Terrestrial Early Detection & Rapid Response Crew

Final Report

June 15, 2020 – September 24, 2020

Invasive Plant Control, Inc.
Adirondack Park Invasive Plant Program

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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Introduction

The 2020 field season was the ninth 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 2020, Richard Gentry served as the primary crew leader and Shelby Thomaston, who was new to the crew this season, served as a secondary crew leader. Additional members joining the crew for their first year were Danielle Browne and Lilian Chorlian. Vance Brown and Lee Patrick provided off site supervision.

Invasive species monitoring and management activities were conducted from June 15 through September 24, 2020 for a total of 15 weeks. Throughout the field season, IPC assessed and/or managed an astounding 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 and county roads, TNC 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 2020 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 2020 Annual Report. Visit www.adkinvasives.com to access past and current annual reports.

Photo 1. Danielle Browne conducts an assessment of purple loosestrife.

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 Department of Environmental Conservation (DEC) 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 (DEC), New York State Department of Transportation (DOT), and New York State 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 DEC. To learn more, visit www.adkinvasives.com.

Response Crew Objectives and Methodology

The EDRR crew's main objective for the 2020 field season was to revisit, assess, and perform treatments on all of 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 Tiers 1 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. 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
Hemlock woolly adelgid	*Adelges tsugae*	Yes
Japanese angelica tree	*Aralia elata*	Yes
Mile-a-minute	*Persicaria petiolate*	Yes
Scotch broom	*Cytisus scoparius*	Yes
Tree of heaven	*Ailanthus altissima*	Yes
Tier 3 – Containment		
Common reed grass	*Phragmites australis*	Yes
Cup plant	*Silphium perfoliatum*	No
Japanese tree lilac	*Syringa reticulata*	Yes
Jumping worm	*Amynthas spp. & Metaphire spp.*	No
Lesser celandine	*Ficaria verna*	Yes
Swallow-wort species	*Cynanchum louiseae* & *Cynanchum 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
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 a high 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*
Japanese stiltgrass	*Microstegium vimineum*
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, 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-1A. 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 at year's end. 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 was submitted to DEC regional staff to facilitate expedited management during the current season. No Rapid Review Authorization permits were submitted for the 2020 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 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 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 Ford F-series 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 and shovels were used for mechanical management work, while backpack sprayers and stem injection tools were used to perform pesticide applications. Shindaiwa SP518 backpack sprayers were the primary tool used for foliar herbicide application. Custom injection tools, provided by APIPP, were used for treatments on small/sparse populations of hollow-stemmed species such as *Phragmites* and knotweed. 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)
Triclopyr	Garlon 4 Ultra (62719-527)

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 app. 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. In previous seasons, paper logs were used in addition to IPMMS. A Survey123 form filled the role of these paper logs this season and increased the crew's efficiency as data no longer had to be manually entered into a spreadsheet.

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 outline 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.

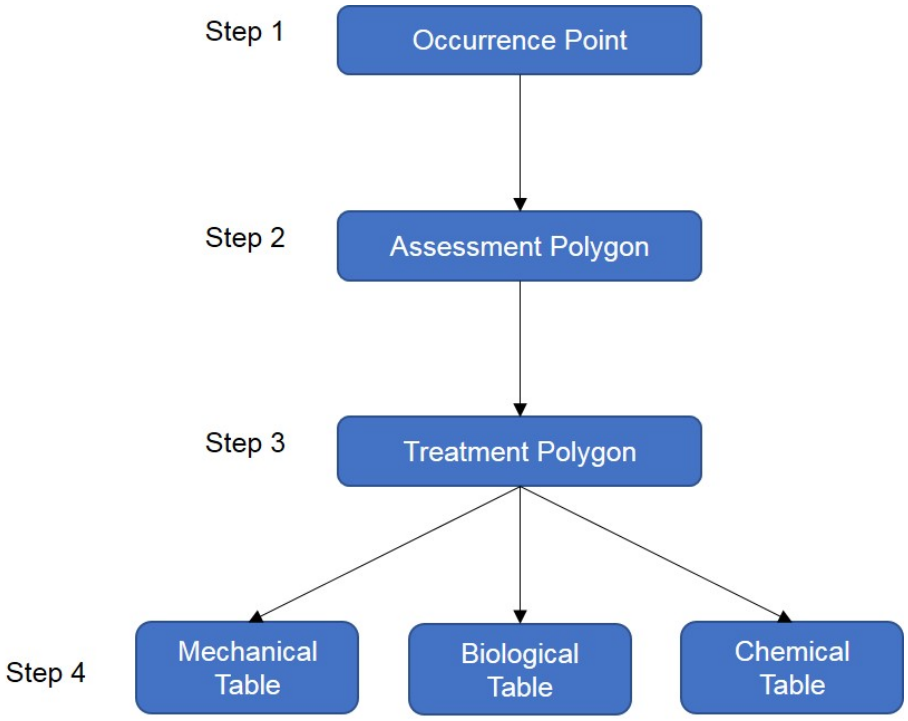

Figure 1. Data collection workflow of the IPMMS

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. 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 2. Danielle Browne conducts as assessment of purple loosestrife in Ticonderoga, NY.

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 produced treatment polygons that were slightly larger or smaller than what was treated. Part way through the project, 2020 assessment polygons were given a blue color as opposed to the traditional red, making them much easier to trace over, reducing this error. However, 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

Yellow Iris

Saranac River Yellow Iris Eradication Project

The yellow iris sites that were part of the Saranac River watershed were assessed during the last two weeks of June. Only one of the historic 20 sites in this project area was found to have yellow iris still present; a 95% success rate (Appendix 2, Figure 1). No new sites were identified. Mechanical treatment was performed at the one site where yellow iris was still present. This site was a challenge last year when the crew spent a collective six hours to remove 206 plants. This year's crew was more efficient and spent a collective five hours to remove 324 plants. Difficulties at this site arise from the site having thick mud that could top boots, the site being hard to reach due to a busy road with no pull-offs, and harsh terrain leading up to the patch.

Ausable-Champlain Yellow Iris Project

Yellow iris sites falling within the Ausable-Champlain project area were also primarily assessed during the last two weeks of June. Three new sites were found bringing the total number of yellow iris sites in this project area to 55. The new occurrences were observed amongst debris from the river flooding. Therefore, it appears that the flooding of the Ausable River is resulting in yellow iris spreading and it is suggested that future projects should focus on walking the riverbank with waders, instead of just following it on road corridors. Five sites in this project area received mechanical treatment while 49 sites no longer had plants observed (Appendix 2, Figure 2). While most sites in the Ausable-Champlain project area are in the Lake Placid area and were accessed using canoes, other sites were often located hundreds of feet off the nearest road and therefore more time was often spent accessing sites than assessing them. All of the sites surveyed via canoe in the Lake Placid area no longer had yellow iris present and should be examined for removal from the site list.

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. The one remote site was foliar sprayed by the remaining crew member. Wild parsnip on the property was also foliar sprayed to alleviate landowner concerns that this species would replace the mile-a-minute. The crew spent a collective eight hours at the site and removed 395 mile-a-minute plants.

Common Reed Grass

Ausable River Watershed Common Reed Grass Suppression

Management of common reed grass in the Ausable River Watershed is showing signs of successful management as 22 of the 51 visited sites in this watershed had no plants observed (Appendix 2, Figure 3). The watershed covers land along State Routes 86, 431, 9N, 73, 22, and 9. Five new sites were identified along the watershed; however, two of these are near private property and landowner permission would need to be secured before treatment. Permissions were in place to treat four sites; these sites have the potential to be eradicated soon as they only

required a collective two hours of treatment. 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.

Chateaugay-English Watershed Common Reed Grass Suppression

The 23 visited common reed grass sites within the Chateaugay-English Watershed all occurred along Route 374, with the bulk of sites occurring on private or timber property. Although no new sites were identified and seven sites had no plants observed highlighting the success of past treatments, most of the remaining sites were high density patches (Appendix 2, Figure 4). Permissions were in place to treat five sites and three hours were spent performing those treatments.

Lake Champlain Watershed Common Reed Grass Suppression

The Lake Champlain Watershed had sites along Routes 22, 9L, 74, 9N, 374, as well as local roads and Interstate 87. In addition to road rights-of-ways, sites also occurred on private property and DEC administered lands. This is one of the larger and most infested watersheds with 318 visited sites (Appendix 2, Figure 5). This season the crew was able to visit some new areas along I-87 or local roads and 66 new sites were discovered. Many of the sites in this watershed were assessment only (mostly due to a lack of landowner permissions or sites being too inundated to treat). However, over 10% of these sites (34) were found to no longer have common reed grass. Almost 300 hours were spent chemically treating 58 sites in this watershed and some of the largest sites in the Adirondack PRISM occur here. It is important to note that the common reed grass at several occurrences in this watershed were short and appear to have been mowed by the DOT before herbicide treatment took place.

Travel times in this watershed were often longer than anticipated due to an abundance of construction and logging trucks slowing down traffic. This watershed also includes downtown Lake George, a major tourist destination, where traffic is often slowed due to its large volume along with a plethora of tourists in the streets. The crew was unable to visit some sites in the downtown Lake George area due to the roads being too small for trucks or a lack of safe places to pull over.

Mohawk River Watershed Common Reed Grass Exclusion

The Mohawk River Watershed covers portions of Routes 8, 10, 29A, and 365 and includes 113 visited common reed grass sites. This watershed boasted 49 sites with no plants observed and four only new sites were found (Appendix 2, Figure 6). Approximately 22 hours were spent chemically treating 24 sites in this watershed demonstrating that many of the sites were still quite large and likely to require multiple years of follow-up to successfully reach local eradication.

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 property. Roughly 57% (16) of the 28 visited sites in this watershed no longer had common reed grass present (Appendix 2, Figure 7). Four new sites were identified this season. Only one site where permissions were in place to treat still had Common Reed Grass present. Only 30 minutes were spent treating in this watershed.

The technical difficulties plagued the crew while working in this watershed, leading to some work slowdowns. Time was taken to reset the GPS and try and reconnect it. For some sites, the GPS had to be ignored and the crew worked based off the site names and the imagery map.

Sacandaga River Watershed Common Reed Grass Exclusion

The Sacandaga River Watershed occurs in the southern portion of the Adirondack PRISM and includes Routes 8, 10, 29A, and various local roads. This season, only four new sites were found in this watershed bringing the total number of visited sites to 86 (Appendix 2, Figure 8). Concerningly, three of these new sites have high invasive plant densities. The crew spent approximately 13 hours treating 18 sites and two of these sites were relatively large. These sites occurred at a DOT facility and a RV parking area. DOT facilities routinely have the largest sites and present a spread potential. Sixty-four percent (55) of sites in this watershed no longer had common reed grass present as a result of successful treatment in past seasons.

Salmon River Watershed Common Reed Grass Suppression

The Salmon River Watershed has the fewest common reed grass sites of any of the common reed grass suppression projects with only 13 visited sites in the watershed. All these sites are located along Routes 11B and 30. All sites, including five new sites, were high density, so spread is a concern. Only one site in this watershed no longer had plants present and permissions were only in place to treat one of the 13 sites (Appendix 2, Figure 9).

Saranac River Watershed Common Reed Grass Suppression

The Saranac River Watershed common reed grass sites are found along Route 3 and local roads. A few sites are also located near a TNC preserve. Nine new sites were found while working the watershed, all with high density so spread is a concern. Fortunately, 39 (55%) of the 71 visited sites in this watershed no longer had common reed grass present (Appendix 2, Figure 10). In total three and half hours were spent treating seven sites.

Southern St. Lawrence Watershed Common Reed Grass Exclusion

The Southern St. Lawrence Watershed had a total of 175 visited sites along State Routes 3, 28, 30, 56, and 421, as well as county and local roads. Management in this area is showing signs of success with the highest percentage of sites no longer having common reed grass present (66% or 116 out of 175 sites) out of all the common reed grass projects (Appendix 2, Figure 11). Only one new site was identified in this watershed. In total, approximately 35 hours were spent treating 36 sites. Several of the treatment sites were large; however, many of these large sites were smaller than in previous years. One site that was particularly dense last season and required the use of brush cutter to ensure proper treatment, only required 1/5 of the herbicide that it took last year demonstrating the success of last season's treatment.

At a DOT facility, crew leader Richard Gentry talked with the head of the facility about managing invasive plants. The manager was passionate about dealing with invasives and was glad to hear that many of the sites at his facility were either eradicated or fractions of what they once were. He mentioned how he hand-harvested purple loosestrife to make sure the species would be unable to spread, indicating he had removed thousands of plants.

While working along the route, the crew encountered individuals from the State University of New York College of Environmental Science and Forestry (ESF) who were working on knotweed control.

St. Regis River Watershed Common Reed Grass Exclusion

The St Regis Watershed covers portions of Routes 11B, 30, and 458. Most of the 91 visited sites in this watershed are relatively small and 54% (49) no longer had common reed grass present

(Appendix 2, Figure 12). Twenty-one new sites were identified while working in this watershed and eight sites were treated chemically.

Upper Hudson Watershed Common Reed Grass Exclusion

The Upper Hudson Watershed had 102 sites visited this season and no new sites were identified (Appendix 2, Figure 13). This watershed covers parts of Routes 8, 9, 28, 29, 30, and 74, as well as Interstate 87 and local roads. Most of the 25 sites where treatment was performed were rather large and approximately 20 hours were spent performing treatments in this watershed. Some sites were challenging to assess due to hazardous topography or flooding. In one wetland, two separate patches of common reed grass spread to become one large polygon. Fifty-three percent (54) of the common reed grass sites in this watershed no longer had plants present.

At one DOT facility, the crew encounter four smaller sites that had been paved over. While no plants were observed growing through the asphalt here, the crew had encountered that in other areas (Photo 3.)

Photo 3. Common reed grass growing through asphalt.

Other Common Reed Grass Sites

In addition to the common reed grass associated with one the projects discussed above; the crew encountered an additional 72 new sites that have yet to be associated with one of the suppression projects. The data for these sites will be analyzed by APIPP staff throughout the winter and they will be added to the appropriate suppression project area in advance of next field season.

Knotweed Species

Resilient and Connected Land Network Knotweed Suppression

Knotweed spp. sites span all regions of the Adirondack PRISM including the Adirondack Park. This species can be found growing in various terrains such as rocky roadsides, maintained grassy areas, riparian areas, and sand pits. Knotweed is one of the most resilient plants treated and is the only species where a mixed pack containing two herbicides (glyphosate and imazapyr) is used. Knotweed is the second most assessed and managed species by the crew after common reed grass. In total the crew visited 525 knotweed sites throughout the season in the suppression project area including 174 sites where knotweed was no longer present (Appendix 2, Figure 14). The crew spent roughly 79 hours treating 110 sites and identified 74 new sites associated with the suppression project. In addition to the numbers listed above, the crew visited 64 sites not associated with the suppression project. Areas not associated with the suppression project tend to be in the northern counties and along the lake shores where there is a higher human population density. Five of these sites were chemically treated, 17 no longer had knotweed present, and 18 of these sites were newly identified.

As a part of their knotweed treatment activities the crew helped treat knotweed for the town of Franklin on their right-of-way. While on site, the crew provided information to the town staff about invasive species and best management practices. They also obtained landowner permission to treat the knotweed that had spread off the right-of-way. Treating the entire patch will help ensure that treatment is successful.

While the crew helped obtain several landowner permissions throughout the season, one was a knotweed site that had likely been spread to a new area due to fragmentation by floodwaters. Treating these newly infested sites quickly helps to reduce further spread potential.

The most challenging treatments the crew undertook this project were all knotweed. At the Camp Santanoni Historic Area, one large site that must be hiked to required more than an entire backpack of product last season. Hiking long distances can be a challenge when carrying a backpack sprayer. Luckily, this season that patch was much smaller due last season's treatment and staff at Santanoni covering the remaining plants with tarps to try to shade them out. This season the crew only needed to hike to that area once and did not need to return to the truck to refill their backpack sprayers. The crew also helped educate the public at Santanoni when the public inquired what they were doing.

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. This species is most commonly found in wetlands and roadside ditches. This season the crew visited 283 sites associated with the suppression project area. The resilient and connected land network purple loosestrife suppression 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. Of the 283 sites, 65 of them no longer had plants present, 37 received chemical treatment, 34 received mechanical treatment, and 102 of them were new (Appendix 2, Figure 15). In general, smaller sites where treated mechanically via digging and pulling and larger sites were treated chemically. Two large sites did require mechanical treatment due to their

proximity to water. One of these sites was treated two years prior and filled twenty-one contractor bags. This season only nine contractor bags were removed.

In addition, to the sites associated with the suppression project, the crew visited an additional 82 purple loosestrife sites. The bulk of these were new (69). Only two of the sites outside of the suppression area were treated (mechanically) and four no longer had purple loosestrife present.

The high number of new sites both within and outside of the suppression project area are the result of surveys conducted in areas where they had not previously been done. Many of the new sites that the crew encountered were in the right-of-way and seemed to stretch for long distances (Photo 4). Others were just beyond the right-of-way and completely dominated the landscape (Photo 5). This was especially common in the Lake George area.

In the future it is suggested that biological treatments are used to most efficiently treat large patches of purple loosestrife. The best approach may be to focus on singular routes with biocontrol beetles until they become well established and then to start moving to other priority routes.

Photo 4. Purple loosestrife stretches for a distance in roadway right-of-way.

Photo 5. Purple loosestrife dominates landscape.

It should be noted that some purple loosestrife was found to be treated by highway departments or DOT if they were near common reed grass (Photo 6).

Photo 6. Purple loosestrife presumed to be treated by local highway departments or DOT in near Common Reed Grass.

Swallow-wort Species

Resilient and Connected Land Network Swallow-wort Exclusion

Twenty-nine swallow-wort sites were visited throughout the swallow-wort exclusion area (and 11 were visited outside of the exclusion zone); many of which were on private property (Appendix 2, Figure 16). Seven new swallow-wort sites were identified this season including six within the exclusion area. Several of these new infestations were reported to APIPP staff by the public and the crew confirmed them. One such site was dominating a yard near Limekiln Lake (Photo 7).

Photo 7. Pale swallow-wort dominating a yard new Limekiln Lake.

Twelve treatments of swallow-wort occurred within the exclusion area; including 11 chemical and one mechanical treatment. An additional four chemical treatments and one mechanical treatment took place outside of the exclusion zone. Roughly 45 hours were spent treating swallow-wort. However, a large amount of time was spent physically removing seed pods prior to spraying at one site. Concerningly, a previously small and scattered patch in Elizabethtown had become large flowering patches this season. Twelve sites within the exclusion area (and one outside of the exclusion zone) were found to no longer have plants present.

Tree-of-Heaven

APIPP PRISM Tree-of-Heaven Eradication Project

The crew treated one tree-of-heaven site this season. This site has been treated for several years via a "hack and squirt" method. Unfortunately, the treatment last year was not very effective on one tree and it produced dozens of saplings around the property that needed to be treated. Two and a half hours were spent managing this site. One additional tree-of-heaven site was visited but this infestation is located on private property and permission has not been obtained for treatment.

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.

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.

This season the crew focused on pulling up knapweed (*Centaurea* spp.), sweetclover (*Melilotus* spp.), caraway (*Carum carvi*), dandelions (*Taraxacum spp.*), crown vetch (*Securigera varia*), and bladder cambion (*Silene vulgaris*), among other species. Due to the sheer amount of plants the crew removes, work is quantified by number of contractor bags filled, instead of counting per plant. In total, 19 contractor bags were filled and roughly 158 hours were spent managing the roadside.

There have been some noticeable changes to the site over the past few years. Previously, knapweed and sweetclover dominated the roadside, while this year it was sparser. Bladder cambion was rarely seen and most found looked stressed. Unfortunately, this year more dandelions were observed which formed thick matts. Next year crews should bring pliers or a dandelion digger to be the most effective.

End of Season Review

This year's crew made good progress despite the challenges of conducting a field season under COVID-19 precautions. The crew was able to revisit all priority historic sites, except for the knotweed sites along the Veteran's Memorial Highway and some common reed grass sites on property owned by the Lake George Land Conservancy. In total, the crew assessed over 2,200 sites and preformed management at approximately 425 sites. Major progress has made in large sites, with many sites that had been a challenge in previous years now becoming fractions of their original size. As a result of this success and the increasing number of sites that no longer have historically managed invasive species present (almost 800 sites), the crew was able to survey many new locations. The additional survey time resulted in approximately 500 new invasive species locations being mapped.

Changes to the data-collection software including using Survey123 instead of paper logs and altering how this season's assessment polygons were displayed on IPMMS were most welcome and increased efficiency. No longer did time need to be spent writing up every site and then later manually entering the data into an excel sheet; this year that step was done electronically as soon as the site polygons were complete. Unfortunately, due to TNC's offices being closed, any issues that were encountered with the iPad could not be fixed at the office prior to heading into the field each day. Instead, technology issues had to be explained over the phone and were usually troubleshooted by the crew. One benefit of this problem-solving approach was that the crew became more aware of various features of Collector and the Survey123 systems, so they were often able to fix issues as they arose.

For the third year, IPC surveyed wetlands for common reed grass to help provide data for APIPP's drone project which will use machine learning and drone obtained imagery to help find this species in areas that are hard or impossible to access on foot. The crew's field data will be compared to what the drone finds and be used to further tune the machine learning algorithm. The crew spent fifty hours on the project and covered many acres of wetlands.

Photo 8. Work along the Veterans' Memorial Highway on Whiteface Mountain.

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

- In the past, the APIPP facebook page would have a post about the new EDRR crew working in the PRISM for the season. Turnover of APIPP staff prevented that in 2020, as a result, the crew had more instances of residents and visitors not knowing who the crew was or what they were doing. Previously, the crew had taken photos of interesting animals or plants during the day and wrote summaries about their findings; these often were posted on the Facebook page. Doing this again in the future would be a good way to help the crew feel more included in the larger scope of the projet.

- 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. Remove duplicate sites and sites where historic populations are no longer observered

- Some sites that the crew visited this year have not had historically managed invasive plant species present for well over three years. If these points could be removed from the system, it would make the team availble to survey new areas and conduct addional treatments. The crew also found it frustrating to continue to assess sites that have not had historic invasive species present for many years.

- In some areas where there are more than one occurrence points in close proximity to one another, the assessment polygons have started to merge together. These polygons and their occurence points should be reassessed in IPMMS so that there is only one occurance point and polygon for these sites.

3. More comprehensive overview of software

- The crew was not aware, until late in the season, that there is map on APIPP's website which shows all of the invasive species sites. The initial crew orientation and training meetings, while covering all aspects of right-of-way work, plant identification, and how the iPads functioned, did not have this information. It would be beneficial to add an overview of the website to the orientation meeting as the website includes previous seasons' reports and best management practices that are helpful to the crew. The information on the webiste includes resources the crew can direct curious property owners to.

4. 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; however, adding capacity with volunteers could be effective in future years.

- Given how deep some roots are, hand pulling is no longer the most effective way to remove the plants along the roadside. Pliers or dandelion wrenches will need to be provided to more effectively remove these plants. A cheap alternative would be to use U-shaped screw drivers which offer the same benefits but are much lower in price.

5. Use paper maps

- In the past, a large map with every site and every major route was printed for the crew to use. For the first few weeks of the project APIPP staff would deploy the crew to specific sites and then onto specific routes as the crew become more comfortable with the work. Eventually, the crews would break down the routes on their own using the map. If any trouble arose, then notes would be made on the map. This season, APIPP staff assigned routes throughout the duration of the season and the crew used a new virtual tracking map to report which routes had been completed and show which routes still needed to be worked on. When routes were completed, the crew could make any notes about the route in the virtual map. There were some issues downloading these maps and confusion about how to edit them. This led to some confusion about where crews were and crews driving through already assessed areas to reach some unassessed sites. Next year, the paper map should be used in addition to the virtual tracking map as it provided another way for the crew to visually see the progress they were making.

Conclusions

2020 was the ninth season IPC provided staff for APIPP's terrestrial invasive species project. Despite new COVID-19 guidelines, 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 mile-a-minute and tree of heaven 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.

Appendix 2: Management Project Overview Figures

NOTE: NPO = no historically managed plants observed

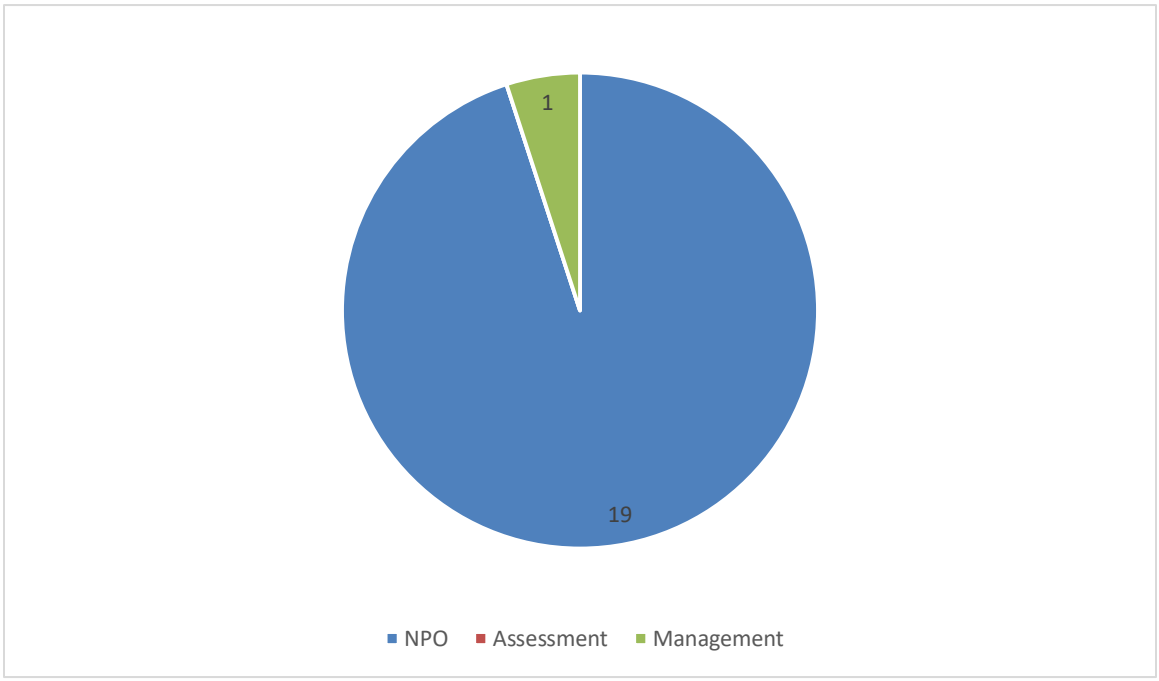

Figure 1. Status of sites visited by the EDRR crew throughout the Saranac River Yellow Iris Eradication Project during the 2020 field season.

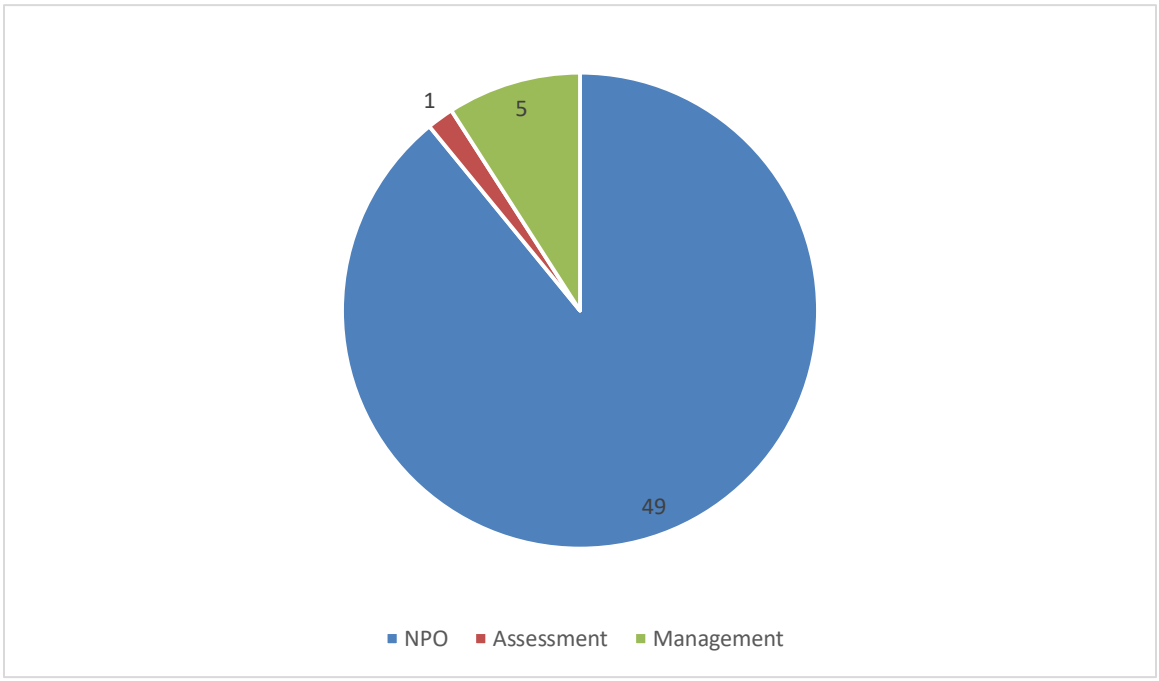

Figure 2. Status of sites visited by the EDRR crew throughout the AuSable-Champlain Yellow Iris Project during the 2020 field season.

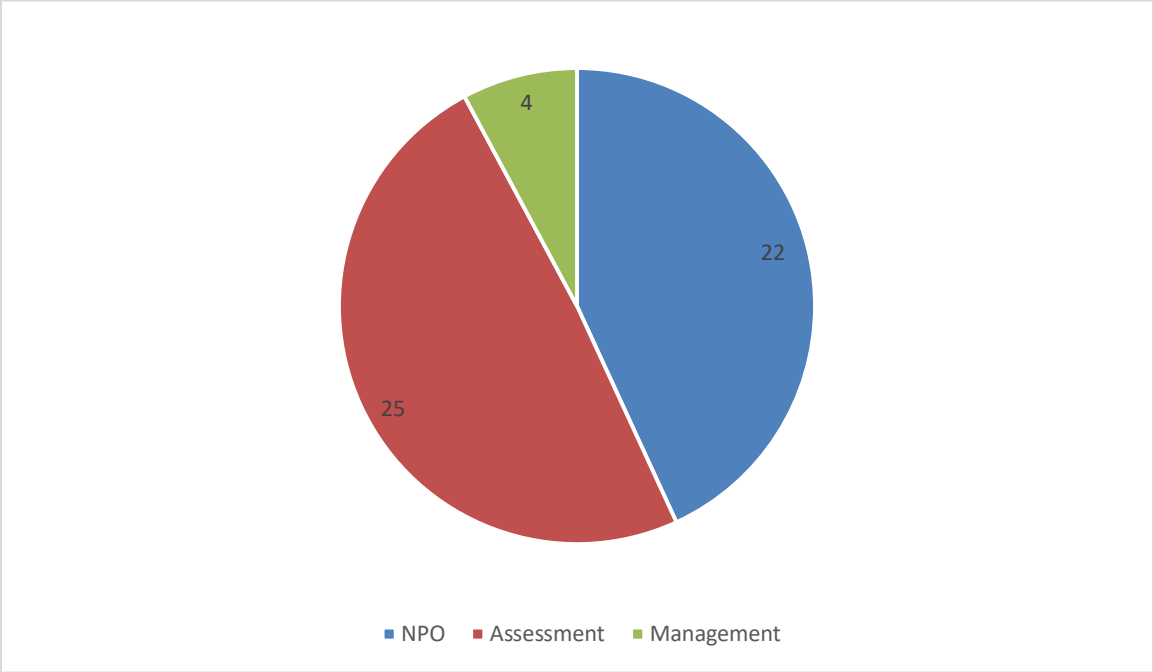

Figure 3. Status of sites visited by the EDRR crew throughout the Ausable River Watershed Common Reed Grass Suppression Project during the 2020 field season.

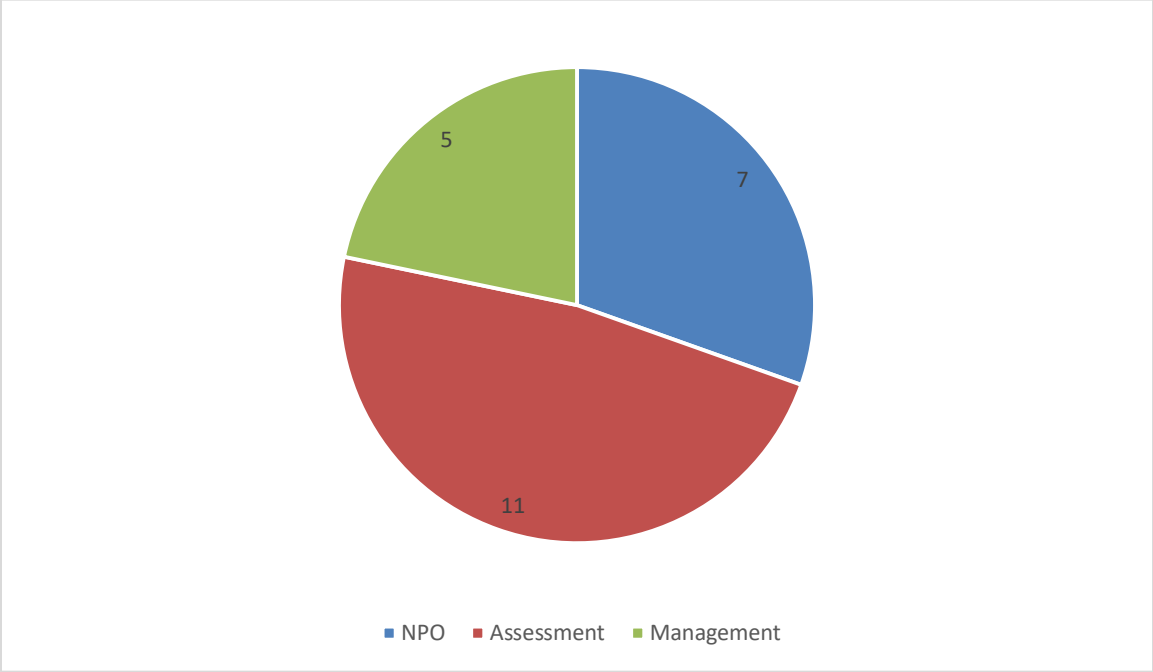

Figure 4. Status of sites visited by the EDRR crew throughout the Chateaugay-English Watershed Common Reed Grass Suppression Project during the 2020 field season.

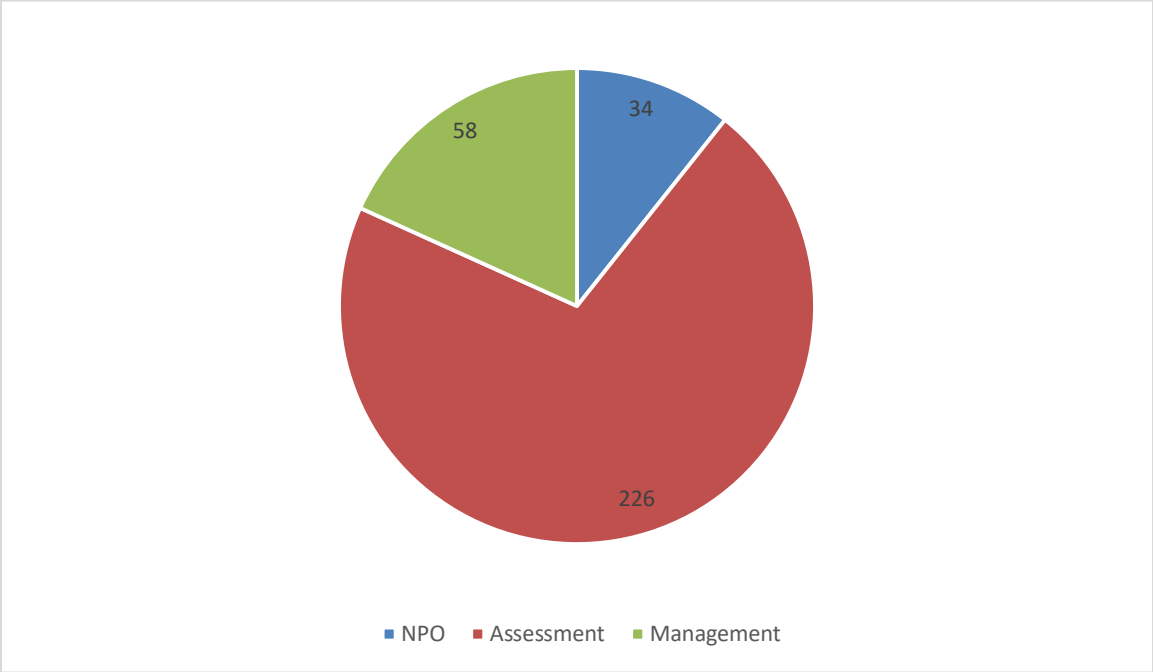

Figure 5. Status of sites visited by the EDRR crew throughout the Lake Champlain Watershed Common Reed Grass Suppression Project during the 2020 field season.

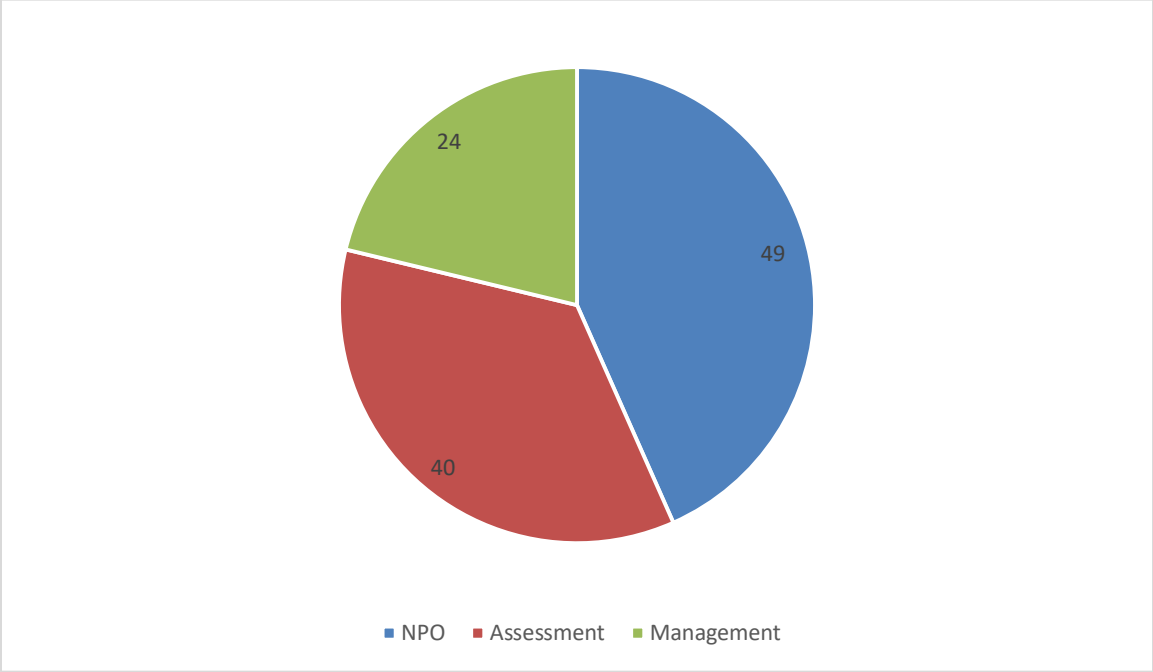

Figure 6. Status of sites visited by the EDRR crew throughout the Mohawk River Watershed Common Reed Grass Exclusion Project during the 2020 field season.

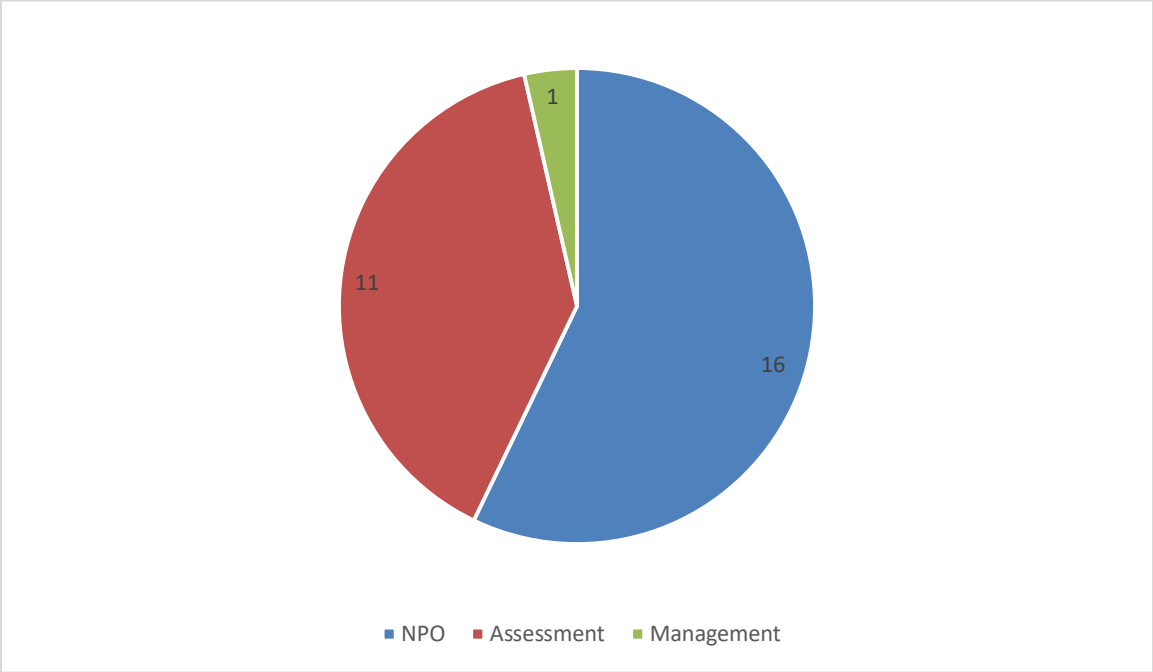

Figure 7. Status of sites visited by the EDRR crew throughout the Northeastern Lake Ontario Common Reed Grass Exclusion Project during the 2020 field season.

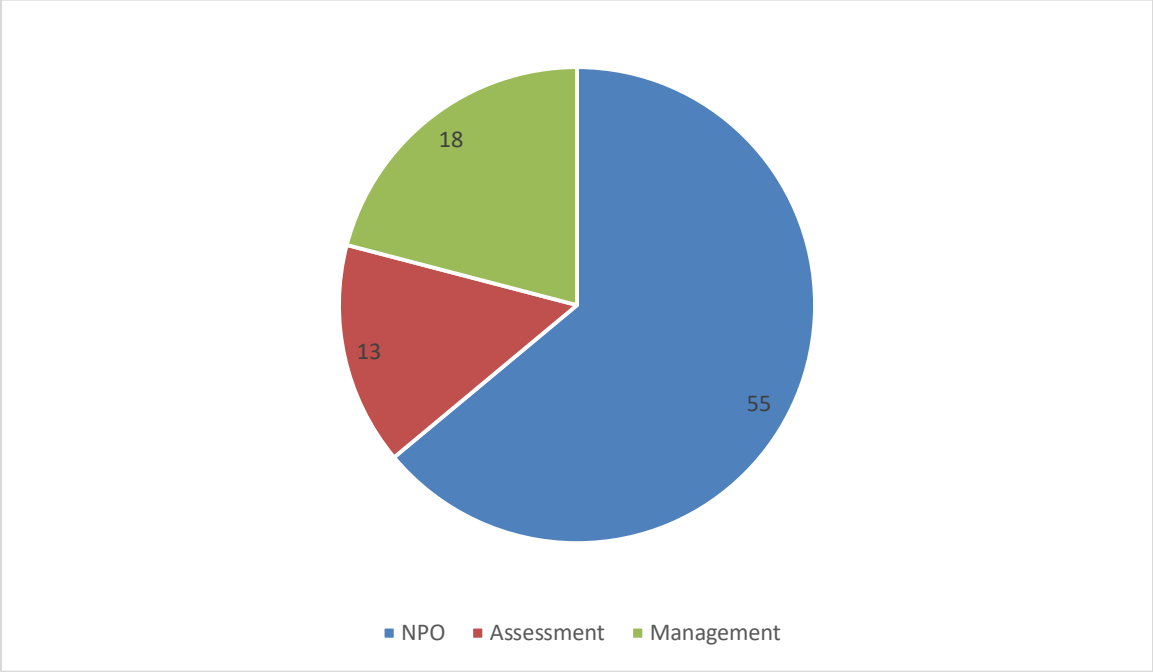

Figure 8. Status of sites visited by the EDRR crew throughout the Sacandaga River Watershed Common Reed Grass Exclusion Project during the 2020 field season.

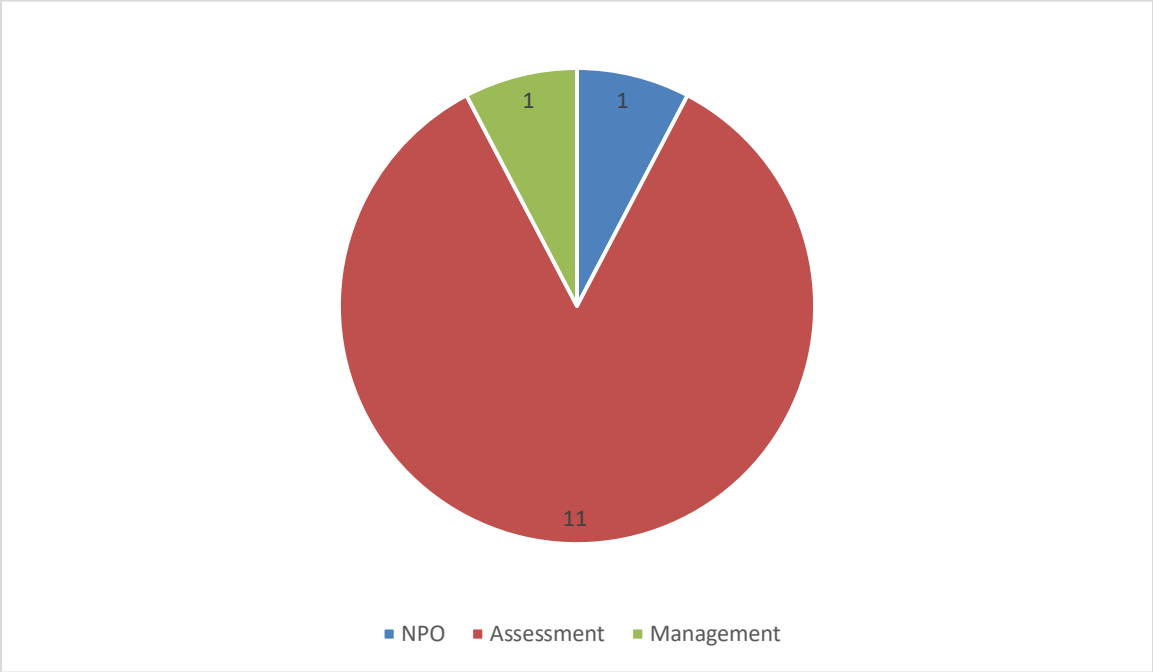

Figure 9. Status of sites visited by the EDRR crew throughout the Salmon River Watershed Common Reed Grass Suppression Project during the 2020 field season.

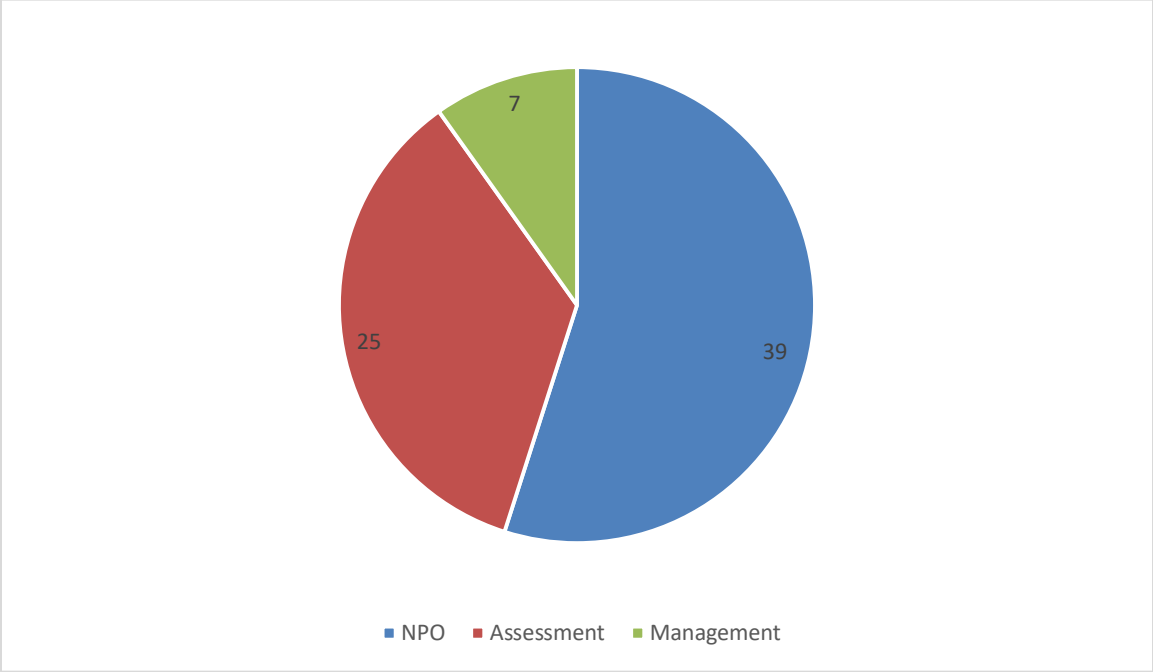

Figure 10. Status of sites visited by the EDRR crew throughout the Saranac River Watershed Common Reed Grass Suppression Project during the 2020 field season.

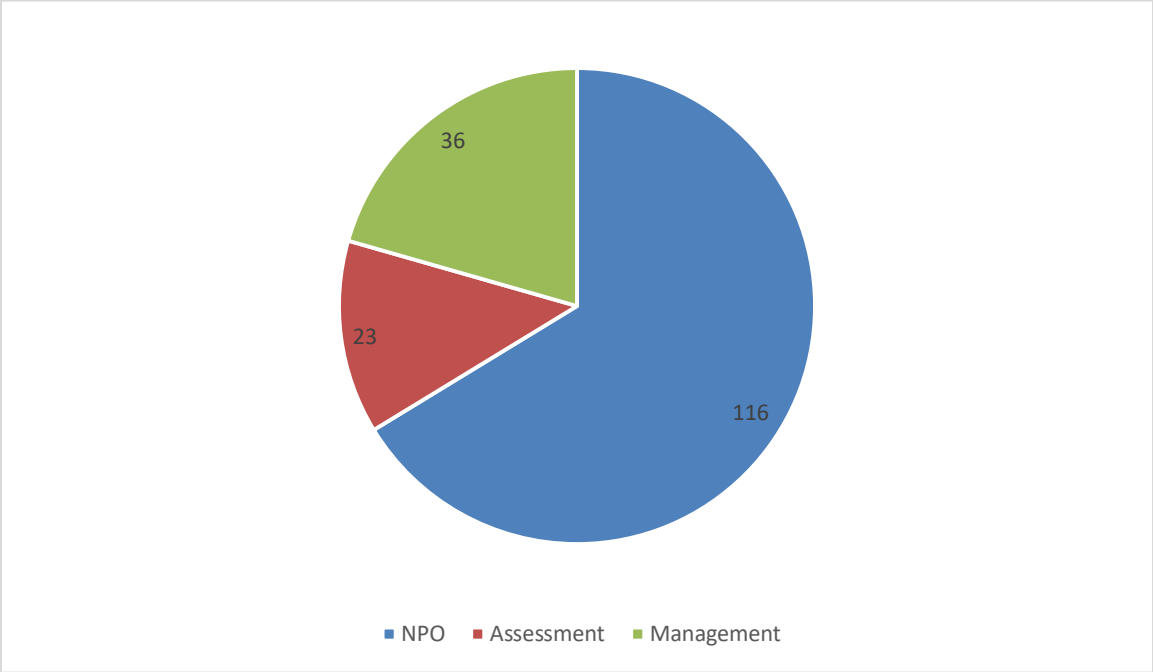

Figure 11. Status of sites visited by the EDRR crew throughout the Southern St. Lawrence Watershed Common Reed Grass Exclusion Project during the 2020 field season.

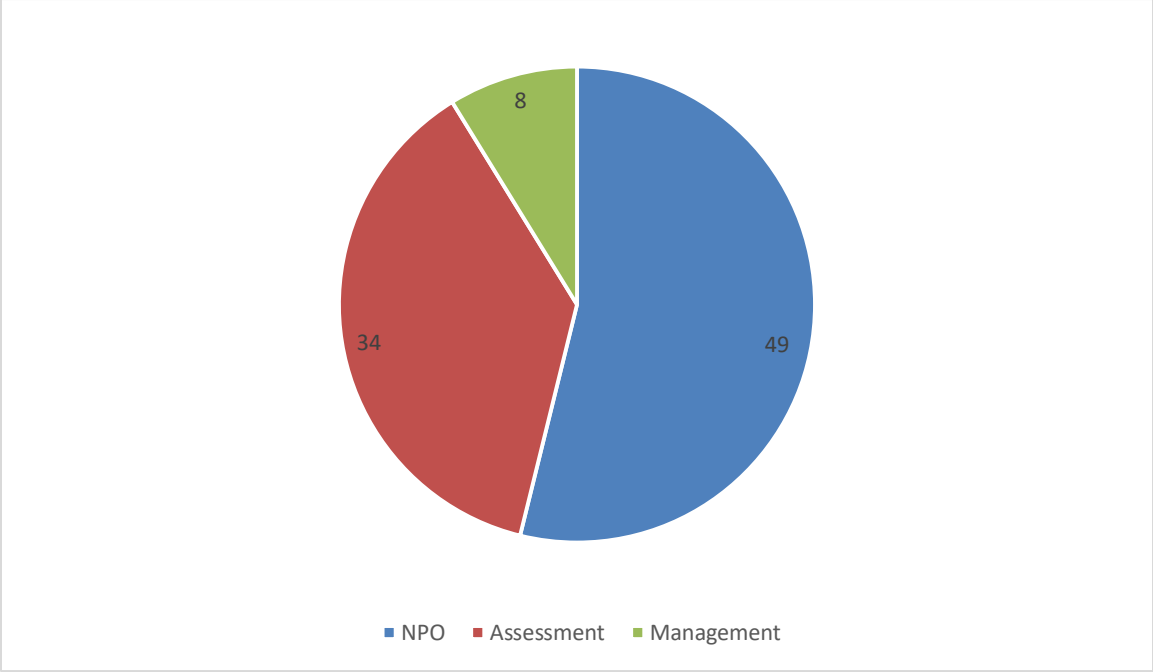

Figure 12. Status of sites visited by the EDRR crew throughout the St. Regis River Watershed Common Reed Grass Exclusion Project during the 2020 field season.

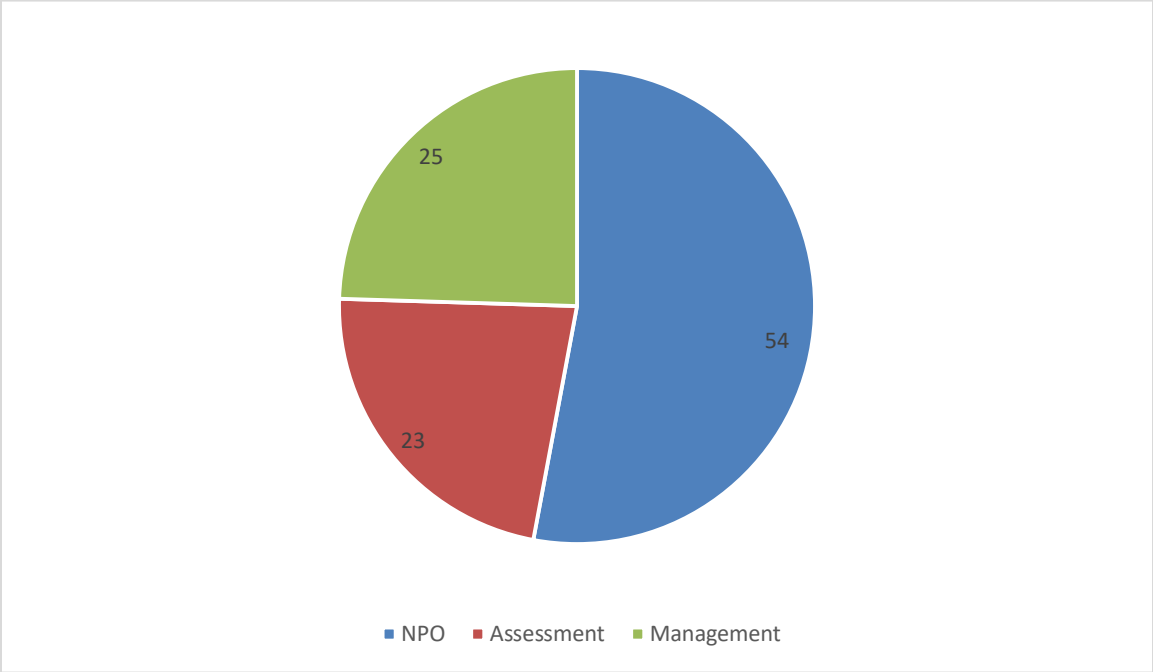

Figure 13. Status of sites visited by the EDRR crew throughout the Upper Hudson Watershed Common Reed Grass Exclusion Project during the 2020 field season.

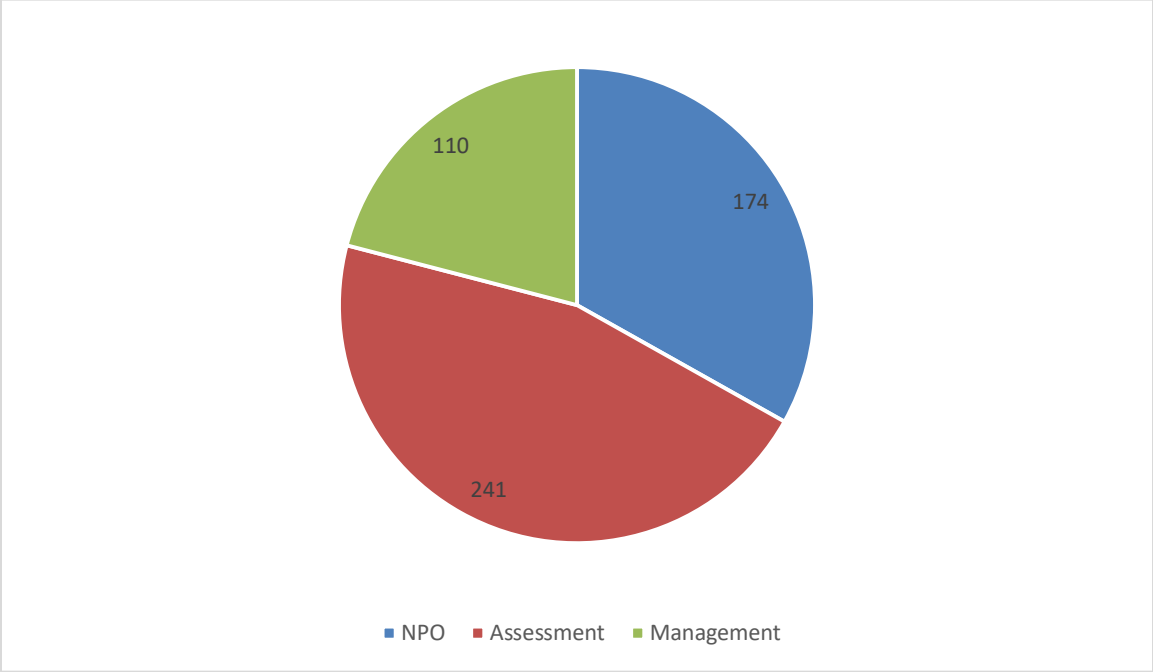

Figure 14. Status of sites visited by the EDRR crew throughout the Resilient and Connected Land Network Knotweed Suppression Project during the 2020 field season.

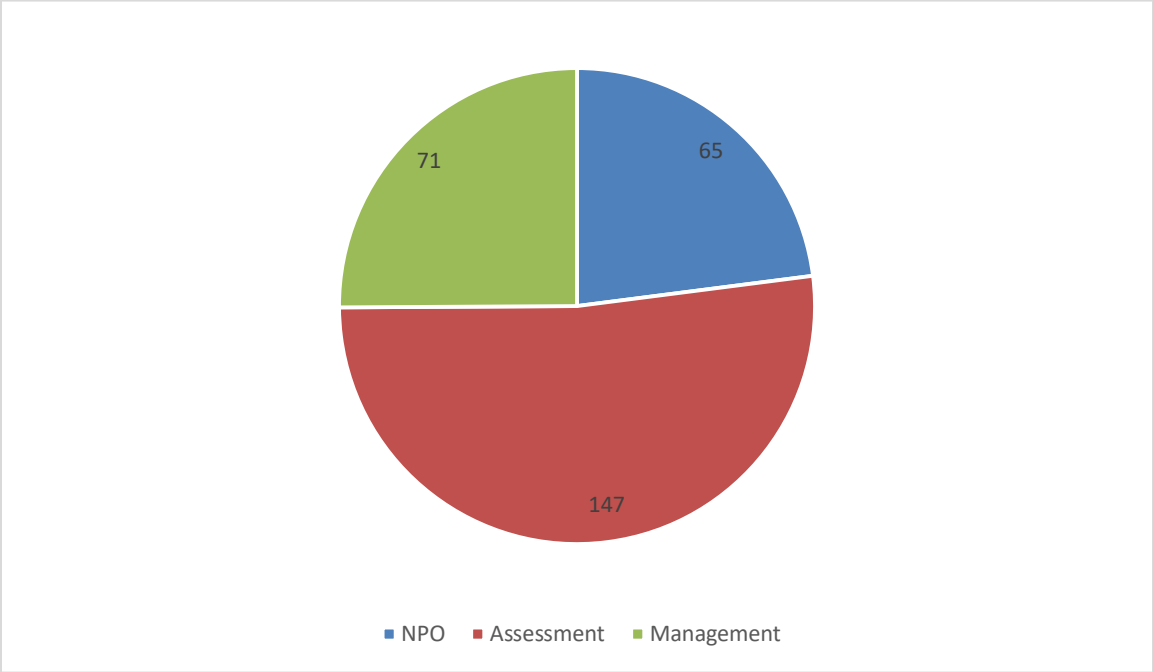

Figure 15. Status of sites visited by the EDRR crew throughout the Resilient and Connected Land Network Purple Loosestrife Suppression Project during the 2020 field season.

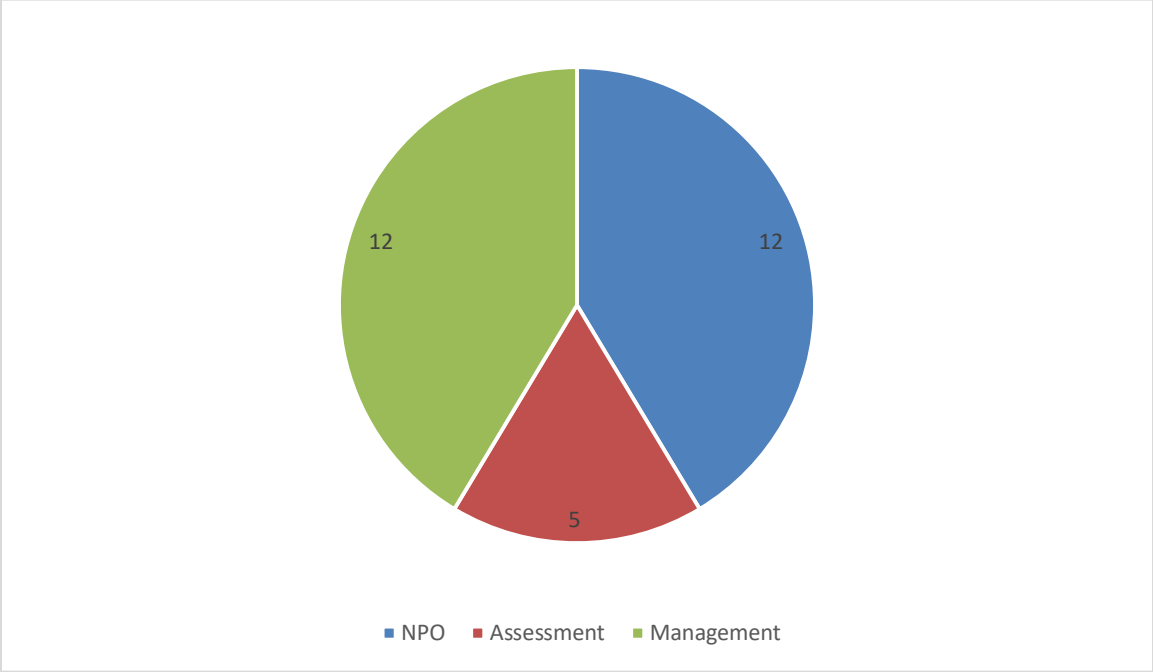

Figure 16. Status of sites visited by the EDRR crew throughout the Resilient and Connected Land Network Swallow-wort Exclusion Project during the 2020 field season.