

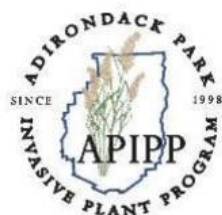
Terrestrial Early Detection & Rapid Response Team

Final Report



June 24th – October 8th, 2019

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 2019 field season was the eighth year that Invasive Plant Control, Inc. (IPC) served as the Terrestrial Invasive Species Early Detection and Rapid Response Team (terrestrial response team) for the Adirondack Chapter of The Nature Conservancy's (TNC) Adirondack Park Invasive Plant Program (APIPP). APIPP serves as the Adirondack Partnership for Regional Invasive Species Management (PRISM). Spencer Barrett served as the primary team leader and Richard Gentry served as a secondary crew leader. Additional members joining the team for their first year were William Bridge, Dustin Clark, and Ronald Robinette.

Invasive species management activities were conducted from June 24th to October 8th, 2019 for a total of 15 weeks. An additional week of management activity was allocated this season to address time lost due to staff turnover. Throughout the field season, IPC assessed and/or managed a record number of invasive species infestations within the jurisdictional boundaries of the Adirondack PRISM, including both historically managed sites and new infestations. The team worked to expand APIPP's terrestrial invasive species database by mapping and/or treating new infestations of target species on previously unsurveyed state and county roads, TNC preserves, wetlands, riparian corridors, Forest Preserve lands, and private properties throughout the PRISM. 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 2019 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 2019 Annual Report. Visit www.adkinvasives.com to access past and current annual reports.



APIPP's mission is to protect the Adirondack region from the negative impact of invasive species.

APIPP Overview and Response Team Objectives

APIPP Overview

APIPP serves as the Adirondack 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 TNC, DEC, New York State Department of Transportation (DOT), and New York State Adirondack Park Agency (APA) and is housed under 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 Team Objectives and Methodology

The terrestrial response team’s main objective for the 2019 field season was to revisit, assess, and perform treatments on all of APIPP’s priority and historically managed target invasive species infestations. The team also mapped, and when permits/permissions allowed, managed newly documented infestations of target species threatening conservation assets in the region. Species that are present in the Adirondack PRISM and ranked “High” or “Very High” under the [PRISM invasiveness ranking process](#) are classified as [targets](#). APIPP further prioritizes infestations of these species for management based on whether the infestation is affecting a conservation, economic, or human health asset, 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 [target species](#) that meet these criteria are prioritized for ongoing rapid response and control efforts (see table below). Additional information on these species can be found on APIPP’s [webpage](#).

APIPP’s Target Terrestrial Management Species	
Common reed grass	<i>Phragmites australis</i>
Garlic mustard	<i>Alliaria petiolata</i>
Giant hogweed	<i>Heracleum mantegazzianum</i>
Hemlock woolly adelgid	<i>Adelges tsugae</i>
Japanese angelica tree	<i>Aralia elata</i>
Japanese barberry	<i>Berberis thunbergii</i>
Knotweed species	<i>Reynoutria spp.</i>
Lesser celandine	<i>Ficaria verna</i>
Mile-a-minute	<i>Persicaria petiolata</i>
Norway maple	<i>Acer platanoides</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Scotch broom	<i>Cytisus scoparius</i>
Swallow-wort species	<i>Cynanchum louiseae</i> & <i>Cynanchum rossicum</i>
Tree of heaven	<i>Ailanthus altissima</i>
Yellow iris	<i>Iris pseudacorus</i>

Throughout the season, the crew mapped and assessed several lower priority invasive plants to provide APIPP a better understanding of their regional distribution and potential impacts. Such species included: autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), Indian cup plant (*Silphium perfoliatum*), oriental bittersweet (*Celastrus orbiculatus*), bush honeysuckle (*Lonicera spp.*), common buckthorn (*Rhamnus cathartica*), wild parsnip (*Pastinaca sativa*) and burning bush (*Euonymus alatus*). The team typically did not manage species that were locally or regionally widespread or had a low to moderate New York State [invasiveness ranking](#).

The terrestrial response team was also trained to identify and survey for APIPP's watched species (see table below). 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. The team identified and mapped one infestation of a watched species – Japanese angelica tree (*Aralia elata*) – during the 2019 field season. This species transitioned to APIPP's list of target species and will be prioritized for management during the 2020 season.

APIPP's Terrestrial Watched Species	
Asian longhorned beetle	<i>Anoplophora glabripennis</i>
Eurasian boar	<i>Sus scrofa</i>
Japanese stiltgrass	<i>Microstegium vimineum</i>
Porcelain berry	<i>Ampelopsis brevipedunculata</i>
Slender falsebrome	<i>Brachypodium sylvaticum</i>
Wineberry	<i>Rubus phoenicolasius</i>

Under the jurisdiction of a DOT highway work permit, the response team was authorized to manage any infestations discovered within the state road right-of-way (ROW). The response team excluded 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 be difficult to obtain in certain cases. In addition, management of infestations extending onto residential properties often yields little conservation benefit. If a new infestation was documented beyond the extent of the ROW and was outside a developed/residential area, the team 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' 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 years end. However, this permit



Richard Gentry treats small re-sprouts of *Phragmites* among a patch of cattails along State Route 3.

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.



Spencer Barrett assesses a *Phragmites* infestation in a wetland adjacent to State Route 11.

The response team 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 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. 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 response team 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 team leader's responsibility. Overall, the goal was to ensure that proper permissions and permitting documents were obtained before management activities occurred.

Field Season Logistics

Lodging

The response team resided at an apartment located within Ausable Acres in Jay, NY, for the entirety of the field season. The apartment provided all necessary amenities for the team during their stay. Lana Gokey of Adirondack Realty once again served as the realtor who provided IPC with this rental.

Typical Workday

The response team typically worked four ten-hour days per week, leaving the apartment at 7:00 a.m. and returning at 5:00 pm. This optimized the team'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 team's 40-hour work week.

Weather conditions primarily determined the team'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 team leader documented work activities using paper logs and 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 team 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 teams of two when needed. The ability to divide into two teams 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. In instances where additional staffing was required, such as to manage larger infestations, the entire team worked together out of one truck.

The team deployed several different pieces of equipment to perform invasive species management activities. Stihl brush cutters 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



Brush cutters were often to create spray lanes through dense infestations of *Phragmites* to improve access for foliar spray treatments.

populations of hollow-stemmed species such as *Phragmites* and knotweed. The herbicide products included in the table below were used throughout the project period, either individually or as a mixture:

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 and Bullseye Blue were commonly incorporated as adjuvants into herbicide applications by the team.



William Bridge and Dustin Clark assemble a Shindaiwa SP518 backpack sprayer in preparation for foliar spray treatments.

Data Collection and Limitations

Data Collection and Management

A strong emphasis was placed on thorough documentation of the response team'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 team Apple iPad tablets which operated TNC's IPMMS via the Esri Collector Classic 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 includes both descriptive and abundance related data fields including plant phenology, invasive plant percent cover, habitat type, management goal for the site, infested acreage, etc.

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. The following paragraphs describe these features and outline the data collection process. When the response team observed a new infestation of a target species, a GPS occurrence point was recorded near the center of the infestation. The occurrence feature classifies which species is present and contains unique naming and attribute information for the specific infestation. After an occurrence was entered, the response team collected an assessment polygon for the infestation. An assessment polygon is mapped by circumnavigating the exterior boundary of both new and historic infestations to document changes in acreage and percent cover over time, as well as document phenology and other non-spatial attributes. Photos were collected and attached to each assessment polygon to further document expansion or decline of an infestation, as

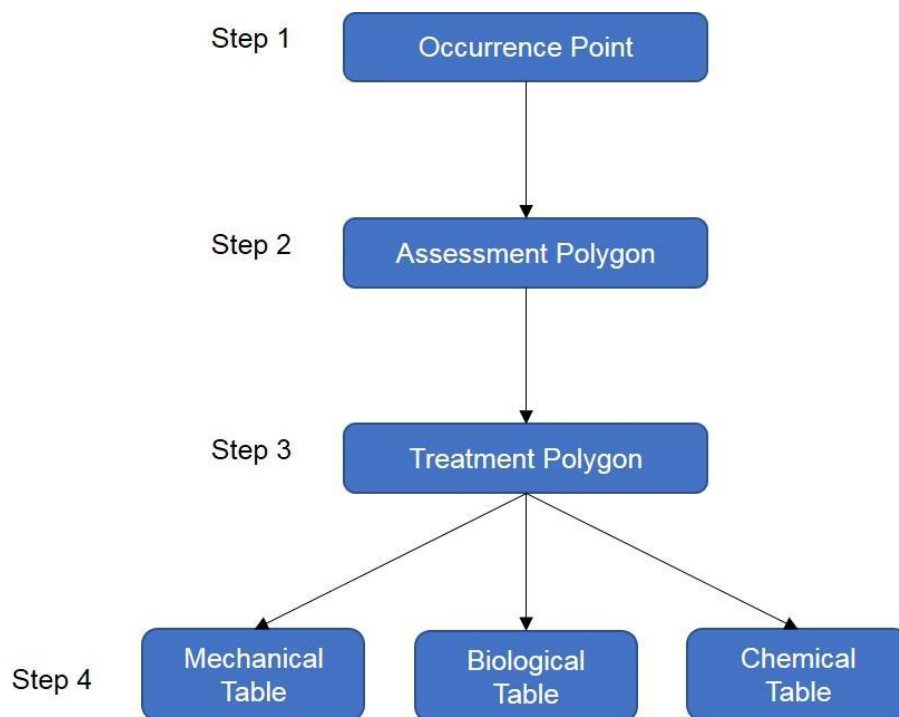


Figure 1. Data collection workflow of the IPMMS.

well as 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.

The response team 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 team created a treatment polygon for the infestation. A treatment polygon is similar to an assessment polygon, but instead of detailing attributes of the invasive species infestation, 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, what management technique was utilized, and how many staff participated. If the entire infestation was treated, the team digitized a polygon over the assessment polygon previously recorded that year for the infestation. If an infestation was only partially treated, the treatment was drawn only over the areas that received treatment efforts. If the entire infestation was treated, which was nearly always the case, the team digitized a treatment polygon over the existing assessment polygon recorded that year. This increased efficiency by preventing the team from having to circumnavigate the infestation more than once.

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, the total quantity of herbicide applied, etc.



Richard Gentry assists William Bridge in collecting invasive species distribution data using the IPMMS.

Data Limitations

The team 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 team 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 overestimate the actual amount of time spent performing the activity. This was also standard practice for the team's daily logs, which provide most of the data presented in this report.

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. 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.

Project Overviews by Month

The following sections detail response team activities by week and month throughout the 2019 field season.

June 2019 Weekly Overview

June 24th – June 28th

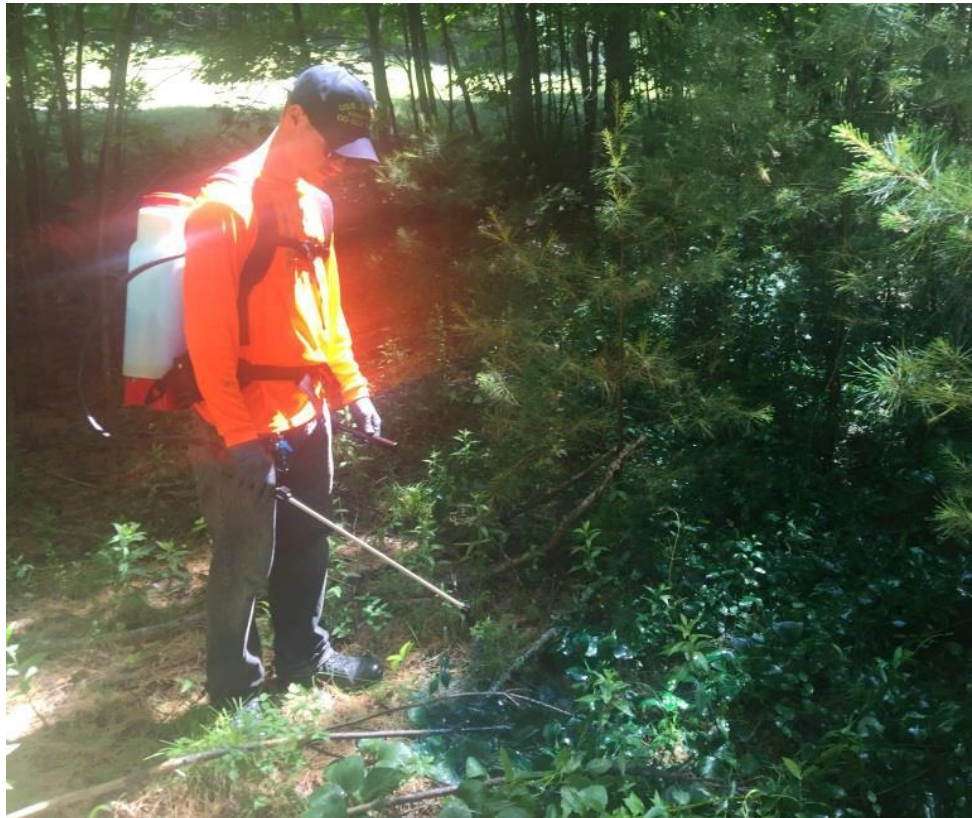
Site Visits: 90

The team began work on June 24th with a half-day in-office orientation provided by APIPP's Terrestrial Invasive Species Project Coordinator, Zachary Simek. The crew received an introduction to APIPP and its history addressing invasive species impacts in the Adirondacks, an overview of the project timeline, and instruction on how to identify and manage APIPP's [target](#) and [watched](#) species. Later in the day, the team traveled to Elizabethtown for field training where they practiced identifying APIPP's target species and recording invasive species distribution data using the IPMMS.

June 25th was dedicated entirely to field training in the northern portion of the PRISM. The team mapped new infestations of knotweed spp. and *Phragmites* near Plattsburgh and Churubusco. On June 26th, the team continued field training in the southern portion of the PRISM near Great Sacandaga Lake documenting multiple species including: garlic mustard, winged burning bush, knotweed spp., *Phragmites*, oriental bittersweet, and bush honeysuckle. Later in the day, the team discovered and mapped the first known infestation of Japanese angelica tree within the Adirondack PRISM.

The team ended the week with their first management work of the season. They began chemical treatments of multiple black swallow-wort infestations along State Route 9N and on private properties in Elizabethtown and manually removed yellow iris infestations at nearby Wagner Pond.

Many historic swallow-wort infestations had declined significantly in extent and cover from previous seasons; however, some infestations persisted, particularly along forest edge habitats. Several new swallow-wort infestations were identified and treated on a private property.



Spencer Barrett performs a foliar spray treatment of black swallow-wort at a private property in Elizabethtown. Swallow-wort spp. flower and produce seed early in the summer, so they are one of the first species treated during the field season.

June 2019 Summary

During the month of June, the team worked a total of 191 person-hours and traveled 596 miles. Figure 2 provides a breakdown of hours worked for the month of June by activity.

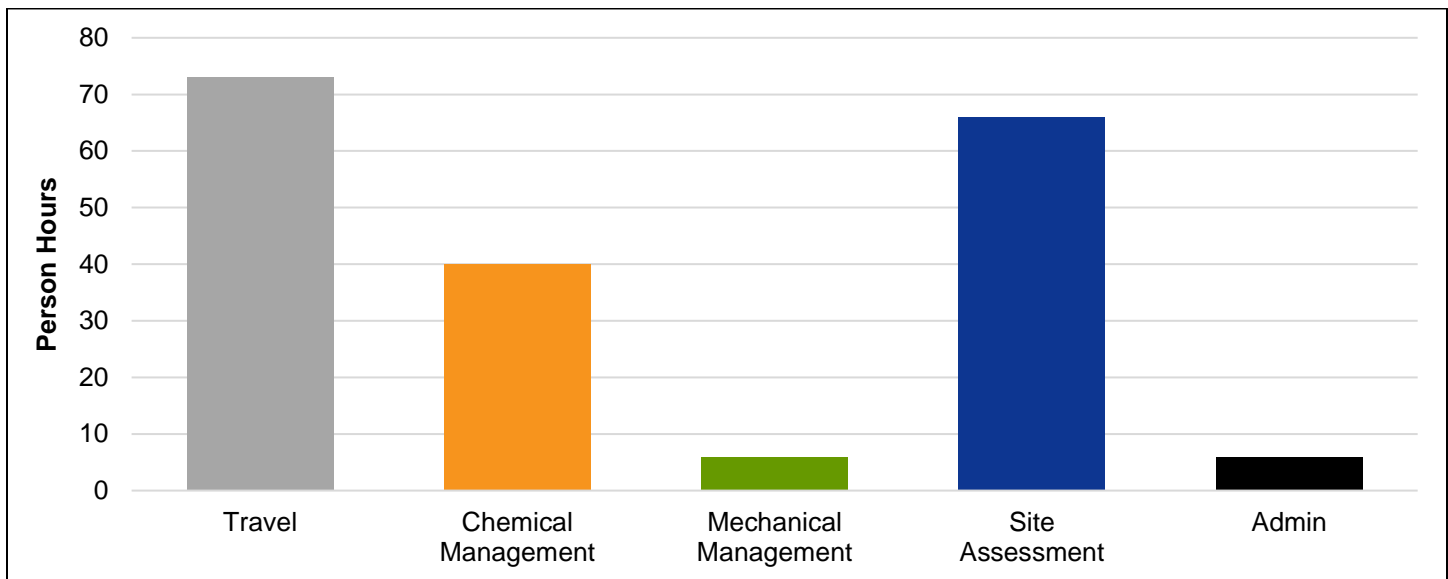


Figure 2. Hours worked in June 2019 by activity.

A significant portion of the response team's time in June was dedicated to travel and conducting site assessments. All mapping/survey activities conducted as a component of field training are included in the site assessment category.

Figure 3 provides the status of sites visited in June, including the number managed, surveyed, and documented as having no target invasive species observed upon follow-up assessment.

Out of 90 unique sites visited in June, 14 were managed, including one new infestation. The sites left unmanaged were surveyed to inform APIPP of the species' current distribution in the PRISM, required additional permissions, or were not deemed a priority for management this field season. The "No Invasive Species Observed" category includes historic management sites documented upon follow-up survey as having an absence of target invasive species for at least one year.

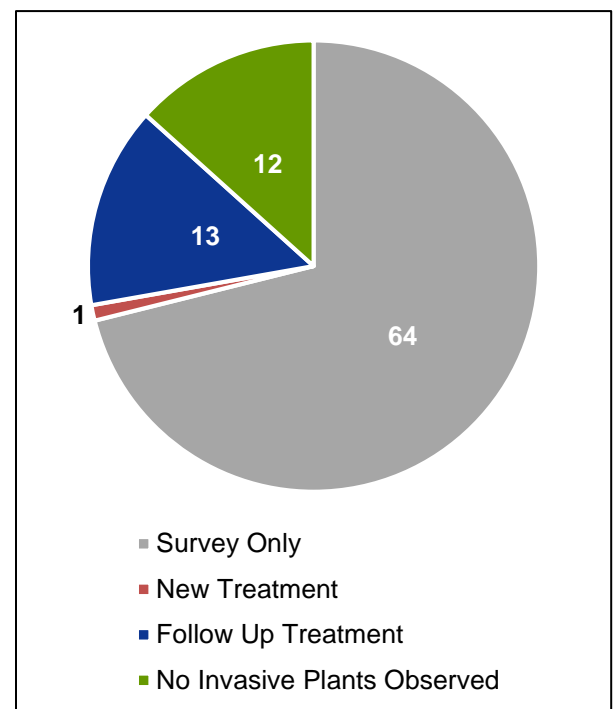


Figure 3. Status of sites visited during June 2019.

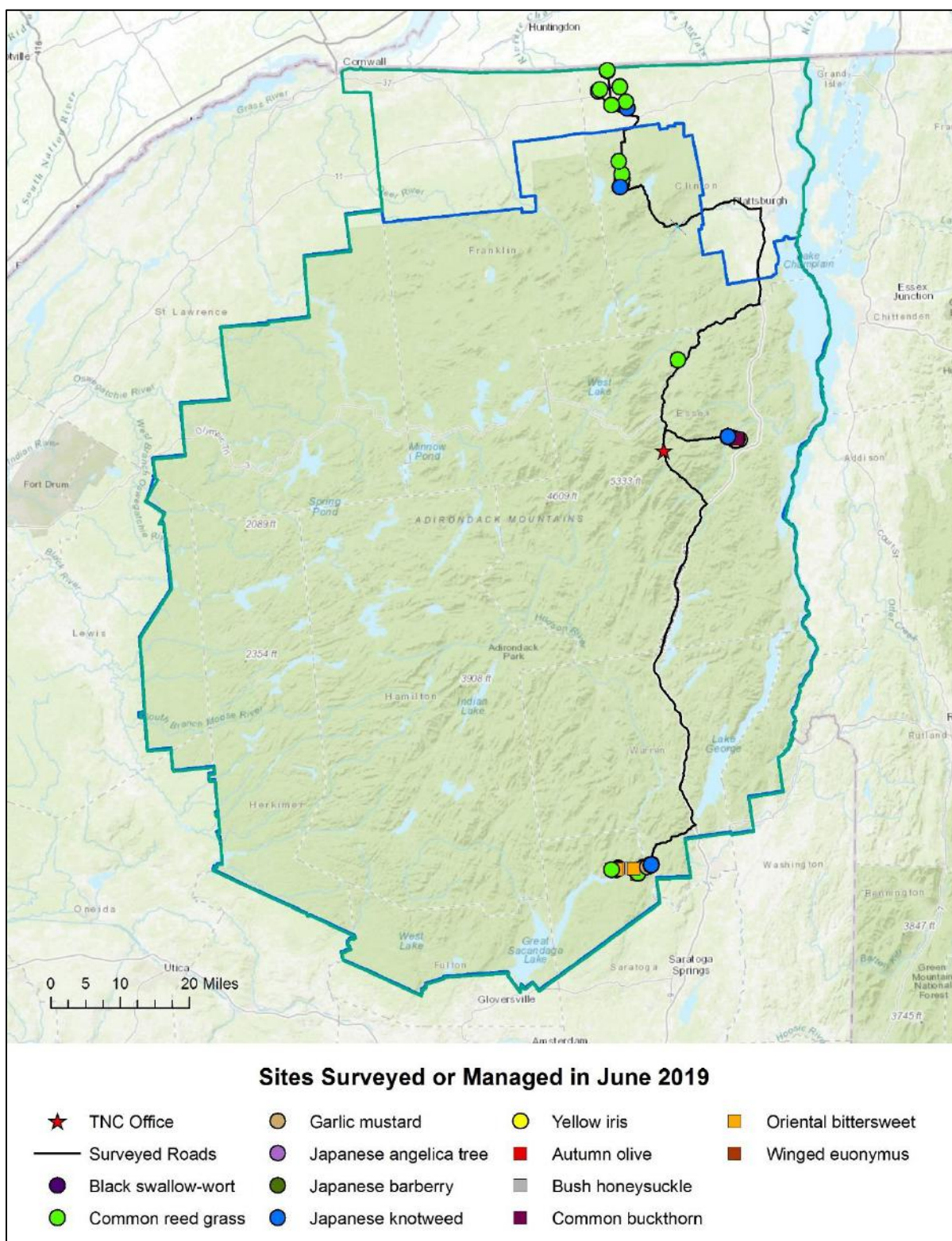


Figure 4. Sites surveyed or managed by IPC in June 2019. The sequence of management of activities was dependent upon the phenology of the individual species and latitudinal gradient of growing conditions. For example, species that bloom earlier in the growing season, such as yellow iris and swallow-wort species, were managed earlier than those that reach maturity later in the season, such as *Phragmites* and knotweed. In general, management activities started in the southern portion of the PRISM and progressed northward to coincide with the latitudinal advance of the growing season.

July 2019 Weekly Overview

July 1st to 5th

Site Visits: 70

The crew began the week as a team of four, conducting chemical treatments of historic black swallow-wort and knotweed spp. infestations at TNC's Boquet River Nature Preserve in Willsboro. Later in the week, the team split into teams of two in order to increase their management efficiency and footprint. They spent two days completing manual control of yellow iris around the Ausable River in Keene Valley and various waterbodies in Saranac Lake.

At the end of the week, the teams located and assessed a new and extremely dense infestation of yellow iris in a wetland complex north of Saranac Lake, located between the Saranac River and State Route 3. This population was too large for manual control and is recommended for chemical treatment in future seasons. The team speculated this new infestation could be serving as the source population for historic infestations that have been managed further downstream.

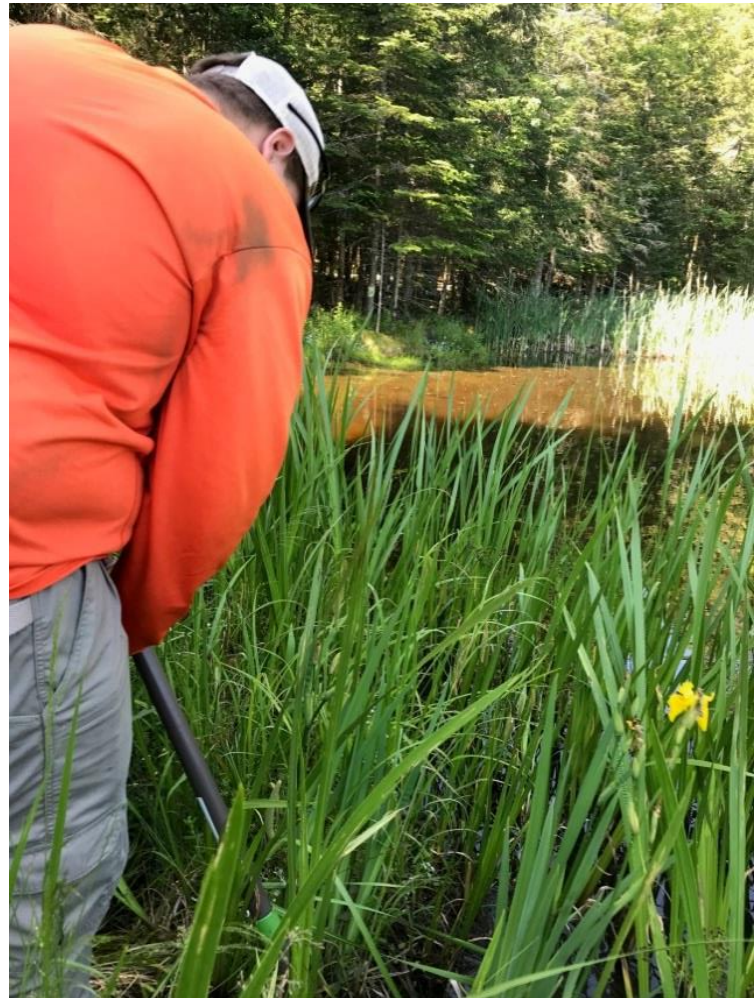
July 8th to 12th

Site Visits: 194

To begin the week, Spencer and William traveled to Cranberry Lake to treat an infestation of pale swallow-wort at a DOT residency. One new infestation of swallow-wort was mapped and treated along the fence line of the residency. Later, the team surveyed the shoreline of Streeter Lake by canoe for yellow iris. Meanwhile, Dustin and Richard performed manual control of yellow iris on Mirror Lake and Mill Pond in the Village of Lake Placid.

On Tuesday, the entire response team partnered with TNC staff to host a Weed Wrangle® at TNC's Boquet River Nature Preserve as part of New York State's Invasive Species Awareness Week. The team served as invasive plant ID experts and instructed volunteers on how to identify and manage various invasive shrub species such as common buckthorn and bush honeysuckle. After the Weed Wrangle®, the team performed cut stump treatment of several shrubs that were too large for volunteers to remove manually. Later in the day, the team surveyed Fish and Game Road in Willsboro, documenting several previously unmapped infestations of swallow-wort. The team then surveyed Bear Swamp Road and recorded the first infestations of glossy buckthorn in APIPP's invasive species distribution database.

July 10th marked the beginning of *Phragmites* and knotweed spp. treatments along priority state road corridors throughout the PRISM. Dustin and Richard began work along State Route 10, from the



Dustin Clark manually removes an infestation of yellow iris along the shoreline of a private pond in Keene Valley.

southern PRISM boundary to Caroga Lake. Spencer and William began work along State Route 30, from the southern PRISM boundary to Speculator. The crews continued surveys and chemical treatments along these routes for the remainder of the week, primarily focusing on *Phragmites* and knotweed spp.



Participants of the Adirondack's first Weed Wrangle® hosted at TNC's Boquet River Nature Preserve in Willsboro
(Photo Credit: © Erika Bailey).

July 15th to 19th

Site Visits: 226

Spencer and William began the week by completing manual control of the remaining yellow iris infestations along the Ausable River and associated tributaries in Keene Valley. Next, they continued surveys and chemical control of *Phragmites* and knotweed spp. along State Route 30 from Speculator to Indian Lake. Richard and Dustin continued surveys and control of *Phragmites* and knotweed spp. on State Route 10, working north from Caroga Lake.

On July 16th, the entire team worked together to address several larger *Phragmites* sites along State Route 10, between Arietta and Wheelerville. Many previously treated historic *Phragmites* infestations sites showed good progress and had significantly declined in extent and cover.

During a period of inclement weather mid-week, the team traveled south to the Lake George area to perform early detection surveys along several lower priority road corridors. The team mapped multiple target species along State Routes 149, 9N, 9L, and Bay Road. The team documented many new infestations in the disturbed/developed area near the PRISM's southeast border.

On July 18th, Spencer and William began surveys and treatment of APIPP's target species along State Route 365. They ended their day on State Route 8 in the town of Ohio, where they assessed

several large new infestations of knotweed spp. Richard and Dustin performed surveys and treatments of APIPP's target species along State Route 29A from the intersection with State Route 10 to the Town of Stratford.

To end the week, Spencer, Richard, and William worked together to manage target species along State Route 8 in the Town of Ohio, heading west toward the PRISM boundary. As part of their work along this corridor, the team treated knotweed spp. along the bank of West Canada Creek and attained permission to treat an additional source population located on nearby private property.

July 22nd to 26th

Site Visits: 259

Inclement weather on July 22nd limited the team's ability to conduct chemical treatments. Spencer and William surveyed for APIPP's target species along previously unmapped road corridors from Lake George to Warrensburg. Dustin and Richard mowed dead *Phragmites* stalks at a previously treated infestation in the median of I-87 to facilitate access for follow-up treatment later in the season. Next, they surveyed new infestations of *Phragmites* along I-87.



Mile-a-minute was found in several ornamental plant beds, suggesting it may have been unintentionally introduced via contaminated nursery stock.

On July 23rd, Richard and Dustin continued their survey and management work along State Route 29A from their previous end point in Stratford to finish near Dexter Lake. That same day, Spencer and William worked along State Route 8, following up on historic management sites and obtaining permissions for three additional knotweed spp. treatments on private property. They ended the day treating a new knotweed spp. site on private property adjacent to State Route 8.

On the 24th, Spencer and William surveyed and treated knotweed spp. and *Phragmites* infestations from their end point on State Route 28 in Indian Lake to North Creek. William and Dustin worked north along State Route 29A, reaching

the Ferris Lake Wild Forest in Arietta.

To end the week, Spencer and William traveled to Plattsburgh to assist APIPP's Terrestrial Project Coordinator with management of the PRISM's first documented mile-a-minute infestation. The infestation was located on a private property and reported by a citizen scientist. Multiple infestations were mapped and managed using a combination of manual and chemical control techniques. No additional infestations were detected during follow up surveys of surrounding road corridors.

Dustin and Richard continued surveys and management work along State Route 28 around the Wevertown area. Finally, both teams focused on completing surveys and management of target species along unfinished priority corridors including State Route: 8, 9, 28, and 28N, as well as a few infestations along I-87.

July 29th to 31st

Site Visits: 36

On July 29th, Dustin and William assisted APIPP's Terrestrial Project Coordinator with a manual *Phragmites* control project at a private property along the shore of Little Moose Lake near Old Forge. Meanwhile, Spencer and Richard completed surveys and management work along State Routes 8 and 9, treating multiple infestations of knotweed spp., *Phragmites*, and Japanese barberry.

On July 30th and 31st, the entire team worked collectively on the manual *Phragmites* control project at Little Moose Lake. Since most of the infestation was in standing water, it could not be treated with herbicide. Stems in standing water were manually excavated, with special care taken to remove as much rhizome system as possible. Isolated stems located on the dry shoreline were treated with a clip and drip of glyphosate-based herbicide. During this control project, the team utilized two trucks to increase storage capacity for hauling away plant material. This manual control project continued through the end of August 1st. An isolated patch of knotweed spp. was incidentally detected and treated on the same property.



Richard Gentry and Dustin Clark manually manage a *Phragmites* infestation along the shore of Little Moose Lake. The infestation was growing out of standing water, precluding chemical treatment.

July 2019 Summary

During the month of July, the team worked a total of 870 person-hours and traveled 9,324 miles. Figure 5 provides a breakdown of hours worked for the month of July by activity.

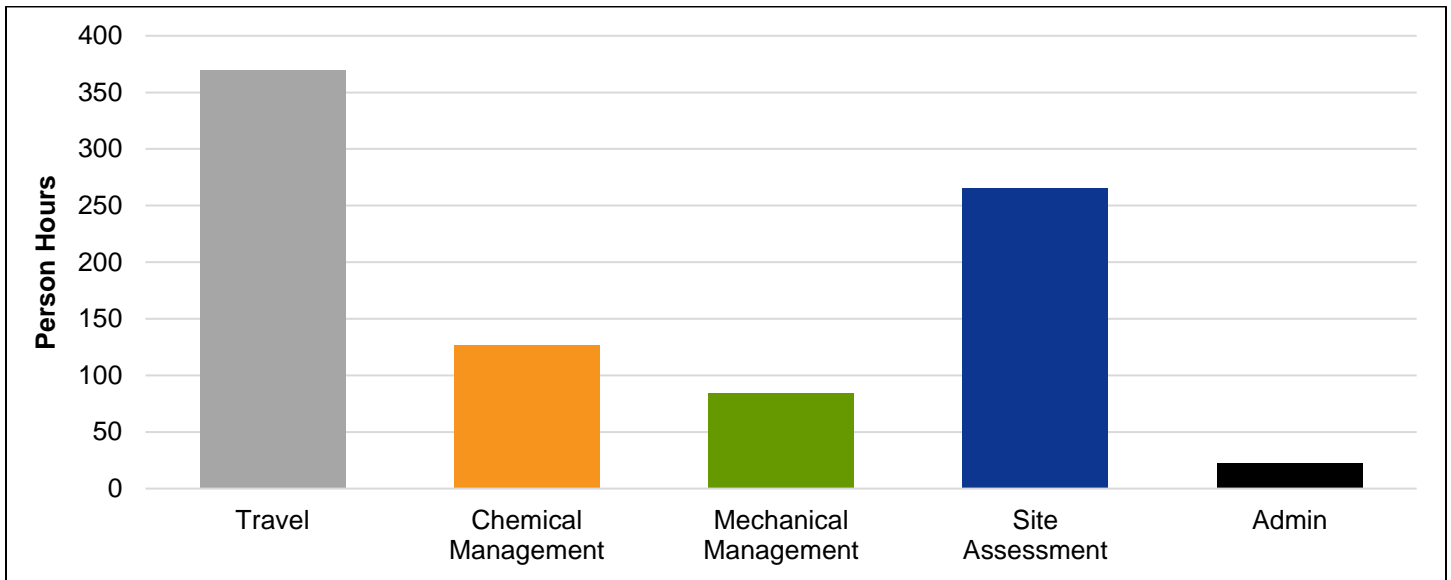


Figure 5. Hours worked in July 2019 by activity.

A significant portion of the response team's time in July was dedicated to travel, as many management sites were located in the far southern portion of the PRISM. A large portion of time was also spent performing site assessments during periods of inclement weather. The remaining time was more evenly distributed between chemical and mechanical control work.

Figure 6 provides the status of sites visited in July, including the number managed, surveyed, and documented as having no target invasive species observed upon follow-up assessment.

Out of 785 unique sites visited in July, 180 were managed, including 19 new infestations. The sites left unmanaged were surveyed to inform APIPP of the species' current distribution in the PRISM, required additional permissions, or were not deemed a priority for management this field season. The "No Invasive Species Observed" category includes historic management sites documented upon follow-up survey as having an absence of target invasive species for at least one year.

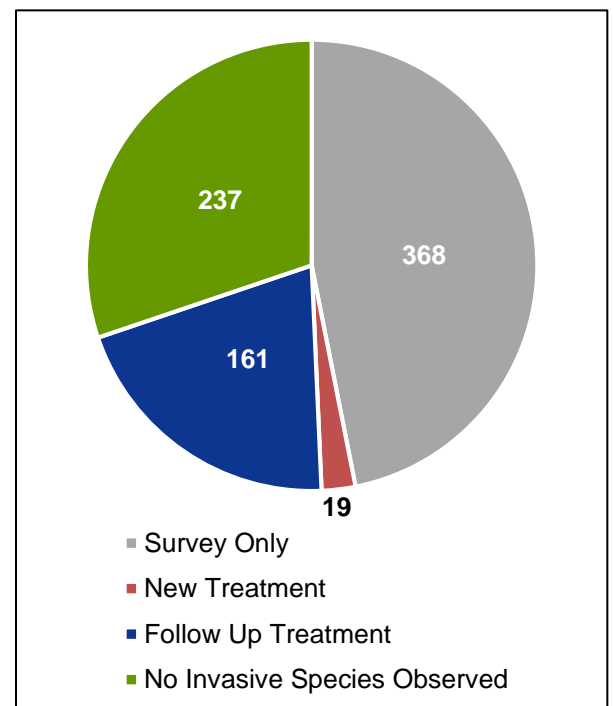


Figure 6. Status of sites visited during July 2019.

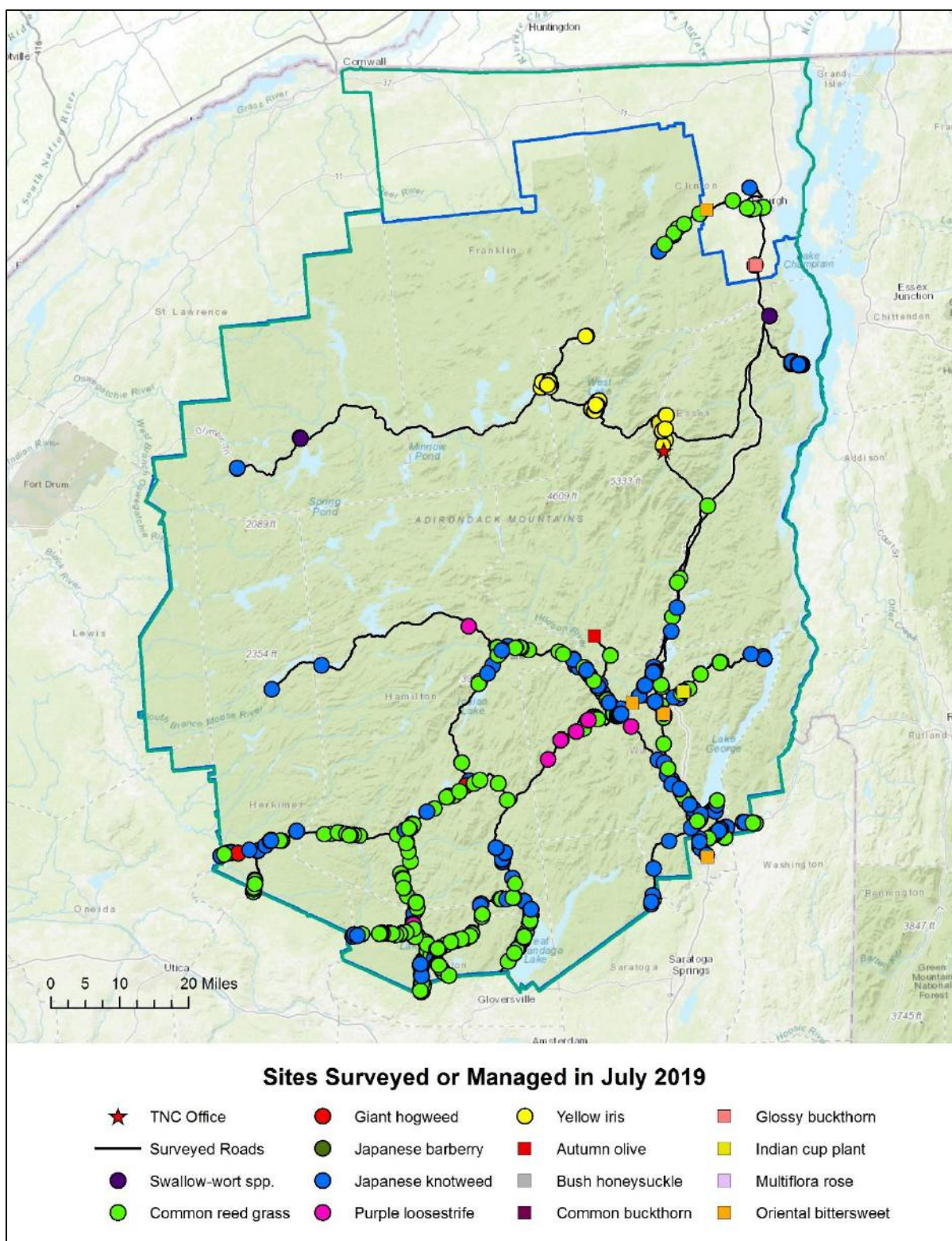


Figure 7. Sites surveyed or managed by IPC in July 2019. The sequence of management of activities was dependent upon the phenology of the individual species and latitudinal gradient of growing conditions. For example, species that bloom earlier in the growing season, such as yellow iris and swallow-wort species, were managed earlier than those that reach maturity later in the season, such as *Phragmites* and knotweed. In general, management activities started in the southern portion of the PRISM and progressed northward to coincide with the latitudinal advance of the growing season.

August 2019 Weekly Overview

August 1st to 2nd

Site Visits: 73

On August 1st, the entire team completed manual control of the *Phragmites* infestation at Little Moose Lake. The next day, the crew split once again. Richard and Dustin worked near Ticonderoga to assess large populations of *Phragmites* on State Route 22 and 74. Meanwhile, Spencer and William completed surveys and management of APIPP's target species along State Route 28N from Minerva to the junction with Blue Ridge Road. At that intersection, they performed partial manual control of the only known scotch broom infestation within the PRISM. The team only removed shrubs located within the Route 28N right-of-way, but additional plants extended onto the adjoining private property and require permission before management can be completed. Spencer and William then began surveys and management along Blue Ridge Road, working from the intersection with State Route 28N toward the intersection with I-87. They primarily mapped and managed purple loosestrife.

August 5th to 9th

Site Visits: 90

Richard and William were on vacation during the week of August 5th, so only one team was active. Spencer and Dustin began the week by completing all priority treatments along Blue Ridge, including the chemical control of three knotweed spp. infestations on Forest Preserve near Palmer Pond. Later in the day, they worked along State Route 28 near Ohio, treating several historic knotweed spp. infestations.

Work along State Route 28 continued on August 6th as the team surveyed and managed target species between Forestport and Seventh Lake.

On August 7th, Spencer and Dustin managed various target species on a variety of routes including: State Route 74 between Severance and Ticonderoga, State Route 9 between Keene Valley and Elizabethtown and State Route 9N from Keene to Westport.

To end the week, the crew continued surveys and management of target species along State Route 28, working northbound from Raquette Lake and ending in Blue Mountain Lake.



Dustin Clark assesses a knotweed infestation on private property along State Route 28.

August 12th to 16th

Site Visits: 88

Spencer and Dustin were on vacation during the week of August 12th, so once again only one team was active. On August 12th, William and Richard completed surveys and management of APIPP's target species along State Route 3 from the western PRISM boundary to Star Lake, along State Route 58, and St. Lawrence County Route 27.

On August 13th, the crew focused on treating several *Phragmites* and knotweed spp. infestations along River Road and at the Town of Clifton Highway Department. Later, additional assessments of *Phragmites* were completed along St. Lawrence County Route 60.

On August 14th, William took temporary leave from the project for a personal matter. In his absence, Richard teamed up with APIPP staff to begin manual control of several terrestrial invasive plants along the Whiteface Mountain Veteran's Memorial Highway. The team focused on manual control of *Euphorbia* spp., *Vicia* spp., *Leucanthemum* spp., *Taraxacum* spp., *Centaurea* spp., and other non-native weeds. While these species are not usually a priority for management by APIPP, they are controlled at this unique location to protect populations of several rare, threatened or endangered plants present on the mountain. To end the day, Richard split off from the group to perform chemical treatment of several knotweed spp. and *Phragmites* infestations located at lower elevations on the mountain.

To end the week, Richard worked independently, assessing existing populations of target species on Youngs Road, Marshall Avenue, and Hillcrest Drive in the Star Lake area. He also surveyed and managed APIPP's target species along State Route 3, from Star Lake to Wanakena.



Multiple non-native weed species were unintentionally introduced along the Whiteface Mountain Memorial Highway via contaminated topsoil during a reconstruction project in 2015.

August 19th to 23rd

Site Visits: 100

During the week of August 19th, Dustin left the project to pursue another job opportunity and William remained on temporary personal leave. Spencer and Richard continued work, surveying and managing target species along State Route 3 from Wanakena heading west toward the PRISM boundary, ending near Peavine Swamp.

Inclement weather on August 20th limited the team's ability to perform chemical treatments, so they returned to Whiteface Mountain to continue manual control of non-native weeds along the Memorial Highway.

On August 21st a new staff member, Ronnie Robinette, joined the project and began assisting Spencer and Richard with survey and management work along State Route 3, west of Wanakena. Even though a portion of the day was dedicated to training Ronnie on target species identification and data collection protocol, the team still had a productive week, reassessing all historic APIPP management sites from the Oswegatchie River to the Cranberry Lake DOT residency.

August 26th to 30th

Site Visits: 144

William returned from temporary leave on August 26th, allowing the crew to once again divide into two teams; one consisting of William and Spencer, the other of Ronnie and Richard.

Ronnie and Richard spent August 26th treating priority infestations of knotweed spp. and *Phragmites* along State Route 3 from the Grasse River to Mt. Arab. Spencer and William addressed target species along most of State Route 56, surveying beyond the PRISM boundary and re-treating historic management sites within the PRISM from the intersection with State Route 3 to the town of Colton.

On August 27th, Richard and William treated an infestation of tree-of-heaven near Pioneer Village Road in Bolton and then surveyed for APIPP's target species along a portion of State Route 9N from Ticonderoga to Bolton. Ronnie and Spencer hiked along the Grasse River in Cranberry Lake to re-treat several historic knotweed infestations along the riparian corridor. Most knotweed infestations contained only a few stems, and several had no invasive plants observed.

On August 28th, the entire team returned to Whiteface Mountain to continue manual control of non-native weeds along the Memorial Highway.

To end the week, Richard and Ronnie began chemical treatment of a new, large *Phragmites* infestation on Forest Preserve near Cranberry Lake. Meanwhile, Spencer and William surveyed and managed APIPP's target species along State Route 30 between Blue Mountain Lake and Long Lake.



Ronnie Robinette documents a historic knotweed spp. infestation along State Route 3 as 'no invasive plants observed'.

August 2019 Summary

During the month of August, the team worked a total of 498 person-hours and traveled 4,423 miles. Figure 8 provides a breakdown of hours worked for the month of August by activity.

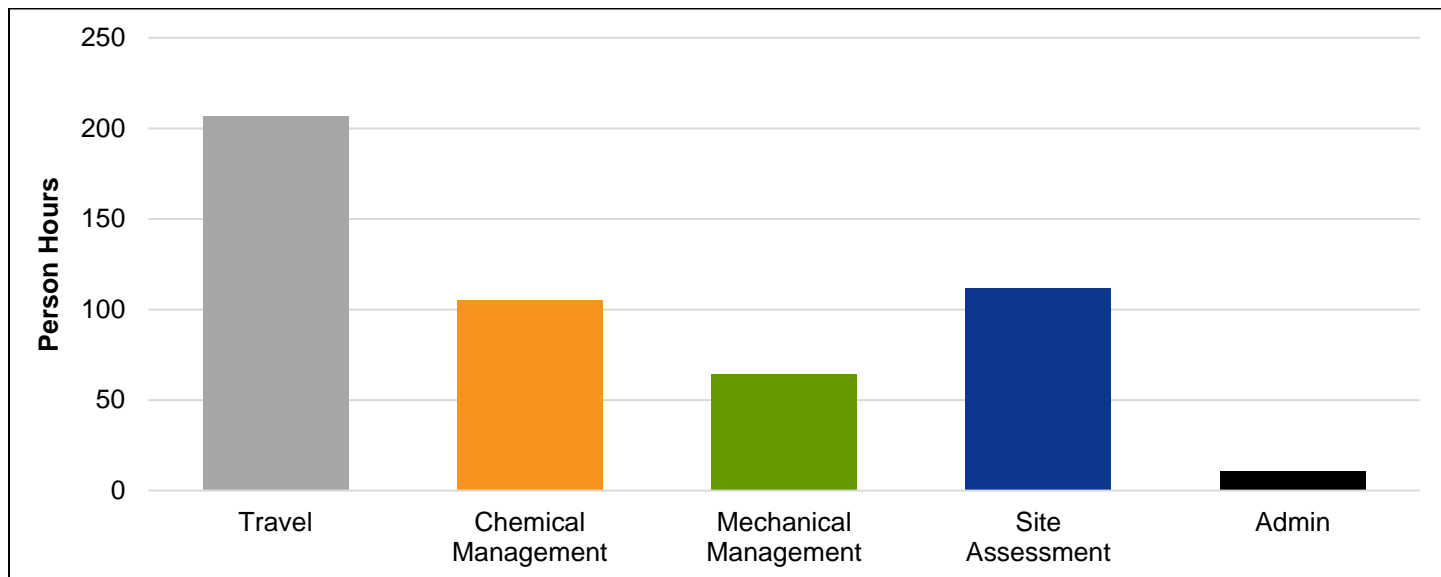


Figure 8. Hours worked in August 2019 by activity.

A significant portion of the response team's time in August was dedicated to travel as the crew worked to survey and/or manage many infestations in the far western portion of the PRISM. The remaining time was more evenly divided amongst site assessments, chemical and mechanical management.

Figure 9 provides the status of sites visited in August, including the number managed, surveyed, and documented as having no target invasive species observed upon follow-up assessment.

Out of 493 unique sites visited in August, 140 were managed, including 10 new infestations. The sites left unmanaged were surveyed to inform APIPP of the species' current distribution in the PRISM, required additional permissions, or were not deemed a priority for management this field season. The "No Invasive Species Observed" category includes historic management sites documented upon follow-up survey as having an absence of target invasive species for at least one year.

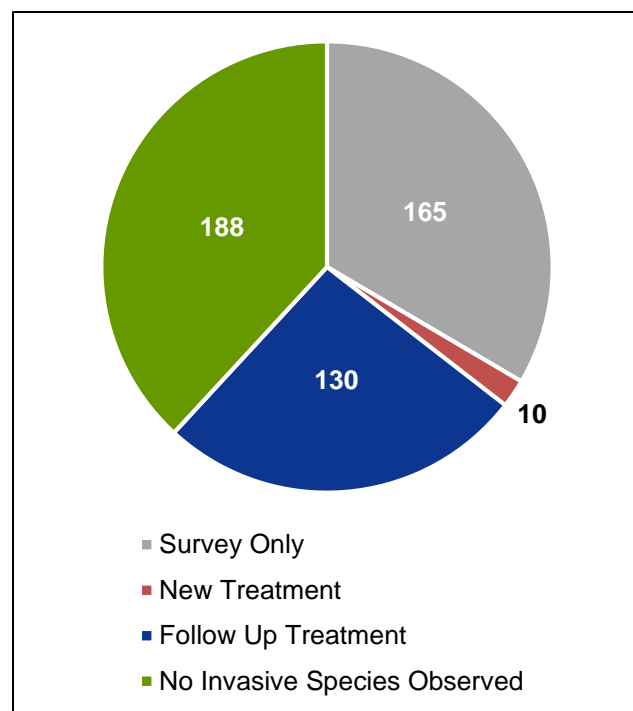


Figure 9. Status of sites visited during August 2019.

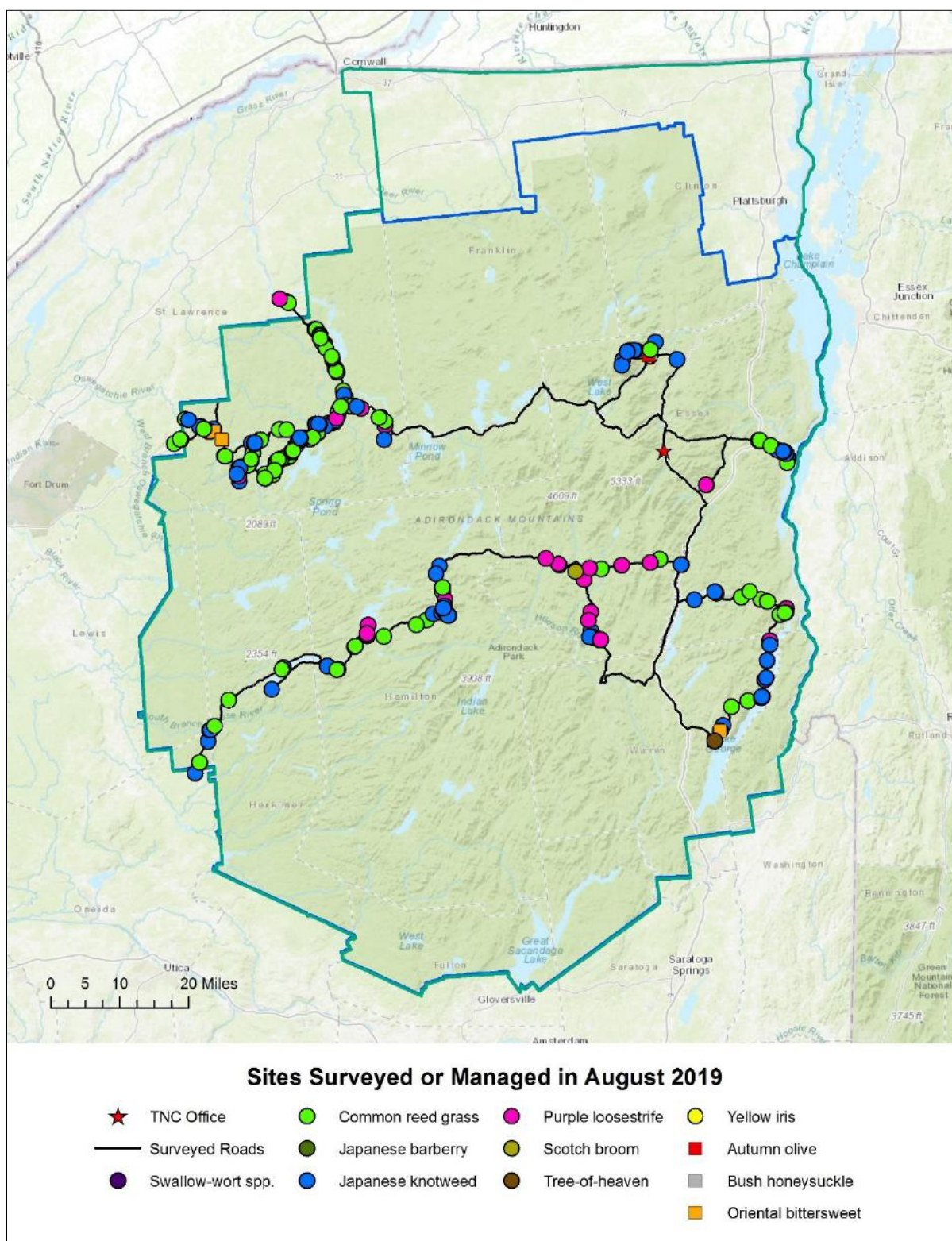


Figure 10. Sites surveyed or managed by IPC in August 2019. The sequence of management of activities was dependent upon the phenology of the individual species and latitudinal gradient of growing conditions. For example, species that bloom earlier in the growing season, such as yellow iris and swallow-wort species, were managed earlier than those that reach maturity later in the season, such as *Phragmites* and knotweed. In general, management activities started in the southern portion of the PRISM and progressed northward to coincide with the latitudinal advance of the growing season.

September 2019 Weekly Overview

September 2nd to 6th

Site Visits: 184

On the first workday in September, Spencer and Richard completed treating a large *Phragmites* infestation on Forest Preserve near Cranberry Lake. Next, they treated several historic knotweed infestations around Mt. Arab. Meanwhile, Ronnie and William began manual control of large historic purple loosestrife infestations near Cascade Lake, Lake Placid, and Wilmington. They spent the remainder of the day continuing manual control of non-native species on Whiteface Mountain.

Inclement weather on September 4th brought the entire team back to Whiteface Mountain for manual control work. The crew completed management from the summit to the highest elevation parking area and continued down the mountain toward the stone guiderail.

On September 5th, Ronnie and Richard surveyed and managed priority infestations along State Route 86 and 73 from Keene to Wilmington focusing primarily on *Phragmites* and knotweed spp., while Spencer and William managed the same species along State Route 30 between Long Lake and Tupper Lake.

To end the week, Ronnie and Richard surveyed and managed APIPP's target species along Route 9N between Upper Jay and Keene and State Route 73 between Alstead Hill Rd. and Cascade Lake. Meanwhile, Spencer and William surveyed and managed target species along State Routes 30 between Tupper Lake and the intersection with State Route 3, continuing along State Route 3 to Harrietstown. Spencer and William also assessed and treated historic knotweed spp. infestations along Panther Mountain Road.

September 9th to 13th

Site Visits: 190

To begin the week, Spencer and William continued surveys and management of target species along State Route 3, working east from Saranac Lake to Redford. After completing this section of road corridor, they traveled north to State Route 374, where they surveyed and managed target species between Cadyville and Dannemora. This corridor includes some of the largest *Phragmites* infestations ever treated by APIPP, which have decreased significantly in extent and cover over the previous seasons.



Before treatment, this *Phragmites* infestation along State Route 374 covered nearly one-acre at 100% invasive plant cover. After two treatments, only 0.01 invaded acres remain.

On September 10th, Richard and Ronnie continued surveys and management of priority species along State Route 73 near Keene and Keene Valley. Next, they began managing APIPP's target species along State Route 9N between Keene and Elizabethtown. They assessed several large historic infestations of knotweed spp. along the Boquet River, which they noted are continuing to spread downstream. Meanwhile, Spencer and William continued working northbound on State Route 374, completing management of all historic infestations and mapping several new infestations of *Phragmites* and purple loosestrife along the roadsides.

The whole team worked together on September 11th to treat several *Phragmites* infestations on private property managed by the Lake George Land Conservancy (LGLC), located directly adjacent to Forest Preserve in Lake George. After meeting with the Land Steward for LGLC, Alexander Novick, William and Ronnie cut spray lanes through the denser patches of *Phragmites* while Spencer and Richard performed chemical treatments. The team was unable to complete management of all infestations and made plans to return at a later date.

The team split on September 12th, with Richard and Ronnie assessing and treating priority infestations along State Route 9N, as well as points on Scrabble Hollow Road in Elizabethtown. Meanwhile, Spencer and William mapped and treated a large infestation of knotweed spp. located at a private property on Keese Mill Road, directly adjacent to the St. Regis River. Later the crew began surveys and management of APIPP's target species along State Route 30, heading south from Paul Smiths toward Lake Clear.

That following day Richard and Ronnie assessed and treated infestations of *Phragmites* along I-87 near Lake George, and knotweed infestations along State Route 9N near Keene. Spencer and William continued surveys and treatments of APIPP's target species along State Routes 30 and 186 from Lake Clear to Saranac Lake.

September 16th to 20th

Site Visits: 182

During the week of September 16th, the crews continued work along priority road corridors in the northern Adirondacks. Spencer and William surveyed and managed APIPP's target species along State Route 30 from Fish Hatchery Brook to Lake Clear, and later State Route 86 from Harrietstown to Paul Smiths. Meanwhile, Richard and Ronnie worked on State Route 86 near Ray Brook and Route 30 from Paul Smith's to the intersection with State Route 458.

On September 17th, the entire team returned to the LGLC property with Alex to continue *Phragmites* control work. With limited time remaining in the season, the team was only able to treat 7 of 11 infestations present in the wetland. The remaining patches will be prioritized for control in 2020.



Ronnie Robinette mows a spray lane through a large patch of *Phragmites* near the Lake George Wild Forest.

On September 18th, Spencer and William surveyed and managed target species along State Route 9N from Ausable Forks to Keeseville and I-87 between exits 34 & 30. Meanwhile, Richard and Ronnie surveyed and managed target species along State Route 458 from St. Regis Falls to Nicholville.

The next day, Spencer and William surveyed and managed target species along State Route 30 from Barnum Pond to Duane, and State Route 458 from Santa Clara to St. Regis Falls. Richard and Ronnie continued work along State Route 458, ending at the northern Adirondack Park boundary. Both teams ended the day mapping *Phragmites* infestations along previously unsurveyed portions of State Route 11B in northern Franklin County.

September 23rd to 27th

Site Visits: 19

During the week of September 23rd, the team assisted APIPP with an ongoing research project evaluating the utility of small unmanned aerial systems (UAS) for invasive species detection and mapping. As part of this project, APIPP performed aerial surveys over vulnerable wetlands to detect incipient infestations of *Phragmites* using remote sensing techniques. IPC crews assisted with the project by performing ground-based surveys to validate the aerial survey data. On September 23rd, the team surveyed three study sites: Route 3 Wetland (#2), a portion of Mud Creek Wetland, and White Hill Wild Forest, totaling approximately 302 acres. During the survey, Ronnie slipped on uneven terrain and injured his knee. As a result, Ronnie and William returned to Whiteface to continue manual control work. Meanwhile, Spencer and Richard continued UAS validation surveys, completing the 87-acre Brown's Tract Inlet study site.

Unfortunately, Ronnie resigned from the team on September 24th as a result of his knee injury. Richard was left to work on his own and surveyed the 125-acre St. Regis Wetland study site. Meanwhile, William and Spencer surveyed three additional wetlands: State Brook, Trammel Creek, and Pinnacle Rd., totaling approximately 130 acres.

To finish the week, Spencer and William surveyed the remainder of Mud Creek Wetland and Spring Brook, while Richard surveyed Ayers Creek Wetland, for a cumulative total of approximately 351 acres.

September 30th

Site Visits: 1

To end the month, Spencer began work on the annual report. William and Richard surveyed the final wetland for the UAS remote sensing research project – Stony Lake – totaling approximately 159 acres.

September 2019 Summary

During the month of September, the team worked a total of 665 person-hours and traveled 4,759 miles. In addition, the team surveyed over 1,000 acres of wetlands in support of APIPP's UAS remote sensing research project. Figure 11 provides a breakdown of hours worked for the month of September by activity.

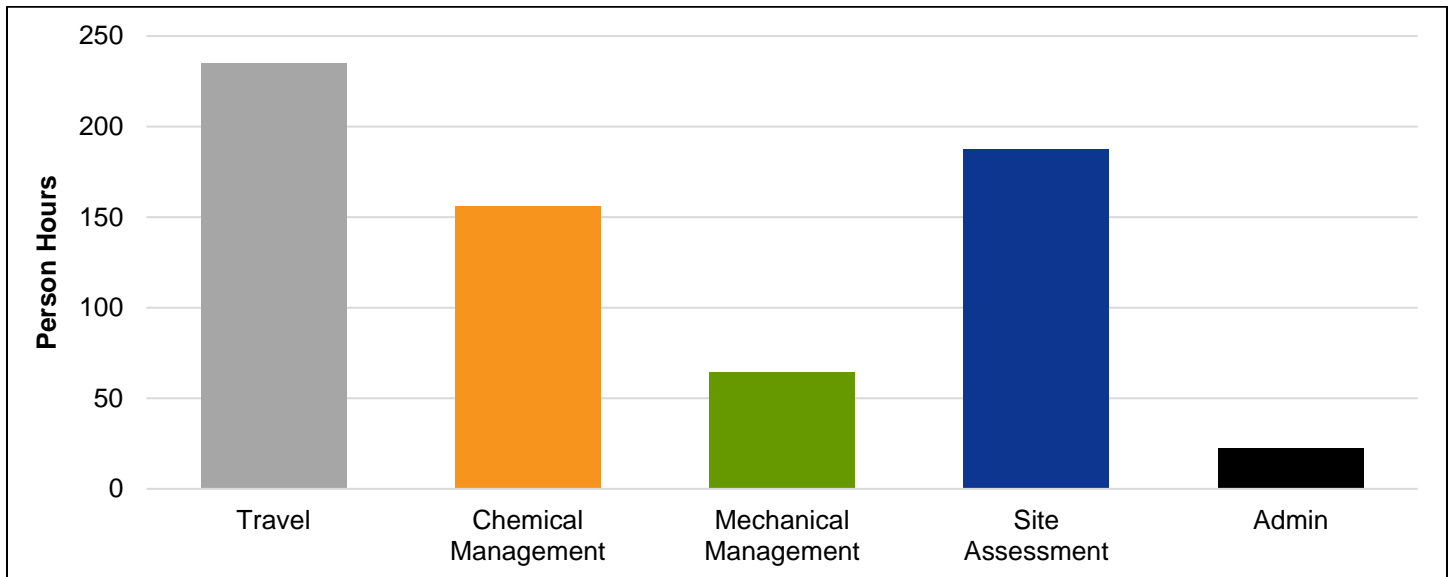


Figure 11. Hours worked in September 2019 by activity.

A significant portion of the response team's time in September was dedicated to travel and site assessment. Time allocated to wetland surveys as part APIPP's UAS research project is included in the site assessment category.

Figure 12 provides the status of sites visited in September, including the number managed, surveyed, and documented as having no target invasive species observed upon follow-up assessment.

Out of 566 unique sites visited in September, 174 were managed, including 24 new infestations. The sites left unmanaged were surveyed to inform APIPP of the species' current distribution in the PRISM, required additional permissions, or were not deemed a priority for management this field season. The "No Invasive Species Observed" category includes historic management sites documented upon follow-up survey as having an absence of target invasive species for at least one year.

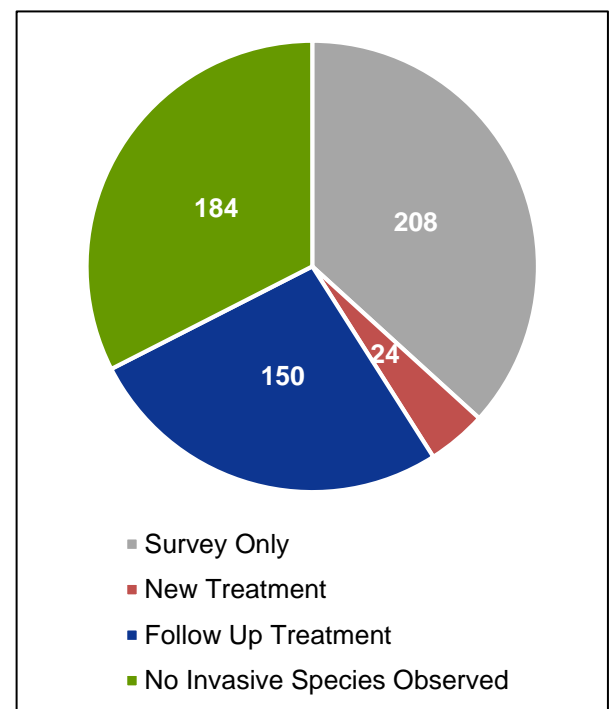


Figure 12. Status of sites visited during September 2019.

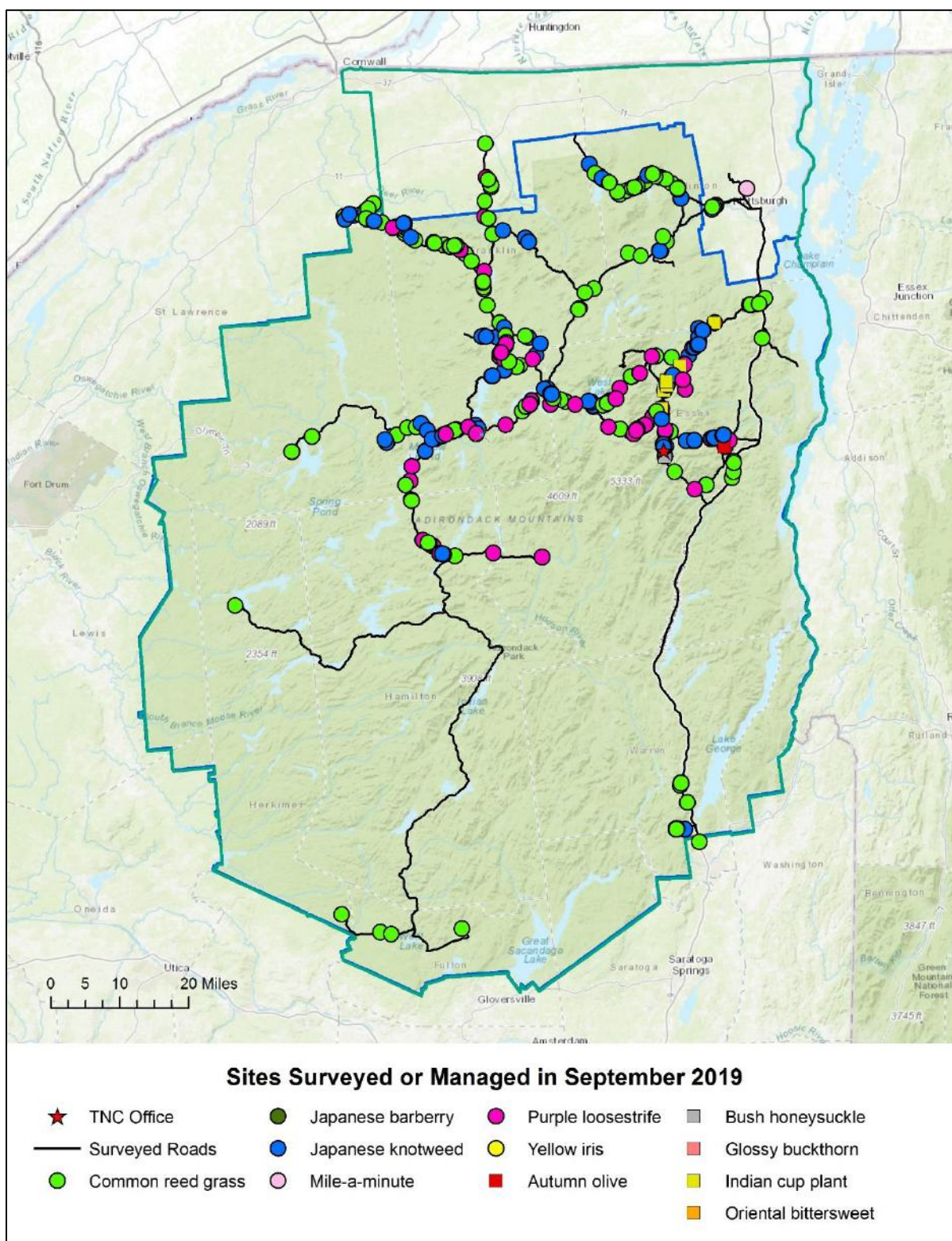


Figure 13. Sites surveyed or managed by IPC in September 2019. The sequence of management of activities was dependent upon the phenology of the individual species and latitudinal gradient of growing conditions. For example, species that bloom earlier in the growing season, such as yellow iris and swallow-wort species, were managed earlier than those that reach maturity later in the season, such as *Phragmites* and knotweed. In general, management activities started in the southern portion of the PRISM and progressed northward to coincide with the latitudinal advance of the growing season.

October 2019 Weekly Overview

October 1st to 4th

Site Visits: 19

During the week of October 1st, William and Richard continued manual control work along the Whiteface Mountain Veteran's Memorial Highway, while Spencer completed the annual report and ancillary administrative tasks.

October 7th to 9th

Site Visits: 20

Spencer, Richard and William spent the remainder of the week surveying and treating knotweed spp. and *Phragmites* infestations along I-87 between Exit 31 and 26. The crew mapped and managed both historic and new infestations.

October 2019 Summary

During the month of October, the team worked a total of 157 person-hours and traveled 394 miles. Figure 14 provides a breakdown of hours worked for the month of October by activity.

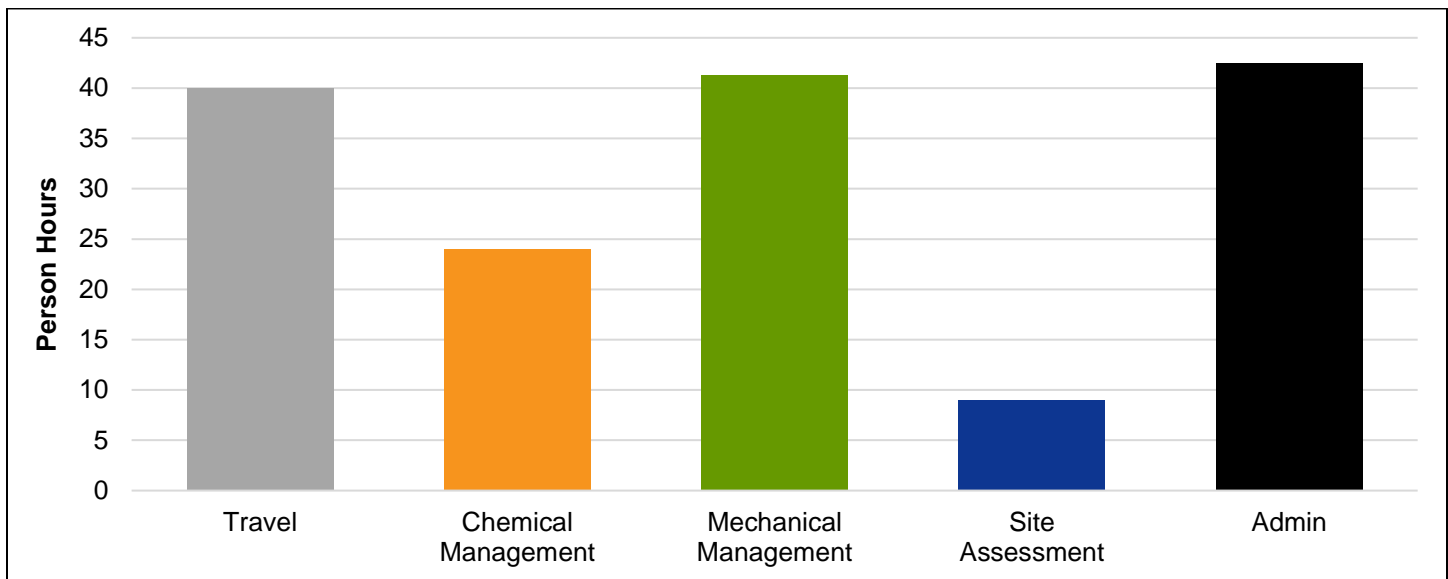


Figure 14. Hours worked in October 2019 by activity.

The response team's time in October was more evenly distributed amongst a variety of tasks including report writing (admin) and mechanical control on Whiteface Mountain.

Figure 15 provides the status of sites visited in October, including the number managed, surveyed, and documented as having no target invasive species observed upon follow-up assessment.

Out of 38 unique sites visited in October, 18 were managed, including eight new infestations. The sites left unmanaged were surveyed to inform APIMP of the species' current distribution in the PRISM, required additional permissions, or were not deemed a priority for management this field season. The "No Invasive Species Observed" category includes historic management sites documented upon follow-up survey as having an absence of target invasive species for at least one year.

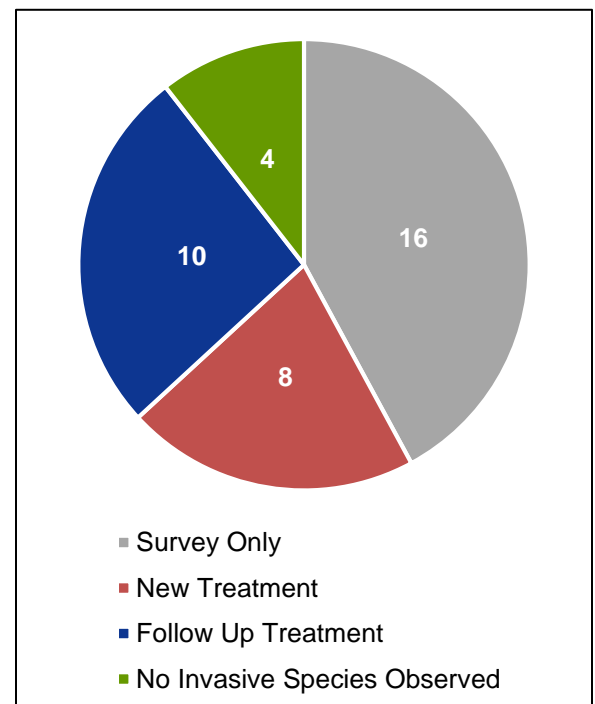


Figure 15. Status of sites visited during October 2019.

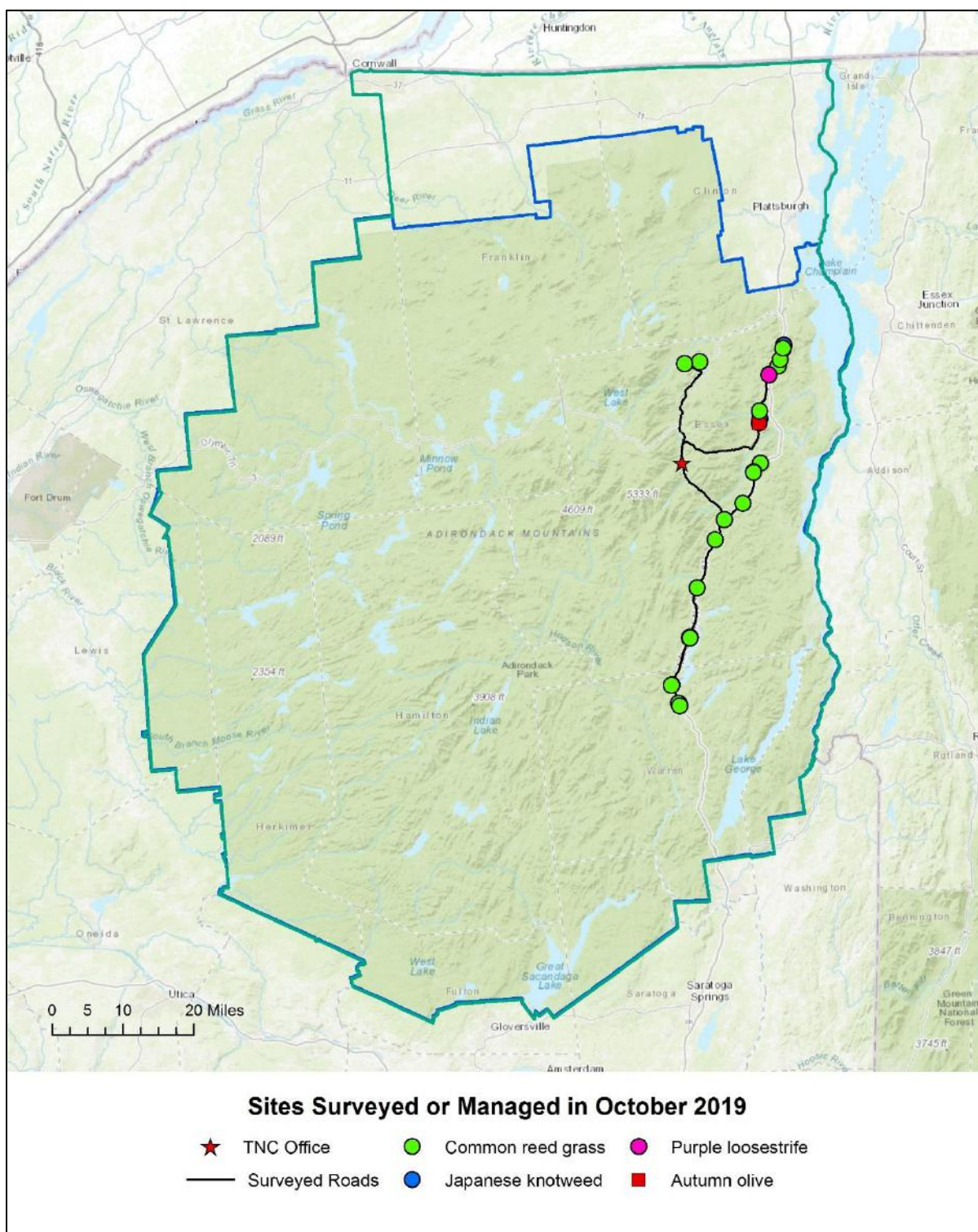


Figure 16. Sites surveyed or managed by IPC in October 2019. The sequence of management of activities was dependent upon the phenology of the individual species and latitudinal gradient of growing conditions. For example, species that bloom earlier in the growing season, such as yellow iris and swallow-wort species, were managed earlier than those that reach maturity later in the season, such as *Phragmites* and knotweed. In general, management activities started in the southern portion of the PRISM and progressed northward to coincide with the latitudinal advance of the growing season.

Field Season Totals:

Throughout the 2019 field season, the terrestrial response team worked a total of 2,381 person hours and traveled 14,497 miles. Figure 17 provides a breakdown of hours worked throughout the project by activity.

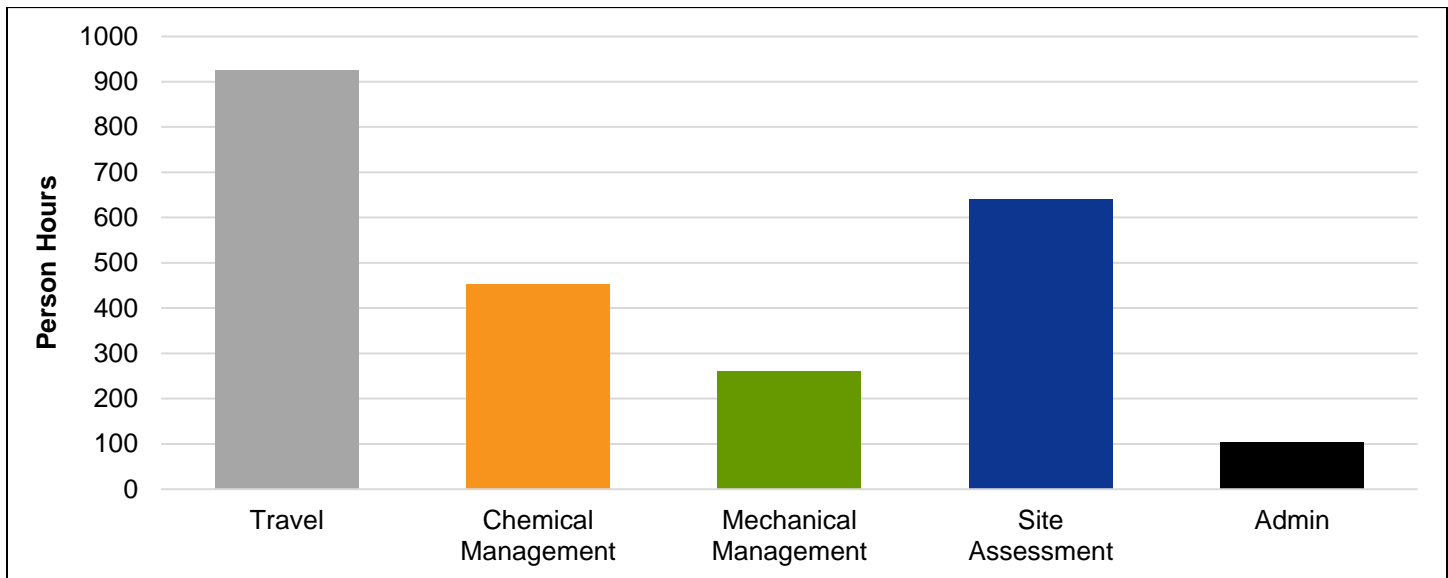


Figure 17. Hours worked throughout the 2019 field season by activity.

The majority (39%) of the response team's time in 2019 was dedicated to travel. Many of APIPP's priority management sites are located a significant distance from the response team's cabin and APIPP's headquarters, sometimes necessitating over three hours of daily travel. Remaining time was more evenly distributed amongst core management activities including site assessment (27%), chemical (19%), and mechanical management (11%). Site assessment includes the collection of outcome monitoring data with IPMMS and UAS validation surveys. In total, only 4% of project time was allocated for administrative tasks.

Figure 18 provides the status of sites visited throughout the 2019 field season, including the number managed, surveyed, and documented as having no target invasive species observed upon follow-up assessment.

Out of 1,963 unique sites visited in 2019, 521 were managed, including 58 new infestations. The sites left unmanaged were surveyed to inform APIPP of the species' current distribution in the PRISM, required additional permissions, or were not deemed a priority for management this field season. The "No Invasive Species Observed" category includes historic management sites documented upon follow-up survey as having an absence of target invasive species for at least one year. Approximately 42% of all sites visited by the terrestrial response team in 2019 had no target invasive plants observed.

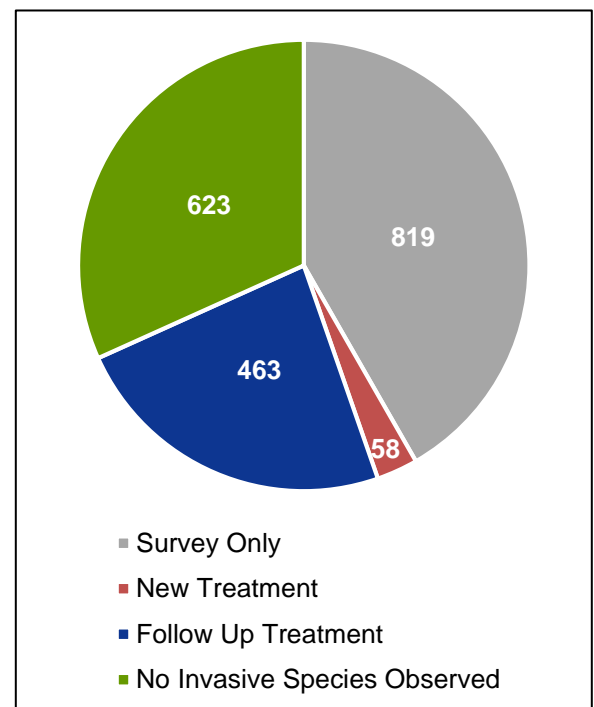


Figure 18. Status of sites visited throughout the 2019 field season.

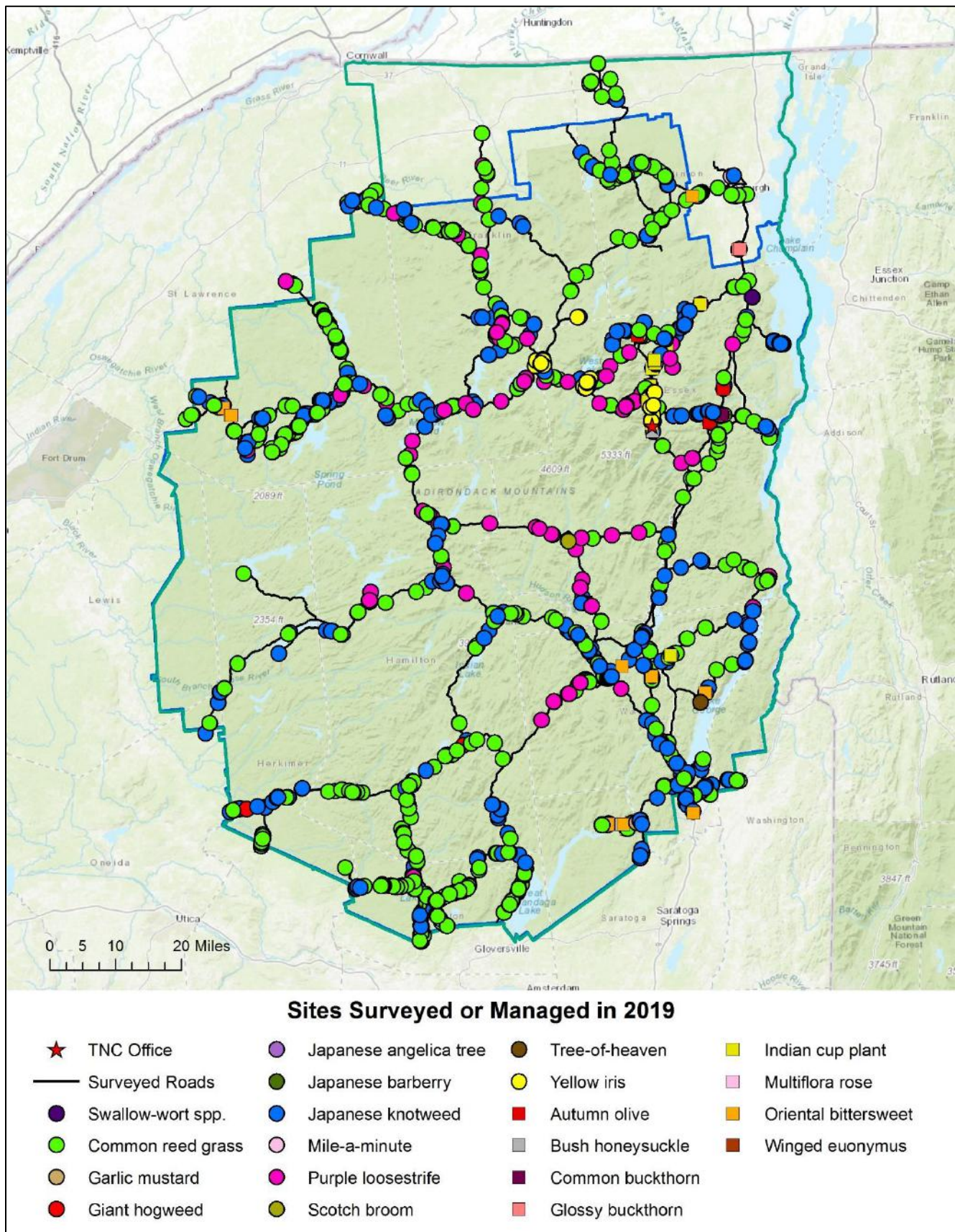


Figure 19. Sites surveyed or managed by IPC in 2019.

End of Season Review

The team progressed quickly through APIPP's list of priority road corridors, collecting a record number of treatments and assessments during the project period. This was largely due to the increasing number of sites with no invasive plants observed that did not require treatment in 2019. In addition, many historic management sites were significantly reduced in extent and cover, decreasing the amount of treatment time required at each site. The crew was able to revisit all priority historic management sites and expanded management efforts into several new areas. Early detection/rapid response efforts were initiated for multiple new species to the PRISM, including mile-a-minute vine and scotch broom. IPC's management efforts should significantly reduce the ability of these emerging species to spread within the PRISM. In addition, IPC also documented the first infestation of a watched species – Japanese angelica tree – in the PRISM. This infestation will be prioritized for treatment in 2020.

For the second year, IPC assisted with APIPP's ongoing research into the utility of small UAS for invasive species detection and mapping, dedicating 152-person hours to perform ground validation surveys for over 1,000 acres of wetlands. This new technology could increase APIPP's ability to survey large, previously inaccessible tracts for *Phragmites*, ultimately providing greater opportunities for early detection and rapid response.



An aerial image collected by APIPP's UAS detected this previously unmapped infestation of *Phragmites* (pictured right-middle) in a remote wetland on Forest Preserve land.

Recommendations and Conclusion

Recommendations

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

1. Increase the use of volunteers for the mechanical management on the Whiteface Mountain and conduct additional trail surveys.

The team made several incidental detections of non-native species along the hiking trail leading to/from the Whiteface summit. Engaging volunteers/citizen scientists to survey the hiking trails – and assist with management – would increase the impact of the project while decreasing the amount of resources that must be dedicated by IPC.

2. Involve crew members in additional education and outreach opportunities, especially manual removals with volunteers.

This year the crew interacted with the public at a Weed Wrangle® event as part Invasive Species Awareness Week. The team felt this was a valuable enrichment opportunity and enjoyed interacting with APIPP's partners. Involving the crew in more volunteer control projects could increase the overall impact of IPC's management work/presence in the PRISM.

3. Improve and/or research alternative technology to improve data collection accuracy.

The team encountered multiple opportunities where outfitting each individual crew member with an iPad and Garmin GLO would have increased operational efficiency. This was particularly applicable when surveying previously unmapped road corridors and wetlands. In addition, updating available tablets to the newest version of the Collector would allow for more efficient planning and coordination.

4. Consider accessibility and weather when selecting wetlands to target for remote sensing surveys.

The crew surveyed a greater number of wetlands in 2019 as part of APIPP's UAS research project, with the overall size of wetlands also increasing. Heavy rains before and during the time allotted for surveying resulted in difficult access and slow movement through the wetlands. If possible, these surveys should be scheduled during periods of clear weather.

5. Remove duplicate and inactive points from the IPMMS database.

Many points in the IPMMS have met the threshold identified by APIPP to be considered locally eradicated. In addition, there are some instances of duplicate occurrences or inaccurate points that were backlogged from historic paper data sheets. Removing inaccurate points and/or visiting eradicated sites on a less frequent basis would provide the team more time to focus on new infestations and project areas.

6. Expand the team's management footprint to new areas.

APIPP has made significant progress managing priority species and infestation within the interior Adirondacks. Many historic management sites have transitioned to having no invasive plants observed or have been deemed locally eradicated. With less time required to survey/manage

historic infestations, the team feels APIPP should begin expanding their management footprint to new portions of the PRISM.

7. Evaluate and rank additional species for management and/or survey work.

Several species known to be invasive in nearby states are present in the Adirondack PRISM, but are not currently included on APIPP's list of target species. Such plants include big-leaf lupine (*Lupinus polyphyllus*), which is highly invasive in the geographically similar Acadia National Park, and white poplar (*Populus alba*), which the team observed in multiple locations across the project area. These emerging species should be evaluated and considered for survey/management efforts.

8. Examine additional management options for the Whiteface Mountain control project.

Many of the target management species on Whiteface Mountain – such as spurge spp. and vetch spp. – are not responding well to manual control. Despite intensive hand-pulling performed over the last two seasons, these species remain in high abundance along the upper elevations of the highway. Additional management options, such as foliar spray with herbicide, should be considered to increase the efficacy of control efforts.

Conclusions

This season marked the eighth year that IPC provided staff for APIPP's Terrestrial Invasive Species Early Detection and Rapid Response Team. Through IPC's work, APIPP's survey and management footprint has expanded significantly within the Adirondack PRISM. As historic management sites continue to decrease in size and cover following treatment, crews have been able to address a greater number of infestations and engage in a wider range of ancillary survey and control projects. Maintaining such a low density of invasive species across 6-million+ acre portion of New York State is a major feat, and IPC is proud to contribute to keeping this scenic and ecologically significant area intact. 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. New or expanded infestations of invasive species could have significant negative impacts on the region's biodiversity and natural resources, economy or even human health. Through its holistic approach to invasive species management, APIPP delivers tangible lasting results that continue to have a positive impact on the region's natural resources and communities. IPC looks forward to continuing and building upon its partnership with TNC and APIPP in the future.