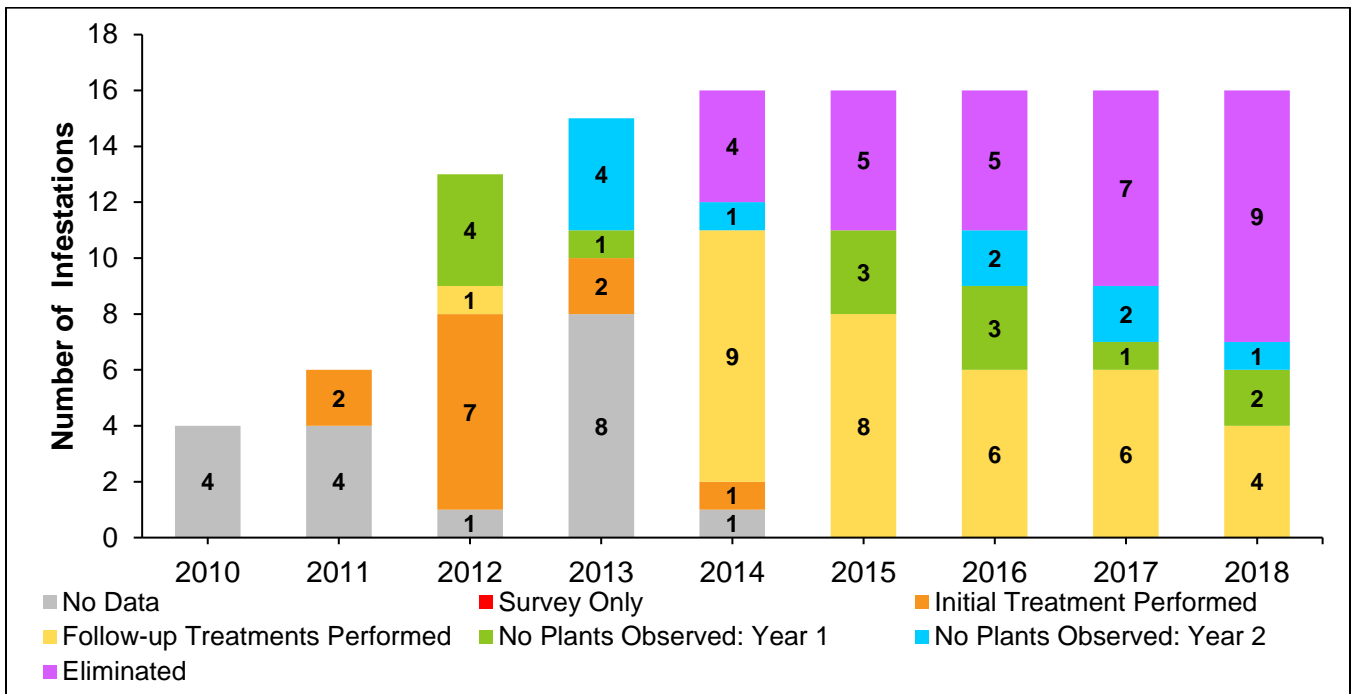


Figure 13: Progression of giant hogweed management annually

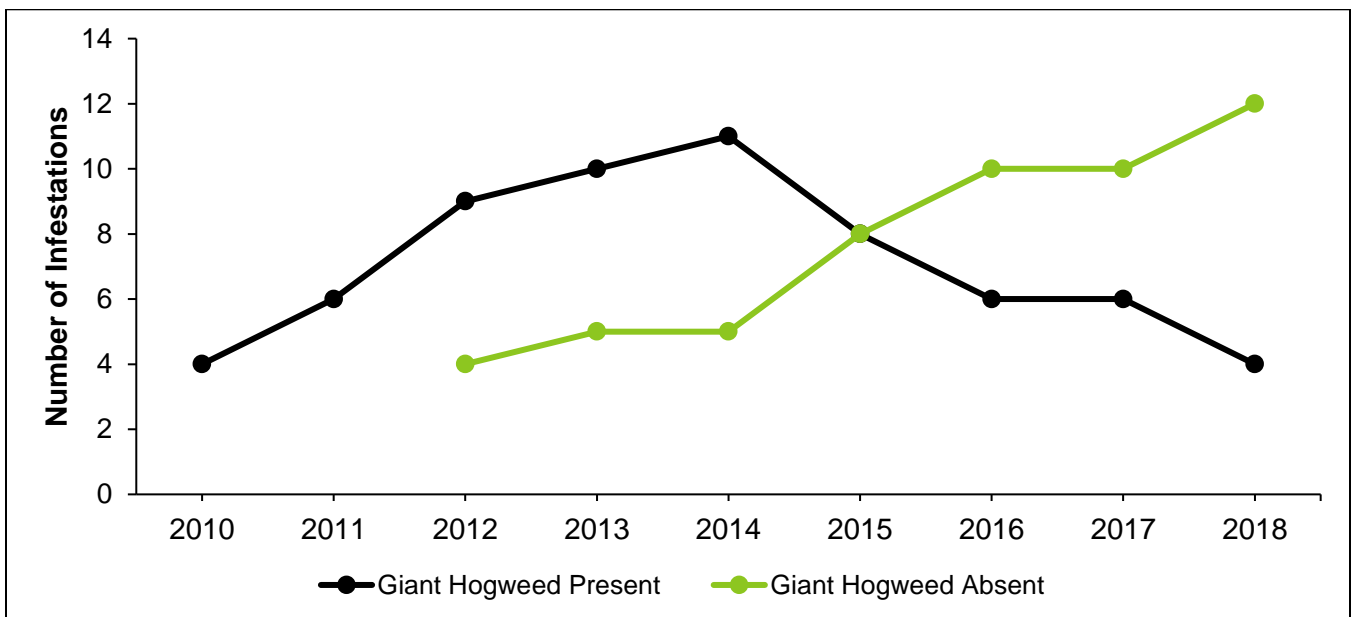


Figure 14: Management sites with giant hogweed present or absent annually

Yellow iris

Since the beginning of the Terrestrial Project's invasive plant mapping efforts, 189 yellow iris infestations have been identified within the PRISM, with 185 prioritized for management. As of 2018, 17 previously managed infestations have been deemed locally eradicated after having no yellow iris plants observed for at least three consecutive years. An additional 13 infestations had no yellow iris plants observed for two consecutive years, while 19 had no plants observed for the first time in 2018 (Figure 15). To date, approximately 40% of infestations actively managed in the PRISM have no yellow iris observed (Figure 16).

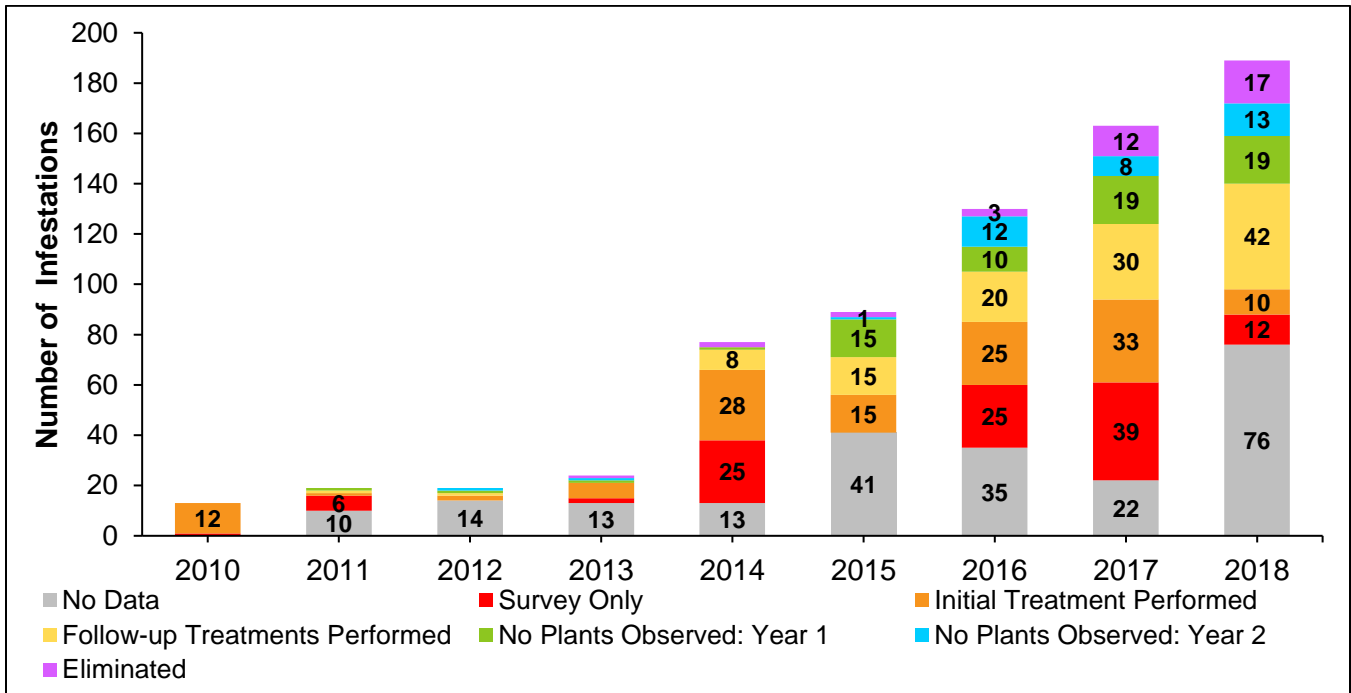


Figure 15: Progression of yellow iris management annually

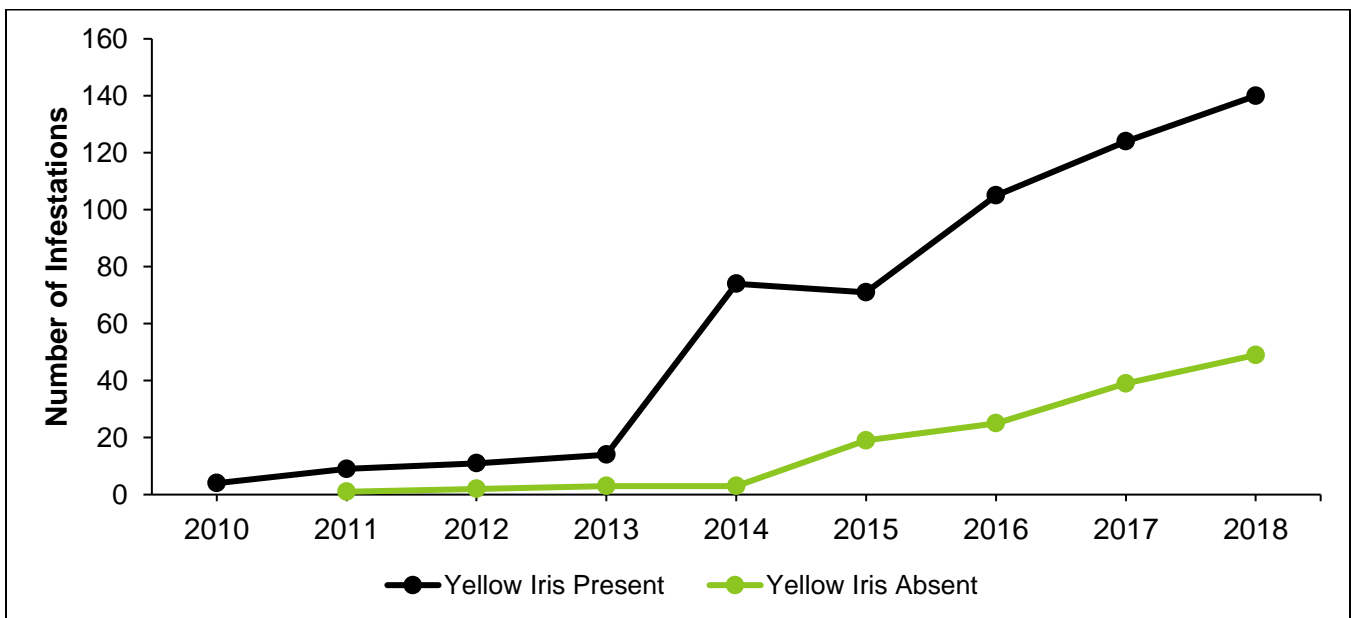


Figure 16: Management sites with yellow iris present or absent annually

Swallow-wort species

Since the beginning of the Terrestrial Project's invasive plant mapping efforts, 46 swallow-wort species infestations have been identified within the PRISM, with 36 prioritized for management. As of 2018, eight previously managed infestations had no invasive plants observed for two years, while four sites had no plants observed for the first time in 2018 (Figures 17). To date, 36% of infestations managed have no swallow-wort plants present (Figure 18).

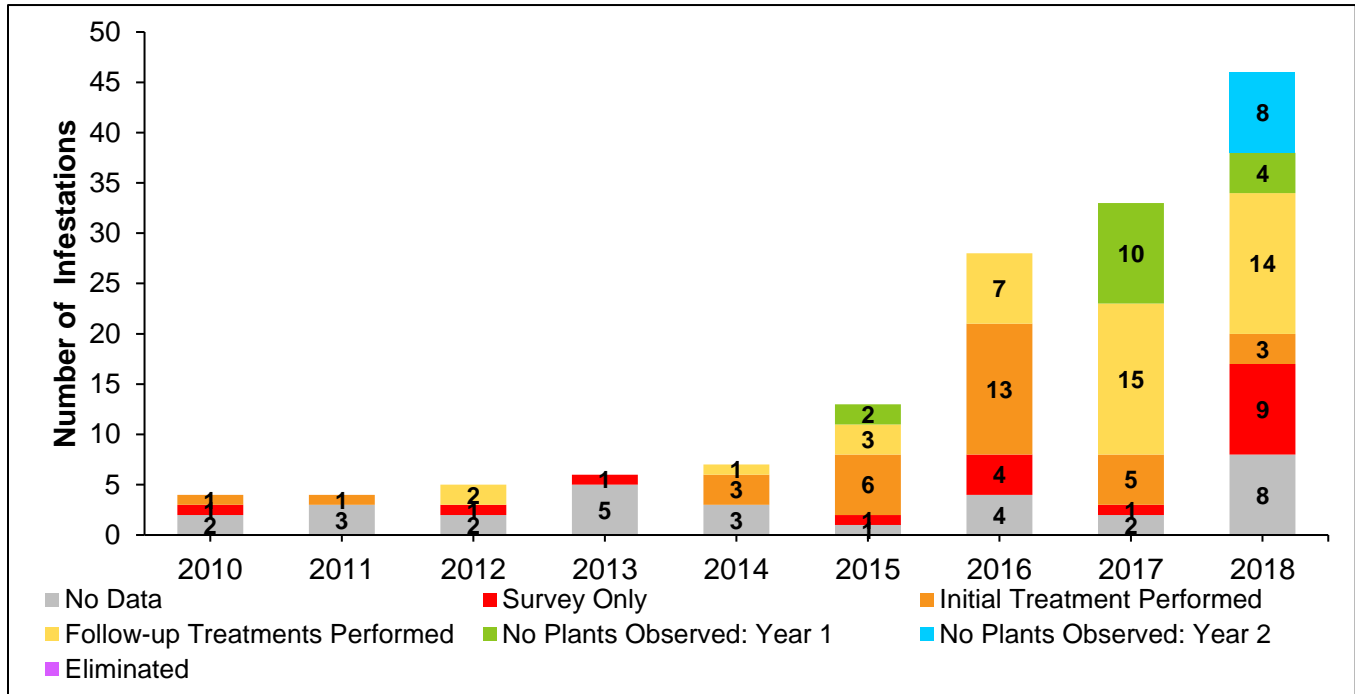


Figure 17: Progression of swallow-wort spp. management annually

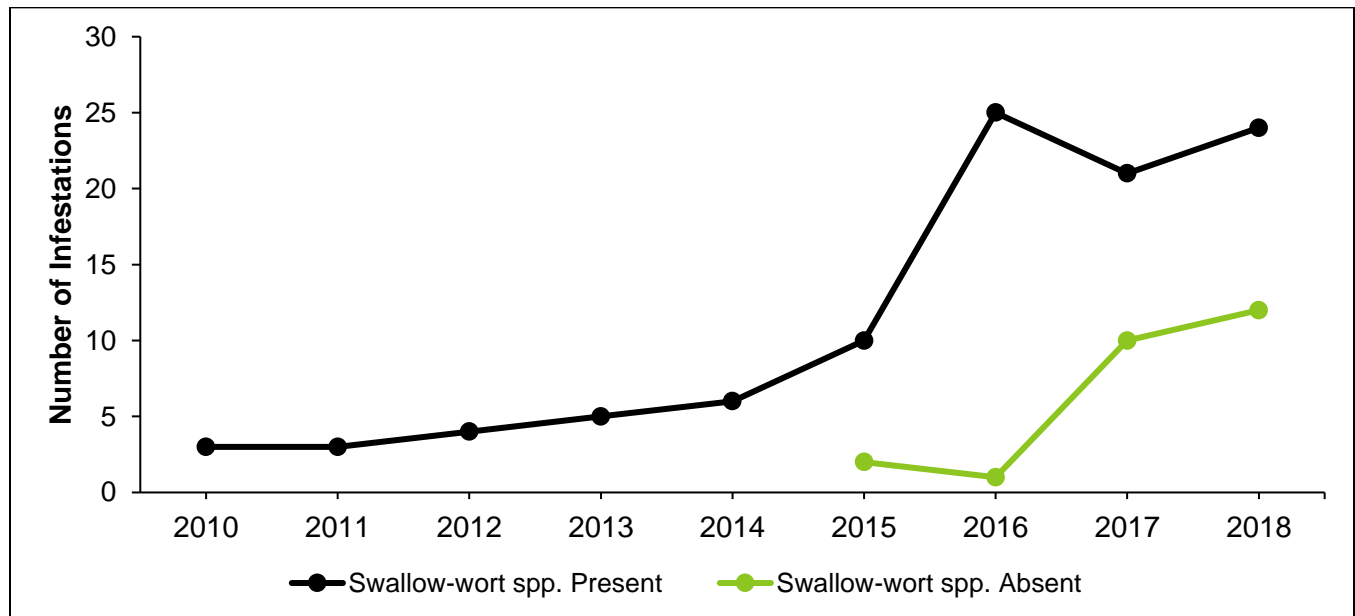


Figure 18: Management sites with swallow-wort spp. present or absent annually

Purple loosestrife

Since the beginning of the Terrestrial Project's invasive plant mapping efforts, 583 purple loosestrife infestations have been identified within the PRISM. Purple loosestrife is primarily prioritized for control at NYS DEC campgrounds and trailheads, where 29 locations are currently being managed mechanically. An additional 15 infestations have been identified as potential locations for biological control release. Since purple loosestrife is regionally widespread, the terrestrial project relies heavily on bio-control releases of *Galerucella* beetles to suppress infestations. These releases significantly reduce the cover and density of purple loosestrife but never completely eliminate infestations. As of 2018, the Terrestrial Project has conducted bio-control releases on eight priority infestations.

Summary

Since the beginning of the Terrestrial Project's invasive species mapping and management efforts, 4,677 infestations have been identified within the PRISM. Of these, 2,256 have been prioritized for control based on APIPP's unified theory of invasive species management (Figure 1). As of 2018, 1,184 infestations were under active management, while 669 and 80 infestations had no invasive species observed for one or two years, respectively. An additional 234 infestations had no invasive species present for 3+ consecutive years and are considered locally eradicated. Approximately 70% of all prioritized terrestrial infestations were free of invasive species in 2018 (Map 5). Upon assessment, APIPP has maintained an 87% success rate in attempted eradications of 1,130 discrete invasive species infestations since 2009.



APIPP's Terrestrial Response Team removes purple loosestrife along State Route 73 near Lower Cascade Lake – Keene

ADIRONDACK PARK INVASIVE PLANT PROGRAM

celebrating 20 years of invasive species management success

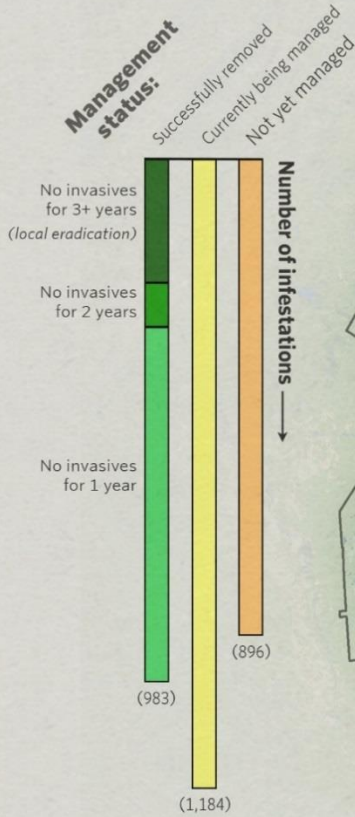


THE BAD NEWS

Invasive species degrade plant and wildlife habitat and can harm industry, recreation opportunities, and even us.

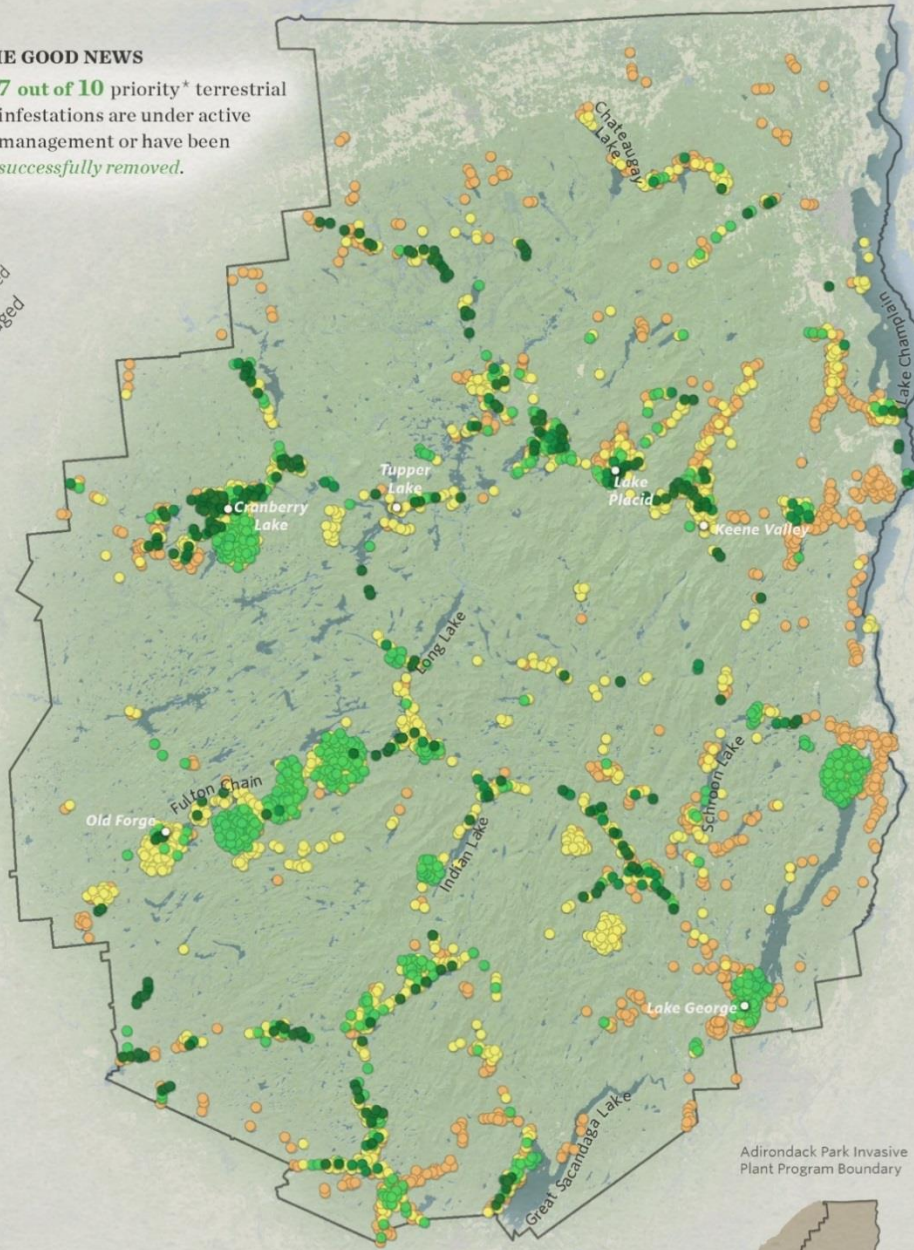
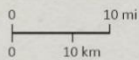
THE GOOD NEWS

7 out of 10 priority* terrestrial infestations are under active management or have been *successfully removed*.



○ Each point represents a priority* terrestrial invasive species infestation (locations approximate)

- Forest
- Agricultural
- Water
- Developed



* Priority infestations:

- Pose significant threat to the Adirondacks,
- Affect an ecological, economic, or societal asset,
- Can be effectively managed, &/or
- Promise high return on investment.

for more information on APPIP'S prioritization process visit: <http://adkinvasives.com/priority-setting/>

Data from The Nature Conservancy & USGS | December 2018

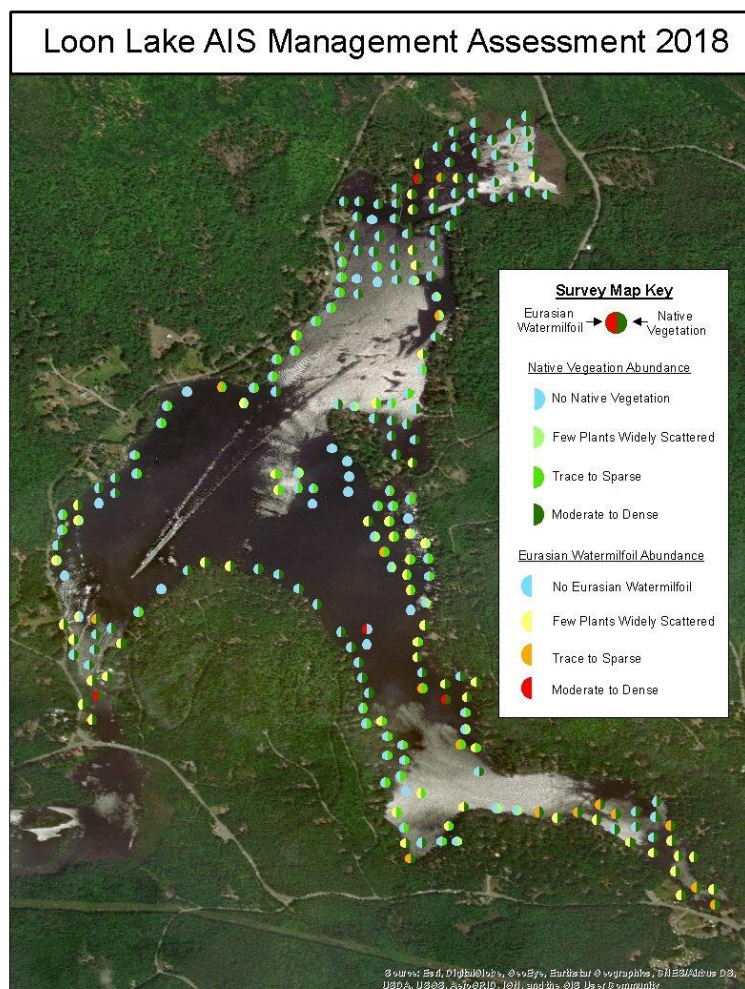
Map 5: Distribution and management progress of priority terrestrial invasive species infestations in the Adirondack PRISM

Innovation

This section describes efforts by APIPP staff and partners to pilot innovative approaches and technologies to improve program effectiveness.

Aquatic Project

- The Aquatic Project deployed its early detection team to collect and process sonar data utilizing the [ciBioBase](#) lake mapping system and produced high resolution lake depth, bottom substrate hardness, and vegetation biovolume maps. BioBase data was collected for the entirety of six lakes and within the littoral zone of an additional 22 waterbodies. The technology is being evaluated for its utility in informing AIS prevention, early detection and management efforts as well as lake vulnerability assessments. Based on 2018 results, the Aquatic Project will likely expand this pilot project into a citizen-scientist based mapping program in 2019.
- The Aquatic Project partnered with the APA and Adirondack Lakes Alliance to develop a Survey 123 based mobile monitoring tool and protocol – the Lake Management Tracker – for lake associations to assess progress and outcomes of their ongoing aquatic invasive plant management efforts. The project focuses on collecting outcome assessment data to improve decision making and resource allocation for aquatic invasive plant harvesting efforts. This project will be expanded to a full citizen-science monitoring project in 2019.



Lake Management Tracker Results – Loon Lake

Terrestrial Project

- The Terrestrial Project completed its first year of unmanned aerial vehicle-assisted surveys for invasive species over the Adirondack Forest Preserve. Sixteen wetlands were surveyed, totaling approximately 890 acres. Surveys were implemented to determine: (1) the optimal flight parameters (operating altitude & seasonal timing) to detect infestations of common reed grass and (2) how UAS surveys compare to traditional GPS survey techniques in terms of patch detectability, mapping accuracy, and survey time. An overview and results is provided below.

1. Determining Optimal Flight Parameters

Monthly flights were conducted at three reference wetlands with known infestations of common reed grass from June to October. Upon each monthly visit, identical flights were completed via an automated flight at 150, 300, and 400 feet above ground level (AGL). Ground based surveys were performed at each visit to serve as a control. Results indicate common reed grass detectability is greatest in August, when APIPP's UAS was able to detect approximately 70% of known infestations with an average mapping error of +/- 0.05 acres compared to on-the-ground surveys. Operating altitude did not significantly influence infestation detection or mapping accuracy, with detection rate and mapping accuracy increasing slightly as a function of higher operating altitude. Best results were achieved for surveys conducted at 400'AGL.

2. Comparing UAS to Ground Based Surveys

Flights were completed over 13 previously unsurveyed wetlands in an effort to detect and map incipient infestations of common reed grass. All flights were performed at 400'AGL in August or September. A separate observer performed a ground-based GPS survey of each wetland to serve as a control. UAS infestation detectability, mapping accuracy, and survey time were compared against on-the-ground controls. UAS successfully detected three infestations of common reed grass (range 0.02 -0.78 acres) in two wetlands, with an average mapping error of -0.21 acres. In addition, UAS successfully confirmed the absence of common reed grass in seven wetlands. However, UAS failed to detect five infestations of common reed grass (range 0.001 - 0.38) in four wetlands. For all locations surveyed, UAS provided an average time savings of 80 minutes per site.



APIPP's drone navigates over a wetland in search of Phragmites – Cranberry Lake

State Regulations

This section describes laws in place to prevent new invasions and minimize the spread of existing infestations.

Aquatic Invasive Species

- The [Part 575](#) regulation prohibits or limits the transport and sale of known invasive plants and animals in NYS.
- The [Part 576](#) regulation prohibits the launch of boats and associated equipment and floating docks at any public boat launch without having taken reasonable AIS spread prevention actions.
- The [Part 59.4 and 190.24](#) regulations prohibit watercraft from launching into or leaving NYS DEC owned launch sites without first draining the watercraft and internal water holding compartments and cleaning the boat, trailer and equipment of visible plant and animal material.
- The [Part 377.1](#) regulation prohibits watercraft from launching into or leaving Office of Parks, Recreation and Historic Preservation owned launch sites without first draining the watercraft and internal water holding compartments and cleaning the boat, trailer and equipment of visible plant and animal material
- Pursuant to [Section 35-D](#) of the NYS Navigation law, owners of public boat launches are required to display a [universal AIS spread prevention sign](#) at the boat launch.
- The [Subpart 646-9](#) regulation requires all trailered watercraft being launched into Lake George be inspected at one of the lake's inspection stations. Watercraft must be clean, drained, and dry to pass inspection and enter the lake. If they are not, they receive a decontamination through a high pressure, high temperature wash.

Terrestrial Invasive Species

- The [Part 575](#) regulation prohibits or limits the transport and sale of known invasive plants and animals in NYS.
- The [Part 192.5](#) regulation prohibits the import of firewood into NYS unless it has been heat treated to kill pests and limits the transportation of untreated firewood to less than 50 miles from its source.
- NYS DEC Commissioner Orders have been issued to establish [quarantines](#) to prevent the spread of oak wilt in the towns of Glenville and Islip.

PROGRAM REPORT

Seasonal Employment

This section describes efforts by APIPP staff and partners to support seasonal job opportunities.

- APIPP supported one invasive species educator position. Katherine Gale was hired into this position and assisted with the education, outreach and training activities described throughout this report.
- APIPP collaborated with NYS DEC and the State University of New York College of Environmental Science and Forestry (SUNY ESF) to support one invasive species campground specialist position. James Longo was hired into this position and conducted mapping and management of terrestrial invasive species at state campgrounds and trailheads throughout the Adirondack Park. The results of this work can be accessed in the project's [final report](#).
- APIPP contracted with Invasive Plant Control Inc. and Adirondack Research LLC. to staff two seasonal response teams, one for the Aquatic Project (two members) and one for the Terrestrial Project (four members). These teams assisted with the surveillance, early detection and rapid response, and ongoing management efforts described throughout this report. The results of both response teams can be accessed in their final [aquatic](#) and [terrestrial](#) response team reports.



Terrestrial Early Detection & Rapid Response Team Members - The Adirondack Chapter of TNC, Keene Valley

Awareness Building

This section describes efforts by APIPP staff and partners to foster broad invasive species awareness & public engagement.

- APIPP staff gave formal presentations to 56 audiences, reaching approximately 1,934 people in 2018. On average, the Program presents to approximately 48 audiences and 1,755 people annually. Since 2009, the Program has given formal presentations to 483 audiences reaching approximately 17,553 people (Figure 19). These totals do not include those reached through informal tabling or public display events.

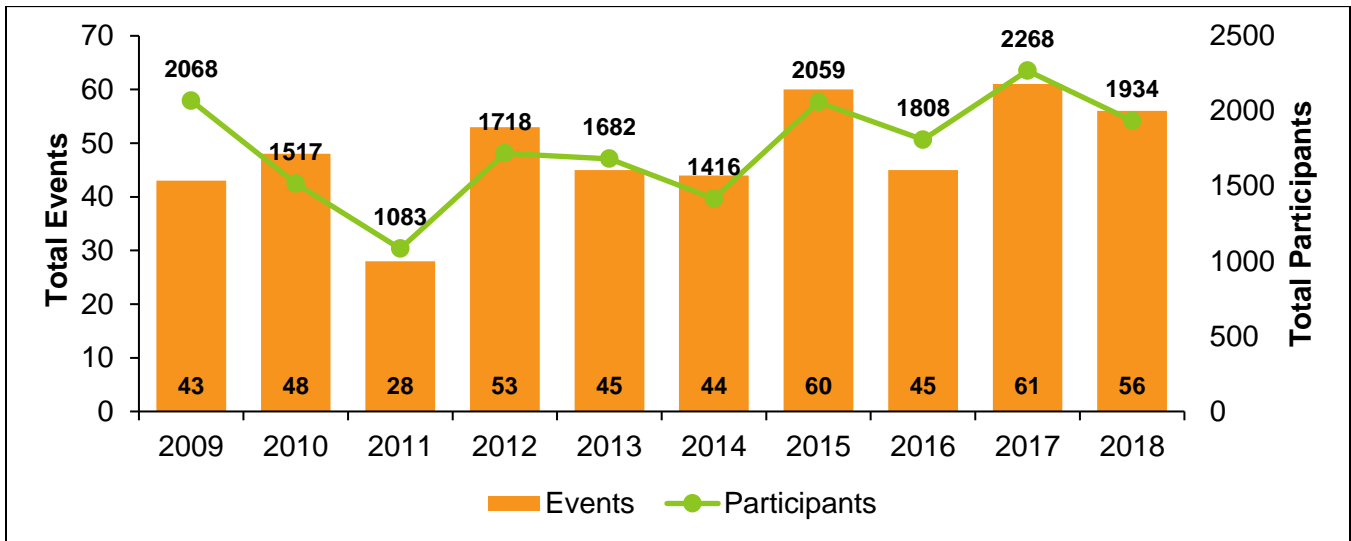


Figure 19: Audiences & participants reached through formal presentations annually

- APIPP staff hosted or provided supplemental content during 18 training sessions in 2018: Approximately 527 people participated in these trainings. On average, the Program hosts or provides supplemental content during approximately 15 training events each year, reaching approximately 424 people annually. Since 2009, the Program has hosted or presented during 148 training events in which approximately 4,239 people participated (Figure 20).

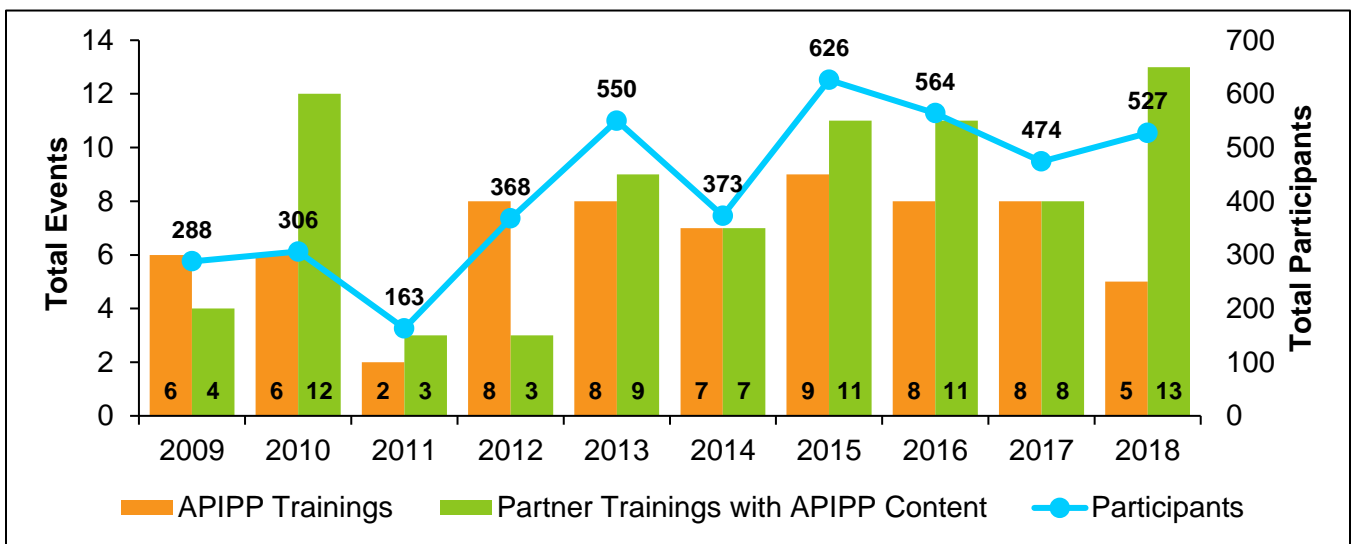


Figure 20: Trainings offered & participants instructed annually

- APIPP had 10,995 unique visitors to its main website - www.adkinvasives.com, 3,584 unique visitors to its Keep Invasive Species Out micro-website - www.keepinvasivespeciesout.com, and 640 unique followers on its Facebook page - www.facebook.com/adkinvasives in 2018. On average the Program reaches approximately 7,700 people through its websites and recruits 320 followers on Facebook annually. Since 2015, the Program has engaged 39,389 people through its website and social media platforms (Figure 21).

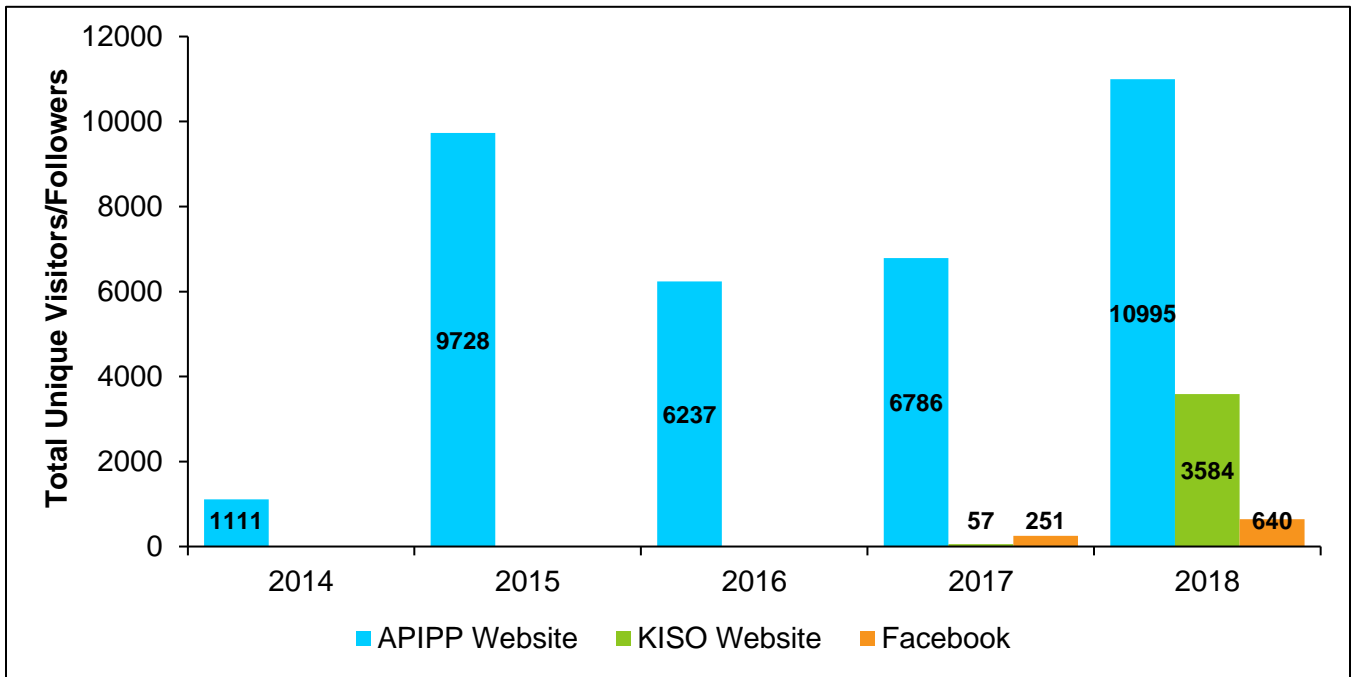


Figure 21: Unique visitors/followers to websites and social media platforms annually

- APIPP staff presented during the following professional conferences in 2018: Lake Champlain Research Conference; Regional Invasive Species and Climate Change Symposium; TNC’s Science, Stewardship, and Conservation Conference; Montana Invasive Species Council’s Annual Summit; and the Innovations in Invasive Species Management Conference.
- APIPP contracted with Behan Communications Inc. to advance the year two objectives of the Keep Invasive Species Out (KISO) (keepinvasivespeciesout.com) public awareness and marketing campaign. This included the advancement of a robust promotional framework, development of new [KISO themed promotional items and print materials](#), and creation of the [KISO pledge agreement](#).



Keep Invasive Species Out Billboard – Fort Ann

Regional Planning and Coordination

This section describes APIPP's efforts to organize and lead regional action.

- Updated [APIPP's Best Management Practices Manual](#) for invasive species affecting the Adirondack PRISM.
- Collaborated with and provided guidance to the [Regional Inlet Invasive Plant Program](#).
- Coordinated one AIS steering committee meeting focused on advancement of the BioBase mapping project and Lake Management Tracker.
- Coordinated one Education & Communication steering committee meeting focused on advancement of the Keep Invasive Species Out public awareness and marketing campaign.
- Held two full APIPP partner meetings and provided meeting minutes.
- Participated in quarterly meetings with NYS Invasive Species Program Partners and participated in monthly [PRISM webinars](#).
- Contributed research priorities to the [NYS Invasive Species Research Institute](#).
- Submitted all invasive species related data collected by APIPP to the statewide [iMapInvasives](#) database.
- Attended and represented TNC at two [NYS invasive species advisory committee](#) meetings.
- Utilized the APIPP email listserv 53 times to send program correspondence to partners.
- Shared information through over 225 posts on [APIPP's facebook page](#).

Awards & Recognition

This section describes efforts by staff and partners to recognize exemplary projects and individual actions

- Emily Tyner received APIPP's 2018 volunteer achievement award, recognizing her dedicated volunteer service to the program since 2004. Her ongoing volunteer contributions include conducting numerous surveys of Adirondack lakes and ponds for aquatic invasive species, managing garlic mustard on Valcour Island to protect several threatened and endangered species of native plants, and most recently, coordinating access to several private properties in Saranac Lake to facilitate rapid response management to the first documented infestation of lesser celandine in the Adirondacks. Congratulations and thank you Emily!

2019 Objectives

This section provides an overview of objectives to be advanced by APIPP in the year ahead

- APIPP's 2019 Work Plan will be uploaded to its website in the spring of 2019 and will include a complete list of objectives and tasks. Priorities will include:
 - Secure APIPP's renewed five-year contract with NYS.
 - Ensure continuation of the Part 576 AIS Transport Regulation.
 - Coordinate aquatic and terrestrial regional response teams.
 - Advance the year three objectives of the *Keep Invasive Species Out* public awareness and marketing campaign.
 - Expand the BioBase lake mapping project into a citizen-science program.
 - And much more!

APIPP PARTNERS

Thank you for helping protect the Adirondack region from invasive species.

Founding Partners

- The Nature Conservancy
- NYS Department of Environmental Conservation
- Adirondack Park Agency
- NYS Department of Transportation

NYS Program Partners

- NYS Invasive Species Council
- NYS Invasive Species Advisory Committee
- NYS's seven other Partnerships for Regional Invasive Species Management
 - St. Lawrence Eastern Lake Ontario
 - Capital Mohawk
 - Catskills
 - Finger Lakes
 - Western New York
 - Lower Hudson
 - Long Island
- New York Invasive Species Research Institute
- New York Invasive Species Database (iMapInvasives)

Cooperating Partners

- Adirondack Association of Towns and Villages
- Adirondack Council
- Adirondack Garden Club
- Adirondack Lakes Alliance
- Adirondack Landowners Association
- Adirondack Mountain Club
- Adirondack Research LLC.
- Cornell Cooperative Extension
- Darrin Freshwater Institute
- Essex County Soil & Water Conservation District
- The Fund for Lake George
- Hamilton County Soil & Water Conservation District
- Lake Champlain Basin Program
- Lake Champlain Sea Grant
- Lake George Association
- Lake George Land Conservancy
- Lake George Park Commission
- Lake Placid Land Conservancy
- New York Power Authority
- NYS Department of Agriculture & Markets
- NYS Hemlock Initiative
- NYS Natural Heritage Program
- Paul Smith's College Adirondack Watershed Institute
- United States Department of Agriculture, Animal & Plant Health Inspection Service
- Warren County Soil & Water Conservation District

REFERENCE MATERIALS

- [Five-year Strategic Plan](#)
- [Priority Setting Structure](#)
- [Best Management Practices Manual](#)
- [Target & Watched Species Profiles](#)
- [Past Annual Work Plans](#)
- [Past Annual Reports](#)
- [Past APIPP Partner Meeting Minutes](#)
- [Flagship Reports](#)
- [Brochures & Handouts](#)
- [Scientific Publications](#)
- [Videos & Recordings](#)
- [Training & Workshop Materials](#)
- [Interviews & Articles](#)
- [Press Releases](#)
- [Interactive Invasive Species Distribution Map](#)
- [APIPP Website](#)
- [APIPP Facebook Page](#)
- [Keep invasive Species Out micro-website](#)

ENGAGEMENT OPPORTUNITIES

- [Keep Invasive Species Out](#)
- [Follow APIPP's Work](#)
- [Become an APIPP Volunteer](#)
- [Manage an Infestation](#)
- [Collaborate on Research with APIPP](#)
- [Make a Donation](#)



AIS Early Detection Team Displaying the Keep Invasive Species Out Flag