Terrestrial Early Detection & Rapid Response Crew

Final Report

June 21, 2021 – September 22, 2021

Report Prepared by Invasive Plant Control, Inc.
For use by the Adirondack Park Invasive Plant Program

IPC
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Funding for this project was provided by the Environmental Protection Fund as administered by the New York State Department of Environmental Conservation.

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All photos contained within this report are credited to the 2021 APIPP EDRR Crew

Introduction

The 2021 field season was the tenth year that Invasive Plant Control, Inc. (IPC) served as the Terrestrial Invasive Species Early Detection and Rapid Response (EDRR) Crew for the Adirondack Park Invasive Plant Program (APIPP). In 2021, Richard Gentry returned to serve as the primary crew lead, and Jacy Hazlitt, who was new to the crew this season, served as a secondary crew leader. Additional members joining the crew for their first year were Zachary Paiva and Nicole Emrick. Vance Brown and Lee Patrick provided off site supervision.

Invasive species monitoring and management activities were conducted from June 21 through September 22, 2021, for a total of 14 weeks. Throughout the field season, IPC assessed and/or managed an astonishing number of invasive species infestations within APIPP's jurisdictional boundaries, including both historically managed sites and new infestations. The crew worked to expand APIPP's terrestrial invasive species database by mapping and/or treating new infestations of target species on previously surveyed and unsurveyed state, county, and local roads, Nature Conservancy preserves, wetlands, riparian corridors, Forest Preserve lands, and private properties throughout the region. Administrative tasks, such as data processing, report writing, and equipment maintenance, were performed as needed throughout the project period.

This report summarizes work completed and data collected throughout the 2021 field season. A comprehensive analysis of invasive species distribution and management progress is not included in this report but will be provided in APIPP's 2021 Annual Report. Visit www.adkinvasives.com to access past and current annual reports.

Photo 1. The crew is often tasked with surveying invasive species in backcountry locations. In this case, the crew was surveying invasives down a hiking trail. The crew brought waders with them to assess common reed grass in a wetland near the trail. Nicole Emrick (left) carries battery packs and water bottles for the crew members in a backpack.

APIPP Overview and EDRR Crew Objectives

APIPP Overview

APIPP serves as the Adirondack Partnership for Regional Invasive Species Management (PRISM), one of eight regional partnerships across New York State funded by the New York State Department of Environmental Conservation (NYSDEC) to conduct invasive species management activities. APIPP is a partnership founded by the Adirondack Chapter of The Nature Conservancy (TNC), New York State Department of Environmental Conservation, New York State Department of Transportation (NYSDOT), and the Adirondack Park Agency (APA). It is hosted by the Adirondack Chapter of TNC. Over 30 partner organizations and hundreds of volunteers assist APIPP in its mission "to protect the Adirondack Region from the negative impacts of invasive species". APIPP is funded in part by the invasive species line of New York State's Environmental Protection Fund as administered by the NYSDEC. To learn more, visit www.adkinvasives.com.

Response Crew Objectives and Methodology

The EDRR crew's main objective for the 2021 field season was to revisit, assess, and perform treatments on all APIPP's priority and historically managed target invasive species infestations. The data that the crew collects is vital to determining the extent of invasive species infestations, whether past management actions have been successful, and whether management would be effective moving forward. The crew also mapped, and when permits/permissions allowed, managed newly documented infestations of target species threatening conservation priorities in the region.

Invasive species in New York State are categorized into tiers according to a standard state-wide system (Appendix 1). The crew focuses on surveying and treating species in Tiers 2 through 4. Tier 5 only includes those species that need more research to understand their invasiveness and includes naturalized and cultivated-only species that are not yet invasive in the Adirondack region. Tier 1 includes species that have not yet reached the PRISM. Within these tiers, APIPP further prioritizes infestations of these species for management based on whether the infestation is affecting a conservation, economic, or human health priority, whether there are effective tools available to control both the infestation and the source(s) of introduction, whether sufficient resources are available, and whether the project will result in a high return on investment. Infestations of Tier 2 through 4 species that meet these criteria are prioritized for ongoing rapid response and control efforts (Table 1). Species that are not prioritized for management (locally or regionally widespread or had a low to moderate New York State invasiveness ranking) are occasionally mapped and assessed to provide APIPP a better understanding of their regional distribution and potential impacts. Additional information on any of these species can be found on APIPP's webpage.

Table 1. Tier 2-4 terrestrial species in the APIPP PRISM.

APIPP's Tier 2-4 Terrestrial Species		
Common Name	Scientific Name	Management Target
Tier 2 – Eradication		
Giant hogweed	*Heracleum mantegazzianum*	Yes
Japanese angelica tree	*Aralia elata*	Yes
Japanese stiltgrass	*Microstegium vimineum*	Yes
Mile-a-minute	*Persicaria petiolate*	Yes
Scotch broom	*Cytisus scoparius*	Yes
Tree of heaven	*Ailanthus altissima*	Yes
Tier 3 – Containment		
Cup plant	*Silphium perfoliatum*	No
Hemlock woolly adelgid	*Adelges tsugae*	Yes
Japanese tree lilac	*Syringa reticulata*	No
Jumping worm	*Amynthas spp. & Metaphire spp.*	No
Lesser celandine	*Ficaria verna*	Yes
Swallow-wort species	*Vincetoxicum louiseae* & *V. rossicum*	Yes
Yellow iris	*Iris pseudacorus*	Yes
Tier 4 – Suppression		
Autumn olive	*Elaeagnus umbellate*	No
Bush honeysuckles	*Lonicera spp.*	No
Common buckthorn	*Rhamnus cathartica*	No
Common reed grass	*Phragmites australis*	Yes
Emerald ash borer	*Agrilus planipennis*	No
Garlic mustard	*Alliaria petiolate*	Yes
Glossy buckthorn	*Frangula alnus*	No
Japanese barberry	*Berberis thunbergii*	No
Knotweed species	*Reynoutria spp.*	Yes
Multiflora rose	*Rosa multiflora*	No
Norway maple	*Acer platanoides*	No
Oriental bittersweet	*Celastrus orbiculatus*	No
Purple loosestrife	*Lythrum salicaria*	Yes
Reed canary grass	*Phalaris arundinacea*	No
Winged burning bush	*Euonymus alatus*	No

The EDRR crew was also trained to identify and survey for APIPP's Tier 1 species (Table 2). These species have high or very high state invasiveness rankings and are not yet known to be present in the PRISM but have the potential to expand their distribution into the region over the coming years.

Table 2. Tier 1 terrestrial species in the APIPP PRISM.

APIPP's Terrestrial Tier 1 Species	
Asian longhorned beetle	*Anoplophora glabripennis*
Eurasian boar	*Sus scrofa*
Porcelain berry	*Ampelopsis brevipedunculata*
Slender falsebrome	*Brachypodium sylvaticum*
Spotted lanternfly	*Lycorma delicatula*
Wineberry	*Rubus phoenicolasius*

Permits and Permissions

Under the jurisdiction of a DOT highway work permit, the EDRR crew was authorized to manage any infestations discovered within the state road right-of-way (ROW). Permits were also obtained to work within the county road ROW in Clinton, Essex, Hamilton, and Herkimer counties. The EDRR crew did not manage new infestations within the ROW that were discovered in highly developed or residential areas of the PRISM. In these areas, there is a high likelihood for infestations to extend onto private property, thus requiring additional permissions from the property owner, which can often be a challenging to obtain. If a new infestation was documented beyond the extent of the ROW and was outside a developed/residential area, the crew conducted a preliminary survey, but would not engage in management until the appropriate permissions and/or permits were obtained.

Infestations located in or within 100 feet of a wetland were managed under the jurisdiction of APA General Permit 2014G-1B. This permit allows APIPP to manage terrestrial invasive species within 100 feet of a wetland without the need for site-specific work plans. A summary of all invasive plant management activities that occurred in or near wetlands is submitted to APA by APIPP by February 28th of the following year. However, this permit does not provide authority to treat infestations located in standing water. Those instances require additional DEC permitting under Article 15. If an infestation was observed in standing water, the site was only mapped, but not managed. All infestations subject to Article 15 were flagged in APIPP's database to be evaluated for permitting in coming years.

The EDRR crew performed preliminary surveys of all new infestations discovered on Forest Preserve lands, then alerted APIPP's Terrestrial Invasive Species Project Coordinator. If the infestation was not already covered under a permit, was determined to be a high priority for management, and was less than 0.1 acres in size, a Rapid Review Authorization permit must be submitted to DEC regional staff to facilitate expedited management during the current season. No Rapid Review Authorization permits were submitted for the 2021 field season. If the infestation was deemed a priority for management but was greater than 0.1 acres, it was slotted for a comprehensive site planning and state environmental quality review act process to be completed and approved over the following winter. Once approved, this permitting allows APIPP to conduct management of infestations that are located on state lands and larger than 0.1 acres over five consecutive field seasons.

If an infestation extended onto private property or fell completely within a privately-owned parcel, and was considered a high priority for management, the EDRR crew or APIPP's Terrestrial Invasive Species Project Coordinator attempted to contact the landowner to obtain permission. Completed permission forms allow APIPP to conduct mechanical or chemical management activities on the property until the population is eradicated or permission is revoked by the landowner.

The determination of property ownership was the individual crew leader's responsibility. Overall, the goal was to ensure that proper permissions and permitting documents were obtained before management activities occurred.

Field Season Logistics

Typical Workday

The EDRR crew typically worked four ten-hour days per week, from 7:00 a.m. to 5:00 pm. This optimized the crew's efficiency by increasing the amount of time spent in the field as opposed to traveling to and from work sites. Lunch was typically consumed during travel between sites. Given the expansive size of the Adirondack PRISM and significant travel distances to and from work sites, travel time was considered part of the crew's 40-hour work week.

Weather conditions primarily determined the crew's daily activities. Clear days were spent performing invasive species assessment and management activities, while periods of inclement weather were reserved for mapping new infestations in areas previously un-surveyed by APIPP or preforming mechanical management activities. Each crew leader documented work activities using TNC's Invasive Plant Mobile Monitoring System (IPMMS), which provided most of the data included in this report.

Equipment

IPC supplied two pickup trucks to transport the crew and their management equipment. These trucks were outfitted with the pesticide products, tools, and safety equipment needed to complete invasive species management work within the Adirondack PRISM. Having multiple trucks allowed the four-person crew to split into crews of two when needed. The ability to divide into two crews significantly increased efficiency as the majority of APIPP's management sites are less than 0.1 acres in size and are widely distributed throughout the Adirondack PRISM.

The crew deployed several different pieces of equipment to perform invasive species management activities. Stihl brush cutters, shovels, hatchets, and hand clippers were used for mechanical management work, while backpack sprayers and spray bottles were used to perform pesticide applications. The crew used various backpack sprayers such as the Shindaiwa SP518, Birchmeier Iris 15, and the Jacto CD-400. The herbicide products included in Table 3 were used throughout the project period, either individually or as a mixture.

Table 3. Herbicide products used throughout the project.

Active Ingredient	Trade Name (EPA Registration Number)
Glyphosate	Accord XRT-II (62719-556)
	Rodeo (62719-324)
Imazapyr	Arsenal Powerline (241-431)
	Arsenal Applicators Concentrate (241-299)

Chemsurf 90, AquaChem 90, and Bullseye Blue were commonly incorporated as adjuvants into herbicide applications by the crew

Data Collection and Limitations

Data Collection and Management

A strong emphasis was placed on thorough documentation of the EDRR crew's invasive species survey and management activities. APIPP advances stringent data collection and processing protocols to promote data quality and facilitate comparative analysis over time. This data is used for a variety of applications including predictive analysis, management outcome analysis, and impact assessments. APIPP meets these comprehensive data collection and analysis goals by utilizing pre- and post-treatment monitoring tools including TNC's IPMMS, global positioning systems (GPS), and geographic information systems (GIS).

APIPP provided the crew Apple iPad tablets which operated TNC's IPMMS via the Esri Collector application. Invasive species distribution, assessment, and treatment data was collected in the field using each tablet and later synced to a secure TNC server for storage and analysis. The IPMMS tool includes both descriptive and abundance related data fields including plant phenology, invasive plant percent cover, habitat type, management goal for the site, and infested acreage among others.

The most important item for clarification regarding the IPMMS data collection process relates to the differences and relationships between the IPMMS occurrence point, assessment polygon, treatment polygon, and treatment table features (Figure 1). The following paragraphs describe these features and outlines the data collection process. When the EDRR crew observed a new infestation of a target species, a GPS occurrence point was recorded near the center of the infestation. The occurrence point classifies which species is present and contains unique naming and attribute information for the specific infestation. After an occurrence point was entered, the EDRR crew collected an assessment polygon for the infestation. An assessment polygon is mapped by circumnavigating the exterior boundary of an infestation. Recording new assessment polygons each season allow us to document changes in acreage and percent cover over time. Non-spatial data such as phenology are also recorded in association with the assessment polygon. Photos were collected for each assessment polygon to further document expansion or decline of an infestation along with any transition to native plant composition. If an infestation had been historically managed, a visual survey was completed before mapping the assessment

polygon. If no target invasive species were observed, a "0" was recorded for percent cover class. APIPP deems an infestation to be locally eradicated after three consecutive years of invasive species absence.

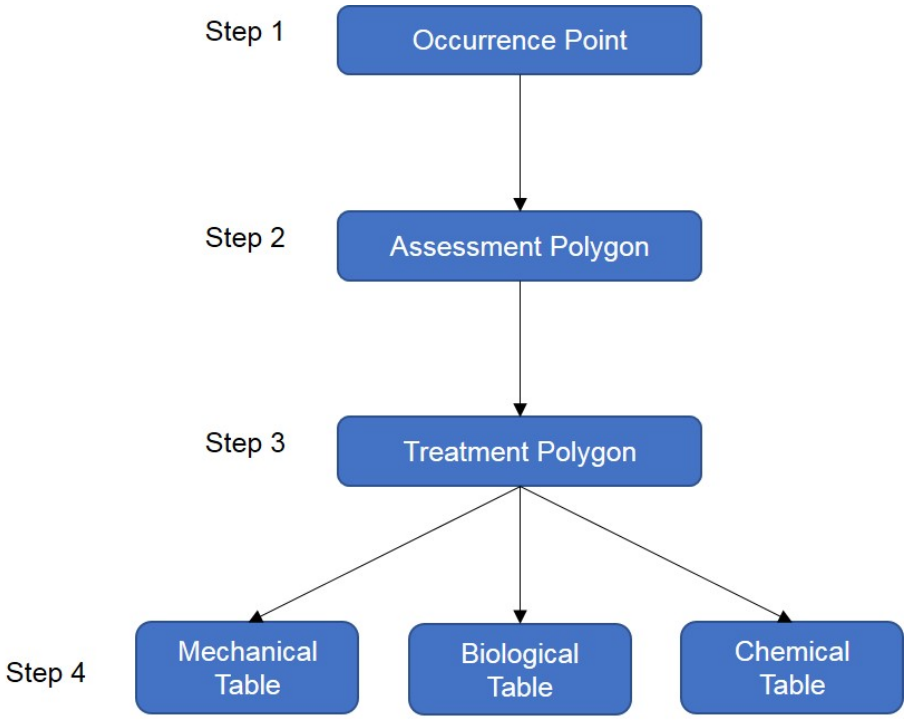

Figure 1. Data collection workflow of the IPMMS

The EDRR crew performed initial management when a new priority infestation of a target species was documented, and all required permits and/or permission had been obtained. Follow-up management was conducted on any historically managed infestations when invasive species persisted, and permissions were in place to do so. For all managed sites, the crew created a treatment polygon for the infestation. A treatment polygon is similar to an assessment polygon, but instead it focuses on the management activity that was performed and delineates the area that was managed. Some of the treatment data fields include the time needed to complete management, management technique utilized, and how many staff participated. If the entire infestation was treated, an infestation polygon matching the assessment polygon was digitized. This increased efficiency by preventing the crew from having to circumnavigate the infestation more than once. If an infestation was only partially treated, the treatment polygon was drawn only over the areas that received treatment.

Finally, one or more treatment tables were completed for each treatment polygon to detail the exact management activities that occurred. Treatment tables are specific to the management activity performed (mechanical, chemical, and/or biological) and include fields such as the number of plants removed, herbicide product used, and the total quantity of herbicide applied, among others.

Photo 1. Jacy Hazlitt conducts an assessment in Newcomb.

Data Limitations

The crew strived to collect quality data throughout the duration of the project, but there were instances when data errors or inaccuracies occurred. Minor technical errors arose during the data collection process, and in most cases, could be attributed to GPS inaccuracy. There was also a small degree of user error, which was typically associated with estimation and rounding. For example, the crew was instructed to use quarter-hour increments when recording time spent performing survey and management activities. In some instances, the times recorded may slightly under- or over-estimate the actual amount of time spent performing the activity. This was also standard practice for the crew's daily logs.

Another minor inaccuracy resulted from the treatment polygon mapping process. Treatment polygons were digitized over previously recorded assessment polygons to avoid circumnavigating infestations more than once. This may have produced treatment polygons that were slightly larger or smaller than what was treated. Therefore, the number of acres treated is more accurately represented by the assessment polygons, than the treatment polygons.

These minor errors and inaccuracies will not change the dynamics of this report or significantly influence the following data analysis but should be considered when interpreting the information presented.

Management Project Overviews

NOTE: NPO = no historically managed invasive plants observed

Yellow Iris

Saranac River Yellow Iris Eradication Project

The yellow iris sites within the Saranac River watershed were assessed during the last week of June. Only one of the historic 15 sites in this project area was found to have yellow iris still present: a 94% success rate (Figure 2). No new sites were identified. All the sites occurred at Moody Pond outside of Saranac Lake and the crew split into two crews of two to cover more ground. The crew spent a collective half hour digging up yellow iris. Nearby landowners approached by the crew and were thrilled to see someone removing the irises. The landowners took pictures of the crew for their local newsletter.

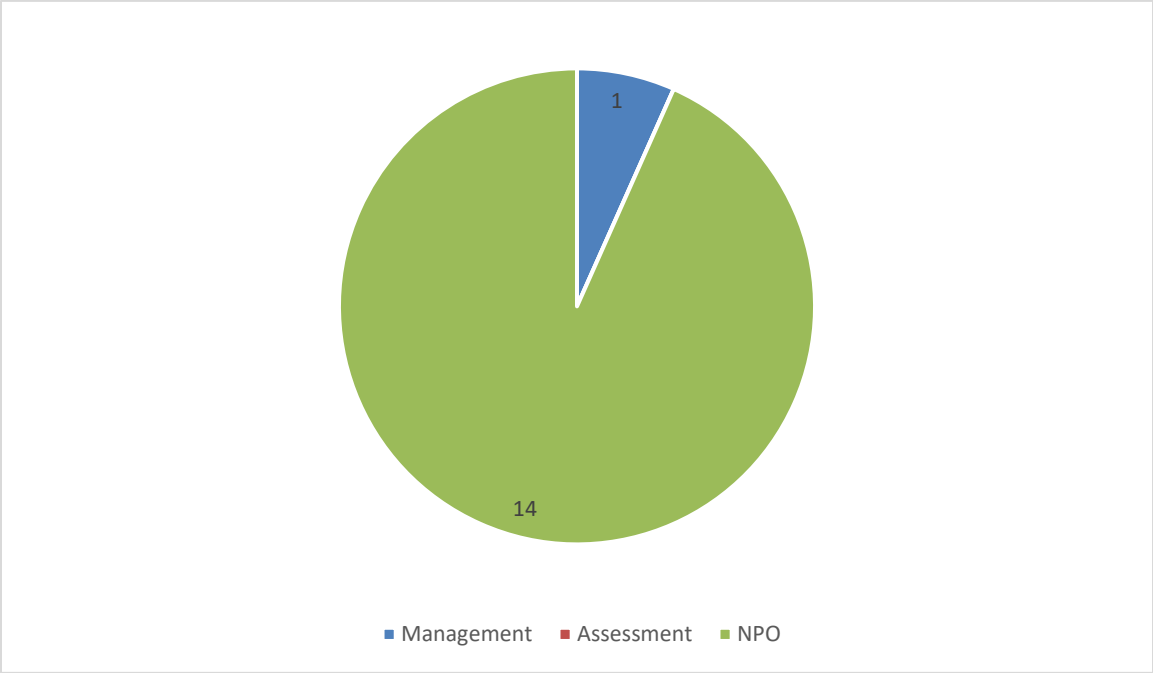

Figure 2. Status of sites visited by the EDRR crew throughout the Saranac River Yellow Iris Eradication Project during the 2021 field season.

Ausable-Champlain Yellow Iris Project

Yellow iris sites falling within the Ausable-Champlain project area were assessed during the last two weeks of June. On the first day of field work, the crew practiced plant identification and found two new sites at the Town of Jay Covered Bridge. Usually, the crew would assess dozens of sites within this project, but all the boat access sites in the Lake Placid area were handled by APIPP's seasonal steward in 2021. In total, six sites were assessed with only one being actively managed and three having no plants present due to past management (Figure 3). At the sole site of management in this management project area, the yellow iris surrounded a pond with steep banks and numerous irises were in the water. The crew spent a collective four hours at the site and dug up 419 plants.

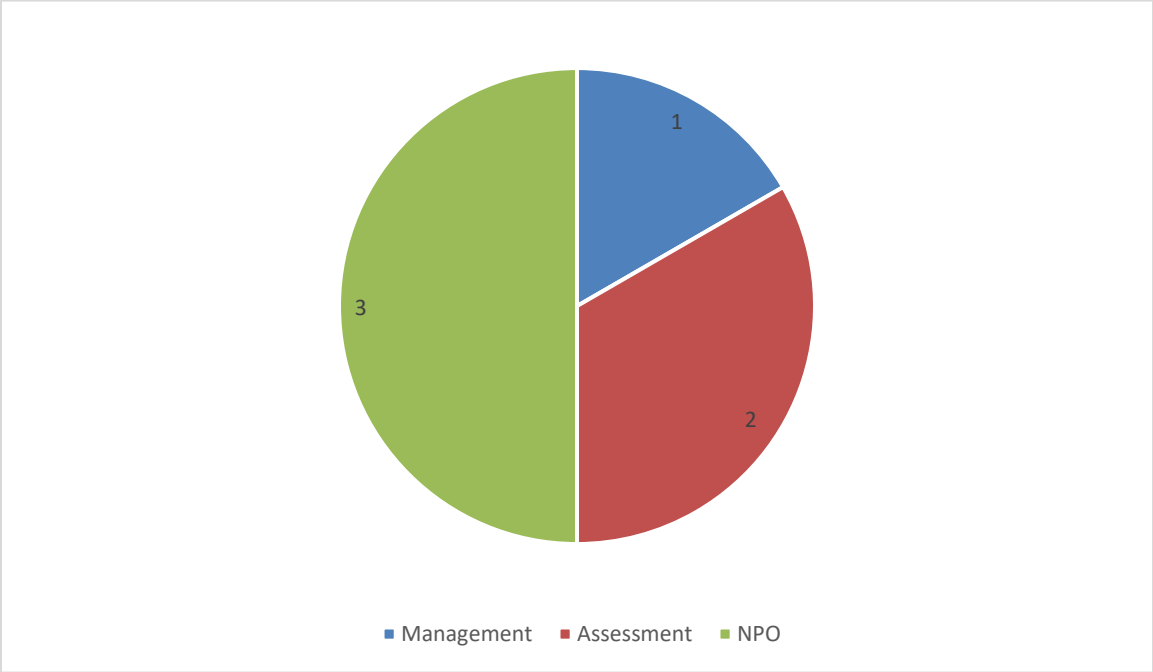

Figure 3. Status of sites visited by the EDRR crew throughout the AuSable-Champlain Yellow Iris Project during the 2021 field season.

Other Yellow Iris Projects

The crew assessed and managed multiple other sites that fell outside of the previously mentioned project areas. A total of 28 sites in Elizabethtown, Keene Valley, and the Upper Hudson area were assessed (Figure 4). In Elizabethtown, all management was done at Wagner Pond where 332 plants were removed taking a cumulative eight hours due to thick matts of irises forming along the ponds edge. In Keene Valley, all sites occurred between Hulls Falls Road and the Ausable River. The sites closer to the river side were challenging to get to since the crew had to cross through a large meadow (Picture 3) and find a way to cross the Ausable River. An additional challenge was that some of the iris found had deep roots that needed to be thoroughly removed (Photo 4). The crew spent a cumulative seven hours in the area and removed 86 plants. The Upper Hudson area was uneventful with only two priority sites both of which no longer had plants present.

Photo 3. Jacy Hazlitt, Zachary Paiva, and Nicole Emrick returning from managing yellow iris along the Ausable River.

Photo 4. The yellow Iris found along the Ausable were difficult to pull up due to their large roots that trailed in various directions. Debris was also common in this area due to the flooding of the Ausable River.

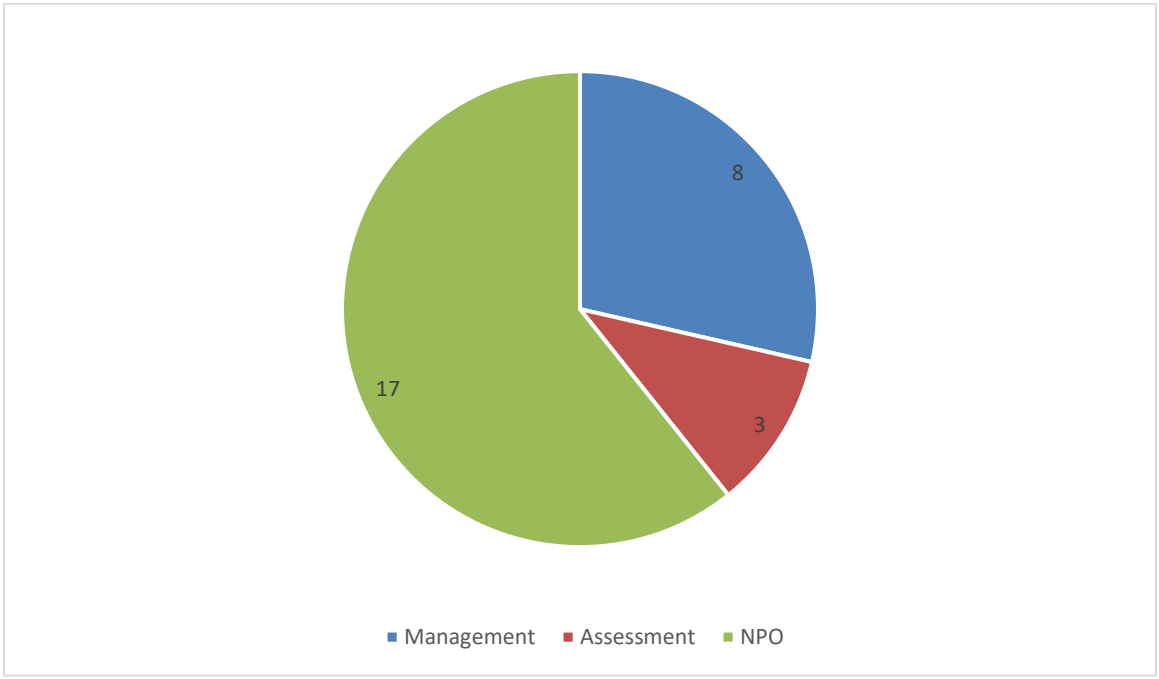

Figure 4. Status of sites visited by the EDRR crew throughout the remaining Yellow Iris Project sites during the 2021 field season.

Mile-a-Minute

APIPP PRISM Mile-a-Minute Eradication Project

The five mile-a-minute occurrences were all located on the private property of a homeowner in the Plattsburgh area. The infestation was brought to APIPP's attention by the homeowners' daughter who recognized it from one of APIPP's invasive species talks. Three crew members worked to mechanically remove mile-a-minute near the home as the homeowner did not want herbicide used in these areas. A more remote site containing both mile a minute and wild parsnip was foliar sprayed. To make sure no wild parsnip got on his skin, the crew leader wore extra shirts that could be removed after treating the site as well as work gloves over top of his nitrile gloves (Photo 5). The crew spent a collective eight hours at the site and removed 497 mile-a-minute plants.

Photo 5. Richard Gentry covered with breathable attire to help protect his skin from any potential wild parsnip breakage.

Common Reed Grass

Ausable River Watershed Common Reed Grass Suppression

Common reed grass management in the Ausable River Watershed had an unexpected uptick in sites. Last year, 22 sites had no plants observed, yet this year only nine were found to no longer have invasive plants present (Figure 5). The crew found 13 new sites; all were managed except for one site that is located on private property. The watershed covers land along State Routes 9. 9N, 22, 73, and 86, as well as the I-87 Northway, and various local roads.

Despite having a relatively low number of priority sites compared to the other common reed grass management projects, the project did boast the highest percentage of management sites at 51% of the 63 visited sites. The project also used the second highest amount of herbicide. However, these sites were all easy accessed and only took 19 hours to treat. A research project examining the legacy effects of repeated herbicide use was underway at some of the treatment sites and native planting at these sites were given a wide berth to avoid accidental treatment.

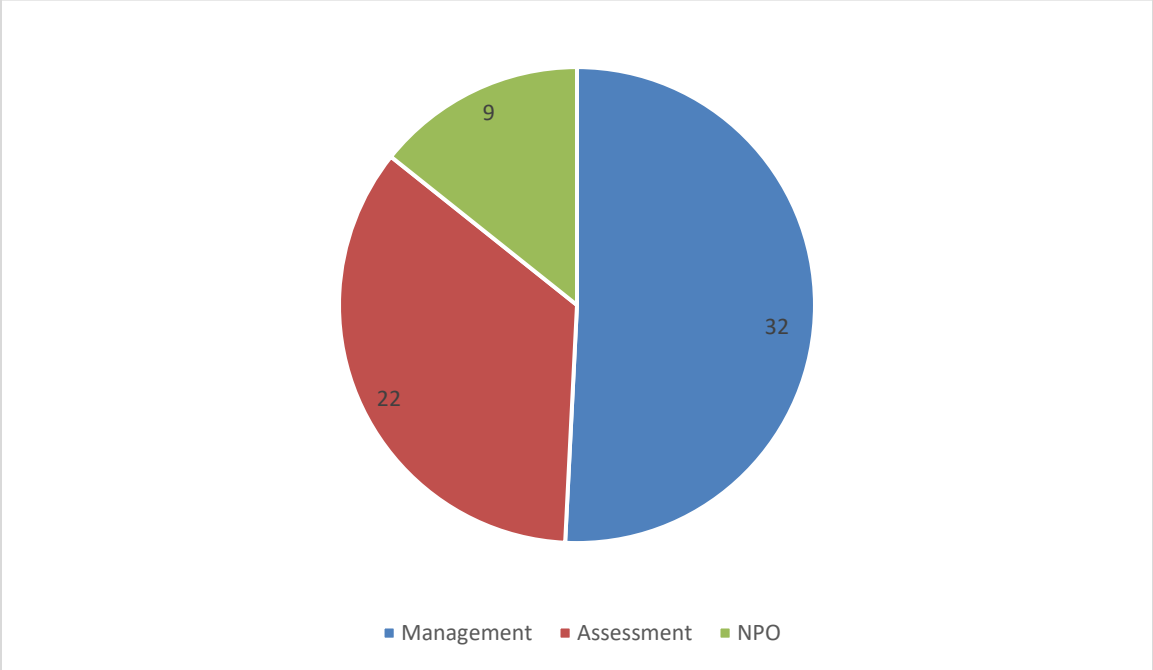

Figure 5. Status of sites visited by the EDRR crew throughout the Ausable River Watershed Common Reed Grass Suppression Project during the 2021 field season.

Chateaugay-English Watershed Common Reed Grass Suppression

The 17 visited common reed grass sites within the Chateaugay-English Watershed all occurred along Route 374, with the majority occurring on private or timber company property. Although no new sites were identified and three sites had no plants observed, it is difficult to assess the how successful management of this entire project area has been as many of the sites are assessment only due to lack of permission to treat on private properties (Figure 6). A total of 4.5 hours were spent treating the four management sites.

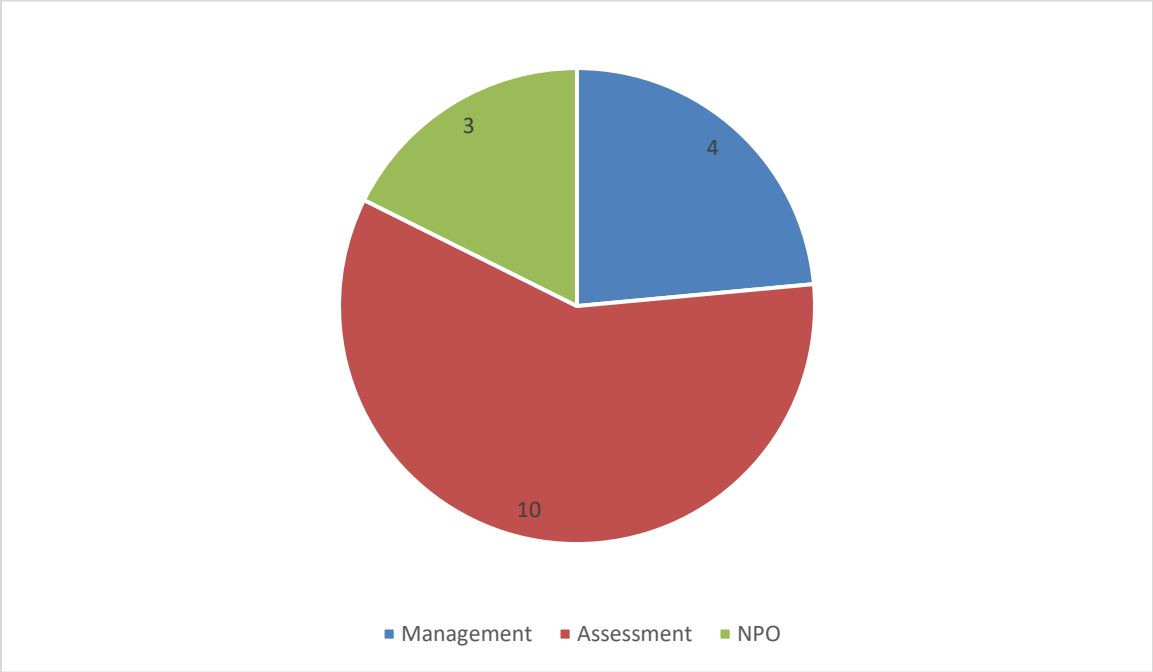

Figure 6. Status of sites visited by the EDRR crew throughout the Chateaugay-English Watershed Common Reed Grass Suppression Project during the 2021 field season.

Lake Champlain Watershed Common Reed Grass Suppression

The Lake Champlain Watershed had sites along Routes 9, 9L, 9N, 22, 74, 276, 374, as well as local roads and the I- 87 Northway. In addition to road rights-of-ways, sites also occurred on private property and DEC administered lands. This watershed has the highest number of sites with a total of 179 sites being visited, 21 of which were new (Figure 7). Only about half as many sites were surveyed this year compared to last year as many of the sites in the southern end of this watershed are no longer considered a priority after APIPP reassessed priorities over the winter. Despite this, the region had both the most management and the most assessments of any common reed grass project. A total of 86 sites were managed taking a total of 85.5 hours.

For a couple of weeks this season, IPC brought in an additional crew to help with some specialty projects, but due to scheduling issues they spent the bulk of their time working on the I-87 Northway. This proved beneficial since often the I-87 Northway work is done as a final project towards the end of the year. This year the common reed grass at these sites was able to be treated earlier in the season.

The crew was able to treat all the sites at Matty's Mountain, a special site that the crew works with in conjunction with the Lake George Land Conservancy. These sites occur in a wetland that is a challenge to access since it's a mile up a rocky road where four wheel drive a must. This year, the crew assisted with clearing the road to the site; cutting and removing fallen trees that were blocking the road. Additionally, the staging area where the crew usually parks was flooded. This area consists of 11 large common reed grass sites that were originally assessed by APIPP's Zachary Simek using drones. Most sites had shrunk to fractions of their original size with three no longer having plants present. With most of the sites well under control, the crew shifted to working on the largest of the common reed grass sites, which totals roughly two acres in size. While one crew member assessed and treated the smaller polygons, the rest of the crew utilized brush cutters to cut lines through the site (Photo 6). This ended up taking two days since the

initial day was extremely hot out and the crew risked heat exhaustion working in the wetland. After cutting was done, the crew performed foliar sprays and would leapfrog through the lines, spraying one side then another so that they would not risk spraying their crew members that were in nearby lines (Photo 7).

Travel times in this watershed were often longer than anticipated due to an abundance of construction traffic in this vacation area. This made working in downtown sites a major challenge with heavy pedestrian traffic and limited areas to pull over. The crew was able to assess some of the local parks which thrilled the park attendants, however more remote sites in the town could not be assessed due to the roads being far too narrow for work trucks to reach.

Photo 6. Jacy Hazlitt uses a Stihl brush cutter to cut lines through the common reed grass at Matty's Mountain. Crew members would cut three- to four-foot-wide paths through the area with common reed grass. The common reed grass was cut as close to the ground as possible so that crew members spraying could move through the area with ease. These lines would be cut every ten our so feet so that a sprayer would be able to spray about halfway through using a jet, if the paths were any further apart the coverage would not be as effective since the common reed grass was so tall.

Photo 7. Nicole Emrick walks down a line spaying all common reed grass to her right and then coming back up the path to spray everything to her left. First the closest common reed grasses are sprayed with a mist, while common reed grass deeper between the lines are sprayed using a jet stream. After a line is fully sprayed, crew members will leapfrog to the next line spraying all common reed grass along the edges.

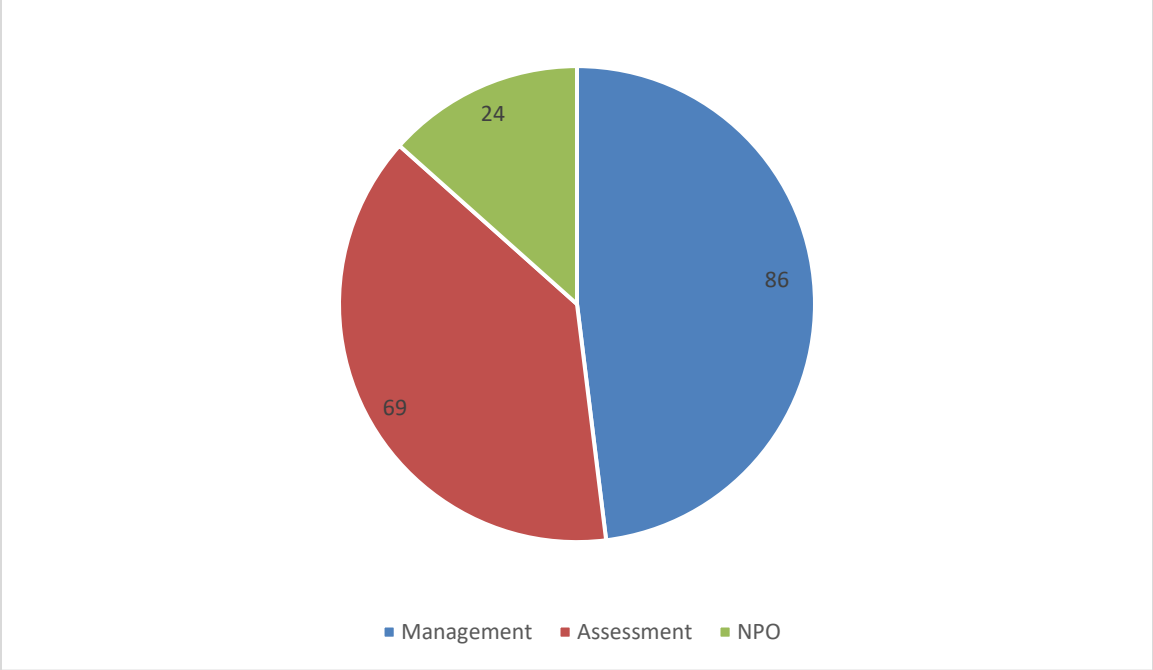

Figure 7. Status of sites visited by the EDRR crew throughout the Lake Champlain Watershed Common Reed Grass Suppression Project during the 2021 field season.

Mohawk River Watershed Common Reed Grass Exclusion

The Mohawk River Watershed covers portions of Routes 8, 10, 10A, 29A, and 365 and some local roads. This watershed consisted of 152 visited sites, 25 of which were new (Figure 8). This watershed has the highest number of new sites of any common reed grass project in 2021. Twenty-four hours were spent chemically treating the 29 managed sites in this watershed. This watershed took the third most time of any common reed grass management project yet wound up using a below average amount of herbicide.

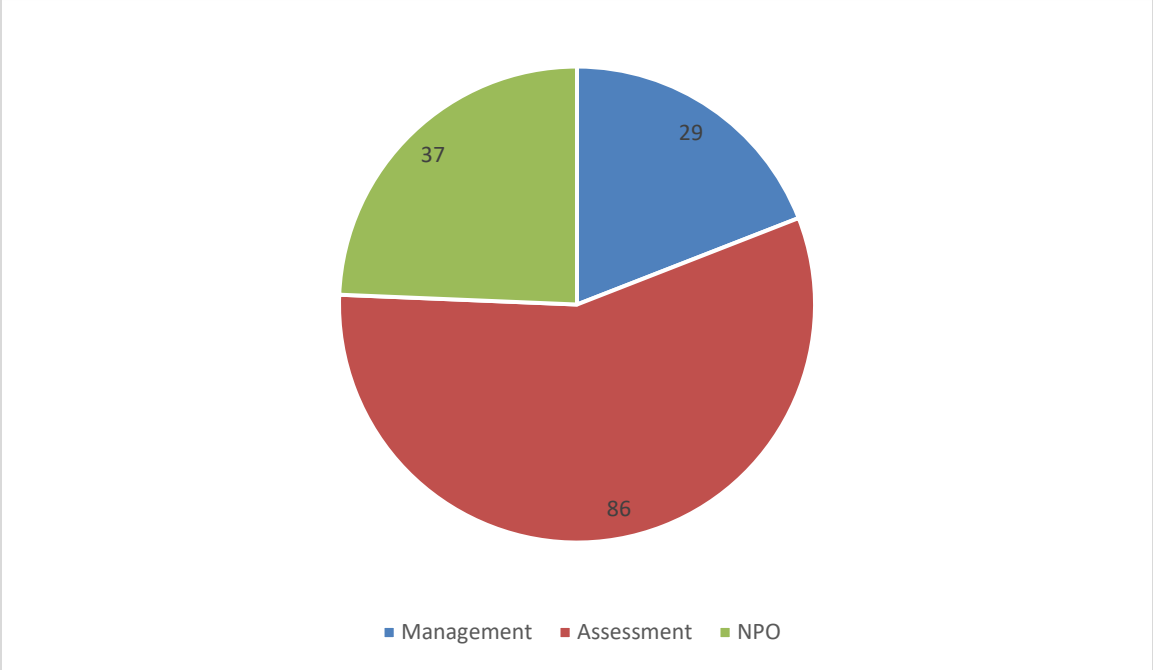

Figure 8. Status of sites visited by the EDRR crew throughout the Mohawk River Watershed Common Reed Grass Exclusion Project during the 2021 field season.

Northeastern Lake Ontario Common Reed Grass Exclusion

The Northeastern Lake Ontario Watershed common reed grass sites run along route 28, local roads, and included DEC administered lands. Like previous years, the bulk of the sites of this project no longer had invasive plants present; seven of the 21 visited sites (Figure 9). Two new sites were surveyed this year, one of them being reported by a landowner along his property. This new site will be challenging to treat due its location in the middle of a dense alder stand. However, it has limited growth due to the property owner removing the seed heads of the plants. The crew continued treating the only management site in the region this season, spending a collective half hour on treatment.

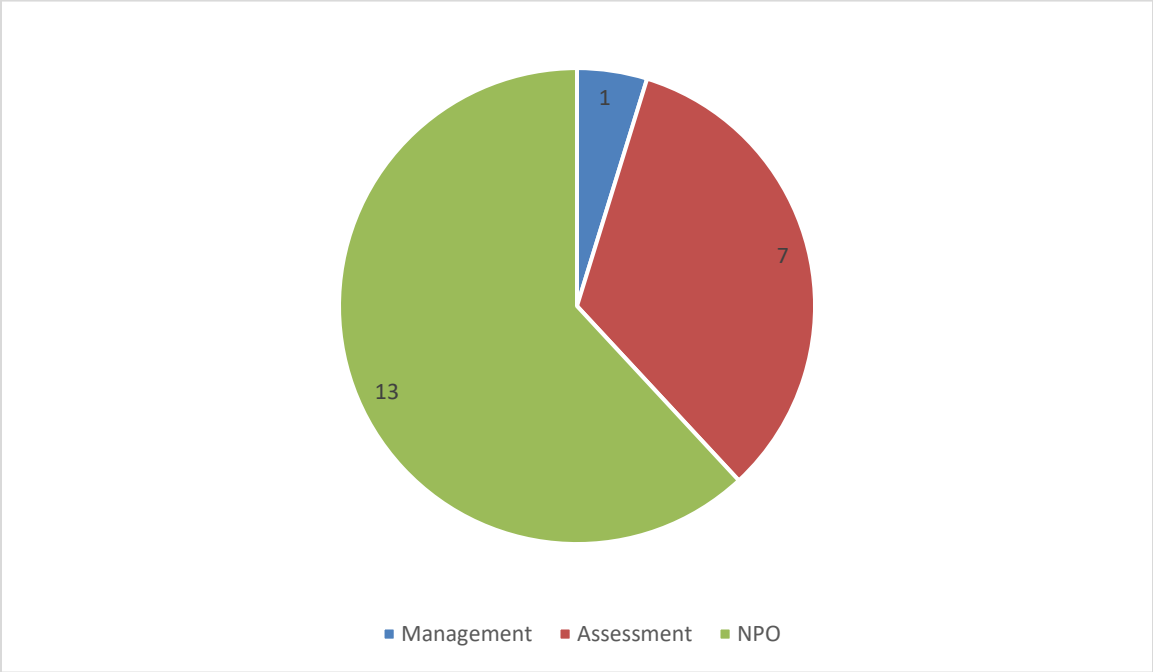

Figure 9. Status of sites visited by the EDRR crew throughout the Northeastern Lake Ontario Common Reed Grass Exclusion Project during the 2021 field season.

Sacandaga River Watershed Common Reed Grass Exclusion

The Sacandaga River Watershed occurs in the southern portion of the PRISM and includes Routes 8, 9N, 10, 29A, 30, and various local roads. Fourteen new sites were found this year, bringing the total of visited sites up to 115 (Figure 10). Sacandaga has had the third most uptake in new sites, with most of these new sites having dense populations of common reed grass. Despite being along private property, these are not all small sites with five being over a tenth of an acre in area. The crew treated 18 historical management sites in the span of 15 hours.

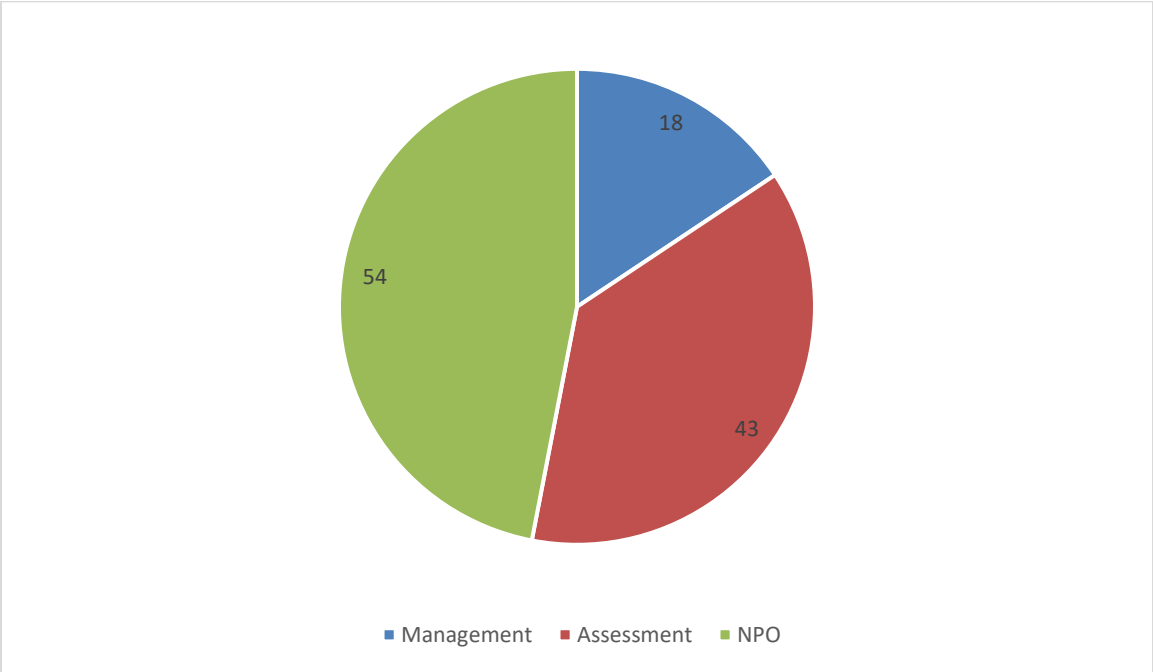

Figure 10. Status of sites visited by the EDRR crew throughout the Sacandaga River Watershed Common Reed Grass Exclusion Project during the 2021 field season.

Salmon River Watershed Common Reed Grass Suppression

The Salmon River Watershed is the smallest project area the crew assessed featuring only seven sites along State Route 30 (Figure 11). The three management sites took a total of 1.5 hours to complete. All these sites, except for the two historically managed sites, have widespread distributions so spread is a concern. One of these widespread sites was a new find this year and was able to be treated. There is some concern about how well the management sites are being controlled in this project area since the management sites were larger than in the last two seasons despite not having a high percent coverage.

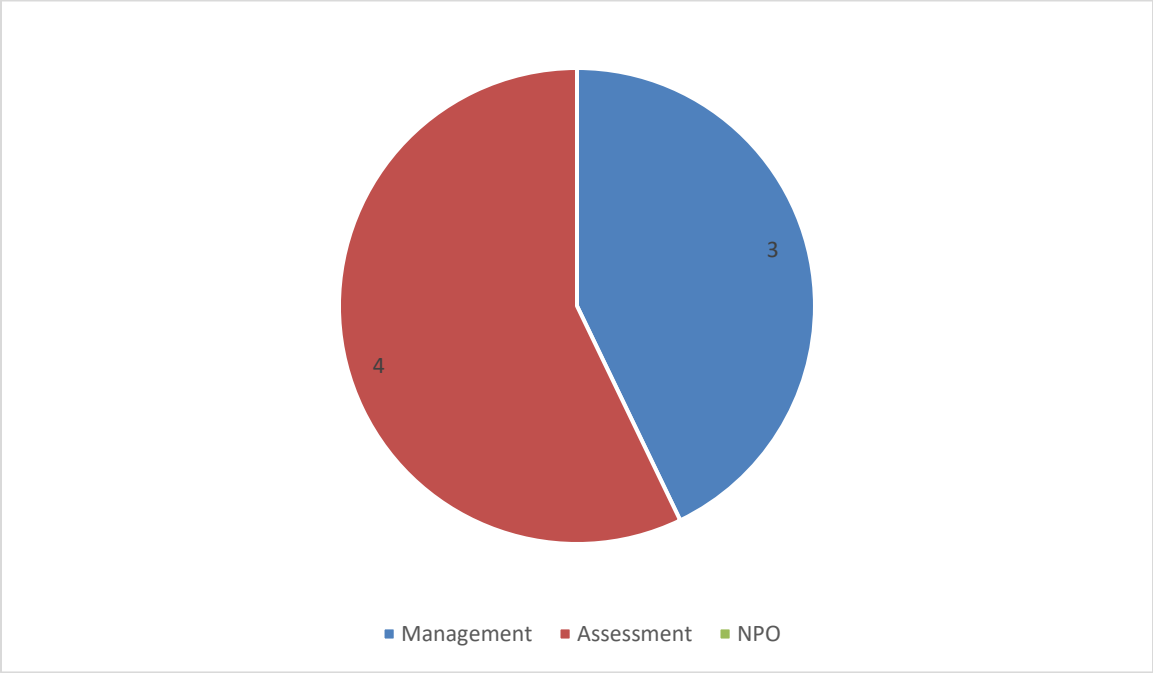

Figure 11. Status of sites visited by the EDRR crew throughout the Salmon River Watershed Common Reed Grass Suppression Project during the 2021 field season.

Saranac River Watershed Common Reed Grass Suppression

The Saranac River Watershed common reed grass sites are found along Route 3, 9, 186, 374, local roads, and a DEC trail. Two new sites were assessed in the watershed. Spread is concern with these two new sites as they have high densities and are located along local roads. More concerningly, only one of the 21 sites were found to no longer have invasive plants present (Figure 12). In total the crew spent four hours treating the seven management sites in this watershed.

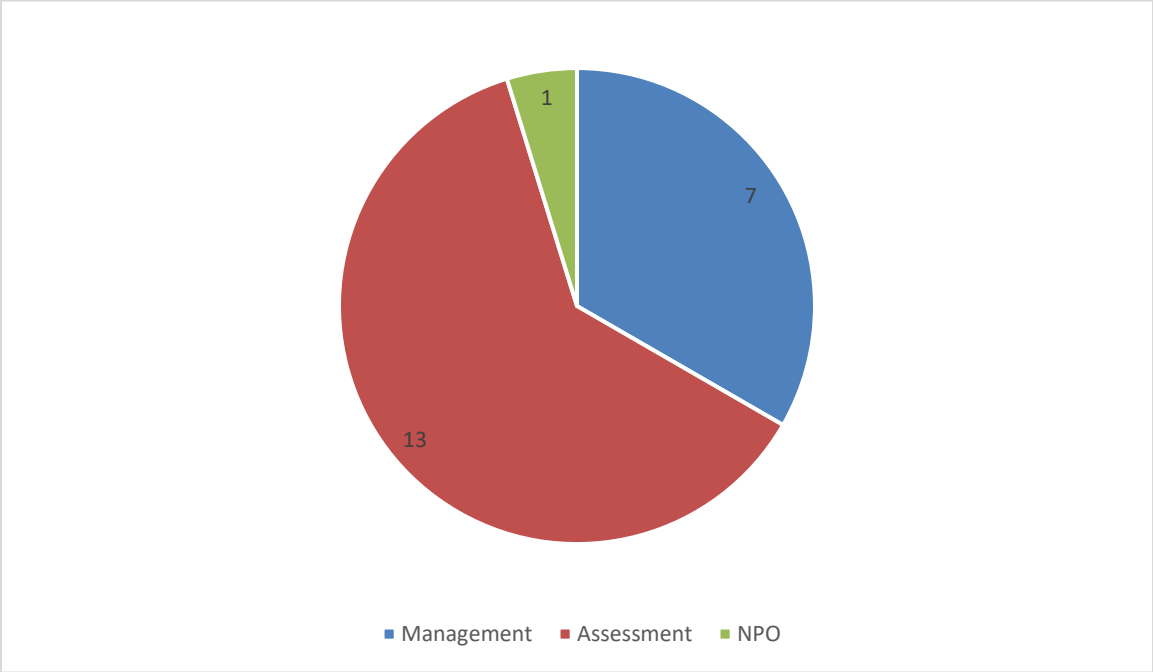

Figure 12. Status of sites visited by the EDRR crew throughout the Saranac River Watershed Common Reed Grass Suppression Project during the 2021 field season.

Southern St. Lawrence Watershed Common Reed Grass Exclusion

The Southern St. Lawrence Watershed had a total of 105 visited sites along State Routes 3, 28, 30, and 56, as well as county and local roads. This region is showing signs of success by having the highest number of sites with no invasive plants present two years in a row (Figure 13). Three new sites were found in the watershed, but all of them were able to be managed. In the past, this region has had some of the larger common reed grass sites in term of area, but this year very few sites were larger than 0.04 acres in size. The one exception is a wetland site the crew first treated two years ago. This site is less than half an acre in size, but the common reed grass in this area is extremely spread out. It took an hour for the crew to get out to the site (it's a tenth of a mile from the road through wetland) and treat it. In future years it may be ideal to cut the dead stalks down to make it easier to navigate the site and find new individuals. In total the crew spent 16.5 hours managing sites in this watershed.

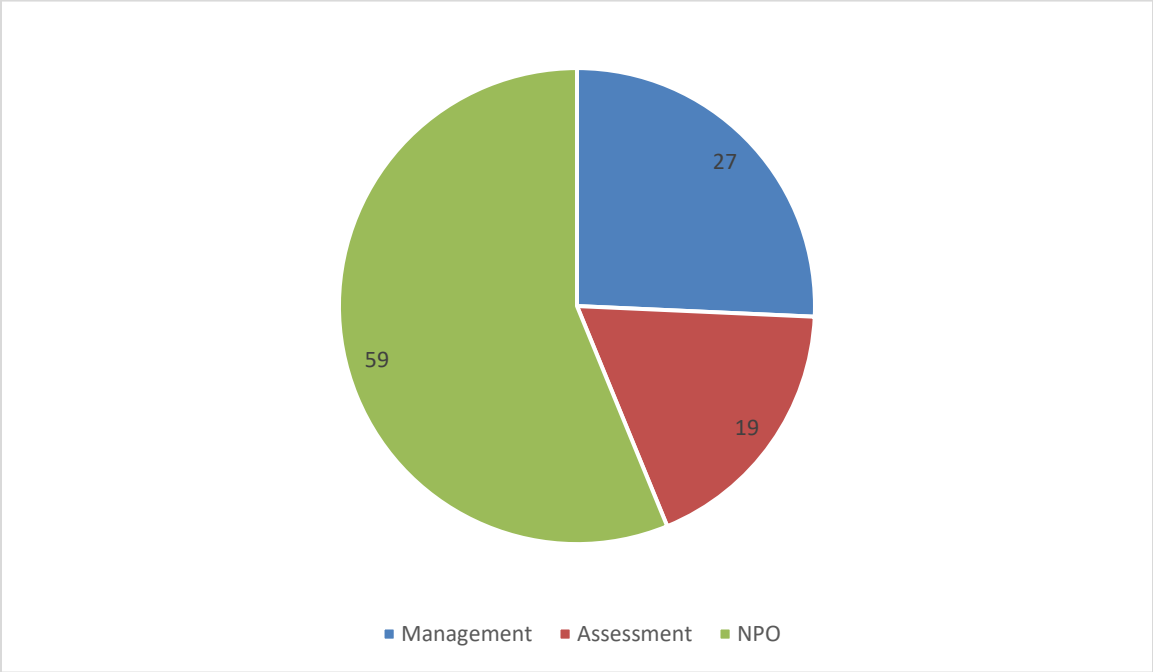

Figure 13. Status of sites visited by the EDRR crew throughout the Southern St. Lawrence Watershed Common Reed Grass Exclusion Project during the 2021 field season.

St. Regis River Watershed Common Reed Grass Exclusion

This year, the crew surveyed around a third as many sites in the St. Regis River Watershed as in the past due to changes in priority and sites becoming locally eradicated. The 34 sites that were surveyed were found along State Routes 30 and 458. The bulk of the sites were small or no longer had plants present (Figure 14). This watershed did have the highest percentage of sites where invasives are no longer present. The crew 5.75 hours at the nine management sites.

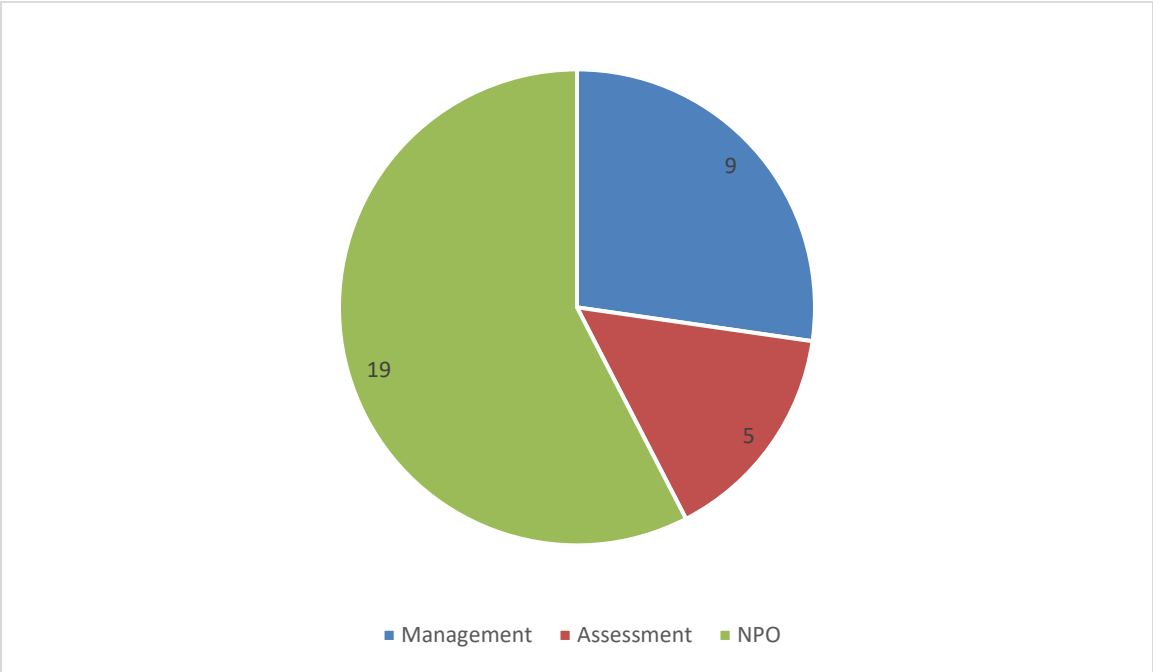

Figure 14. Status of sites visited by the EDRR crew throughout the St. Regis River Watershed Common Reed Grass Exclusion Project during the 2021 field season.

Upper Hudson Watershed Common Reed Grass Exclusion

This watershed covers parts of Routes 8, 9, 28, 28N 30, and 74, as well as the I-87 Northway and local roads. The work done here was almost evenly split between the number of sites assessed (26), managed (30), and with no plants observed (23) (Figure 15). These sites however were not easily treated with many being large in scope. The watershed boasted the second most treatment time with 25.75 hours being spent on management. Three new sites were found, with two of them managed. Due to this summer's high rainfall, sites that were a challenge to fully assess due to flooding had to be approximated.

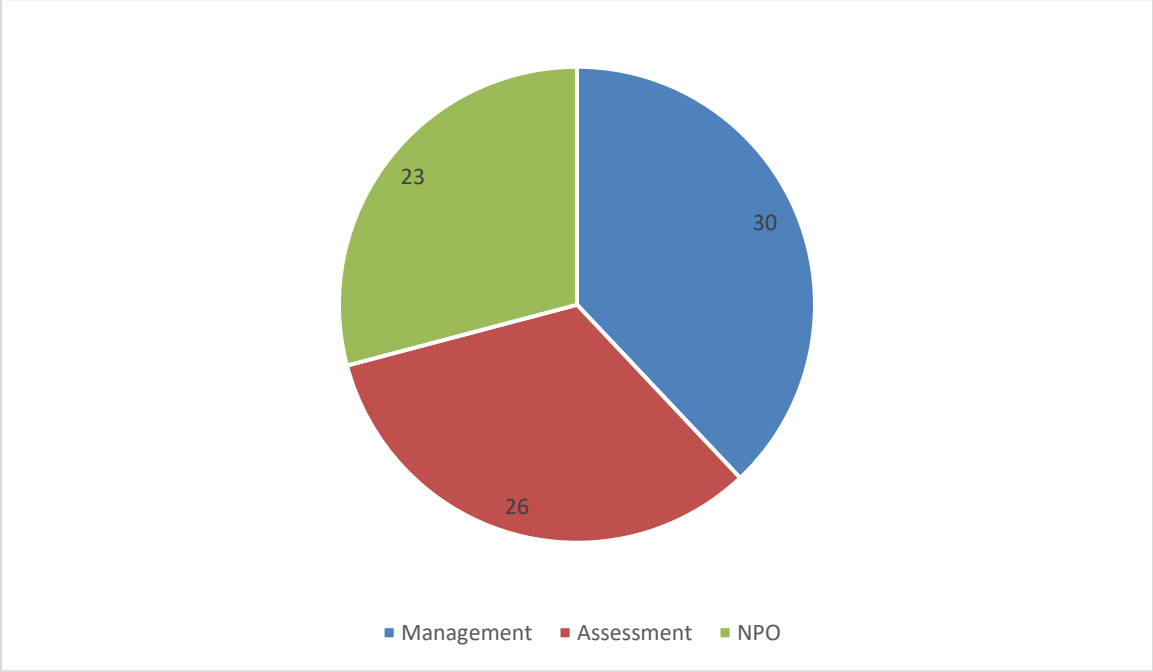

Figure 15. Status of sites visited by the EDRR crew throughout the Upper Hudson Watershed Common Reed Grass Exclusion Project during the 2021 field season.

Knotweed Species

Resilient and Connected Land Network Knotweed Suppression

Knotweed species sites span all regions of the Adirondack PRISM. However, the resilient and connected land network project area includes the bulk of the Adirondack PRISM but excludes the areas in the northern counties and along the lake shores that are more densely human populated This species can grow in various environments such as rocky roadsides, sand piles, grassy fields, stream banks, and riparian buffer zones. It is the most resilient plant the crew treats and is the only species that is treated using a pack containing two herbicides (glyphosate and imazapyr). Knotweed is the second most surveyed plant following common reed grass and is the third most managed. The crew visited a total of 394 sites within the suppression project, with 84 of them being new points (Figure 16). Of these new sites, only six were able to be managed. In total the crew spent 62.5 hours managing and treating a total of 106 sites. The crew surveyed 20 sites outside of the management project area, with two of them being new findings (Figure 16). An additional 3.25 hours were spent managing five of these new sites.

The crew was pleased to learn that a large knotweed treatment area in Franklin County that been first managed the previous year had responded extremely well to treatment. Previously, knotweed well over eight feet tall dominated the area in dense patches, while this year they were a foot tall at most (Photo 8). However, the homeowner did show the crew another patch of knotweed he had found on his property which was promptly treated.

Photo 8. Above in blue are what remains of the Japanese knotweed found along Fletcher Farm Road in Franklin County. The knotweed used to line the forest edge and back into the woods as seen by the dead stalks. Now there are only small plants along the edges.

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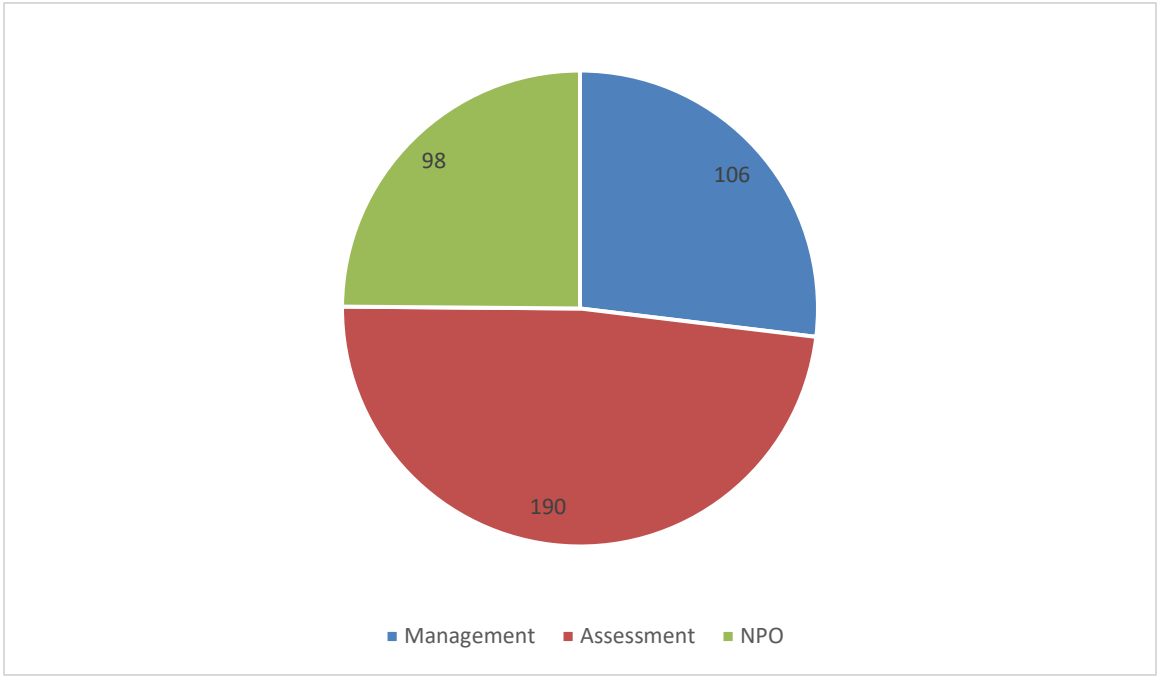

Figure 16. Status of sites visited by the EDRR crew throughout the Resilient and Connected Land Network Knotweed Suppression Project during the 2021 field season.

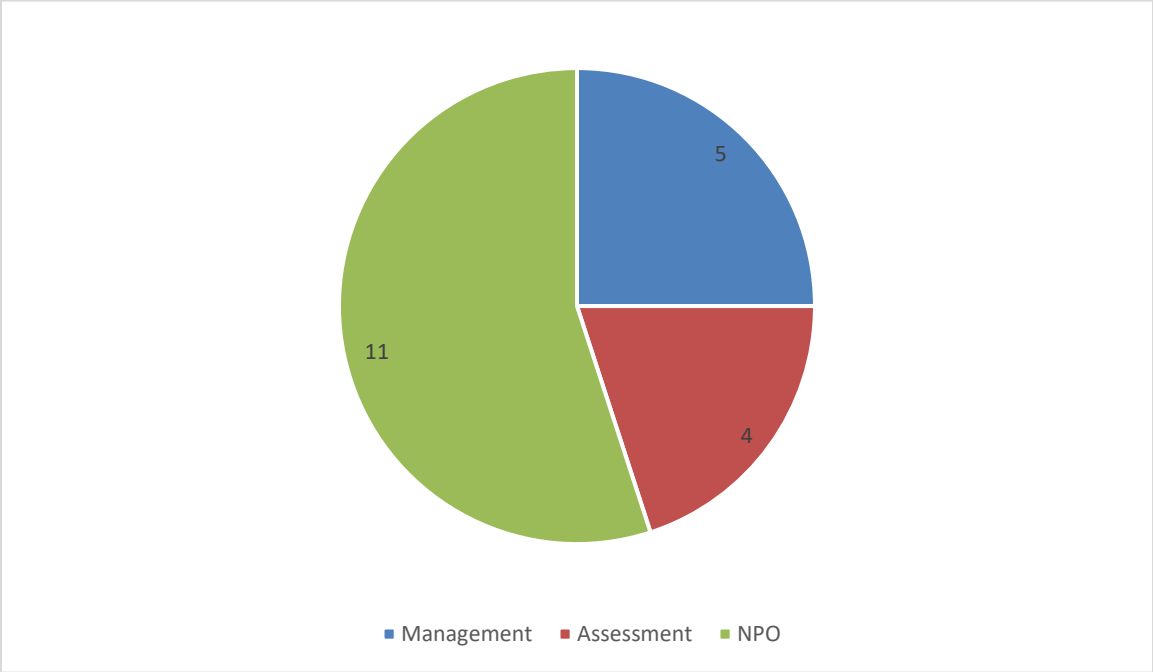

Figure 17. Status of sites visited by the EDRR crew outside of the Resilient and Connected Land Network Knotweed Suppression Project during the 2021 field season.

Purple Loosestrife

Resilient and Connected Land Network Purple Loosestrife Suppression

Purple loosestrife sites also span all regions of the Adirondack PRISM including the Adirondack Park. Nevertheless, the resilient and connected land network purple loosestrife suppression project area excludes the areas in the northern counties and along the lake shores that are more densely human populated. This species is commonly found in wetlands, roadside ditches, and fields. This season the crew surveyed 354 sites as part of the project. Of these 354, 174 were assessment only, 76 no longer had invasive plants present, and 104 were managed (Figure 18). Not only was more purple loosestrife managed than Japanese knotweed, but more time was spent (65.25 hours) on that treatment. Part of the reason for this is that there are three methods of treating this plant: mechanical, chemical, and biological.

Mechanical control is used for smaller sites where the plants can easily be dug or pulled up and/or herbicides cannot be used in the area. There were some challenges with mechanical treatments due to the loosestrife roots being large and hard to unearth (Photos 9 and 10).

Chemical control is used for larger sites typically along highways where it simply is not feasible to dig up all the plants. For these areas, the crew will foliar spray the leaves using a dilute glyphosate spray.

Lastly, biological control is used for large infestations of plants where it would take hours to fully spray the region. This year marked the first time the crew was able to use biocontrol which is normally handled by APIPP personnel. Biocontrol beetles were given to the crew by the Lake George Land Conservancy and were then released at various sites chosen by APIPP (Photo 11). In other areas, if there were signs of biocontrol already present the crew would deadhead the plants but leave them in place to minimize spread via seeds while still leaving a food source for the biocontrol beetles.

In addition, to the sites associated with the suppression project, the crew visited 15 sites outside of the project region. Most of these sites were new findings with only two being previously surveyed. Of these sites, only one was managed (mechanically) with the crew spending an hour there.

Photos 9 and 10. Shown above are two of the largest root clusters that the crew leader found while pulling purple loosestrife. Normally the roots are short and can be easily pulled, while these were at least a foot in length. The right image proved the most challenging due to all the large rocks on top of it which had to be removed by hand before digging could be done.

Photo 11. Purple loosestrife plants were provided by partners at Lake George Land Conservancy with colonies of biocontrol beetles living in an enclosed bug netting bag. At the designated sites, the plants were carried to the center of the polygons and then the plantings were dumped, and the nets were shook to make sure all beetles were released.

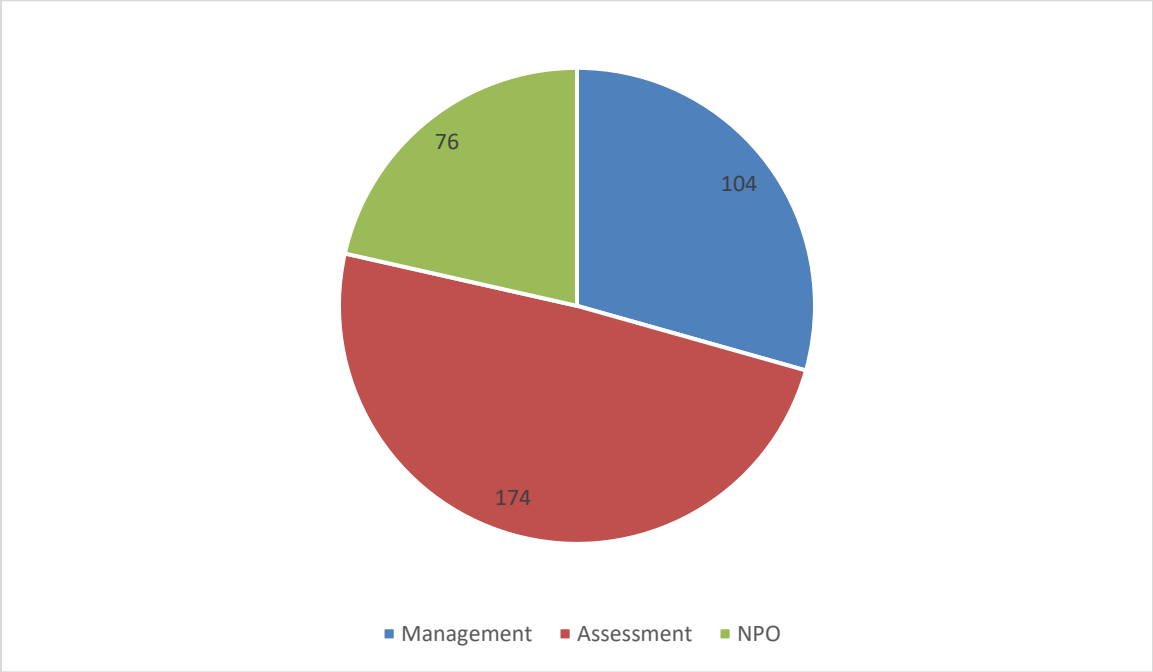

Figure 18. Status of sites visited by the EDRR crew throughout the Resilient and Connected Land Network Purple Loosestrife Suppression Project during the 2021 field season.

Swallow-wort Species

Resilient and Connected Land Network Swallow-wort Exclusion

Thirty swallow-wort sites were visited in the exclusion area, with none of them being purely assessments (Figure 19). Sites were predominantly on private property or local roads. Eighteen sites were managed with the bulk being done in the first two weeks of the project. The crew spent 43 hours completing these management activities, with a combination of chemical and mechanical treatment methods. If encountered later in the season, the plants would have their seedpods removed before they were sprayed. The crew once again observed that the swallow-wort at a historic property had large flowering plants along the water's edge. Elsewhere on the property, the swallow-wort was well under control.

This year, the crew assessed ten sites that fell outside of the exclusion zone. Seven of these sites were managed taking 7.5 hours.

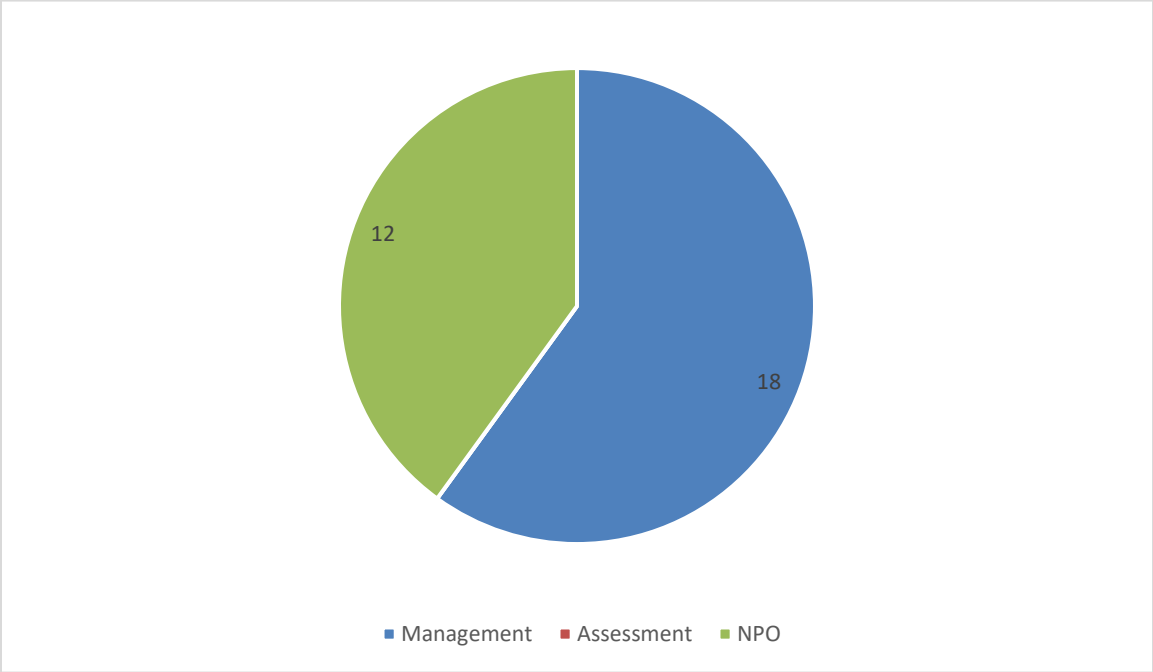

Figure 19. Status of sites visited by the EDRR crew throughout the Resilient and Connected Land Network Swallow-wort Exclusion Project during the 2021 field season.

Tree-of-Heaven

APIPP PRISM Tree-of-Heaven Eradication Project

The crew was able to assess and eventually treat new tree-of-heaven sites in the Fort Ann area. These trees were far larger than anything the crew had previously seen in the area, with one being the largest tree in the neighborhood (Photo 12). The crew leader was able to speak with property owners about the infestation and learn that they had attempted to excavate the trees but with middling success. The crew returned to the site the following day with brush cutters and hatchets and clear cut the tree-of-heavens and sprayed the stumps with a 50% glyphosate mix. Hatchets were used for larger trees to help break them apart when dragging them off to the side as asked by the homeowner. All but the largest tree was able to be managed. APIPP will contract an arborist for the largest tree as it is near power lines and far too large in scope for the EDRR crew.

The historic site in Lake George that the crew has been treating for several seasons was down to a few saplings, with the largest trees being dead from the previous years of girdling. The crew is hopeful that the site will no longer have tree-of-heaven present next season. Tree-of-heaven was also assessed in the neighboring yard, but the crew was unable to receive permissions to treat it this season. Between cutting, backpack spraying, and hack n' squirt methods the crew spent 20 hours managing tree-of-heaven.

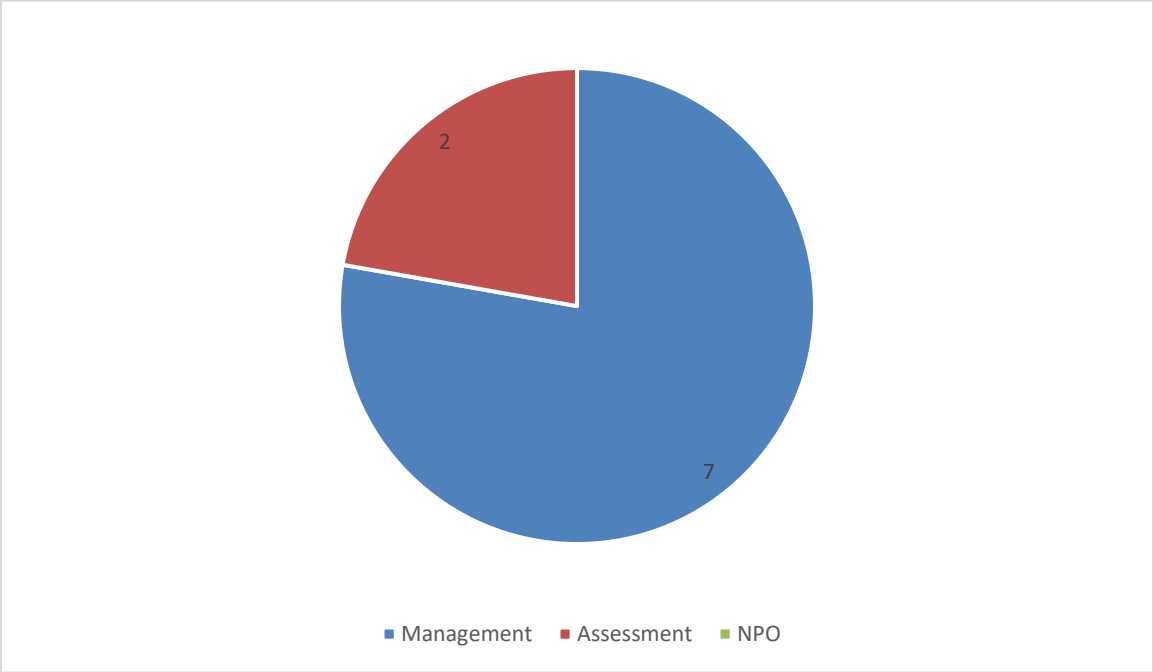

Figure 19. Status of sites visited by the EDRR crew throughout the APIPP PRISM Tree-of-Heaven Eradication Project during the 2021 field season.

Photo 12. The Fort Ann patches were notable since not only were they covering a large amount of ground, but they formed dense patches. Everything along the hill in the above photo was tree-of-heaven varying in size from small saplings to spindly trees that had four-inch diameters to the largest tree-of-heaven the crew lead has seen in the Adirondacks (next to the mailbox).

Japanese Stiltgrass

APIPP PRISM Japanese Stiltgrass Eradication Project
Japanese stiltgrass was first found in the PRISM in September of this season when an observant landowner reported it to APIPP. The five sites of the infestation were treated along the roadside in a home-owners association in Bolton Landing using a combination of mechanical and chemical treatment methods. A total of 6.75 hours were spent managing this species.

Whiteface Mountain

Several years ago, the Veterans' Memorial Highway leading to the summit of Whiteface Mountain was redone. As a part of this project, contaminated fill was brought in, spreading invasive species. The mountain is home to rare native plants such common blue-eyed grass (*Sisyrinchium angustifolium*). Due to several factors, including the presence of rare plants, chemical treatment is not a viable option to treat these invasive species so hand pulling is exclusively use. The exception is sites where Japanese knotweed has been found lower in elevation. The crew was pleased to learn that of the eight Japanese knotweed sites only one had plants observed.

Whiteface Mountain is the most publicly visited area that is managed. Visitors will often approach the crew and pull their vehicles over to inquire about what is being done. This provides a great opportunity for the crew to educate the public about invasive species.

Unfortunately, Whiteface Mountain typically exhibits the worst weather that the area has to offer and the summit it often 10-15 degrees colder than the base and often experiences high winds. The crew typically works on Whiteface on rainy days since hand-pulling can be conducted in the rain and chemical treatment cannot (Photo 13).

This season the crew focused on pulling up knapweed (*Centaurea* spp.), sweetclover (*Melilotus* spp.), caraway (*Carum carvi*), dandelions (*Taraxacum spp.*), crown vetch (*Securigera varia*), cypress spurge (*Euphorbia cyparissaias*), bladder cambion (*Silene vulgaris*), and wild chervil (*Anthriscus sylvestris*). Due to the sheer number of plants the crew removes, work is quantified by number of contractor bags filled, instead of counting per plant. In total, 25 contractor bags were filled and roughly 168 hours were spent managing the roadside.

Cypress spurge has a sap that can be extremely irritating if it gets on the skin or in the eye so the crew wears gloves as protection. The plant comes up easily and grows in dense matts so it can quickly fill up the contractor bags. Dandelions and bladder cambion roots can be frustrating to remove and the crew used pliers to help pull up their root clusters. Some cambion roots were unusually long and required shovels to get out of the ground (Photo 14).

Photo 13. On this particularly rainy day all members of the EDRR crew were at Whiteface including Lee Patrick and Vance Brown. The ditch the crew was in was coated in cypress spurge, vetch, and cambion with the occasional sweet clovers and dandelions. The other side was well under control with the occasional dandelion or caraway. Due to the low visibility, members of the crew would make sure to always have their vests or high visibility clothing on.

Photo 14. Vance Brown sits holding a large bladder cambion root showing how established some of these plants have become. This plant took two crew members with shovels to completely remove from the soil.

End of Season Review

This year's crew made good progress despite the challenges of conducting a field season under COVID-19 precautions and an unusually rainy summer. The crew was able to revisit all priority historic sites. In total, the crew assessed over 1,700 sites and preformed management at approximately 500 sites. Major progress has made at specialty sites, such as the common reed grass sites on property owned by the Lake George Land Conservancy and tree-of-heaven in Lake George, both which should be fractions of their size in the coming season. Similar to last year, the crew found around 500 sites that no longer had any invasive species observed. Thanks to the heavy rainfall early in the season the crew was able to do more assessments early in the project allowing APIPP to get treatment permissions for many new sites before the season's end. Due to extensive work by crews in previous years, the crew struggled in finding new sites along major routes (around 300 this year, down from the previous year's 500), allowing focus to be shifted towards smaller county and local routes that had remained unassessed for years.

Changes to the data-collection software such as the way nonpriority sites were presented and the focus on flagging helped speed up work. Previously, non-priority sites would look the same as priority sites, with the difference in the two being in the details on the points. Therefore, when a crew was driving, they would sometimes drive to a site that is no longer a priority, wasting time unless they checked every single point while driving. Now with the new fade system, crews can skip areas and it is easy to double check if assessments are already in the system. Often the procedure when getting to a site is to start mapping things immediately if it is an assessment only, and to check the pervious year's polygons to determine what previous crews did to know how much equipment is needed if it is a management site. If something about the site seems unusual, crew leads will look at comments on previous polygons. With flags crews know what areas to avoid or things to look out for and better yet, future crews will no longer have to repeat any concerns that old crews had.

There were some technology challenges this year, which were only heightened by COVID-19 restrictions. Since the crew could not meet personally with APIPP personnel, troubleshooting would have to be done over the phone or text. Since Richard had to deal with similar circumstances the season prior, he was able to help fix issues due to becoming familiar with the software after lots of self-troubleshooting. However, there were some issues with connectivity in the iPads with maps often becoming inaccessible, which would slow down the workday when crews would have to pull over and try to resync data using hotspots.

Recommendations and Conclusion

Recommendations

IPC provides the following recommendations to increase the EDRR crew's efficiency and effectiveness during future field seasons.

1. **Making the public more aware of crew's presence**

   When driving, the crew would put their hazard lights on and hope traffic behind them would slow down and allow them to pull over. While other drivers usually slowed down, this was not always the case. This concern could be allieviated by the contractor placing "Caution: Vehicles Make Frequent Stops" signs on the back of the trucks.

2. **Additional assistance for Whiteface Mountain**

   Treating the Whiteface Highway is one of the more tedious projects of the season. The crew believes that if more people were part of the eradication crew, productivity and effectiveness could be greatly increased. Unfortunately, this year it was not possible to engage volunteers in this effort due to COVID-19; however, adding capacity with volunteers could be effective in future years.

3. **Solving hardware issues**
   The iPads age started to show. The iPads would often overheat so once pictures were taken, and polygons were made the crew would have to put the iPads in the truck to try and cool them down. On many occasions, when the AC was cranked up, the iPads would be put in front of the vents in hopes of improving their performance. Often in Collector, the application would take minutes to load polygons, crash during the submitting process, and/or photos would not save properly. One possible solution could be having points appear in chunks since the crew is rarely hitting all corners of the Adirondacks at once. Another idea could be when working on yellow iris and swallow-wort at the beginning of the season, only those points could be uploaded as a separate map to help improve performance.

Conclusions

2021 was the tenth season IPC provided staff for APIPP's terrestrial invasive species project. Despite COVID-19 precautions, IPC's work helped enable APIPP to continue expanding its invasive species monitoring and management projects. As historically managed sites continue to decrease in size and cover following treatment, crews have been able to address a greater number of infestations. The crew's efforts on newer projects, such as treating aggressive tree-of-heaven and Japanese stiltgrass plants, greatly reduces the ability of these emerging species to spread throughout Adirondacks. Tourism is a major economic driver for the Adirondack region; however, increased tourism also presents opportunities and pathways for the introduction and spread of invasive species. Thanks to APIPP's outreach programs, DEC boat washing stations, and APIPP's EDRR crews, many of the threats of invasive species can be reduced.

Appendix 1: Standardized New York State Invasive Species Tiers

Invasive Species Tiers

Standardized species lists for each PRISM

		Difficultly of Eradication / Cost of Control Abundance (In PRISM plus Buffer)			
		None in PRISM	**Low** (Eradication/ Full containment may be feasible)	**Medium** (Strategic management to contain infestations and slow spread in PRISM)	**High** (Established/widespread in PRISM; only strategic localized management)
Impact (current and future)	**Very High or High**	**TIER 1** *Early Detection/Prevention* Highest level of early detection survey efforts. Should conduct delineation surveys and assign to appropriate Tier if detected. a) Inside buffer, but not in PRISM b) Outside PRISM and Buffer, but close (eastern North America) c) Far outside PRISM and buffer (not in east NA), but introduction pathway exists	**TIER 2** *Eradication* Highest level of early detection response efforts. High impact species with low enough abundance and suitable treatment method available to make eradication feasible within the PRISM. Need delineation surveys to determine extent.	**TIER 3** *Containment* Target strategic management to slow the spread, as likely too widespread for eradication, but many surrounding regions could be at risk if left unattended. For plants, use the IPMDAT. Possible eradication candidate only if adequate resources and effective control methods available.	**TIER 4** *Local Control* Eradication from PRISM not feasible; focus on localized management over time to contain, exclude, or suppress to protect high-priority resources like rare species or recreation assets. Be strategic when deciding if / where to control.
	Medium	*Evaluate (Medium Impact)* Further evaluate impacts and PRISM resources to see if the species should be assigned to one of the other lists. If this species could feasibly become high impact with climatic or other environmental changes, consider moving to the appropriate High Impact row based on abundance. If too little is known, consider moving to "Monitor".			
	Unknown	**X**	**TIER 5** *Monitor* Species that need more research, mapping, and monitoring to understand their invasiveness. This includes naturalized species and cultivated-only species that are known to be invasive in other regions but are not yet invasive here. Invasiveness may change with environmental or genetic changes. Should monitor populations on a regular basis to see if they are starting to become invasive and assign to appropriate Tier if invasive infestations detected.		

Buffer: An area chosen by the PRISM that surrounds the PRISM and takes in certain counties, states and provinces. Most PRISMs are using about 100 miles as the buffer.

Impact: Use the PRISM-specific invasiveness rankings if available, or use NYS ranks (see nyis.info for existing ranks). For species that are not ranked yet, or PRISM-specific adjustments of state ranks are deemed necessary, use expert opinion and document justification. Low-impact species not included since cannot justify spending resources to control these.

Abundance: This is left as a qualitative metric, since assigning standardized values to categories is not feasible due to the diversity of species dispersal strategies and data gaps.

This ranking system takes into account populations that have escaped into natural areas, but not intentionally (and legally) distributed individuals. For example, a landscape planting would not be counted.