

Assateague Island National Seashore

Alien Plant Management Program (APMP) / Phragmites Control Project Report 2017



Image 1: Molly Struble, of the 2017 Vegetation Management Crew, rests after treating *Carex kobomugi* (dyed blue in the background) on the island.

Jonathan Chase, Biological Technician
Vegetation Management
Division of Resource Management

Assateague Island National Seashore
7206 National Seashore
Berlin, MD 21811
(410) 641-1443

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Introduction

During 2017 Assateague Island National Seashore's (ASIS) Alien Plant Management Program (APMP) and Phragmites Control Project worked to monitor or control infestations of: *Ailanthus altissima*, *Albezia julibrissan*, *Artemesia vulgaris*, *Carex kobomugi*, *Cirsium arvense*, *Clematis terniflora*, *Elaeagnus umbellata*, *Eragrostis curvula*, *Lezpedeza cuneata*, *Lonicera japonica*, *Ligustrum vulgare*, *Mentha spp.*, *Microstegia viminium*, *Miscanthus sinensis*, *Morus alba*, *Paulownia tomentosa*, *Pennisetum alopecuroides*, *Phragmites australis*, *Pinus thunbergii*, *Rosa multiflora*, and *Rosa wichuraiana*.

Alien plant species infestations that were treated by the Alien Plant Management program (APMP) during FY2016 occurred in the park, as well as around the park's Headquarters area. Previously documented and treated infestation sites were monitored during FY2017 and those sites found to be inactive during each of the past three years were determined to be controlled or eradicated.

During the fall of 2017, ASIS received some much needed assistance from both the NCR Exotic Plant Management Team (EPMT) and the Northeast Region (NE EMPT) who came to assist us in treating *P. australis* at Burn Units 2 and 8, at the Life of the Forest and Life of the Marsh Trails and along Bayberry Drive.

Methods

ASIS Alien Plant Management Program Design 2009-2017

The APMP follows the alien species guidelines found at the NPS inventory and monitoring website (<http://science.nature.nps.gov/im/monitor/index.cfm>) and employs the North American Weed Management Association (NAWMA) standards. The APMP also refers to the Bureau of Land Management's (BLM) Technical Reference 1730-1: Measuring and Monitoring Plant Populations and the Nature Conservancy Weed Handbook for guidance on monitoring and treating targeted alien plant populations. The ASIS APMP database was updated to include 2017 APMP activities. Additionally, the Phragmites database was updated to store and manage data associated with the ASIS Phragmites Control Project. During FY17 the ASIS APMP continued to expand its management of *P. australis* with large scale ground treatments and continued to treat/ retreat the previously mapped/ treated infestations associated with this monitoring and management project. The grand size and complexity of this ambitious project was again the responsibility of the permanent biological technician and the Chief of Natural Resources. Two seasonal employees were hired to assist our program in 2017. Additionally, 1 Student Conservation Association (SCA) member and 3 NPS Seasonal Plover Technicians were cross trained to assist in invasive plant treatments. The permanent biological technician and the Chief of Resources Management shared the coordination of all *P. australis* monitoring and management activities during this reporting period.

Data Management

The ASIS APMP database and the ASIS Phragmites Control Project databases document and track the development and treatment success of each targeted alien plant infestation. Multiple infestations are often grouped into sites for record keeping and reporting purposes. Beginning in 2008, a site code was used to group the infestations so that they could be referred to more generally. This practice has been found to be burdensome, but does at some level help to identify the areas of infestation on the island. For the purposes of continuity, the same sites will be used for this report. The APMP database sites are listed in Table: 3. Combined treatment information for the APMP actions taken in 2017 are presented in Table 1. Treatment information for the combined ASIS/ EPMT actions taken in 2017 are presented in Table 2. Individual treatment actions taken during 2017 are included in Table 4. The herbicide use log associated with treatment information of Table 4 are included for all APMP activities in Table 5.

To indicate multiple different treatments on a single day, each treatment was given an "Rx Code" that included the characters "Rx" and the date of the treatment and if more than 1 treatment was conducted on that day the filename was appended with discreet numbers added to the end of the filename. The

second treatment, for example, on 7/5/2016 would be labeled "Rx070516_2". This was especially useful in the naming of polygons that represented separate treatments that occurred on the same day.

Safety Precautions

A non-toxic marker dye has been used in herbicide mixtures at ASIS since 2004. The dye assures that proper coverage of the herbicide is administered on the foliage of targeted species. It also ensures the protection of the applicator by making visible, any possible contamination of his/her protective clothing. Proper protective equipment (PPE) was always employed during treatment activities. Employee safety is important to ASIS, especially when working with potentially hazardous materials. Therefore, the project lead assured that all equipment was in good working order and that all permits were current at the start of the season prior to large scale treatment activities. This methodology has been adopted as standard operating procedure by the ASIS APMP. The lead technician responsible for coordinating and implementing the APMP is a certified pesticide applicator (categories 2 and 5) in the State of Maryland who is therefore permitted to conduct and oversee the herbicide treatments described in this report.

Alien Plant Inventory and Monitoring

The criteria used to determine a plant species' status as an alien invasive are:

1. The species has been identified in a previous APMP report as an invasive alien Species of Management Concern (ASIS SOMC).
2. The species is included on the Maryland Department of Natural Resources Wildlife & Heritage Services' list of invasive non-native plants (<http://www.dnr.state.md.us/wildlife/inintro.asp>)
3. The species is considered to be potentially invasive by the NPS Natural Resource Program Center's Invasive Plant Program and its level of abundance at ASIS has been found to warrant Consideration by Park Managers.

Island searches for invasive alien plants were conducted in 2017 and Global Positioning System (GPS) units were used to record data. The Trimble® Juno 3B® handheld unit was the preferred unit in 2017. Whenever possible, the perimeter of larger alien plant infestations were mapped, however some infestations were too difficult to circumnavigate and were therefore documented using point data.

The primary focus of this years' work was to revisit previously known infestations of invasive plants on the island while looking for new, or previously unrecognized infestations of invasive, non-native plants.

Results

A summary of the ASIS APMP accomplishments during the fiscal year 2017 follows. This summary includes ASIS APMP monitoring and treatment activities as well as those conducted with the assistance of the National Capital Region's Exotic Plant Management Team. Treatment data are presented by species including the time associated with these treatments in Table 5. The herbicide use log that is associated with the treatments in Table 5 is presented in Table 6. Treatment and monitoring information are presented in the narrative for each species. The sites used by the APMP are found in Table 4 for reference, as mentioned previously.

Ailanthus altissima:



Image 2: *A. altissima* atop the dune which faces the inlet at the North End of Assateague Island National Seashore. (NPS Photo)



Image 3: 2017 Seasonal Biotech Molly Struble treats *Ailanthus altissima* with a hack and squirt method at the top of the dune which faces the inlet on the islands North end. (NPS Photo)

This species was thought to have been eradicated from the island at the time of the last reporting period, however a discovery of *A. altissima*, made by Biotech Jonathan Chase at the inlet and found during the Seabeach Amaranth census in August of 2017, has changed this status again to active.

Albezia julibrizzan:



Image 4: *A. julibrizzan* tree from @ 12 meters (NPS Photo)

Upon monitoring the site in August of 2017, the trees were found to be dead and there was no new recruitment within a 100 meter radius of the site.

There are no other known occurrences of this species elsewhere on the island (Chase 2014) and no new sites were discovered during the 2017 season.

This species is currently eradicated from the island.

Artemesia vulgaris:

A sizable infestation had appeared in the vicinity of the ASIS Sinepuxent District Visitor Center since 2012, when it was first discovered and has been found to be active on the island, as well. Control efforts at the Visitor Center and Island infestations during 2016 were found to have killed those plants which were treated. Additional treatments had been conducted in August and September of 2016 at the Headquarters property, the guardrail by the entrance to the Park and by the Visitor Contact Station on the island, on the north side of Bayside Drive between loops B and C further helped to control this species. These sites were revisited in 2017 and found to have been successfully treated, though additional plants continue to be active at the Headquarters property along the southern boundary in particular, that required treatment in the fall of 2016, or the beginning of the fiscal year 2017.

The total area treated for this species in 2017 was 40 meters squared, or 0.0099 Acres.

Carex kobomugi:



Image 5: Pile of flotsam washed ashore during winter storms of 2016



Image 6: Young colony of *C. kobomugi* with Flat Stanley at the center, used for scale.



Image 7: 2017 Vegetation Management Crewmember Molly Struble posing behind a group of ramets of recently treated *C. kobomugi*

Many storms came to ASIS during the winter of 2015/ 2016. These storms brought flotsom debris that washed onto our island beaches (see Image 5). In some of these piles of debris came rhizomes of the invasive sedge *Carex kobomugi*. These rhizominous masses were quite numerous and widespread which required that we search the island from north to south again in 2017 to locate them entirely and deal with them early following the EDRR credo. These sites were promptly treated after being located with a foliar spray application of 2% Imazapyr herbicide solution of Polaris® in water.

The Seabeach Amaranth Restoration project provides the opportunity to locate new infestations of this species annually both before the census when we attempt to locate and protect as many plants as possible with cages as well as during the island wide census. Because we have frequently found new infestations of this species in the past, as well as re-emergent, or newly emergent populations in previously treated sites, it is believed this species will be of continued concern for many years to come. It is recommended that all sites be revisited again in 2018.

Lastly, the concession area at the Assateague State Park was a long time active site that received treatment in 2016 but was found to be inactive in 2017. This site will require monitoring again in 2018.

The total area treated for this species in 2016 was 8023.75 meters squared, or 0.1842 acres.
The total area treated for this species in 2017 was 369 meters squared, or 0.0908 acres.

A comparison of the data from these last 2 treatment years indicate the great effectiveness of the current treatment method (a 2% solution of Imazapyr based herbicide (Polaris SP) with 0.5 % concentration of dye and non-ionic surfactant, because the same areas were searched each of the 2 years and while new plants were found in the 2017 search, those plants that were treated in 2016 were not encountered again in 2017. We can now safely say (Chase 2017) that we have this species under control island-wide, until the next storm delivers new recruits to the island. Therefore, this species must be managed until the threat is diminished.

Cirsium arvense:

This nefarious invader had become established in areas of the Maryland Headquarters starting in 2011 when various disturbances related to landscape buffer construction and large quantities of abandoned vehicles altered mowing practices in the southern portion of this property. Judicious herbicide treatments have helped to reduce, but not eliminate, the prevalence of this species since 2011.

Treatments of this species were conducted during October of 2017 on the Headquarters property in the un-mowed vegetated buffers that border the property to the south.

The total area treated for this species in 2017 was 690 meters squared, or 0.1705 Acres.

Clematis terniflora:



Image 8: *Clematis terniflora* in flower. (Credit: EDDMapS.org)



Image 9: ASIS 2016 Vegetation Management Employee Jeremy Fendley stands next to a *Clematis terniflora* that was discovered on the causeway to the Assateague State Park

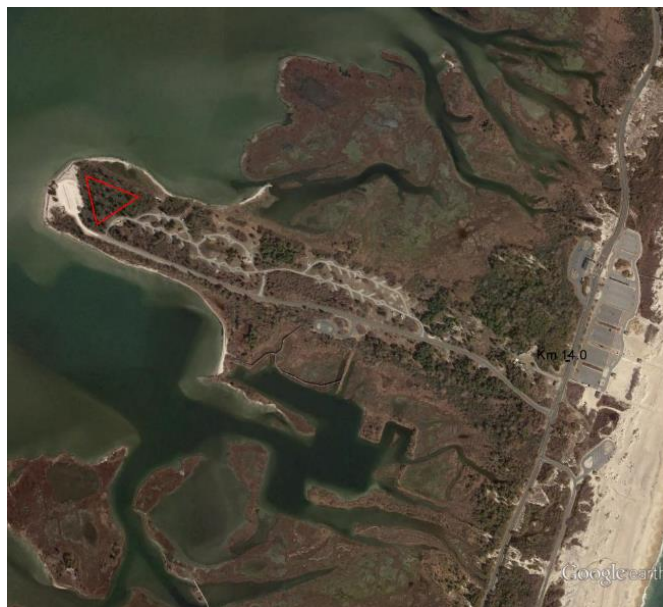


Image 10: *C. terniflora* treatment site at Bayside Drive (red triangle)

The reoccurrence of *C. terniflora* at CLTE_Site_01 is likely the result of an abundant seed Bank, established by the original infestation over many years. The entire CLTE_Site_01 (see Image 10) was found to be lightly infested during an early season assessment of the area in June of 2017. The site had been treated, in earnest, in late summer of 2016 after access trails were cut using bladed weedwackers. There were some vines discovered at the western portion of loop C campground on Bayside drive about 50 meters east of the dump station on the north side of Bayside Drive. The 2016 treatments were highly effective.

This species had also been discovered on the causeway in 2 small patches (see Image 9) that were treated for the Assateague State park in August of 2016. In 2017 they were both found to be inactive.

No treatments were conducted at the Bayside Drive site in 2017 as detectability was low for the species following the previous years' treatments there, but it is recommended that the site be revisited in 2018.

Elaeagnus umbellata:



Image 11: *Elaeagnus umbellata* in flower (Credit: Bill Johnson (NPS))

E. umbellata saplings continue to emerge at the Headquarters area of ASIS. Because a great number of these trees have been found bordering the Headquarters land in the past, as well as being well established throughout South Point, it is believed that this species will remain on our watch list for many years to come. Very few trees of this species have become established on the island in the past, but there have been some found and treated in the past on the State Park land near their pump houses along Bayberry Drive as well as at the end of ASIS's Bayside Peninsula. These sites were active in the State Park in 2016 and were treated then. A handful of saplings were treated behind the Maryland Visitor, as well in 2016. All trees that were treated in 2016 were inactive in 2017 and no additional treatments were conducted upon this species in 2017.

Elusine indica:

The bike trails and roadways are frequently bordered by this species which causes the pavement to crumble as the plants make their way through it, so we were asked by the Maintenance Division to treat these areas. Both Maryland and Virginia were treated once during the growing season. In Virginia the maintenance yard and the area just west of the Chincoteague National Wildlife Refuge were the areas that received treatments in 2017. In Maryland the roads and trails on the mainland were treated in 2017.

The total area treated for this species in 2017 was 1575 meters squared, or 0.3892 acres were treated.

Eragrostis curvula:

E. curvula infestations have been treated in the Developed Area (which it has remained confined to) at ASIS since 2005 and the treatments have successfully kept this species under control. Because the detectability of this species had increased in 2016, it was treated along with *L. cuneata* in October of 2016.



Image 12: *Eragrostis curvula* along Bayberry Drive just south of the Northern boundary marker (Credit: NPS ASIS 2004)



Image 13: 2016 Crewmembers treat *Eragrostis curvula* tussocks in the field just south of the Park's entrance on the island. (NPS Photo)

The total area treated for this species in 2017 was 150 meters squared, or 0.0371 acres.

Hedera helix:

The infestation on the southeast corner of the Clement's house was found to be inactive in August of 2017. The infestation in the housing buffer at the MD headquarters behind Bayberry House was treated in October of 2016. Later, the infestation was found to still be active when observed in October of 2017 and will require treatment in the Spring of 2018.

There was one single treatment for this species in 2017, it was 4 meters squared, or 0.0010 acres.

Lezpedeza cuneata:

The developed area in Maryland was targeted for this species in 2017, because this species had become detectable in 2016. The entire developed area was treated along with *E. curvula* in September of 2016. Also several patches of *L. cuneata* were treated behind the Maryland Visitor Center in the Sinepuxent Vegetation Buffer. Follow up treatments occurred in October of 2016 and again in June and July of 2017.

In all of the areas that were treated in 2016. Significantly less plants were discovered after the 2016 treatments which indicates that the treatments were effective.



Image 14: 2016 Crewmembers treating *Lespedeza cuneata* near the “boneyard” September 2016 on the footprint of where the original Bayside Campground was first established. (NPS Photo)

This species is present in 2 Park locations, they are: 1) The Sinepuxent Vegetation Buffer: behind the ASIS Sinepuxent District Visitor Center and 2), The Developed Area (See Image 12). Treatments have been conducted on the mainland in the past, but not on the island. This species should be monitored later in the growing season when it is most detectable. Because the level of detection has increased at both locations, treatments of this highly invasive species are recommended to continue in the fall of 2018 if project funding will allow.

The total area treated for this species in 2017 was 205 meters squared, or 0.0507 acres.

Ligustrum vulgare:

This species may now be considered to have been eradicated from the Headquarters property.

Lonicera japonica:

In 2016 ASIS had been greatly assisted by the NCR EPMT who helped them to treat *L. japonica* at the Bayside Campground peninsula. The combined team was able to treat all of the peninsula except the areas south of the Bayside Drive roadway, therefore this was the primary focus for 2017. In May of 2017 all of the area south of Bayside Drive to the marshland was treated for *L. japonica* to tie in with the previous years' work. Additional treatments of *L. japonica* were conducted at the MD Headquarters property in the vegetated buffers there.

The total area treated for this species in 2017 was 1162 meters squared, or 0.2870 acres.

Mentha spp.:

A species of non-native, hybridized mint was discovered to have become well-established in the vicinity of Loblolly house in Park Housing at the Maryland Headquarters property during the 2014 growing season. Because it had escaped the mowed areas behind the house and entered the vegetated islands that do

not get mowed it was able to flourish. The original source is unknown, but is thought to have been planted by a previous resident of Park housing.

This infestation in Maryland Park housing was found to be inactive in 2017, due to it having been targeted for treatment in 2016, which appeared to have been very successful.

This species was not treated in 2017

Microstegium vimineum:

A very sizable infestation, the extent of which remains unknown, but is thought to occupy more than an acre of cover, was discovered in the fall of 2014 by Seasonal Biological Technician Kristina Fahey. The infestation lies on land owned and managed by the Maryland Department of Natural Resources (MDDNR) which borders the southern and western boundaries of Park Headquarters.

This species had invaded the Park Headquarters at the Sinepuxent Vegetation buffer where animal trails along the bay were heavily infested. An additional new infestation was discovered and promptly treated across the road from the well head on the north side of the road along Ferry Landing Road. All occurrences of this species on Park land were treated in October of 2016 and again in July and September of 2017.

The total area treated for this species in 2017 was 200 meters squared, or 0.0494 acres.

Miscanthus sinensis:

No treatments of this species were conducted in 2017. However the (2) new, small sites discovered during searches in 2015, will require treatments in 2018. These sites were located at (UTM Zone 18N) N 42247067, E 485229 (4 plants) and N 4224710, E 485231 (2 plants). These 2 small infestations will likely need to be treated in 2018. The population of *M. sinensis* that had been treated extensively in the past, located on the North end in the forest just south of the inlet, was found to be active again in September of 2017. This area, Misi_0001, will need a thorough gridding and treatment in 2018.

Morus alba:

No infestations were encountered and none were treated in 2017.

Paulonia tomentosa:



Image 15: Closeup of the *Paulonia tomentosa* leaves (NPS Photo)

The single *P. tomentosa*, located at (UTM Zone 18N) N 4224376, E 485171 was not monitored in 2018, but is presumed to have been eradicated from the 2016 treatment.

Pennisetum alopecuroides:



Image 16: *Pennisetum alopecuroides* behind the Sinepuxent District Visitor Center in September 2014 (NPS ASIS Photo)

This species had some new recruits established once again across our entire Headquarters property in 2017 (see Image 14), so treatments were conducted when the plants had begun flowering in September when they are easier to distinguish.

The total area treated for this species in 2017 was 152 meters squared, or 0.0376 acres.

Phragmites australis:

Abstract

The native coastal communities of Assateague Island National Seashore (ASIS) are threatened by the expansion of *P. australis* (Phragmites or common reed) an invasive, alien plant species. Assateague Island contains the only intact natural barrier island ecosystem remaining in the state of Maryland. At the mid-Atlantic regional scale ASIS represents the largest contiguous expanse of native coastal communities that still collectively functions as an intact barrier island ecosystem. This valuable and unique resource is being degraded and functionally altered by the invasion of *P. australis* and through the development of dense infestations.

P. australis is an aggressive invader that spreads from established infestations by sending out rhizome and root runners thereby creating a thick mat of rhizome which may extend down several feet in depth. *P. australis* spreads to new sites via three routes; through seeds dispersed by wind and water, through dispersal of pieces of rhizome carried in water, and through pieces of rhizome contained in dirt and mud tracked by vehicles and equipment. *P. australis* forms dense monotypic stands, displaces and outcompetes native wetland and terrestrial vegetation, changes marsh hydrology, alters wildlife habitat, and increases wildfire potential.

P. australis has gradually (over a period of years or decades) established an expansive foothold on Assateague Island in a variety of coastal habitats. Individual infestations of varying sizes occur throughout the island. Over time *P. australis* infestations have expanded to the point that today vast areas of once diverse native forest, shrub and marsh communities have been replaced with dense monocultures of itself. Given the comparative rarity of undisturbed coastal communities present elsewhere throughout the region, the serious and continued threat posed by *P. australis* invasion, and the conservation mandate expressed by Congress in ASIS' founding legislation, the park continues to undertake this large scale project to document and treat *P. australis* infestations in order to restore native coastal communities and ecosystem health. After many years of treatments, ASIS has made measurable progress in the effort to gain control of this aggressive invader.

Ground Treatment of Infestations:

The effective control of *P. australis*, particularly larger well-established stands, has required multiple treatments using a combination of methods including aerial applications of herbicide, ground based cut stem treatments followed by applications of concentrated solutions of herbicide, and ground based foliar spraying with herbicide. The use of herbicide treatments is recommended as the primary control method and the first step towards effective control for *P. australis*. By applying herbicide to actively growing green foliage and flower plumes of the target plants after full leaf elongation and up to first killing frost, it is believed to produce the most effective way to control *P. australis*. However, because the window of hiring opportunity and workforce availability occurs earlier than this optimal treatment time period, ASIS has had to conduct their treatments during the growing season, rather than at the end of the growing season. Despite treating this species outside of optimal treatment interval ASIS has had success in gaining control of this species.

During 2017 *P. australis* was sprayed exclusively from the ground with only foliar backpack applications with the assistance of (2) seasonal crew members, the Vegetation Management crew, overseen by the Permanent Biological Technician (Plants), were able to spray, or retreat infested areas that had been treated in the past. Backpack sprayers were used in infestations and a 50 gallon ATV sprayer, transported on a Kawasaki Teryx® UTV, was often used to fill the backpacks near the treatment areas. While plover technicians were trained to assist us in spray treatments their contribution was negligible because of frequent scheduling conflicts which prevented them from actually assisting us.

Since 2015, backpack sprayers were used for the treatment of densities greater than 60% because it was impractical and impossible to get a high volume pump sprayer into the treatment areas and so, there was no other option than to use backpack sprayers on these more dense areas of infestation. The use of backpack sprayers in these areas of density greater than 60% is extremely difficult and time consuming and further justifies the need for future aerial applications of areas of this density, as

it is impractical to use backpack sprayers in this fashion. Nonetheless, the crew sprayed these dense areas to “tie in” with previous years’ treatments.

All treatments were sprayed with a solution containing 2% concentration of Polaris® herbicide and 0.5% concentration of surfactant and 0.5% marker dye. The solution was mixed in water and sprayed on *P. australis* infestations starting from the crown of the plant and working down covering approximately 70% of the plant. See Tables 1 and 2 below for the summary of treatments associated with the *P. australis* at ASIS during FY2017.

When applied to the foliage of actively growing plants, Imazapyr, the active ingredient in Polaris®, is rapidly absorbed and transported throughout the plant tissues. The herbicide kills the entire plant: leaves, stems, and rhizomes. ASIS has primarily used Imazapyr based herbicides to control this species because it has been proven to be statistically superior (see reference below) in efficacy.

Efficacy of Imazapyr and Glyphosate in the Control of Non-Native *Phragmites australis*, Thomas J. Mozdzer^{1,*}, Curtis J. Hutto, Paul A. Clarke and Dorothy P. Field, Restoration Ecology, Volume 16 Issue 2, May 2008.

The crews’ efforts during 2017 were employed in the retreatment of *P. australis* within the ASIS burn units 2 (aerially treated in 2008), 8 (aerially sprayed in 2009) and at select locations of the Developed Area (at the Ranger Contact Station, Oceanside Drive and Life of the Marsh Trail (see Table: 1 and Figures: 4, 5 and 6 respectively). ASIS was only able to treat 3 locations on their own this year because of the small staff and late start that they had in 2017, additionally one of the crew members left early to accept another position outside the park. If not for the help of the combined EPMT’s we would have only been able to perform treatments of *P. australis* in the developed area.

Later, in the fall of September, ASIS received assistance from (2) Exotic Plant Management Teams (EPMT), they were: 1. The National Capital Region’s EPMT and 2. the Mid-Atlantic EPMT. Together ASIS and the EPMT Teams treated *Phragmites* at the Life of the Marsh Trail, east of the Bayside Drive entrance, at Life of the Forest Trail, Burn Unit 2 (west and north of the intersection of Bayberry Drive and Ferry Landing Rd (south of the Ferry Landing Road between it and the Life of the Forest Trail) and also at Burn Unit 8 (north of the Bullpen and north of the previous year’s (2016) treatment areas). Together the Teams treated nearly 38 acres in less than 4 work days (with 1 day lost to rain). (See Table: 2 and Figure 3).

Phragmites australis Discussion:

There was no additional monitoring of burn units in FY17. Because our crew was small this season (2 seasonal employees), 1 of these employees left us early to take another position outside the park.

Further treatments at ASIS are recommended to follow the same approach that has been conducted in the past (ie. aerial spray treatments followed by controlled burning and then follow up ground treatments for infestations with high density and poor accessibility. Smaller satellite infestations with densities less than or equal to 60% may still be treated with backpack sprayers, but the effort put into spraying infestations of high density and poor accessibility with backpack sprayers is still not recommended (Chase 2014).

The total area treated for this species in 2017 was 168,021.41 meters squared, or 41.52 acres.

Figure 1: ASIS Prescription Burn Unit Map (Burn Units 1 and 2)

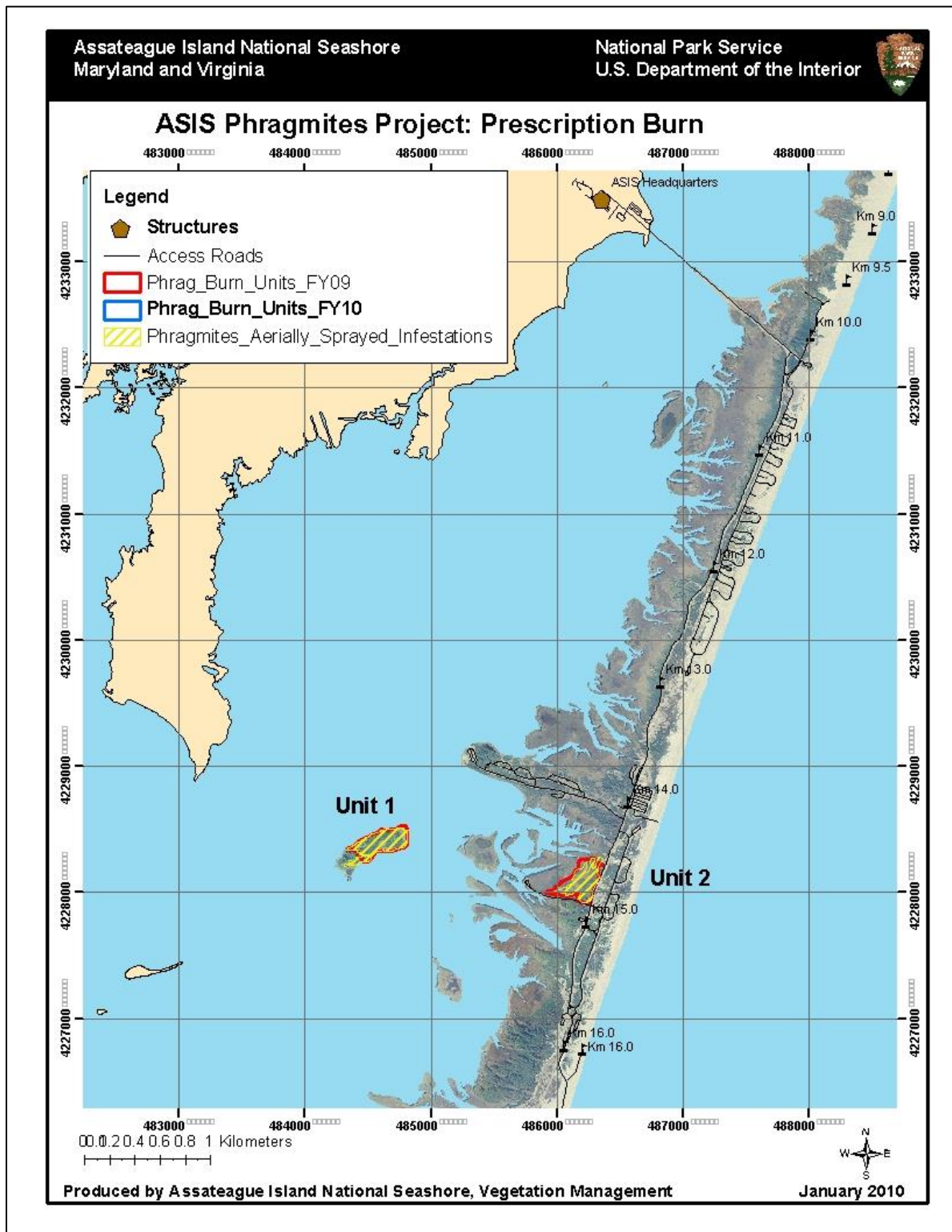


Figure 2: ASIS Prescription Burn Unit Map (Burn Units 3, 4, 7, 8, and 9)

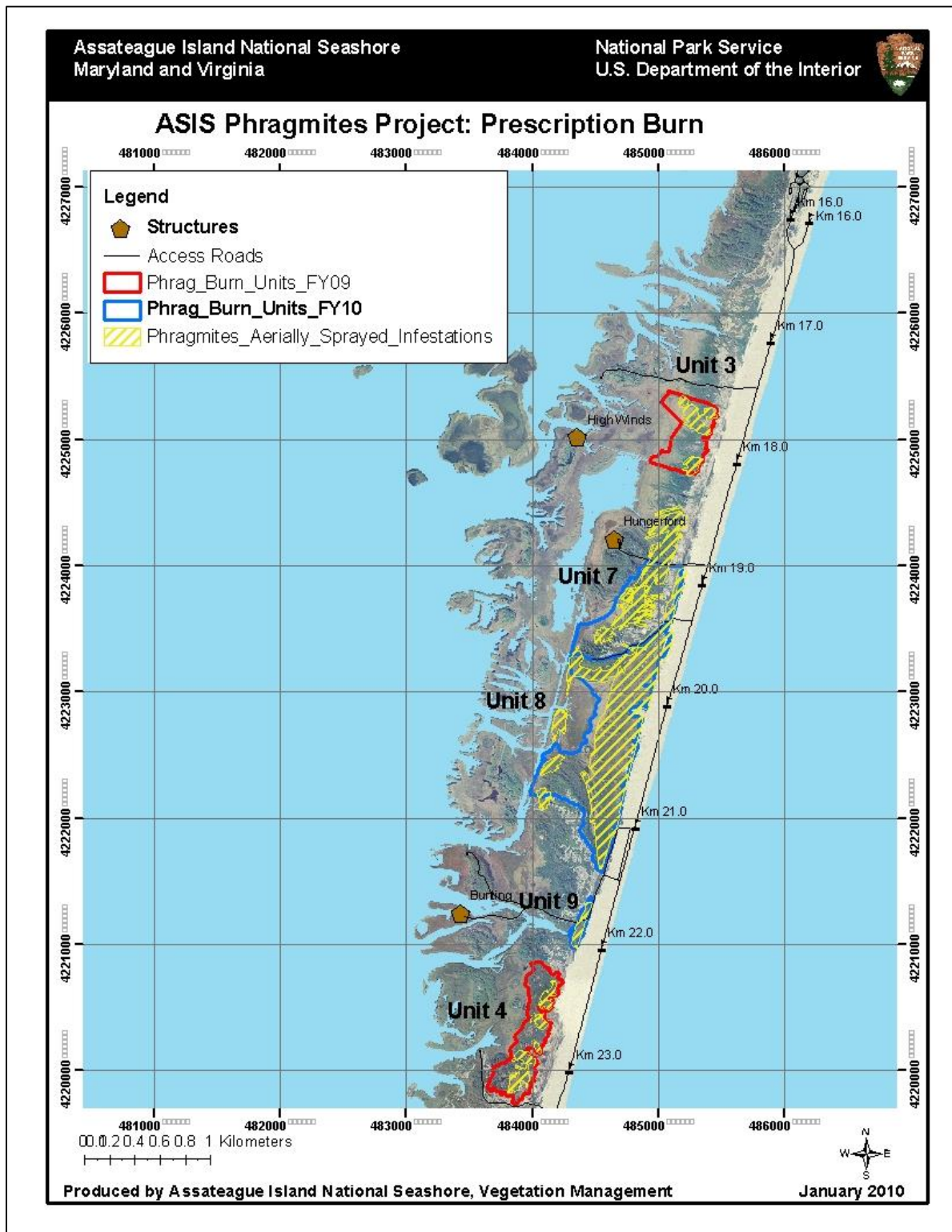


Figure 3: FY 2017 Ground Treatments of *Phragmites australis* at Burn Units 2, 8 and the developed area September 2017

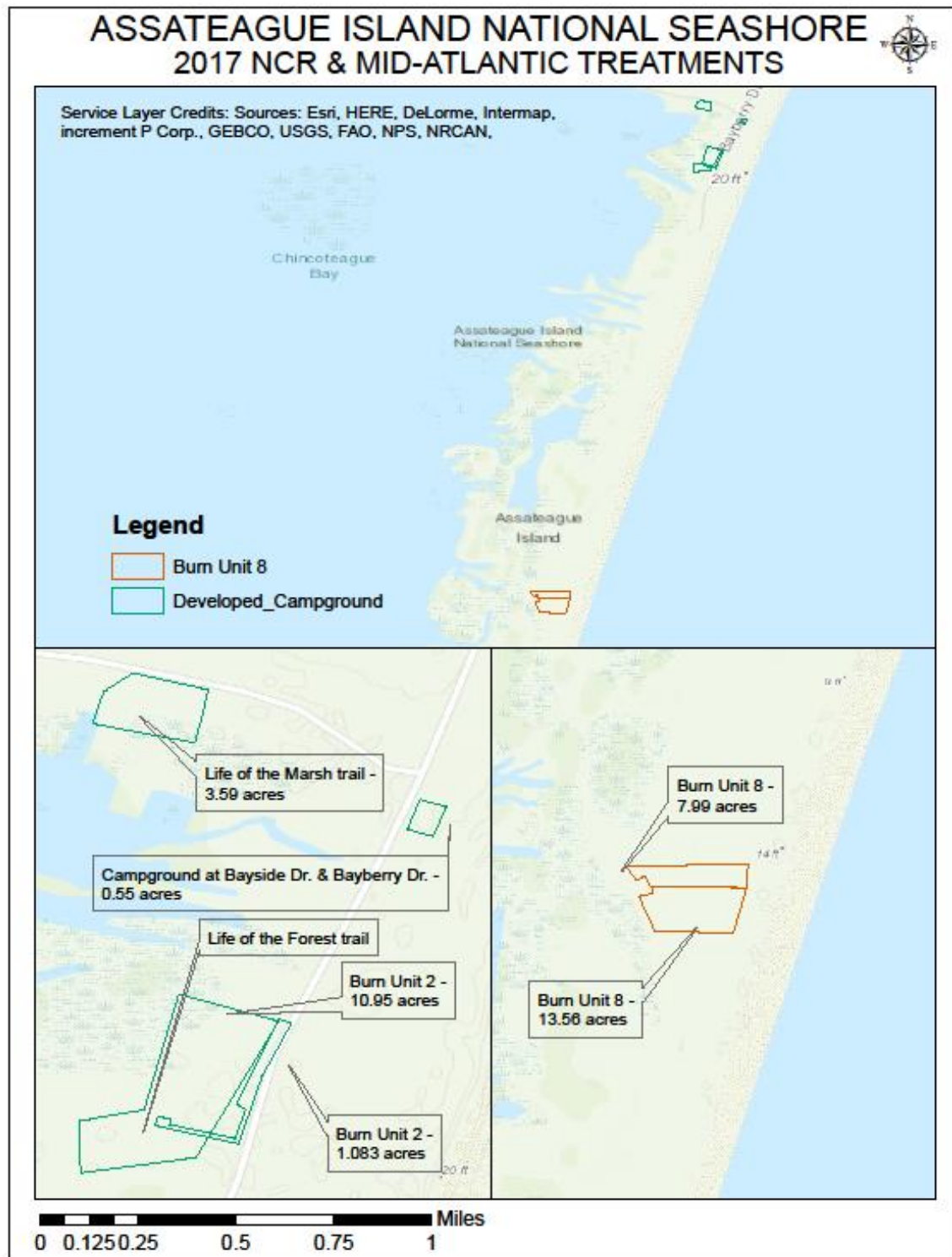


Figure 4: FY 2017 Ground Treatments of *Phragmites australis* at the Life of the Marsh Trail

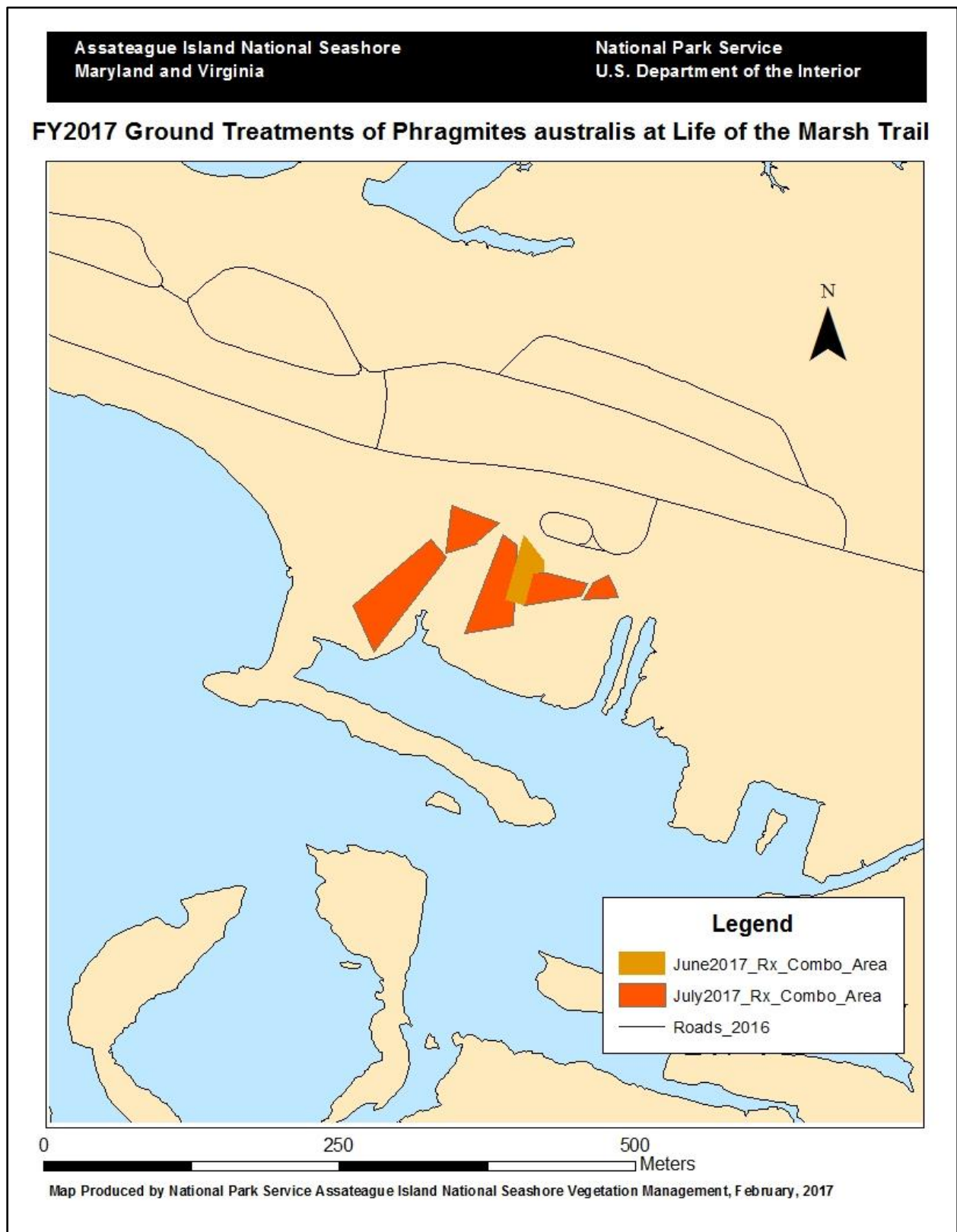


Figure 5: FY 2017 Ground Treatments of *Phragmites australis* at the Life of the Marsh Trail

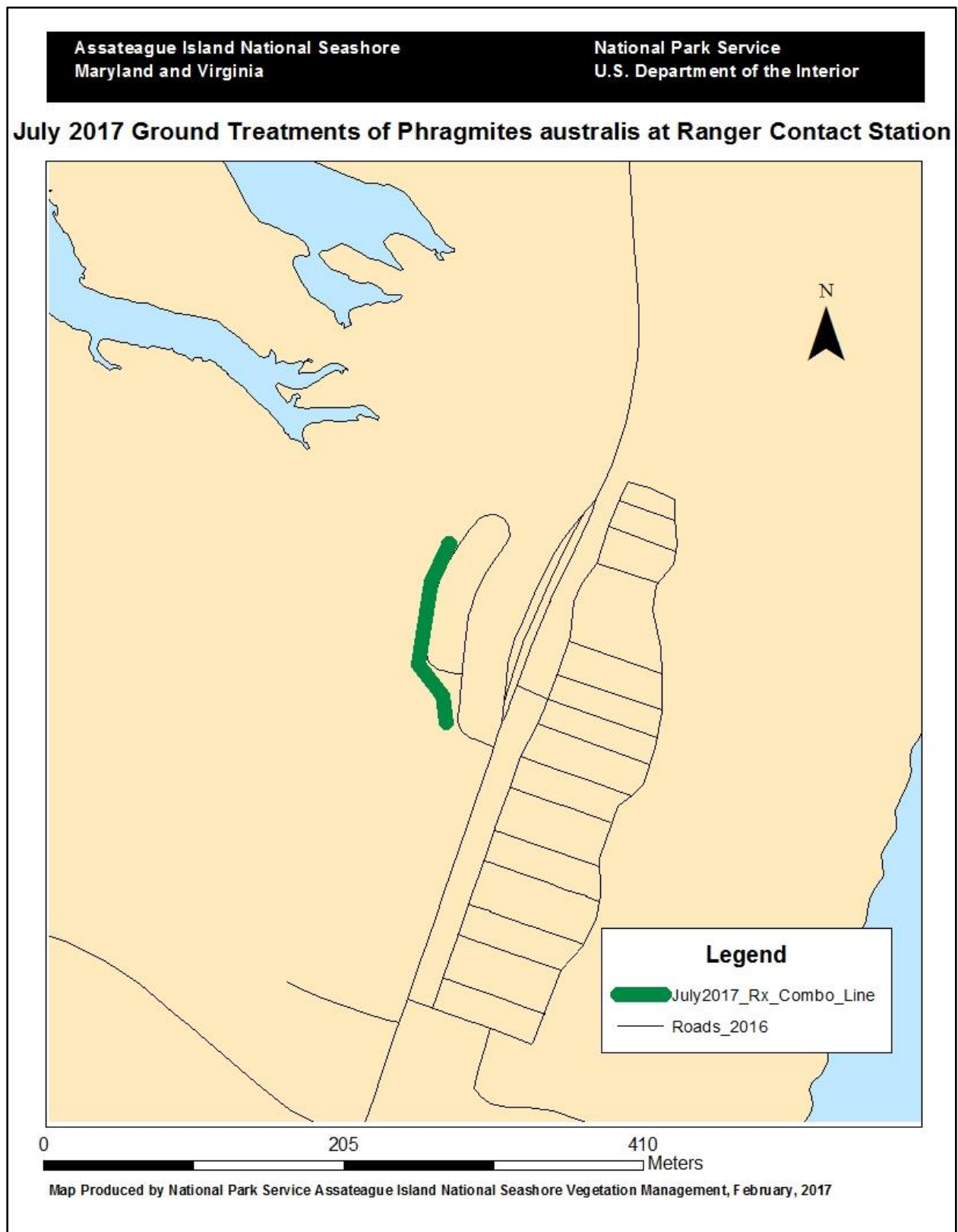


Figure 6: FY 2017 Ground Treatments of *Phragmites australis* at Oceanside Drive

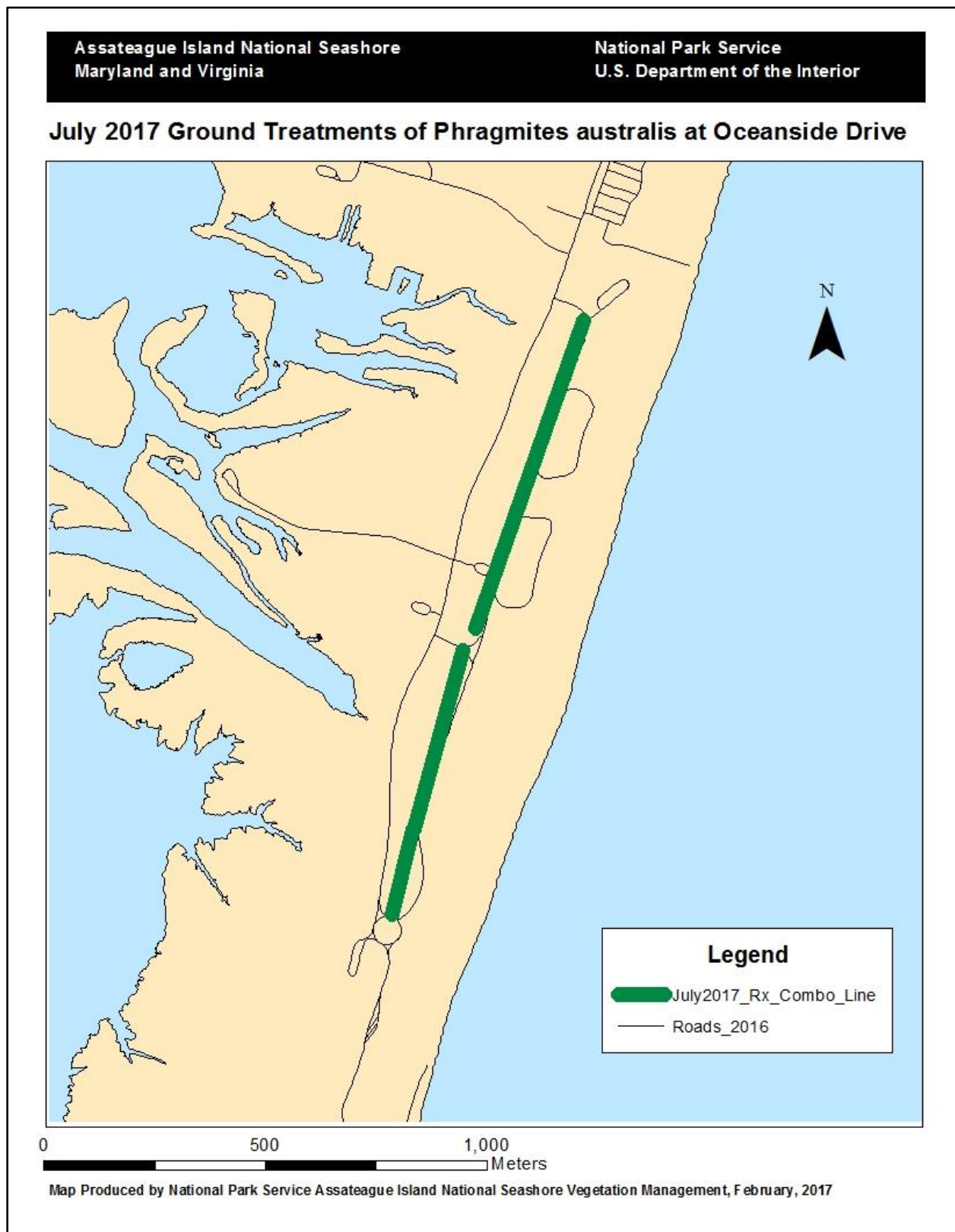


Table 1: FY2017 ASIS Treatment Accomplishments for *P. australis*: (2017 Summer Season)

Site	#Treatments	Days	Acres Treated	Qty. Herbicide Used (L)	Responsible Party	Herbicide Used
Life of the Marsh Trail, Oceanside Drive, Ranger Station	10	7	3.846	5.52	ASIS	Polaris® EPA Reg. Num. (228-534)

Table 2: FY2016 NCR EPMT/ ASIS Treatment Accomplishments (September 2017)

Site	Species	#Treatments	Days	Acres Treated	Qty. Herbicide Used (L)	Responsible Party	Herbicide Used
Developed Area	Phragmites australis	1	1	5.23	6.13	ASIS/NCREPMT	Polaris® EPA Reg. Num. (228-534)
Burn Unit 2	Phragmites australis	1	1	10.95		ASIS/NCREPMT	Polaris® EPA Reg. Num. (228-534)
Burn Unit 8	Phragmites australis	1	1	21.5		ASIS/NCREPMT	Polaris® EPA Reg. Num. (228-534)

Pinus thunbergii:

Pinus thunbergii at Clement's

No treatments were necessary at this location for this species in 2017. Further monitoring of the area is recommended to occur every 3 years to find seedlings that continue to emerge.

Pinus thunbergii at High Winds

Monitoring of this site in June of 2017 indicated that all of the trees that were treated there in 2016 were found to be dead, except for 1 tree, located on the southeastern corner of the house there. This site should be revisited in 2018 to look for additional seedlings and to treat the remaining single, live tree there.

It appears that girdling of the bark of these trees, without the use of herbicide, during the hot summer months can be an effective treatment for this species.

Rosa wichuraiana

On 9/28/16 while spraying other nuisance weeds on the Headquarters property some *R. wichuraina* was encountered and treated.

The total area treated for this species in 2016 was 65.1544 meters squared, or 0.0161 acres.

Table 3: ASIS Alien Plant Management Program Site Coordinates

ID	Site	Northing	Easting	Species	Site Description
1	AIAL_Site_01	4241835	491440.7	Ailanthus altissima	A discreet location the epicenter of which is indicated by the coordinates
2	AIAL_Site_02	4241800	491414.5	Ailanthus altissima	A discreet location the epicenter of which is indicated by the coordinates
3	AIAL_Site_03	4215810	481379.4	Ailanthus altissima	A discreet location the epicenter of which is indicated by the coordinates
4	AIAL_Site_04	4215049	481260.1	Ailanthus altissima	This site is a 100 meter radius surrounding the footprint of the Paradise Hotel site which is situated north of and across the water from the Green Run inholding and just south of the road leading to the Valentine's inholding
5	AIAL_Site_05	4209607	478053.1	Ailanthus altissima	A discreet location the epicenter of which is indicated by the coordinates
6	ALGL_Site_01	4241153	491106	Alnus glutinosa	A discreet location the epicenter of which is indicated by the coordinates
7	ARST_Site_01	4236363	489500	Artemisia stelleriana	This site is a 100 meter radius surrounding the epicenter point near Km 5.75 on the North End of ASIS
8	ARST_Site_02	4226024	485848	Artemisia stelleriana	A discreet location the epicenter of which is indicated by the coordinates
9	CAKO_Site_01	4241654	491796.8	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
10	CAKO_Site_02	4238487	490186.9	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
11	CAKO_Site_03	4237589	489897	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
12	CAKO_Site_04	4237503	489793.6	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
13	CAKO_Site_05	4237425	489824.1	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
14	CAKO_Site_06	4237420	489843.7	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
15	CAKO_Site_07	4237419	489825.8	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates

16	CAKO_Site_08	4237404	489838.6	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
17	CAKO_Site_09	4237402	489824	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
18	CAKO_Site_10	4237394	489843.4	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
19	CAKO_Site_11	4237039	489716.9	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
20	CAKO_Site_12	4236194	489394.7	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
21	CAKO_Site_13	4236173	489412.3	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
22	CAKO_Site_14	4236123	489409.4	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
23	CAKO_Site_15	4225647	485760.2	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
24	CAKO_Site_16	4225037	485594.4	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
25	CAKO_Site_17	4222491	484802.9	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
26	CAKO_Site_18	4222447	484789.4	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
27	CAKO_Site_19	4224430	485407.9	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
28	CAKO_Site_20	4222427	484820.5	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
29	CAKO_Site_21	4216381	482792.6	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
30	CAKO_Site_22	4216370	482801.6	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
31	CAKO_Site_23	4216367	482811.7	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
32	CAKO_Site_24	4216361	482827.9	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
33	CAKO_Site_25	4216356	482852.7	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates

34	CAKO_Site_26	4215252	482321.1	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
35	CAKO_Site_27	4214321	481780.7	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
36	CAKO_Site_28	4210394	479583.6	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
37	CAKO_Site_29	4209968	479281.4	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
38	CAKO_Site_30	4190275	466183.2	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
39	CAKO_Site_31	4190178	466247.7	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
40	CAKO_Site_32	4190025	466371.8	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
41	CAKO_Site_33	4237292	489768.1	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
42	CAKO_Site_34	4237424	489822.9	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
43	CAKO_Site_35	4234703	488914	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
44	CAKO_Site_36	4222525	484789	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
45	CAKO_Site_37	4232004	487963	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
46	CAKO_Site_38	4189535	466500.8	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
47	CAKO_Site_39	4234972	488774	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
48	CAKO_Site_40	4236012	489150	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
49	CAKO_Site_41	4208812	478513	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
50	CAKO_Site_42	4216380	482799.9	Carex kobomugi	A discreet location the epicenter of which is indicated by the coordinates
51	CLTE_Site_01	4229108	485365.6	Clematis terniflora	A discreet location the epicenter of which is indicated by the coordinates

52	ELUM_Site_01	4233449	486272	Elaeagnus umbellata	The combined State and Federal lands surrounding the Headquarters building on the mainland
53	ELUM_Site_02	4229033	485466.3	Elaeagnus umbellata	The entire developed area from the northern park boundary to the OSV entrance
54	ERCU_Site_01	4229434	486764.2	Eragrostis curvula	The entire developed area from the northern park boundary to the OSV entrance
55	HEHE_Site_01	4209043	478638	Hedera helix	A discreet location the epicenter of which is indicated by the coordinates
56	LOJA_Site_01	4215263	481374.7	Lonicera japonica	Is a series of infestations located along the access road to Valentines cabin.
57	LOJA_Site_02	4228590	486484	Lonicera japonica	Originally located within the Bayside Campground peninsula, was expanded during 2007 to include ASIS' entire developed area.
58	LOJA_Site_03	4231224	487325	Lonicera japonica	Located along Bayberry Drive within Assateague State Park.
59	LOJA_Site_04	4232259	487949	Lonicera japonica	Located along the Shell Road and the trail leading to the handicapped accessible duck blind.
60	LOJA_Site_05	4241732	491652	Lonicera japonica	This site is a single infestation discovered near the Ocean City inlet on top of the high dunes there.
61	LOJA_Site_06	4225065	485380	Lonicera japonica	Is located within shrub and forested areas between km 17 and 20.
62	LOJA_Site_07	4233405	486447	Lonicera japonica	Is located on the mainland within the ASIS headquarters area Federal land only.
63	LYSA_Site_01	4227399	486228	Lythrum salicaria	A discreet location the epicenter of which is indicated by the coordinates
64	MISI_Site_01	4241657	491485.7	Miscanthus sinensis	A discreet location the epicenter of which is indicated by the coordinates
65	MISI_Site_02	4240156	490579	Miscanthus sinensis	A discreet location the epicenter of which is indicated by the coordinates
66	MISI_Site_03	4239777	490387	Miscanthus sinensis	A discreet location the epicenter of which is indicated by the coordinates
67	MISI_Site_04	4225014	484363	Miscanthus sinensis	A discreet location the epicenter of which is indicated by the coordinates

68	MISI_Site_05	4240009	490500	Miscanthus sinensis	A discreet location the epicenter of which is indicated by the coordinates
69	MOAL_Site_01	4233425	486455	Morus alba	The combined State and Federal lands surrounding the Headquarters building on the mainland
70	MOAL_Site_02	4227399	486228	Morus alba	A discreet location the epicenter of which is indicated by the coordinates
71	PEAL_Site_01	4233296	486521	Penisetum alopecuroides	A discreet location the epicenter of which is indicated by the coordinates
72	PITH_Site_01	4209046	478675	Pinus thunbergiana	This site is a 100 meter radius surrounding the Clements inholding located in MD near the MD/ VA State Line
73	ROMU_Site_01	4228841	485870	Rosa multiflora	The entire peninsula where the Bayside Campground resides on the island and including the Boneyard maintenance staging area
74	ROMU_Site_02	4233583	486209	Rosa multiflora	Is located on the mainland within the ASIS headquarters area Federal land only.
75	ROMU_Site_03	4209058	478625	Rosa multiflora	A discreet location the epicenter of which is indicated by the coordinates just to the west of the Clements inholding located in MD near the MD/ VA State Line
76	ROWI_Site_01	4233405	486447	Rosa wichuriana	The combined State and Federal lands surrounding the Headquarters building on the mainland

Table 4: ASIS Alien Plant Management Program Treatments Information for FY2016

Rx Code	Location	Species	Applicator	Start Time	End Time	Rx Method	Retreatment	Comments
RX081717_2	North end at the inlet	Ailanthus altissima	JC, MS	8:00	14:00	Foliar Spray	No	
RX051617_2	Boneyard	Artemisia vulgaris	JC			Foliar Spray	No	
RX101416_1	South HQ Border	Artemisia vulgaris	JC	11:00	11:30	Foliar Spray	Yes	
RX102016_2	Developed Area	Artemisia vulgaris	JC	8:00	14:00	Foliar Spray	Yes	
RX072417_3	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Atremisia vulgaris	JC, MS, RC			Foliar Spray	No	
RX081417_1	North End	Carex kobomugi	JC, MS	9:00		Foliar Spray	No	
RX081417_10	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_11	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_12	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_13	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_14	North End	Carex kobomugi	JC, MS			Foliar Spray	No	

RX081417_15	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_16	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_17	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_18	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_19	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_2	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_20	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_3	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_4	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_5	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_6	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_7	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_8	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081417_9	North End	Carex kobomugi	JC, MS		14:00	Foliar Spray	No	
RX081517_1	North End	Carex kobomugi	JC, MS	10:00		Foliar Spray	No	
RX081517_2	North End	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081517_3	North End	Carex kobomugi	JC, MS			Foliar Spray	No	

RX081517_4	North End	Carex kobomugi	JC, MS		12:00	Foliar Spray	No	
RX081617_1	OSV Zone	Carex kobomugi	JC, MS	8:00		Foliar Spray	No	
RX081617_10	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_11	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_12	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_13	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_14	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_15	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_16	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_17	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_2	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_3	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_4	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_5	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_6	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_7	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	
RX081617_8	OSV Zone	Carex kobomugi	JC, MS			Foliar Spray	No	

RX081617_9	OSV Zone	Carex kobomugi	JC, MS		14:30	Foliar Spray	No	
RX081717_1	State Park	Carex kobomugi	JC, MS	8:00	9:30	Foliar Spray	No	
RX051617_4	Boneyard	Cirsium arvense	JC			Foliar Spray	No	
RX060217_4	MD Housing Veg Buffer	Cirsium arvense	JC		12:00	Foliar Spray	Yes	Housing entrance intersection
RX072417_2	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Cirsium arvense	JC, MS, RC			Foliar Spray	No	
RX101816_2	Sinepuxent Vegetation Buffer	Cirsium arvense	JBC	10:00	11:00	Foliar Spray	Yes	
RX101816_3	Maryland Housing	Cirsium arvense	JBC	11:00	11:30	Foliar Spray	No	
RX101816_4	Field by MD Housing Veg Buffer	Cirsium arvense	JBC	11:30	12:00	Foliar Spray	No	
RX051617_5	Boneyard	Eleaegnus umbellata	JC			Foliar Spray	No	
RX071717_1	Crab Deck, VA CNWR	Elusine indica	JC, MS, RN	9:17	10:13	Foliar Spray	Yes	
RX071817_1	MD HQ	Elusine indica	JC, MS, MB	7:30	9:00	Foliar Spray	Yes	
RX071817_2	MD HQ	Elusine indica	JC, MS, MB	9:00	13:45	Foliar Spray	Yes	Crack weeds and borders sprayed
RX071917_1	MD VC	Elusine indica	JC, MS, EB	7:30	12:00	Foliar Spray	Yes	

RX102416_2	MD Housing Road	Elusine indica	JBC	13:00	14:00	Foliar Spray	Yes	
RX102516_1	MD Visitor Center beds, nearby Bike path	Elusine indica	JBC	8:00	11:00	Foliar Spray	Yes	weeds in beds and wiregrass along bike path
RX102016_3	Developed Area	Eragrostis curvula	JBC	8:00	14:00	Foliar Spray	Yes	
RX103116_2	Developed Area	Eragrostis curvula	JBC	10:15	12:00	Foliar Spray	yes	roadsides
RX060917_2	Group Camp Parking lot northwest	Lezpedeza cuneata	JC	9:30	11:00	Foliar Spray	No	
RX072417_6	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Lezpedeza cuneata	JC, MS, RC		14:30	Foliar Spray	No	
RX101716_2	Sinepuxent Vegetation Buffer	Lezpedeza cuneata	JBC	12:00	14:00	Foliar Spray	Yes	only west half of buffer
RX102016_1	Developed Area	Lezpedeza cuneata	JBC	8:00	14:00	Foliar Spray	Yes	
RX051017_1	Developed Area Boundary North and west side of road heading south stopped at the sign pullout	Lonicera japonica	JC	8:00	11:30	Foliar Spray	Yes	
RX051217_1	Developed Area (south of the Entrance Sign on the	Lonicera japonica	JC	8:00	8:45	Foliar Spray	Yes	

	west side of Bayberry Drive							
RX051617_1	Developed Area starting at the contact station and heading South on Bayberry drive on the west side of the road	Lonicera japonica	JC	8:00		Foliar Spray	No	
RX051917_1	Bayside Drive East, south side	Lonicera japonica	JC	8:00		Foliar Spray	No	
RX052417_2	Bayberry Drive	Lonicera japonica	JC	12:30	14:00	Foliar Spray	No	
RX052617_1	Developed Area (Boneyard, Oceanside Drive, Bayberry Drive)	Lonicera japonica	JC	11:00	14:30	Foliar Spray	No	
RX060217_1	MD Housing Veg Buffer	Lonicera japonica	JC	9:00	9:30	Foliar Spray	Yes	
RX060217_2	Oceanside Drive	Lonicera japonica	JC	10:00		Foliar Spray	Yes	
RX060817_1	Oceanside Drive South of sites 51-65	Lonicera japonica	JC	8:30	12:00	Foliar Spray		
RX060917_1	Oceanside Drive south of the Boathouse	Lonicera japonica	JC	8:30	9:30	Foliar Spray		
RX101816_1	Sinepuxent Vegetation Buffer	Lonicera japonica	JBC	10:00	11:00	Foliar Spray	Yes	remaining east half of buffer
RX103116_1	Sinepuxent Vegetation Buffer	Lonicera japonica	JBC	8:30	10:00	Foliar Spray	yes	
RX102416_1	MD Housing Veg Buffer	Lonicera japonica, Hedera helix	JBC	11:00	13:00	Foliar Spray	Yes	CHECK ON THIS HEDERA HELIX AGAIN!!!

RX072417_4	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Microstegium viminium	JC, MS, RC			Foliar Spray	No	
RX100716_1	Sinepuxent Vegetation Buffer	Microstegium viminium	JBC	13:00	14:00	Foliar Spray	No	
RX091517_1	Ferry Landing Road South of the Wells across the street from the wells.	Microstegium viminium	MS	8:00	9:05	Foliar Spray	No	
RX091517_2	Ferry Landing Road North side where the Wells are.	Microstegium viminium	MS	9:20	9:40	Foliar Spray	No	
RX091517_3	Sinepuxent Veg Buffer behind MD Visitor Center	Microstegium viminium	MS	10:00	11:20	Foliar Spray	No	
RX072417_1	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Pennisetum alopecuroides	JC, MS, RC	7:30		Foliar Spray	No	

RX101416_2	South HQ Border	Pennisetum alopecuroides	JBC	11:30	12:00	Foliar Spray	Yes	
RX101416_3	Sinepuxent Vegetation Buffer	Pennisetum alopecuroides	JBC	12:00	13:00	Foliar Spray	Yes	follow up treatment after imazapyr seemed ineffective
RX101716_1	Sinepuxent Vegetation Buffer	Pennisetum alopecuroides	JBC	10:00	12:00	Foliar Spray	Yes	follow up treatment after, as imazapyr seemed ineffective
RX063017_1	Life of the Marsh Trail	Phragmites australis	RC, MS	7:45	11:30	Foliar Spray	Yes	Most Phragmites was short except for dense areas which had tall phragmites present, tall phragmites near roadway is not reachable without cutting trails but the backside was reached from marsh, GPS had no power - needs to be done Monday 7/3, Orange tape was used to mark the polygon
RX070317_1	Oceanside Dr	Phragmites australis	RC, MS	8:35	1:15	Foliar Spray	Yes	Phrag was mostly tall the further from road side, there was 4 large clusters of phrag. Some areas were not reachable do to thick brush.
RX070517_1	Oceanside Dr	Phragmites australis	RC, MS	7:40	11:40	Foliar Spray	Yes	Phrag was mostly tall within the shrubs/forest, shorter along the roadway. There was some herbivory along roadway.

RX070717_1	Oceanside Dr	Phragmites australis	RC, MS	7:30	8:30	Foliar Spray	Yes	Most Phrag was tall inside the brush/forest areas. There were a few dense spots in the center of the spray area, some spots were not reachable do to thick brush.
RX071117_1	Life of the Marsh Trail	Phragmites australis	RC, MS	8:00	11:45	Foliar Spray	Yes	Phrag inside the area was tall and tasseling, short herbivory phrag along the outside of the area. Dense, tall areas of phrag was inside the area, we sprayed what we could reach about 5 meters from the edge of the gps polygon.
RX072617_1	Life of the Marsh Trail	Phragmites australis	JC, RC, MS, EB	8:03	10:00	Foliar Spray	Yes	Most phrag was short, some tall phrag in the shrub areas toward the walkway
RX072617_2	Life of the Marsh Trail	Phragmites australis	JC, RC, MS, EB	10:00	11:48	Foliar Spray	Yes	Short phrag in the marsh with herbivory
RX072617_3	Life of the Marsh Trail	Phragmites australis	JC, RC, MS, EB	12:47	2:00	Foliar Spray	Yes	Short phrag in the marsh with herbivory. There's taller phrag in the shrub/forest area.
RX072717_1	Life of the Marsh Trail	Phragmites australis	RC, KB	7:30	11:35	Foliar Spray	Yes	Mostly small Phragmites in the marsh where herbivory had occurred, taller phrag in the forest areas.
RX072717_2	Ranger Station	Phragmites australis	RC,KB	12:38	1:45	Foliar Spray	Yes	Most Phragmites was tall and deep into the area. Only about 5 meters could be reached from edge. There is a few spots that that were not reachable

RX091817	Burn Unit 2	Phragmites australis	ASIS/ EPMT	12:00	14:30	Foliar Spray	Yes	With NCR and Mid Atlantic EPMT's
RX071917_2	Burn Unit 8	Phragmites australis	ASIS/ EPMT	8:00	16:30	Foliar Spray	Yes	With NCR and Mid Atlantic EPMT's
RX091817_1	Life of the Forest Trail, Life of the Marsh Trail, intersection of Bayberry Drive and Oceanside Drive	Phragmites australis	ASIS/ EPMT	14:30	16:30	Foliar Spray	Yes	With NCR and Mid Atlantic EPMT's
RX071917_2	N Beach Hydrant, OSV entrance	Poison Ivy	JC, EB	13:00	14:00	Foliar Spray	No	
RX051617_3	Boneyard	Rosa multiflora	JC			Foliar Spray	No	
RX051617_6	Sinepuxent Veg Buffer	Rosa multiflora	JC		14:00	Foliar Spray	No	1 shrub by pond by the bike trail
RX051817	Bayside Drive East of Loop B	Rosa multiflora	JC	7:00	9:00	Foliar Spray	No	
RX051917_2	Bayside Drive East, south side	Rosa multiflora	JC		12:00	Foliar Spray	No	
RX052417_1	Oceanside Drive	Rosa multiflora	JC	10:30	12:30	Foliar Spray	No	
RX060217_3	MD Housing Veg Buffer	Rosa multiflora	JC			Foliar Spray	Yes	
RX072417_5	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Rosa wichuraina	JC, MS, RC			Foliar Spray	No	

RX071717_1	VA Maintenance Compound	Weeds	JC, MS, RN	11:00	13:19	Foliar Spray	Yes	
RX101816_5	MD HQ South field vehicle boneyard	Weeds	JBC	13:00	14:30	Foliar Spray	Yes	

Table 5: ASIS Alien Plant Management Program and Phragmites Control Project Herbicide Use Information for FY2016

Rx Code	Location	Species	Rx Method	Product	EPA Reg Number	Active Ingredient	Amt Product (mL)	% Conc	Area Treated (m sq)	Total Amt Spray (L)	Equipment Used*
RX081717_2	North end at the inlet	Ailanthus altissima	Foliar Spray	Polaris	288-534	Imazapyr	250	25%	405	1	1
RX051617_2	Boneyard	Artemisia vulgaris	Foliar Spray	Rodeo	62719-324	Glyphosate	20	2%	20	1	1
RX101416_1	South HQ Border	Artemisia vulgaris	Foliar Spray	Rodeo	62719-324	Glyphosate	40	2%	20	2	1
RX102016_2	Developed Area	Artemisia vulgaris	Foliar Spray	Rodeo	62719-324	Glyphosate	40	2%	20	2	1
RX072417_3	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Artemisia vulgaris	Foliar Spray	Rodeo	62719-324	Glyphosate	173.6	2%	86.8	8.68	1

RX081417_1	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_10	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_11	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_12	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_13	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_14	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_15	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_16	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_17	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_18	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_19	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_2	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_20	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	250	2%	274	12.5	1
RX081417_3	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_4	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_5	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1

RX081417_6	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_7	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_8	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081417_9	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr		2%	1		1
RX081517_1	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	4	2%	2	0.2	1
RX081517_2	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	12	2%	6	0.6	1
RX081517_3	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	30	2%	48	1.5	1
RX081517_4	North End	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_1	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_10	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_11	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_12	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_13	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_14	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	2	0.1	1
RX081617_15	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_16	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1

RX081617_17	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_2	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_3	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_4	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_5	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_6	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_7	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_8	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081617_9	OSV Zone	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX081717_1	State Park	Carex kobomugi	Foliar Spray	Polaris	288-534	Imazapyr	2	2%	1	0.1	1
RX051617_4	Boneyard	Cirsium arvense	Foliar Spray	Rodeo	62719-324	Glyphosate	50	2%	100	2.5	1
RX060217_4	MD Housing Veg Buffer	Cirsium arvense	Foliar Spray	Rodeo	62719-324	Glyphosate	20	2%	25	1	1

RX072417_2	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Cirsium arvense	Foliar Spray	Rodeo	62719-324	Glyphosate	541.6	2%	270.8	27.08	1
RX101816_2	Sinepuxent Vegetation Buffer	Cirsium arvense	Foliar Spray	Rodeo	62719-324	Glyphosate	80	2%	40	4	1
RX101816_3	Maryland Housing	Cirsium arvense	Foliar Spray	Rodeo	62719-324	Glyphosate	100	2%	50	5	1
RX101816_4	Field by MD Housing Veg Buffer	Cirsium arvense	Foliar Spray	Rodeo	62719-324	Glyphosate	400	2%	200	20	1
RX051617_5	Boneyard	Eleaegnus umbellata	Foliar Spray	Rodeo	62719-324	Glyphosate	10	2%	4	0.5	1
RX071717_1	Crab Deck, VA CNWR	Elusine indica	Foliar Spray	Polaris	288-534	Imazapyr	300	2%	150	15	1
RX071817_1	MD HQ	Elusine indica	Foliar Spray	Polaris	288-534	Imazapyr	200	2%	100	10	1
RX071817_2	MD HQ	Elusine indica	Foliar Spray	Rodeo	62719-324	Glyphosate	1000	2%	500	50	1
RX071917_1	MD VC	Elusine indica	Foliar Spray	Rodeo	62719-324	Glyphosate	930	2%	465	46.5	1
RX102416_2	MD Housing Road	Elusine indica	Foliar Spray	Rodeo	62719-324	Glyphosate	120	2%	60	6	1
RX102516_1	MD Visitor Center beds, nearby Bike path	Elusine indica	Foliar Spray	Rodeo	62719-324	Glyphosate	600	2%	300	30	1
RX102016_3	Developed Area	Eragrostis curvula	Foliar Spray	Rodeo	62719-324	Glyphosate	200	2%	100	10	1

RX103116_2	Developed Area	Eragrostis curvula	Foliar Spray	Rodeo	62719-324	Glyphosate	100	2%	50	5	1
RX060917_2	Group Camp Parking lot northwest	Lezpedeza cuneata	Foliar Spray	Rodeo	62719-324	Glyphosate	160	2%	70	8	1
RX072417_6	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Lezpedeza cuneata	Foliar Spray	Rodeo	62719-324	Glyphosate	10	2%	5	0.5	1
RX101716_2	Sinepuxent Vegetation Buffer	Lezpedeza cuneata	Foliar Spray	Rodeo	62719-324	Glyphosate	100	2%	50	5	1
RX102016_1	Developed Area	Lezpedeza cuneata	Foliar Spray	Rodeo	62719-324	Glyphosate	160	2%	80	8	1
RX051017_1	Developed Area Boundary North and west side of road heading south stopped at the sign pullout	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	320	2%	160	16	1
RX051217_1	Developed Area (south of the Entrance Sign on the west side of Bayberry Drive	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	120	2%	60	6	1

RX051617_1	Developed Area starting at the contact station and heading South on Bayberry drive on the west side of the road	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	40	2%	200	2	1
RX051917_1	Bayside Drive East, south side	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	80	2%	40	4	1
RX052417_2	Bayberry Drive	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	120	2%	60	6	1
RX052617_1	Developed Area (Boneyard, Oceanside Drive, Bayberry Drive)	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	180	2%	90	9	1
RX060217_1	MD Housing Veg Buffer	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	20	2%	10	1	1
RX060217_2	Oceanside Drive	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	102.5	2%	57.5	5	1
RX060817_1	Oceanside Drive South of sites 51-65	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	135	2%	184	9	1
RX060917_1	Oceanside Drive south of the Boathouse	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	102	2%	60	5.1	1
RX101816_1	Sinepuxent Vegetation Buffer	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	120	2%	60	6	1
RX103116_1	Sinepuxent Vegetation Buffer	Lonicera japonica	Foliar Spray	Rodeo	62719-324	Glyphosate	200	2%	100	10	1
RX102416_1	MD Housing Veg Buffer	Lonicera japonica, Hedera helix	Foliar Spray	Rodeo	62719-324	Glyphosate	80	2%	40	4	1

RX072417_4	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Microstegium viminium	Foliar Spray	Rodeo	62719-324	Glyphosate	30	2%	15	1.5	1
RX100716_1	Sinepuxent Vegetation Buffer	Microstegium viminium	Foliar Spray	Rodeo	62719-324	Glyphosate	200	2%	150	10	1
RX091517_1	Ferry Landing Road South of the Wells across the street from the wells.	Microstegium viminium	Foliar Spray	Rodeo	62719-324	Glyphosate	100	2%	46	5	1
RX091517_2	Ferry Landing Road North side where the Wells are.	Microstegium viminium	Foliar Spray	Rodeo	62719-325	Glyphosate	13	2%	3	0.7	1
RX091517_3	Sinepuxent Veg Buffer behind MD Visitor Center	Microstegium viminium	Foliar Spray	Rodeo	62719-326	Glyphosate	87	2%	78	4.3	1

RX072417_1	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Pennisetum alopecuroides	Foliar Spray	Rodeo	62719- 324	Glyphosate	43	2%	21.45	2.15	1
RX101416_2	South HQ Border	Pennisetum alopecuroides	Foliar Spray	Rodeo	62719- 324	Glyphosate	60	2%	30	3	1
RX101416_3	Sinepuxent Vegetation Buffer	Pennisetum alopecuroides	Foliar Spray	Rodeo	62719- 324	Glyphosate	100	2%	50	5	1
RX101716_1	Sinepuxent Vegetation Buffer	Pennisetum alopecuroides	Foliar Spray	Rodeo	62719- 324	Glyphosate	100	2%	50	5	1
RX063017_1	Life of the Marsh Trail	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	720	2%	971.25	36	1
RX070317_1	Oceanside Dr	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	820	2%	3690	41	1
RX070517_1	Oceanside Dr	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	860	2%	2090	43	1
RX070717_1	Oceanside Dr	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	320	2%	990	16	1
RX071117_1	Life of the Marsh Trail	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	840	2%	1011.71	42	1
RX072617_1	Life of the Marsh Trail	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	200	2%	364.22	10	1

RX072617_2	Life of the Marsh Trail	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	760	2%	2063.9	38	1
RX072617_3	Life of the Marsh Trail	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	280	2%	971.25	14	1
RX072717_1	Life of the Marsh Trail	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	580	2%	2751.86	29	1
RX072717_2	Ranger Station	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	140	2%	660	7	1
RX091817	Burn Unit 2	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr	6132.4	2%	44313.1		1
RX091817	Burn Unit 8	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr		2%	87007.4		1
RX091817	Life of the Forest Trail, Life of the Marsh Trail, intersection of Bayberry Drive and Oceanside Drive	Phragmites australis	Foliar Spray	Polaris	288-534	Imazapyr		2%	21136.7		1
RX071917_2	N Beach Hydrant, OSV entrance	Poison Ivy	Foliar Spray	Rodeo	62719-324	Glyphosate	2	2%	2	0.1	1
RX051617_3	Boneyard	Rosa multiflora	Foliar Spray	Rodeo	62719-324	Glyphosate	60	2%	30	3	1
RX051617_6	Sinepuxent Veg Buffer	Rosa multiflora	Foliar Spray	Rodeo	62719-324	Glyphosate	20	2%	100	1	1
RX051817	Bayside Drive East of Loop B	Rosa multiflora	Foliar Spray	Rodeo	62719-324	Glyphosate	140	2%	225	7	1
RX051917_2	Bayside Drive East, south side	Rosa multiflora	Foliar Spray	Rodeo	62719-324	Glyphosate	40	2%	6	2	1
RX052417_1	Oceanside Drive	Rosa multiflora	Foliar Spray	Rodeo	62719-324	Glyphosate	20	2%	100	1	1
RX060217_3	MD Housing Veg Buffer	Rosa multiflora	Foliar Spray	Rodeo	62719-324	Glyphosate	5	2%	1	0.25	1

RX072417_5	Headquarters Vegetated buffers on south side of property from the southwest corner all the way around to the northeast corner of the MD visitor center (this includes the UMES buffer and the Sinepuxent veg buffer)	Rosa wichuraina	Foliar Spray	Rodeo	62719-324	Glyphosate	20	2%	10	1	1
RX071717_1	VA Maintenance Compound	Weeds	Foliar Spray	Polaris	288-534	Imazapyr	1160	2%	580	58	1
RX101816_5	MD HQ South field vehicle boneyard	Weeds	Foliar Spray	Rodeo	62719-324	Glyphosate	800	2%	400	40	1