



Invasive Plant Management at Assateague Island National Seashore - 2023 Summary Report

Natural Resource Report NPS/ASIS/2023



ON THE COVER

Seasonal Biological Science Technicians Harrison Greer (Left) and Gabby Morris (Right) record a patch of *Carex kobomugi* (Japanese sedge) in the OSV. Photo by NPS/ J.Chase

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Abstract

This report is an overview of Assateague Island National Seashore's (ASIS) Vegetation Management (VEG MGMT) 2023 season. To better control the invasive plant infestations at ASIS we prioritized 27 species for treatment and an additional 8 species, treated previously but not this season were either monitored or eradicated and included in the report for continuity. We surveyed the entire length of the Maryland (MD) portion of the seashore's beaches and worked at hundreds of interior island locations. The chemical treatments from ASIS personnel resulted in 8.1 acres and 15 acres by the Mid Atlantic Invasive Plant Management Team members'. The ASIS team manually treated 18 *Salsola kali* plants and mechanically cut trails to access a 5 acre management area at the Bayside peninsula terminus and 10 transects were cut/ installed in Burn Unit 10 at Kilometer 24 in the shrub zone while the previously-cut trail system in the forest at the terminus of the northern portion of the island near the inlet of Ocean City, were reflagged for continued access to the expanding *Miscanthus sinensis* infestation there that covers 7 acres. This season, we used 21 gallons of Aquaneat herbicide solution, 156 gallons Rodeo herbicide solution, 214 gallons of Polaris herbicide solution (MAIPMT 320 gallons Polaris herbicide solution) in these treatments. We maintained the mitigation plantings at the Maryland Visitor center that were planted in the Fall of 2022 by reducing grass cover with herbicides, watering the plants in times of drought and keeping cages around the larger shrubs free of twining vines. The ASIS VEG MGMT database was updated to include 2023 treatment activities. During 2023, the program continued to expand its management of invasive plant species including *Phragmites australis* where large scale ground treatments continued to retreat some previously mapped/ treated infestations in select areas of ASIS's burn units 7, 8 and 10, as well as Km 23.4 dune crossing and behind the Sinepuxent District Visitor Center. Several large survey areas were investigated and subsequently treated across the island during the season and are listed here:

- Survey of MD portion of the island for *Carex kobomugi*- North end (638 acres), developed area (40 acres) and (593 acres) in the OSV
- Survey of the 2 km at north end (54 acres) for *Miscanthus sinensis*
- Survey of Headquarters property (19.1 acres) for multiple species (See Table 4)
- Survey of Burn Unit 7 for *Phragmites australis* (7.4 acres)
- Survey of Burn Unit 8 *Phragmites australis* (5 acres)
- Survey of Burn Unit 10 *Phragmites australis* (11.5 acres)
- Survey of Burn Unit 12 *Phragmites australis* (40 acres)

Introduction

Assateague Island is the largest natural barrier island ecosystem in the mid-Atlantic region that remains predominantly unaffected by human development. It is a 37-mile-long barrier island, with adjacent marsh islands and waters in Maryland and Virginia, and the Visitor Center on the Maryland mainland. Approximately 50,000 acres of land and water are within the seashore's boundaries. The island consists of three public areas: Assateague Island National Seashore, Assateague State Park and Chincoteague National Wildlife Refuge. The stated mission of the park is to preserve and protect "*unique coastal resources and the natural ecosystem conditions and processes upon which they depend, provide high quality resource-based recreational opportunities compatible with resource protection, and educate the public as to the values and significance of the area.*" (Draft General Management Plan / Environmental Impact Statement (Draft GMP/EIS) for Assateague Island National Seashore 2016)

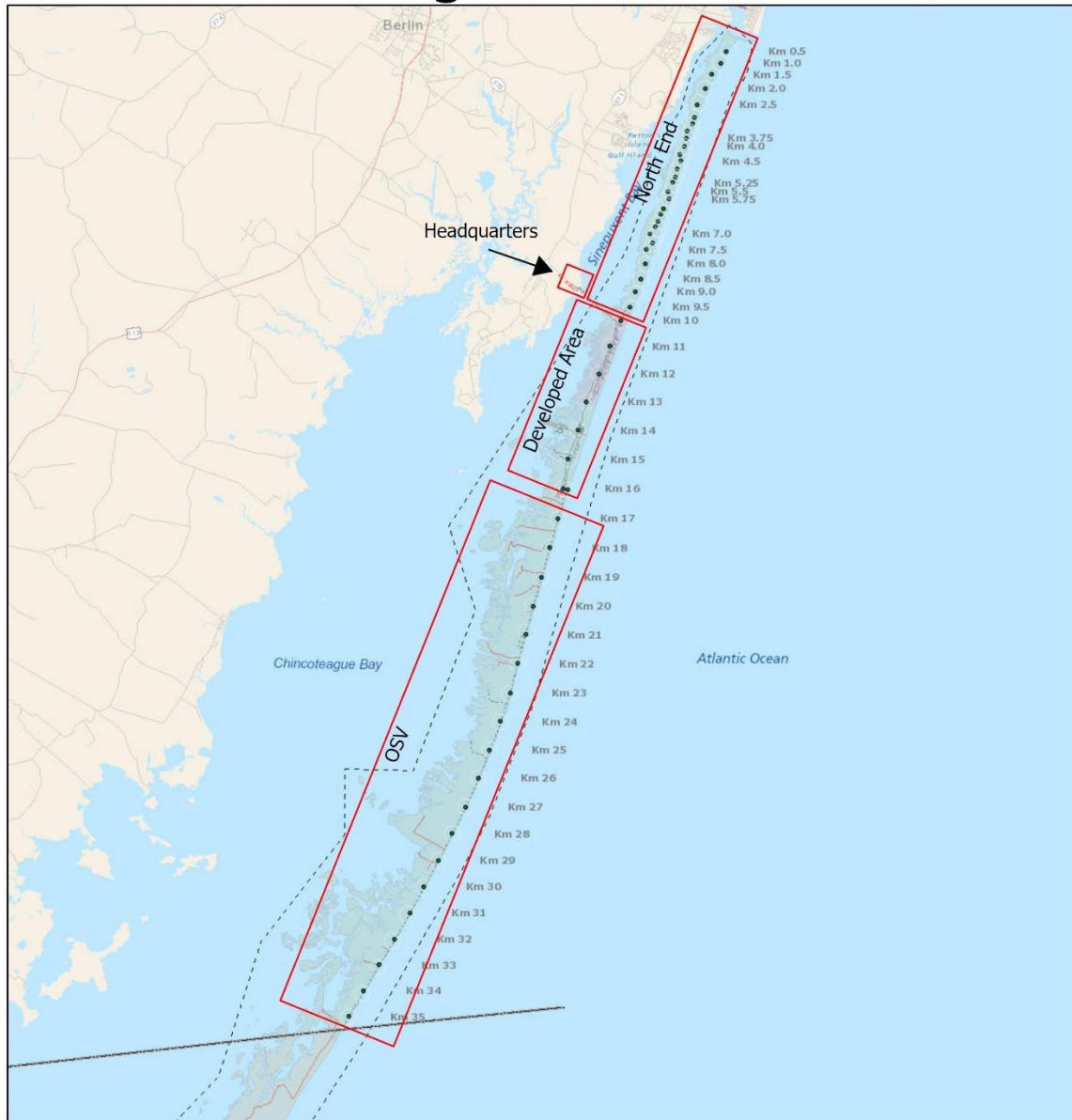
Assateague Island has been identified as one of the 25 national parks most at risk from the effects of global climate change. Accelerated sea level rise, more frequent and intense storms, rising temperatures, and changes in patterns of precipitation are all expected to drive significant ecological change. Climate change adaptation is expected to play an increasingly important role in the future management of the seashore. Manipulations of the natural environment will be minimized to allow the island to continue to be shaped predominantly by natural coastal processes.

Treatments of invasive plant species began at ASIS in 1998 with *Carex kobomugi* (Japanese Sedge). Other species like *Clematis terniflora* (Virgin's Bower) were recorded, but not treated during botanical surveys. However, since 2004 invasive plant surveys and treatments have been conducted seasonally (in spring, summer and fall). This coincided with the hiring of a permanent Biological Science Technician (Plants), and invasive plant treatment became a higher priority for the ASIS Resource Management division. Each year this work is accomplished with seasonal Biological Science Technicians, Student Conservation Association (SCA) interns (individuals or part of the Native Plant Corps) and/or with the assistance of the NPS Invasive Plant Management Team (IMPTs).

The primary focus of 2023 was to revisit and treat previously known infestations of invasive plants on the island while looking for new, or previously unrecognized infestations of invasive, non-native plants that we might treat as a rapid response to their early detection.



ASIS Management Areas (MD)



0 2 4 Kilometers
0 2 4 Miles

Produced by Assateague Island National Seashore, Resource Management, GIS

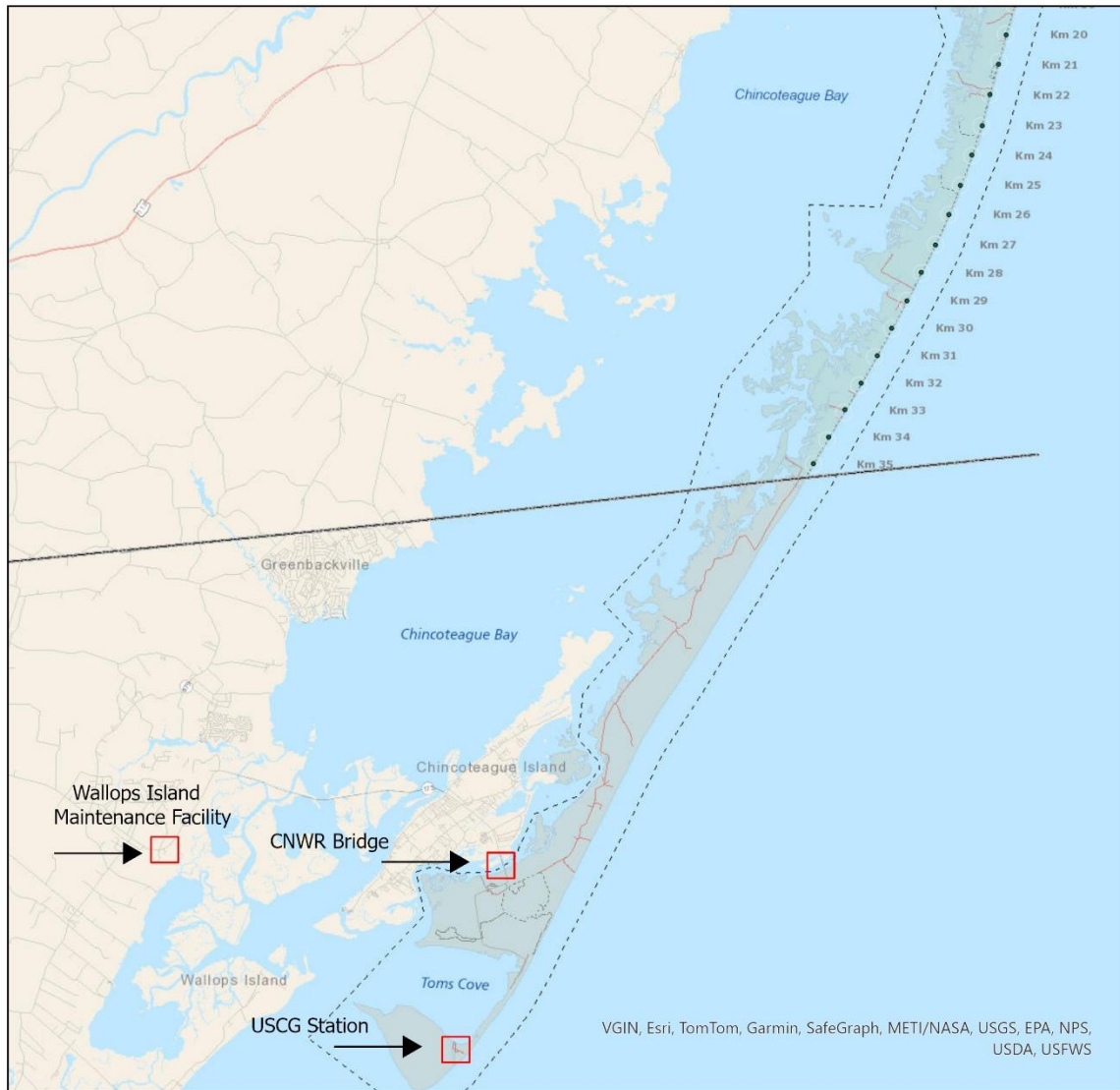


February 2024

Figure 1. Overview of Assateague Island National Seashore Management Areas in Maryland



ASIS Management Areas (VA)



0 2 4 Kilometers
0 2 4 Miles

Produced by Assateague Island National Seashore, Resource Management, GIS



February 2024

Figure 2. Overview of Assateague Island National Seashore Management Areas in Virginia

Synopsis of Table 1

The project areas where management of invasive species is conducted at ASIS are listed in Table 1: ASIS 2023 Project Areas. And because our unit is divided into 2 districts, Maryland and Virginia respectively, the table is further divided for clarity and to more easily present them visually in the report maps. These locations are indicated on Figure 1: Overview of Assateague Island National Seashore Management Areas in Maryland and Figure 2: Overview of Assateague Island National Seashore Management Areas in Virginia for the states they occur in. Further descriptions of the management areas follow below:

Maryland District: (Figure 1: ASIS Management Areas (MD))

North end- This portion of the island includes the land which lies between the Verrazano bridge at the south end and the Ocean City inlet to the north. (Km 0 to Km10)

Headquarters- This area vegetated buffers (Housing Area, Pole Barn buffer, Sinepuxent buffer, UMES buffer, housing meadow, southern border

Developed Area- This portion of the island includes the land between the Verrazano bridge and the entrance to the OSV and it includes the land owned and managed by the Assateague State Park. The Assateague State Park comprises almost 800 acres (3.2 km²) and lies in Maryland within the National Seashore. The state park is the most developed area on the island with 350 campsites. Most of the water around the island is within the boundaries of the national seashore.

OSV- This portion of the island includes the land from the south end of the developed area at Km 16.8 to the state line at Km 35.5

Virginia District: (See Figure 2: ASIS Management Areas (VA))

Wallops Island Maintenance Facility- Located on Wallops island away from the barrier island and adjacent to the NASA facility, this is a 2.4 acre fenced lot with facility within contains the maintenance shop and the vehicles they use to maintain the parking lots on the island at Tom's Cove. Heavy equipment there is damaged by flying stones during mowing operations, so treatments of nuisance weeds are needed to mitigate this.

Chincoteague National Wildlife Refuge bridge and crabbing decks- the west side of the bridge has facilities to allow visitors to the CNWR to recreate by crabbing and fishing at the estuary's edge.

United States Coast Guard Life Saving Station- this historic structure is conserved by the NPS and is located near the southern terminus of the island.

Synopsis of Table 2

The control of ASIS's invaders is performed by 2 teams ASIS personnel and a visiting team, the Mid Atlantic Invasive Plant Management Team (MAIPMT). The results of these teams in acres treated, are presented in Table 2: Summary of Assateague Island National Seashore Invasive Plant Work in 2023.

Synopsis of Table 3

To rank the invasiveness of the non-native plants at ASIS the biological science technician (plants) considered various sources to develop a unique ranking that is specific to our maritime coastal barrier island. The results of the process are presented in Table 3: ASIS Invasive Plant Species and Locations 2023 including status. This table also seeks to indicate the locations within our park where the plants are present or absent by habitat management area.

Invasiveness designations at ASIS (High, Med, Low) are the result of considering the other ranking systems that Maryland and Virginia use to rank their plants with what we have experienced here locally and how much effort the species has received. The following descriptions will relate the source of the result under each heading of the table.

The MD Noxious column output was derived from the Maryland Department of Agriculture's (MDA) Noxious Weeds in Maryland list located here: https://mda.maryland.gov/plants-pests/Pages/noxious_weeds_in_md.aspx.

Invasive plants in Maryland are further classified by the MDA using a filter (Appendix: A, Maryland Filter for WRA Model Risk Rating High Risk Plants) for further refining a high risk ranking as a Tier 1 or Tier 2 Invasive Plant. These rankings also apply to the sales of the plants which is not of interest to us. On this list many of ASIS's invaders can be found with a rank and in those cases they were reported as such in the ASIS/MD Tier column. For those species that occur at ASIS, but were not on this list, the technician used the filter and substituted the word "Maryland" for "Assateague Island National Seashore" and applied the filter with consideration to our localized conditions.

Another ranking determined by the Maryland Invasive Species Council (MISC) is presented in the column MD MISC MOSC list which ranks invasive plants that are Maryland Invasive Species of Concern (MOSC) found at (<https://mdinvasives.org/species-of-concern/>). If the plants we manage at ASIS were found to be on this list, a "Yes" is present in the column correspondent to the species.

Virginia Rank (VA Rank) was derived from the Virginia Invasive Plant Species List found here (<https://www.dcr.virginia.gov/natural-heritage/document/nh-invasive-plant-list-2023.pdf>) at the VA natural heritage program's site. VA High Species poses a significant threat to native species, natural communities or the economy. Medium Species poses a moderate threat to native species, natural communities or the economy. VA Low Species poses a low threat to native species, natural communities or the economy. In VA, invasiveness rank is higher for species that: 1. Alter ecosystem processes, such as succession, hydrology or fire regime. 2. Are capable of invading undisturbed natural communities. 3. Cause substantial impacts on rare or vulnerable species or natural communities or high-quality examples of more common communities. 4. Are found widely distributed and generally abundant where present. 5. Disperse readily to new areas. 6. Are difficult to control.

Newly Emerging plants are presented in the table to indicate that the species has become detectible at ASIS in recent years.

The Species Eradicated? column indicates if ASIS has successfully, after 3 consecutive years of absence, brought the species completely under control to the point of absence.

The colors of the table further help to classify the prioritization for treatment of the species at ASIS where the plants that are Red are priority 1, Gold are priority 2, Beige are priority 3, Green priority 4 lastly, Grey are plants that are on the watchlist for new introductions and early detection.

Nuisance weeds and *Toxicodendron radicans* (Poison Ivy) are not ranked, but their presence in habitat management areas is presented because we do treat them.

Synopsis of Table 4:

To convey an understanding of which species are treated at ASIS in our designated management areas, whether in the past or present, Table 4: Species Treated at ASIS by Management Area is provided. Where invasive plants are present and are currently being managed, the designation of

X=Present is used. Where invasive plants have been treated in the past but are not being treated presently because they are under control yet at another location there is an infestation or occurrence which has not yet been absent for 3 years, they are denoted with H-Historical. Lastly, invasive plants that have been present and managed to completion at a site and all other occurrences of it have been absent for 3 consecutive years are marked with the symbol of E=Eradicated.

Synopsis of Appendix D

Additional information is related by species in the Appendix D: Species Fact Sheets. These sheets convey a summarized version of the status of each species, the suggestions for future action and consideration.

Table 1. ASIS 2023 Project Areas

Areas	Field Sites
Maryland District	North End, Headquarters (Housing Area, Pole Barn buffer, Sinepuxent buffer, UMES buffer, housing meadow, southern border), The Developed Area, OSV
Virginia District	NPS-Wallops Island Maintenance Facility, Chincoteague Wildlife Refuge bridge bike path and crabbing decks, the USCG Life Saving Station Chincoteague

Methods

The ASIS Vegetation Management Program follows the same guidelines as those utilized by the National Capital Area (NCA) Invasive Plant Management Teams where our work effort results in the following:

1. Preserves habitats using Early Detection/Rapid Response.
2. Controls invasive plants impacting ecologically sensitive areas.
3. Restores native habitats by removing exotic pest plants and reestablishing native plants and natural processes.
4. Prevents the spread of invasive species through training and careful stewardship of tools and equipment. The NCA IPMT works closely with our partner parks and agencies to inventory and monitor invasive plants, train staff and volunteers, implement treatment and restoration efforts, and share resources and information.

Our methodology also includes the North American Weed Management Association (NAWMA) standards. The ASIS program 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 invasive plant populations.

The personnel employed to assist in our control efforts are described in Appendix B: ASIS Workforce

Prioritizing Treatment

The criteria used to determine a plant species' status as a non-native invasive at ASIS worthy of treatment are:

1. The species has been identified in a previous Vegetation Management report as an invasive alien Species of Management Concern.
2. The species is included on the Maryland Department of Agriculture's invasive plant list of invasive non-native plants or are on the noxious weeds in Maryland list.
3. The species is considered as 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.
4. The plant is listed on the Invasive Species of Concern in Maryland list created by the Maryland Invasive Species Council. [Terrestrial Plants - Maryland Invasive Species Council \(mdinvasives.org\)](https://mdinvasives.org)

Island searches for invasive plants were conducted in 2023 utilizing the ESRI FieldMaps App, on Global Positioning System (GPS) equipped tablets (Samsung Tab 3 Active) that were used to record data. Whenever possible, the perimeter of larger alien plant infestations were mapped, however some infestations are too difficult to circumnavigate and were documented using point or line data. Point, Line and Polygon GIS data is collected using ESRI FieldMaps and the data is recorded in AGOL shapefiles that are stored on a server in the cloud. Whenever possible the Trimble R1 receiver is used in conjunction with the mobile devices to get a precision of less than 1 meter. On the island all newly discovered plants and treatments are recorded in GIS, but on the mainland where very finite boundaries exist for the various buffers and planting beds it is not necessary to record this information, except for instances where there may be a single plants or small clusters of plants that we are not able to treat and must return to later.

Control Methods

Manual Treatment

Manual treatment involved removing a plant by hand pulling. We used this method on just a single species, *Salsola kali* (Tumbleweed) because they were small and could be removed relatively easily and didn't have rhizomatous roots. Flower heads were removed from *Cirsium spp.* (Thistle species) before herbicide applications to prevent plants from developing viable seeds after they were treated. All *Cirsium spp.* (Thistle species) plant parts that were manually controlled were put in bags and disposed of at the ASIS Maintenance Facility in dumpsters not used by the public. Other manual treatments were performed not to treat plants directly, but rather to allow continued access into management areas where dense thickets of shrubs and grasses make it difficult to work by using string trimmers fitted with hedge trimming attachments used to cut trails and transects.

Chemical Treatment

We used 3 brands of 2 different types of herbicides to chemically treat invasive plants in the park in 2023. Aquaneat (Glyphosate herbicide) was applied to grasses and broadleaf plants at a rate of 6 pints per acre. Roundup (Glyphosate herbicide) was applied to grasses and broadleaf plants at a rate of 6 pints per acre. Polaris (Imazapyr herbicide) was applied to grasses and broadleaf plants at a rate of 6 pints per acre. Herbicide was spot sprayed using backpack sprayers. For larger broadcast applications

an Intellicast sprayer was used that was fitted to the back of a Kawasaki Teryx UTV. The biological science technician holds the State of Maryland certified applicator's permit and the technicians under their direction were registered applicators with the state of Maryland. We documented herbicide use using the National Park Service (NPS) Pesticide Use Proposal System (PUPS). All foliar chemical treatments performed at ASIS in 2023 were at a concentration of 2% or 20mL/L. Cut stump treatments were completed using a 25% solution of Polaris herbicide in all cases in 2023. The nomenclature associated with the type of treatments that we conduct at ASIS are presented in Appendix C: Treatment Methods.

Retreatment

Retreating invasive plant populations with herbicide multiple times throughout the growing season has proven to be a useful strategy to reduce the density of a population during a single year. Applying herbicide to a population for a second time provides the opportunity to treat plants that were missed during the first treatment or that sprouted after the initial application. There is not always enough time or resources to treat all populations two or more times during the growing season, but this strategy should always be considered for populations that are a high priority for treatment.

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. The dye also ensured protection of the applicator by making visible, any possible contamination of his/her protective clothing. Proper protective equipment (PPE), meeting the standards on the label, was always employed during treatment activities. Employee safety is important to ASIS, especially when working with potentially hazardous materials. The lead technician responsible for coordinating and implementing the work activities 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.

Weather monitoring, conducted hourly during treatment days is accomplished by observing the latest data from the ASTM2 RAWs Station, situated on the island at Kilometer 29 in the dunes. These readings help to ensure workers are safe by providing the RH and temperature from which heat index calculations can be made. We adhere to the park's policy on heat, Park Mgmt 511 Working in Excessive Heat and do not work when the heat meets or exceeds a heat index of 100 degrees Fahrenheit.

Data Collection and Analysis

The ASIS Vegetation Management Program database documents the treatment of each targeted alien plant infestation. Multiple infestations often occur in the same sites, so the consistent use of site names is important to our operation.

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 next treatment, for example, on 7/5/2023 would be labeled "RX070523_2". This was

especially useful in the naming of polygons that represented separate treatments that occurred on the same day.

We also documented use in an herbicide treatment spreadsheet. Daily logs were completed to document invasive plant work and timing of control activities and entered along with hourly weather data each day.

Each treatment records the following information:

Rx Code, Date, Location, Applicator, Start Time, End Time, Rx Method, Species, Density Phragmites (for Phragmites treatments only), Density Native plants (for Phragmites treatments only), Habitat Type, Product, EPA Registration Number, Active Ingredient, Amount of Product Used (mL), % Concentration, Diluent, Surfactant, Amount Surfactant %, Dye%, Total Amount of Spray (L), Equipment Used, Retreatment, Phenology at Rx, Acres Treated, Area Treated (m. sq.)

Monitoring Methods

The monitoring of the treatment sites at ASIS that is most often utilized is qualitative monitoring. The most useful options of qualitative monitoring that ASIS incorporates into their work are presence/ absence monitoring which we use to determine when a particular species has been eradicated. Three consecutive years of absence after treatment has begun is the threshold by which we make this determination. The various methods that ASIS uses are listed below with references to how they are incorporated:

Presence or absence. Noting whether the species of interest is still at the site is an effective way to monitor a species with many roadside populations, as is the case with all treatments in the Developed Area and to some degree in the OSV where the beach and driving lanes are unimpeded. Repeated returns into easily accessible treatment areas at ASIS allow us to make these determinations annually.

Estimates of population size. Visual evaluation of population size provides more information than simply noting presence or absence. During Seabeach Amaranth searches when *Carex kobomugi* plants are encountered, or when new populations of plants are discovered elsewhere like *Miscanthus sinensis* on the North end, information is entered into the comments section of our FieldMaps entries.

Estimation of demographic distribution. A population's demographic distribution is the percentage of the population or number of individuals within classes such as seedling, non-reproductive adult, reproductive, and senescent. Each treatment that we conduct is recorded with an estimation of the phenology of the species treated and when treating *Phragmites australis* we estimate the total cover of native and non-native plant cover for each treatment.

Assessment of population condition. In this approach, the observer evaluates the condition of the population by noting occurrence and extent of utilization and other factors. This can be inferred from the data we have collected for some species like *Carex kobomugi* where surveys have been nearly the same for 2 decades. Also, the patterns can be seen by analyzing the effort conducted for each species at each management area.

Boundary mapping. Mapping the perimeter of a plant population monitors change in the area occupied by the population. We have baseline aerial survey polygons that were flown and recorded in 2008 which has served as a reliable means for targeting treatment areas. These polygons have density data associated with them that early on helped to guide our choices for which areas to prioritize for ground or aerial treatments. We map the perimeter of all treatment areas of *Phragmites australis* post

treatment that when later compared to the boundary of the aerial survey polygons help guide us to determine the completeness of our management actions for this species, in particular.

Personnel

The ASIS Vegetation Management Team had three members in 2023: permanent Biological Science Technician (Plants) and two seasonal Biological Science Technicians (Plants). The ASIS Supervisory Biologist assisted by managing the prioritization of projects (with considerable input) and supervised all technicians. Assistance with GIS was provided by the ASIS GIS Specialist. The ASIS Resource Management Division Chief is the official Integrated Pest Management coordinator title for the park. In November, ASIS was assisted by five members from the NPS IPMT (Mid-Atlantic) to treat *Phragmites australis*.



2023 ASIS Vegetation Management Crew



2023 Mid Atlantic Invasive Plant Management Team

Results

2023 Season Overview

The 2023 ASIS Vegetation Management Team completed several projects during the season despite having a smaller than normal staff. These projects included invasive plant surveys and treatments, and collaborative work with the Mid Atlantic Invasive Plant Management Team partners. In 2023 ASIS personnel treated approximately (8.1) acres of invasive plants comprised of (27) different species. With help this season from the visiting Mid-Atlantic Invasive Plant Management Team (MA-IPMT), an additional (15) acres of *Phragmites australis* (Common Reed) were treated. We also manually treated (18) meters squared of Tumbleweeds along the beach using manual control methods. Together, (23.1) acres of invasive plants were treated over the growing season.

Table 2. Summary of Assateague Island National Seashore and NPS Mid Atlantic Invasive Plant Management Team work accomplishments in 2023

Team	Year	Acres Treated
ASIS VEG MGMT	2023	8.1
NPS MA-IPMT	2023	20
TOTAL		28.1

Treatments by Species

Maryland District

North End-

Carex kobomugi

After surveying the entire Maryland portion of the island in search of both Seabeach Amaranth and Japanese Sedge a total of 36 populations of *C. kobomugi* were discovered. These newly discovered plants received chemical treatments on 2 days in August of 2023, applied to the foliage of the plant, and utilized a 2% solution of Polaris (imazapyr-based herbicide).

Lagerstroemia indica

Just 2 small shrubs have been found and treated in the large *Hudsonia tomentosa* dominated clearing at the inlet since 2018, the second of which was discovered in 2022. Both appeared to be dead in 2023 when the site was monitored. There were no treatments of this species this year.

Headquarters vegetated buffers (Pole Barn buffer, Sinepuxent buffer, UMES buffer, housing meadow, southern border)-

We treated most known populations of invasive plants at the ASIS Headquarters during the spring, summer and fall months.

Cirsium arvense

Fifteen treatments were conducted during the months of March, May, June, July, September and November on the Headquarters property to continue the commitment for controlling this terrible invader that threatens the value of the landscaping resources at the ASIS Headquarters.

Chemical treatments for this species, applied to the foliage of the plant, primarily utilize a 2% solution of Rodeo or Aquaneat (glyphosate-based herbicides) or a 2% solution of Polaris (imazapyr-

based herbicide) if there were not hardwood trees present near the treatment site. The total area treated was 0.1251 ac.

Cirsium vulgare

Ten treatments were conducted during the months of June, July, August, September and November at park Headquarters and on the island at the Bayside peninsula. Chemical treatments for this species utilized a 2% solution of Rodeo or Aquaneat (glyphosate-based herbicides) or a 2% solution of Polaris (imazapyr-based herbicide) if there were not hardwood trees present near the treatment site. The total area treated was 0.0136 ac.

Glechoma hederacea

Found only on the mainland at headquarters, this species received a single treatment day in July at the Sinepuxent vegetation buffer and throughout the interior and along the southern border of the headquarters property. Chemical foliar treatments for this species utilize a 2% solution of Rodeo herbicide this year. The total area treated was 0.0578 ac.

Ligustrum vulgare

Only ever encountered on the mainland at the headquarters property, this species is occasionally introduced by birds visiting the property's vegetated buffers. A single sapling was discovered in September and treated with a foliar chemical application of a 2% solution of Aquaneat herbicide. The total area treated was 0.0003 ac.

Microstegium viminium

Treatments for this grass species at the Headquarters property, which is continually reintroduced from adjacent lands where it is not managed, occurred over 6 work days in June, July, August, September, and November on the headquarters property where it invades all areas that are not mowed. All treatments utilized a foliar chemical treatment of 2% Rodeo or Aquaneat herbicide. The total area treated was 0.2404 ac.

Morus alba

Found infrequently, but if established in dense vegetation where they are not detected until stumbled upon, *M. alba* trees are rarely encountered at ASIS. However, the many seeds a single tree can produce make each tree present a great threat when trees are allowed to mature. Two small trees were discovered this year, 1. On the Maryland causeway and 2. In the vegetated buffer behind the visitor center. To control this species a cut stump chemical application of a 25% solution of Polaris was used to minimize the impact to adjacent vegetation in March. The total area treated was 0.0002 ac.

Pyrus calleryana



Pyrus calleryana in flower

A new invader to ASIS, the Callery pear was discovered in the drainage ponds of the Maryland visitor center in 2022. Later in May the tree was treated with a foliar chemical application of a 2% solution of Rodeo herbicide. Two trees have been found/ treated there behind the visitor center to date. The total area treated was 0.0012 ac.

Trifolium praetense

It is important to note that in 2023 this species had emerged at the Maryland visitor center from landscaping beds adjacent to the ramp its west side. To rapidly treat a new emerging infestation, hand pulling, was used to remove a square meter patch of the clover to prevent it from becoming established. The total area treated was 0.0002 ac.

Developed Area-

Ailanthus altissima

A single treatment was conducted for this species in March, behind the garage on the south end of the large concession parking lot at the Assateague State Park, that had been found during the 2022 summer season. The stumps of nearly 20 small trees were cut at ground level with either laupers, or a hand saw followed by an application of a 25% solution of Polaris (imazapyr-based herbicide) upon the cut stumps. The total area treated was 0.0731 acres. While some infestations with multiple individuals of varying ages like this have been found and treated in recent years, there is not a trend that indicates there is a marked increase in the infestations of this species at ASIS. This species has required repeated treatments at the north end inlet to contain and maintain it, though none were active there in 2023. Presently, this species remains well under control island-wide.



Ailanthus altissima treated by a biological technician in the north end meadow 2021.

Artemisia stelleriana

A single treatment was conducted for this species in May at the Boathouse parking lot island that is closest to the entrance to its west. This small patch is contained within the curbed parking island there. To treat the plants, a 2% solution of Rodeo (glyphosate-based herbicide) was used. Repeated treatments may be needed and monitoring of the site should be conducted for 3 consecutive years along with a similar treatment, if it is encountered, until it is eradicated. The total area treated was 0.0025 acres.

Artemisia vulgaris

Multiple treatments were conducted for this species in June, July, August and September during which time the following locations were surveyed and treated: The Sinepuxent vegetation buffer that lies to the east of the MD visitor center and the Visitor center landscaping beds, the southern border of the Headquarters property, the large meadow at the center of park housing at park Headquarters, the housing vegetated buffer (north of the aforementioned meadow), the University of Maryland Eastern Shore vegetated buffer, on the island between loops B and C on the north side of Bayside drive, Bayside campground site A19, the Verrazano bridge causeway south side, the Visitor Contact station parking lot, the Boneyard, the Oceanside drive dump station, and lastly the Bayside canoe and kayak rental. This species is currently at management levels because nearly all individuals are treated at each known site annually, but the species appears to be becoming more widespread despite our efforts. Small seeds that persist in the seed banks for at least 5 years or more cause repeated treatments at sites after they are discovered. The small seeds are easily dispersed by water and the rhizomes are many and thick rhizomes complicate the control efforts of this species. Chemical treatments for this species, applied to the foliage of the plant, utilized a 2% solution of Rodeo or Aquaneat (glyphosate-based herbicide). The total area treated was 0.2854 acres.

Centaurea maculosa (Centaurea stroebe)



Centaurea maculosa in flower.



Centaurea maculosa in rosetted stage of life.

Two treatments were conducted to work towards keeping this species under control at the Assateague State Park/ Route 611 intersection and North Beach this field season, that occurred in May and again in July. This species has only become detectible since 2021, when treatments began at North Beach. Since then, the species has been discovered in the State Park and while the treatments at North Beach have been helpful in reducing the infestation overall, small rosettes are being found across the North Beach Area that will require continued monitoring and treatment for years. The newly discovered population at the State Park must also receive similar attention, or the species will easily become more widespread.

Chemical treatments for this species, applied to the foliage of the plant, utilized a 2% solution of Rodeo (glyphosate-based herbicide). The total area treated was 0.0665 acres.

Clematis terniflora

Six treatments in total were conducted in March, July and November at the following sites this season: Bayside Canoe and Kayak Rental forest (the original invasion site found more than 2 decades ago that lies between the terminus of the peninsula to the west and the exit of loop C to the east), Bayside Drive 100 meters east of the loop C exit along the north side of the roadway on a berm, Bayside campground site B31 and the most extant site at the end of Oceanside Drive at the 2nd to last parking lot heading south and behind the split-rail fence there. The species has been found on the headquarters property in the Sinepuxent vegetation buffer, and treated in April last year, but found to be inactive this year. Chemical treatments for this species primarily utilize a 2% solution of Rodeo (glyphosate-based herbicides) or a 2% solution of Polaris (imazapyr-based herbicide) if there were not hardwood trees present near the treatment site. The total area treated was 0.0400 ac.

Elaeagnus umbellata

Six treatments in total were conducted in March, April, July and September at the following sites this season: the east side of the bike rental at the Maryland visitor center, the Assateague State Park west of the Nature Center, loops A and B of Bayside Campground, Bayside Drive 100m east of loop C exit on north side of the road and at the ASIS Headquarters in the Sinepuxent vegetation buffer. Chemical treatments for this species included cut stump with a 25% solution of Polaris (imazapyr-based herbicide), or foliar application of a 2% solution of Rodeo (glyphosate-based herbicide) or Polaris. The total area treated was 0.0095 ac.

Lezpedeza cuneata

This species has been treated throughout the developed area in past years and at present is not highly detectible, but when encountered along with other treatments, it too is controlled. Such was the case for 2 treatments this year at the entrance booth guard rails and the visitor contact station where small plants were encountered and treated with a foliar chemical application of 2% solution of Rodeo herbicide. This species must remain a priority and every 5 years a thorough survey of the developed area (completed from a UTV) should be performed to maintain the low numbers that we have reached from repeated treatments. The total area treated was 0.0005 ac.

Trifolium arvense

Present at ASIS since at least 1984, when Steven Hill described it as, [sic] “infrequent to locally frequent especially in the State Park and Great Egging Island”. This species presents a threat to the horses of ASIS because it contains compounds that can cause symptoms including photosensitivity and liver damage. Not easily detectible since 2004 (Chase 2024) our actions this year were to begin to bring this species, now indicating signs of advancing its invasion curve, more under control. It must be reduced in numbers to prevent a rapid increase in its abundance to prevent it entering the containment phase of the invasion curve. Three treatment days in the month of May were conducted to begin the treatment of this invasive, noxious plant species. A foliar chemical application of a 2% solution of Rodeo herbicide was utilized for the treatments. All parking lots in Maryland were visited and if the plant was encountered it was treated, where the islands within nearly all but the group camp lot were becoming infested. In 2024, a complete treatment of all parking lots and roadsides will be scheduled, to control this rapidly emerging invader more aggressively. The total area treated was 0.1013 ac.

OSV-

Arthraxon hispidus

While quite widespread in the park’s developed area, just one location was treated in November to keep the species out of the park’s Over Sand Vehicle (OSV) zone where it was discovered and treated in 2021 at the Pine Tree camp road and the Valentine’s road. This year the single treatment occurred 50 meters east of the Valentine's road bridge on the center of the roadbed, a much-reduced portion of the 2021 treatment. Chemical treatments for this species, applied to the foliage of the plant, utilized a 2% solution of Polaris (imazapyr-based herbicide). The total area treated was 0.00035 acres.

SCA Monitoring was conducted one year after treatment in the 3 study plots located in the Oceanside campground by SCA crew leader Connor Ranft and SCA Team member Lucie Ciccone. The results of this study are pending the release of the report.

Extensive treatments of this species are planned to occur throughout the developed area for the fall of the 2024 field season.

Juniperus procumbens

Only a single plant has been found and treated since 2020 behind the Clements inholding near the MD/ VA state line. It has been under observation since its last treatment in 2021 and has not regenerated since. There were no treatment of this species this year.

Salsola kali

Eighteen plants were pulled during the 22 mile Seabeach Amaranth (a T&E species at ASIS) survey of the sparsely vegetated zone of the beach. The total area treated was 0.0044479 acres.

Virginia District

Wallops Island Maintenance Facility-

Nuisance weeds cover the ground within the fenced area where our Maintenance operation in Virginia store their heavy equipment and operate out of a small metal building surrounded by the fenced property. Our first treatment in April involved using 63 liters of Polaris solution 0.3113586 acres the second treatment in August 50 liters of Polaris solution and 0.24711 acres were treated.

Chincoteague National Wildlife Refuge bridge and crabbing decks-

Eleusine indica

Two treatments were conducted to diminish the threat that this species poses to the integrity of pavement edges of bike paths at the following sites: the western side of the Chincoteague National Wildlife Refuge entrance bridge in Virginia during April and the bike path edges between entrance booth E1/E2 and the entrance to the OSV in Maryland during July. Chemical foliar treatments for this species utilize a 2% solution of Polaris (imazapyr-based herbicide). The total area treated was 0.2002 acres.

USCG Life Saving Station Chincoteague-

Eragrostis curvula



ASIS biological technicians stand next to a patch of *Eragrostis curvula* they have treated at the USCG Station at the CNWR

Once ubiquitous along roadsides throughout the developed area of the Maryland portion of Assateague Island National Seashore, this species is completely under control there now requiring only periodic treatment of small individuals. This year a new infestation was discovered in Virginia at the historic U.S. Coast Guard Station at the Chincoteague National Wildlife Refuge in August. In Maryland a few plants were discovered and treated at the Boneyard in the footprint of the first loop of the original Bayside campground loop 1 during November. Both infestations received a foliar chemical treatment of a 2% solution of Polaris herbicide. The total area treated was 0.0178 ac.

Species that are treated at multiple habitat management areas

Lonicera japonica



Lonicera japonica flowers.



2023 ASIS biological technician cuts a *Lonicera japonica* vine before a cut stump treatment.

This species presents one of the greatest threats to ASIS as an invader. To continue the prevention of spread into new habitat in the OSV and to allow shrubs to dominate in places it has become established like at the Bayside peninsula, we continued our control efforts for this species in March, April, August and November this year. The March and April treatments were conducted across the entire headquarters property, at the Bayside campground along the northern edge of the campground loops using the intellicast sprayer mounted from the UTV. The entire peninsula has received treatments now since the 2022 treatment was the interior island of the peninsula and the 2021 treatments were along the southern portion of the campgrounds and the southern portion of the peninsula proper. Still many plants remain and cyclic treatments must continue here to keep the population reduced. Also treated during this period of spring were the infestation lying between Km 18 to Km 20 in the OSV shrub zone that were treated with a backpack sprayer. In August the forest west of loop C on Bayside peninsula was treated with a backpack sprayer. In November, the

Valentines road infestations were treated using the intellicast sprayer mounted from the UTV. All treatments utilized a foliar chemical treatment of 2% Rodeo or Aquaneat herbicide. The total area treated was 1.7401 ac.

Miscanthus sinensis

This species was treated on 3 work days in August and November on the north end of the island. Chemical foliar treatments for this species utilize a 2% solution of Polaris herbicide this year.

Additional efforts are necessary to manage this species such as cutting trail and flagging of the trails because they invade dense shrub thickets of *Morella cerifera* (Wax Myrtle) and become hidden in the tangle of the thickets they create in maturity. First the trails are made to locate plants, then once access is established, the trails are maintained annually for herbicide treatments. The total area treated was 0.0563 ac.

Paulownia tomentosa



2022 SCA Native Plant CORPS Leader Dakota Exum stands next to a *Paulownia tomentosa* at the Life of the Marsh Trail in the Developed Area at ASIS.

No treatments for this species were conducted this year; no new occurrences were discovered and those treatments from the recent past south of Hungerford Road and the life of the Marsh trail were inactive, not requiring retreatment. It is recommended that those sites treated in 2021 and 2022 be revisited in 2024. There were no treatments of this species this year.

Nuisance Weeds



Nuisance weeds were treated in the boardwalk mitigation landscaping bed behind the visitor center when needed this season to help them get established and remove the competition they present.

Nuisance species are native to the local landscape but still can cause problems. For instance, sawtooth blackberry is native to Maryland and Virginia but can grow in dense patches that are difficult to pass through and can cause problems for people. These plants are also a nuisance when they grow in parking lots and landscaping beds, or any place they are not wanted, for several reasons. We treat nuisance weeds at ASIS along bike paths, in landscaping beds, in equipment storage parking lots and in campsites. In parking lots nuisance weeds invade cracks in parking lots and pavement weakening the integrity and lifespan of the surfaces. Treatments for nuisance weeds at ASIS were conducted each month from March through September at the following locations in Virginia: the Wallops Island Maintenance Facility lot, the crabbing decks and bike path at CNWR, in Maryland: the Public Landing repeater, the newly planted landscaping mitigations for the elevated boardwalk, the wastewater treatment plant, all ASIS parking lots (headquarters housing and facilities, the visitor center and all of those on the island). All chemical treatments utilized a foliar chemical application of a 2% solution of either Polaris, Rodeo or Aquaneat herbicide. The total area treated was 1.0738 ac.

Pennisetum alopecuroides (Cenchrus purpurascens)



Four treatment days were conducted to help keep this species at manageable levels at ASIS this July, August, September and November. All chemical treatments utilized a foliar chemical application of a 2% solution of either Polaris, Rodeo or Aquaneat herbicide. The total area treated was 0.0675 ac.

Phragmites australis



A total of 16 treatment days were conducted by ASIS personnel and then the the Mid-Atlantic Invasive Plant Management Team (MAIPMT) assisted us on an additional 4 days of treatments at the end of the season. These treatments occurred in April, July, August, September and November. The ASIS personnel performed chemical treatments at the CNWR bridge and in Burn Units 6, 9, 12, behind the MD visitor center, along Valentines road, at Green Run by the intersection of Bayberry Dr.. ASIS personnel also cut trails for access in Burn Units 7 and 10 that assisted the MAIPMT in November. MA_IPMT treatments were conducted in Burn Unit 7 and 10, the shrub zone at the shrub/ beach interface south of Km 23.4, the southeast corner of Burn Unit 8 and the pond next to the Verrazano bridge on its south side. All chemical treatments utilized a foliar chemical application of a 2% solution of Polaris herbicide. The total area treated by both teams was 24.12 ac..

Pinus nigra

While many hundreds of *Pinus nigra* trees exist as a viable population that was planted at the concession area of the Assateague State Park decades ago, only one tree remains on ASIS lands. The single tree on ASIS lands was planted next to the original ASIS visitor center on the mainland in the 1970's that is now called the Environmental Education Center. We let the tree remain for educational purposes and landscape value. Occasional introductions on the island have been easy to contend with for this species.



Biological technician Mike Burchette cuts the last known *Pinus nigra* tree on ASIS property in 2020

Rosa multiflora

This year, 5 treatment days were spent at the Sinepuxent vegetation buffer, the Bayside kayak and canoe rental, the north of loop C Bayside campground dump station, loops A and B of the Bayside campground, the Life of the Marsh Trail surrounding the parking lot, the Oceanside Drive 2nd to last parking lot, and the Loop C Bayside dump station. A foliar chemical application of a 2% solution of Polaris herbicide was utilized in all of the treatments. The total area treated was 0.0166 ac.

Rosa wichuraiana

No treatments of this species were conducted in 2023, however the location where the first island invasion occurred at Bayside Campground loop B was found to be inactive when observed during treatments of other species in the same location during the 2023 season.



2021 biological technicians Annie Blalock (L) and Rhea Hester (R) point to a *Rosa wichuraiana* plant that they will soon treat

Salsola kali

A total of 8 plants were pulled during the Seabeach Amaranth surveys that are conducted along the length of the island from the inlet to the VA state line in the sparsely vegetated habitat of the beach in mid-summer. This was a remarkable reduction from the previous season when over 800 plants were pulled.

Toxicodendron radicans

A total of 2 treatment days were conducted to treat this species in the backcountry campgrounds and a facility area at ASIS this year in June. The control work was performed at Pope Bay campground, Pine Tree campground, Tingles Campground, and at the request of a maintenance worker the Pole Barn Buffer behind the paint room a foliar chemical application of a 2% solution of Rodeo herbicide. The total area treated was 0.1100 ac.

Vitex rotundifolia

The small single plant (the second ever found at ASIS) located along the north coastline of Bayside peninsula in 2021 (E 485554, N 4229102) that was last treated in 2021 at the Bayside campground, was inactive when observed during the growing season of 2023 and did not require retreatment.



The second *Vitex rotundifolia* ever discovered at ASIS pre-treatment

Treatments by Management Area

Maryland District

North end

We treated *Carex kobomugi*, *Cirsium vulgare* and *Miscanthus sinensis* on the North end this season. For *Carex kobomugi* we applied 1 liter of 2% Polaris solution on 8/9/23 on those plants that had been found during the Seabeach Amaranth survey. For *Cirsium vulgare*, we applied 0.06 L liters of 2% Polaris solution on 8/1/23 on the plants that had been found next to *Miscanthus sinensis* plants on the east side of the open meadow just north of the inlet forest. For *Miscanthus sinensis* we applied a combined 10.94 L of 2% Polaris solution on 8/1/23 and 11/17/23. The extent of the invasion had been mapped previously in the two prior seasons using FieldMaps. We surveyed 75 acres on the north end between Km 0.5 and Km 2 in the shrub zone in search of *Miscanthus sinensis* and discovered 23 infestations totaling 0.0297 acres that we mapped using ESRI FieldMaps. We found 8 individual plants of *Salsola kali* during the Seabeach Amaranth survey and they were manually pulled at the time of their discovery in early August. Lastly, we reflagged the trail system that was installed in the forest at the inlet in 2020, which has been done annually since its installation.

Headquarters (Housing Area, Pole Barn buffer, Southern border, Sinepuxent buffer, UMES buffer, Visitor Center, Wastewater Treatment Plant buffer)

Housing Area

Treatments occurred at this location on 6/27/23, 6/28/23, 6/29/23, 7/12/23, and 7/21/23. We treated the following species with their corresponding products/ total amounts of solution used listed afterwards: *Artemisia vulgaris* 47.23 L Rodeo, *Cirsium arvense* (2.8 L Aquaneat, 0.89 L Rodeo), *Cirsium vulgare* 0.7 L Rodeo, *Lonicera japonica* (1 L Aquaneat, 0.05 L Polaris and 45 L of Rodeo), *Microstegium viminium* 5.88 L Rodeo, and Nuisance weeds 7.5 L of Polaris. We did not record GIS points for any treatments at headquarters because we are satisfied with the level of understanding from the documentation of the work in the discrete areas of the delineated borders there.

Pole Barn buffer

Now well established with native vegetation able to shade out invasive competitors this area presents a threat to workers because it harbors poison ivy. We treated *Toxicodendron radicans* with 4.25 L of Rodeo that lies next to the entrance of the paint room on 8/16/23 and along the paths that personnel take to get to the visitor center from the maintenance area. On 7/7/23 we treated nuisance weeds with 5 L of Polaris in the parking lot adjacent to the buffer because it requires treatments of nuisance weeds annually to prevent the degradation of pavement there.

Southern border

Treatments were conducted here at various locations along the 275 meter length of the southern border of the headquarters between the southwest corner of the property and the entrance loop at the entrance to headquarters facilities on 5/18/23, 6/27/23, 6/29/23, 8/16/23, 9/19/23, 11/14/23. The following species were targeted with their corresponding products/ total amounts of solution used listed afterwards: *Artemisia vulgaris* (0.4 L Aquaneat, 1.2 L Rodeo), *Cirsium arvense* (1.6 L Aquaneat, 3.5 L Rodeo), *Microstegium viminium* (0.2 L Aquaneat, 22.8 L Rodeo, Nuisance Weeds

12.75 L Rodeo used to treat the parking lots next to sheds A-F that are stone and cannot be mowed and, *Pennisetum alopecuroides* 2.51 L of Polaris solution.

Sinepuxent buffer

We conducted multiple treatments in this buffer this season on 3/27/23, 3/28/23, 6/26/23, 7/7/23, 8/4/23, 8/24/23, 9/19/23, and 11/14/23. The following species were targeted with their corresponding products/ total amounts of solution used listed afterwards: *Artemisia vulgaris* (0.5 L Aquaneat, 1.89 L Rodeo), *Cirsium arvense* (1.02 L Aquaneat, 3.5 L Rodeo, 0.5 L Polaris), *Cirsium vulgare* (0.035 L Polaris 2%, 0.016 L Polaris 25%) where a sensitive area next to the landscaping beds required a cut stump point-target treatment where the other treatment was a foliar treatment at the lower concentration in a non-sensitive location. Also treated were *Eleaegnus umbellata* 0.05 L Aquaneat, *Ligustrum vulgare* 0.05 L Aquaneat, *Lonicera japonica* 24.5 L Rodeo, *Microstegium viminium* (6.75 L Aquaneat, 17.1 L Rodeo), *Morus alba* 0.015 L Polaris, *Pennisetum alopecuroides* (Aquaneat 0.15 L, 0.75 L Polaris), *Phragmites australis* (4 L Aquaneat, 9.5 L Rodeo), and *Rosa multiflora* (0.4 L Rodeo).

UMES buffer

We conducted multiple treatments in this buffer this season on 5/19/23, 7/7/23, and 8/24/23. The following species were targeted with their corresponding products/ total amounts of solution used listed afterwards: *Artemisia vulgaris* (0.5 L Aquaneat, 1.99 L Rodeo), *Cirsium arvense* (3.2 L Aquaneat, 6 L Rodeo), *Glechoma hederacea* Rodeo 11.7 L Rodeo, *Microstegium viminium* (1.3 L Aquaneat, 0.81 L Rodeo), *Pennisetum alopecuroides* 0.5 L Rodeo.

Visitor Center

Several treatments were conducted here in the parking lots adjacent to the center, in the large landscaping bed that was planted in 2022, at the base of the flagpole, and around the bike rental building on 3/23/23, 3/28/23, 5/10/23, 6/2/23, and 7/7/23. The following species were targeted with their corresponding products/ total amounts of solution used listed afterwards: *Cirsium arvense* 4 L Rodeo, *Eleaegnus umbellata* 0.0015 L Polaris 25% solution for a cut stump treatment of a single tree, *Pyrus calleryana* (0.25 L Rodeo) was discovered/ treated for the first time at this property, and Nuisance weeds (1 L Aquaneat, 17 L Rodeo, 3 L Polaris) in the landscaping beds that were associated with the mitigation planting behind the visitor center. Polaris was used in the parking lot crack weeds away from sensitive species. *Phragmites australis* MAIPMT- (1.51 L Polaris).

Wastewater Treatment Plant buffer

On 3/28/23, 5/10/23 and 9/19/23 several species were treated in the buffer that obscures the wastewater treatment plant to help to keep it free on non-native or invasive plants, which is the same goal for all of the buffers we treat at ASIS. The following species were targeted with their corresponding products/ total amounts of solution used listed afterwards: *Cirsium arvense* 0.35 L Aquaneat, *Lonicera japonica* 10 L Rodeo, Nuisance weeds (0.5 L Aquaneat, 2L Rodeo), and *Pennisetum alopecuroides* 0.15 L Rodeo.

Developed Area

Bayside Peninsula

On the following days 3/29/23, 3/31/23, 3/31/23, 4/3/23, 7/10/23, 7/11/23, 8/11/23, and 11/14/23 ASIS VEG MGMT team members treated several different species in a continued effort to control the spread throughout the campground sites and natural areas there. The following species were

targeted with their corresponding products/ total amounts of solution used listed afterwards: *Artemisia vulgaris* (1.435 L Rodeo), *Cirsium vulgare* (1.0 L Rodeo, 0.1 L Polaris), *Clematis terniflora* (5.6 L Rodeo, 1 L Polaris), *Eleaegnus umbellata* (0.5 L Rodeo), *Lonicera japonica* (139 L Rodeo, 0.3 L Polaris), *Pennisetum alopecuroides* (0.02 L Rodeo, 0.5 L Polaris), *Rosa multiflora* (2.265 L Rodeo) and monitoring only of *Rosa wichuraiana* that was found in loop B of the Bayside Campground in 2021 where no activity was seen and the treatment appeared to have been effective; we will look for this recently treated new invasion again in 2024 to ensure that it has been eradicated there. The large quantity of *Lonicera japonica* was treated with the UTV intellicast sprayer because of the density and large patch size warrant the use of a greater herbicide delivery tool.

Entrance Station

On three occasions we treated invasive plants near the entrance booths this past season on 5/15/23, 7/11/23 and 7/13/23. Four species were present in this area that required continued control. The following species were targeted with their corresponding products/ total amounts of solution used listed afterwards: *Centaurea maculosa* (0.2 L Rodeo), *Elusine indica* (35 L Polaris), *Lezpedeza cuneata* (0.1 L Rodeo), and *Trifolium arvense* (4 L Rodeo).

Boathouse

The small parking area adjacent to the historic structure of the Boathouse harbors some invasive plants in the parking lot islands and cracks in the pavement. On 5/15/23 the following species were targeted with their corresponding products/ total amounts of solution used listed afterwards: *Artemisia stelleriana* (0.5 L Rodeo), *Trifolium arvense* (0.15 L Rodeo) and again on 7/13/23 *Nuisance weeds* (2.25 L Polaris) were treated at the same location.

The Boneyard

This location is where heavy equipment is staged along with some grading materials that must be kept free of invasive plants that could be spread from there. On 7/11/23 and again on 11/14/23 this location was observed for the treatment of plant invaders. The following species were targeted with their corresponding products/ total amounts of solution used listed afterwards: *Artemisia vulgaris* (0.2 L Rodeo), *Cirsium vulgare* (0.5 L Rodeo, 0.07 L Polaris), and *Eragrostis curvula* (0.07 L Polaris).

The Causeway

This elevated roadway has some fertile areas that, while windswept and very salt sprayed, can afford small populations of invasive plants the small pockets that they can invade and become established in. On 3/28/23 a small sapling of *Morus alba* was treated with a cut stump treatment using (0.003 L Polaris). A patch of *Artemisia vulgaris* was discovered on the south side of the causeway just east of the bikepath bridge entrance was treated on 7/11/23 with (2.5 L Rodeo).

Life of the Forest

This location has parking lot islands that harbor invasive plants, has cracks in the parking lot and has a trail that because of heavy visitation, has occasional introductions of invasive plants. On 5/15/23 *Trifolium arvense* was treated in the parking lot islands with (0.1 L Rodeo). Later on 7/13/23 *Nuisance weeds* were treated in the cracks and curbing there with (1 L Polaris).

Life of the Marsh

This location also has a parking lot islands that harbor invasive plants, has cracks in the parking lot and has a trail that because of heavy visitation, has occasional introductions of invasive plants. On 4/3/23 and 4/4/23 *Lonicera japonica* was treated in the shrubs surrounding the parking lot where it

had become dense in its cover and exposed because the other plant species were not yet fully developed at this time of the year with (105 L Rodeo). On 4/4/23, both *Lonicera japonica* and *Rosa multiflora* were treated in the edge of the parking lot. For *Lonicera japonica* (80 L Rodeo) were used and for *Rosa multiflora* (0.3 L Rodeo) were used. On 5/15/23 *Trifolium arvense*, present in the parking lot islands in large numbers there in 2022 and programmed in for treatment in 2023, was treated with (4 L of Rodeo).

North Beach

The large parking lot at North Beach and its many interior islands harbor invasive plants as they do in the other smaller parking lots; to treat them we performed multiple treatments conducted on 5/15/23, 5/16/23, 5/18/23, 6/30/23. The targets during these treatments were *Centaurea maculosa* (11.05 L Rodeo), *Trifolium arvense* (6.25 L Rodeo) and *Nuisance weeds* (25 L).

Oceanside Drive

On 7/10/23 we treated *Clematis terniflora* (0.5 L Rodeo) at the dumpster at the end of the Oceanside drive and at the dump station we treated *Rosa multiflora* (0.05 L Rodeo) located next to the last dumpster there. On 7/11/23 we treated *Artemisia vulgaris* with (0.05 L Rodeo) at the dump station on Oceanside drive around the dumpster pad which has required repeat treatment for several years like all of the locations where this species has become established.

Visitor Contact Station

On 5/15/23, we treated *Trifolium arvense* with (3 L Rodeo), later on 7/11/23 we treated *Artemisia vulgaris* (0.2 L Rodeo), *Centaurea maculosa* (0.1 L Rodeo) and *Lezpeda cuneata* (0.1 L Rodeo) in the parking islands and around the perimeter of the parking lot in the shrubs. Lastly, on 7/13/23 the Nuisance weeds in the pavement were treated there with (4 L Rodeo).

Assateague State Park

On 3/28/23 behind the storage garage at the Assateague State Park concession across from their island headquarters *Ailanthus altissima* was treated with (0.06 L 25% Polaris), then *Eleaegnus umbellata* (0.03 L 25% Polaris) was treated in the shrubs along Bayberry drive. Later, on 3/31/23 additional *Eleaegnus umbellata* were located along Bayberry drive and they were treated with (0.012 L 25% Polaris). The last treatment we conducted on 7/11/23 where we again assisted our neighbor with some treatments to prevent the spread from them upon us was on *Centaurea maculosa* that was located when the patch there was revealed due to it being in bloom at the intersection of Rt. 611 and Bayberry drive with (4 L 2% Polaris).

OSV

On the following dates treatments were conducted in the roughly 12-mile zone of the island called the OSV (See Figure 1.): 4/19/23, 4/20/23, 6/22/23, 6/23/23, 7/18/23-7/20/23, 8/7/23, 8/30/23, 9/6/23-9/8/23, 9/12/23-9/14/23 and on 9/19/23. The following species were treated in this island zone and the corresponding herbicide follows each species listed. *Arthraxon hispidus* (0.05 L Polaris), *Carex kobomugi* (4 L Polaris), *Lonicera japonica* (20L Rodeo, 0.4 L Polaris) *Phragmites australis* ((ASIS- (50 L Aquaneat, 568 L Polaris) MAIPMT-(22.71 L Polaris), *Salsola kali* (We found 8 plants of during the Seabeach Amaranth survey and manually pulled them), and *Toxicodendron radicans* was treated at the backcountry campgrounds using (18 L Polaris).

Virginia District

NPS-Wallops Island Maintenance Facility

This fenced storage lot area was treated twice during the season on 8/21/23. Nuisance weeds were treated there with (63 L Polaris) in April and in August (50 L Polaris) was used.

Chincoteague Wildlife Refuge bridge bike path and crabbing decks

The recreational area here benefits from a treatment of the weeds that break up the pavement which could pose a threat to bicycle riders. On 4/18/23 *Eleusine indica* was treated in the cracks with (10 L Polaris). The very small patch of *Phragmites australis*, that we have treated since 2022 is nearly eradicated and received just (0.05 L Polaris) in a spot treatment.

USCG Life Saving Station Chincoteague

This remote location is visited infrequently by ASIS VEG MGMT. On 8/2/23 we visited the station and treated a newly discovered patch of *Eragrostis curvula* with (2.5 L of Polaris) See image titled, “ASIS biological technicians stand next to a patch of *Eragrostis curvula* they have treated at the USCG Station at the CNWR”.

on this same day we treated nuisance weeds in the pavement and sidewalk around the Station house and controlled the perimeter of all the structures to prevent climbing vines from damaging the historic structures at the site.

Discussion and Recommendations

We were very pleased with our accomplishments for the calendar year of 2023. The quantity of acreage treated by ASIS (8.1 acres) MA-IPMT (20 acres) can best be described as spot spraying with regards to all species excepting *Phragmites australis*, which is nearly always treated in large broadcast spraying areas. The many acres surveyed (approximately 1,368 acres) over the course of the treatments are a reminder that the majority of infestations at ASIS are manageable when compared to the amount of area actually treated. The ability for us to survey the less ubiquitous species we control on our property is only hindered in the shrubby areas of our habitat management areas; that allows us to have a reliable understanding of the status of nearly all of our infestations island-wide, excepting *Phragmites australis* which is too widespread to be assessed confidently annually from the ground. To maximize the result of our efforts in 2023 we focused on the most invasive species, indicated on Table 3 and to the extent possible, all known occurrences of each species were treated with the hope of reaching manageable levels for each species. Some species are too widespread to be able to be controlled entirely annually, they are *Arthraxon hispidus*, *Clematis terniflora*, *Eleusine indica*, *Glechoma hederacea*, *Lonicera japonica*, *Microstegium viminium*, *Miscanthus sinensis*, *Phragmites australis*, and *Trifolium arvense* at this time. Because our newest invasions are most likely to occur in the developed area, we spend considerable amounts of time surveying there to perform treatments, while looking for new invaders.

Habitat management areas like the headquarters are constantly under attack from invaders that are established on neighboring lands and must be surveyed for each year to ensure the progress made there thus far is not diminished. Additionally, this property itself has experienced a transition from agricultural land to a natural landscape of shrubs and forest in the un-mowed areas. This progression can be seen in Figure 3 where the transition towards development with designated green spaces, application of vegetation management to control invaders, and changes in mowing practices from 2008 through 2023 have rendered the property nearly unrecognizable from its previous state of agricultural cultivation.

We support other divisions and interests of our customers, the visitors. The maintenance division at ASIS does not have anyone with capacity to treat invasive or unwanted plants, so we are tasked with supporting their needs in this regard. To support the maintenance division with nuisance weeds treatments and to support workers and visitors from poison ivy about 16% of our time or 1.26 acres of the total acres treated this year was spent in support of their needs. We often are asked to do more.

Some species that we have treated at ASIS in recent years have been eradicated. This is often achievable when the invasion is early relative to its introduction via early detection and rapid response actions. We achieved this for the following species in 2023: *Hedera helix*, found in small quantities at Clement's inholding and at park housing, a single occurrence of *Juniperus procumbens* also at Clement's, a single *Lagerstroemia* sapling near the inlet, a patch of *Mentha suaveolens* next to Loblolly house, a single *Vitex rotundifolia* on the north beach of Bayside. These were examples where either repeated treatments (the case with *Hedera helix*, *Mentha suaveolens* and *Juniperus procumbens*) or one timely treatment (the case with *Pinus nigra* and *Vitex rotundifolia*) lead to eradication. Some previous eradications are overturned as the case has been with *Artemisia stelleriana*, *Ligustrum vulgare* and *Vitex rotundifolia*. Two species have remained eradicated at ASIS without an instance of being rediscovered, *Albezia julibrizzen*, *Alnus glutinosa* and *Lythrum salicaria*. *Rosa wichuraiana*, once well established at headquarters and recently found at Bayside campground was not treated this year because it was not encountered. When a species is not encountered in areas that it has been treated previously when monitored, or elsewhere we are unable to find it or encounter it for 3 consecutive years, we declare them to be eradicated.

The work we conduct each year is strategized primarily by feasibility and maintaining the commitment to continue to keep isolated, any infestation that has been contained by our management actions that is not yet eradicated. A new consideration will come to the forefront of our decision-making process henceforth because, this year we received notification that a publication had been completed by the USGS researcher Dr. Neil Ganju. This research paper, entitled "Elevation of marsh units in Assateague Island National Seashore and Chincoteague Bay, Maryland and Virginia", presents us with a lifespan of the western marsh portion of our island. All further work must consider the lifespan of the habitat management area that is infested by using the shapefiles of this publication in GIS analyses and weigh the decision to conduct treatments in an area that may erode, in some cases, in less than 25 years. The strategic approach toward the management of all our invasive species will be done with consideration for Sea Level Rise, the effort needed to reach manageable levels of control when repeated treatments are anticipated and whether personnel can reasonably access the treatment area.

Most of our management actions, with regards to obtaining further control of a given species at a given area, have been successful. Treated plant material rarely resprouts because we use effective herbicides. However, new recruitment that comes from many sources such as birds transporting propagules is a common problem that we encounter here at ASIS for *Lonicera japonica*, *Ligustrum vulgare* and *Rosa* species. *Phragmites australis*, because of its density and deep rhizomes must be retreated more than twice, usually, to control it. Windborne propagules from thistle species, and deer who transport seeds from grasses like *Microstegium viminium* and *Pennisetum alopecuroides* for example, confound our efforts. The sea is yet another front we face that brings *Carex kobomugi*, *Phragmites australis*, *Salsola kali* and *Vitex rotundifolia* seeds and or rhizomes. These are introductions that we cannot reduce, but we can make the environments we treat more resilient by avoiding treatments that cause browning out or dead spots by timing treatments, also encouraging cover and growth that encourages shade is a goal of ours, so there are some small things we do to mitigate these constant introductions.

Citizen scientists are quite common in the current era. To utilize their inquisitiveness and desire to help public land managers, we have an iNaturalist project called “Assateague Invasive Plant Watch” where a select list of targets is suggested, but any species may be recorded there, if encountered. To date, 58 observations have been made by users for 11 species. Most of the observations have been made at the CNWR, who have been notified of the project in the App and will hopefully use the data to help further their own management actions or add additional observations.

2008



2013



2018



2023



Figure 3: MD Headquarters: transition of development, vegetation management, and mowing practices from 2008 through 2023. Images courtesy of Google Earth.

Lessons Learned

We have been successful in treating invasive plants of many different species here at ASIS, but there are still lessons that we have learned. We have learned that we need to have access in dense *Morella cerifera* dominated habitat management areas, so that we can locate and treat plants when they become established in these problematic areas. For example, to treat *Clematis terniflora*, *Lonicera japonica* and *Phragmites australis* we have had to install extensive trail systems in these difficult areas just to be able to find the plants. This year we maintained a trail system at the North end inlet forest, in the forest west of loop C at Bayside peninsula to treat *Clematis terniflora*, *Lonicera japonica* and *Pennisetum alopecuroides* and others there. Two additional systems of transects were cut into and flagged at Burn Unit 7 (south of Hungerford road) and Burn Unit 10 (west of Km 24) to be able to treat *Phragmites australis*. These trail systems are quite difficult to install. Hand saws, laupers and hedge trimming-equipped Stihl string trimmers are the tools used to install the access routes. We cut and flagged the routes before they arrived. By enabling the MA-IPMT easy access to the *Phragmites australis* in these dense areas of Burn Units 7 and 10 they were able to treat 20 acres in a week with a crew of 5, an all time record for ground spraying at ASIS. The combination of long hoses up to 900 feet in length, flagged trails and defined routes are prescribed for the treatment of this species here, when aerial spraying is not utilized. The decision to not to continue the use of fire with frequency and aerial spraying of large dense patches, as we did at the onset of the *Phragmites australis*, has resulted in the current, more labor-intensive direct approach.

Cirsium species have been difficult to control at ASIS because of their prolific seed production, neighboring agencies lacking control efforts, the species ability to flower more than once annually and their ability to evade detection in dense vegetation have made this species especially problematic, but this is true state-wide and they are designated noxious weeds by the state of MD. To overcome these issues, we survey and treat this species multiple times during the growing season. Early season, mid-season and late season treatments must be employed to gain an advantage of an infestation.

The importance of the annual Seabeach Amaranth survey cannot be understated. This survey of the beach from the inlet to the VA state line reveals the locations of *Carex kobomugi*, affords the opportunity to hand pull *Salsola kali* plants, provides the early detection of threats like *Vitex rotundifolia* and can provide a status assessment for the presence of both Federally-listed and State-listed rare plant species. The survey is best performed between mid-July and mid-August in order to capture the targets at the peak of their phenology.

Recommendations

We will utilize the Marsh Unit Lifespan shapefile created by Dr. Neil Ganju to consider whether the length of time before any habitat management area section is impacted in the short term and consider the benefit of taking management actions like chemical treatments in areas that will erode in less than 25 years.

There are 2 emerging species that will require more treatment to control because of their highly invasive potential. It is recommended that an intensive effort be made to treat all areas of the developed area, including the Assateague State Park, if possible, this growing season. These species are *Centaurea stoebe*, and *Trifolium arvense*. Both species pose a threat to animals that eat them.

In the developed area, excluding the Assateague State Park, *Arthraxon hispidus* should be treated in its entirety during the coming growing season along the ASIS Bayberry drive and throughout the Oceanside campground. Previous pilot efforts of control have been effective using Glyphosate herbicide at 2%.

All trail systems on the North end should be maintained and flagged. At Bayside, trails should be maintained, as well and in the OSV at Burn Units 7 and 10 should be revisited to either retreat them, or remove flagging.

iNaturalist- we should consider adding additional species to the watch list in the project, continue to review the observations and identify them appropriately.

Reconsider the use of aerial spraying and fire for the treatment of *Phragmites australis*. Because monitoring and mapping of this species at the landscape level is extremely difficult in this barrier island habitat, Map the island using of these techniques in this order of preference: 1. Machine learning with High resolution imagery, 2. Drones with processing of imagery, 3. Helicopter as we did in 2008 to better understand the current population at ASIS. This map would be useful for the planning of these methods and would assist in the monitoring of the effectiveness of previous treatment actions.

Reestablish and Maintain Partnerships

We may consider initiating conversations with partners again (Assatague State Park, Maryland Department of Natural Resources Natural Heritage Program) with thinking of invasives on adjacent lands. Specifically, the intent would be to raise their awareness of the presence of noxious weeds on their lands, ensure that if we choose to treat species on their lands that they continue to approve, informally, of doing so and to see if, perhaps they can position themselves to help in the control efforts.

We will build upon the proposal presented to the MAIPMT in 2023 by furthering treatments in Burn Unit 7 and with additional monitoring find the most appropriate areas to add to this planned activity.

Prioritized Treatments for ASIS's (Priority 1 and 2 Species) 2024

Tier 1

Artemisia vulgaris (Mugwort)

Revisit all previously treated areas in the developed area and retreat as necessary, what is discovered with a foliar application of glyphosate herbicide at 2% concentration.

Carex kobomugi (Japanese Sedge)

Locate during the Seabeach Amaranth survey all occurrences in MD and treat them in August with a foliar application of imazapyr herbicide at 2% concentration.

Cirsium arvense (Canada Thistle)

Revisit all previously treated areas twice during the growing season at a minimum and retreat, as necessary what is discovered with a foliar application of glyphosate herbicide at 2% concentration.

Cirsium vulgare (Bull Thistle)

Revisit all previously treated areas twice during the growing season at a minimum and retreat, as necessary what is discovered with a foliar application of glyphosate herbicide at 2% concentration.

Clematis terniflora (Virgin's Bower)

Maintain the trail system at Bayside west of loop C and treat later in the summer just before flowering with a foliar application of glyphosate herbicide at 2% concentration.

Microstegium viminium (Japanese Stiltgrass)

Revisit all previously treated areas at headquarters and retreat as necessary, what is discovered with a foliar application of glyphosate herbicide at 2% concentration. Visit Ferry landing road in mid-summer and determine if there are any plants present there along the roadside and in the adjacent forest.

Miscanthus sinensis (Chinese Silvergrass)

A more comprehensive survey of the shrub zone between Km 0.5 and Km 2.0 is needed to fully map the occurrences of this species that was found to have expanded there from the inlet forest population in 2023. Treatments at the end of the summer are recommended across this entire region and a foliar application of imazapyr herbicide with 2% concentration is recommended.

Pennisetum alopecuroides ((syn. *Cenchrus purpureus*))(Black Fountaingrass))

The population at the headquarters and the other population at the forest west of Bayside loop C are well under control, but a comprehensive search of these areas should be conducted with a corresponding treatment of a foliar application at 2% concentration of glyphosate herbicide at the end of summer to maintain or reduce current conditions.

Rosa multiflora (Multiflora Rose)

Treated at the developed area (including Assateague State Park along Bayberry drive) and headquarters for many years, we must continue to look for this species during the course of other work and, if encountered, it should be treated with a foliar application of a 2% concentration of glyphosate herbicide, or a cut stump treatment with a 25% solution of imazapyr herbicide.

Trifolium arvense (Rabbit's Foot Clover)

Early in the growing season (May, June) and before, or just before the onset of flowing, this species should be treated throughout the developed area including Assateague State park with a 2% concentration of glyphosate herbicide.

Tier 2

Arthraxon hispidus (Small Carpetgrass)

Late in the growing season (September, October) and before, or just before the onset of flowing, this species should be treated throughout the developed area excluding Assateague State park with a 2% concentration of glyphosate herbicide. We need to revisit the results of the SCA monitoring conducted at Oceanside campground to consider their implications.

Centaurea stoebe (Spotted Knapweed)

Early in the growing season (May, June) and before, or just before the onset of flowing, this species should be treated throughout the developed area including Assateague State park with a 2% concentration of glyphosate herbicide.

Lonicera japonica (Japanese Honeysuckle)

Early in the growing season (March, April) this species should be treated at Bayside peninsula beginning at the edge of Bayside drive facing north and then the other side of this portion of the campground should be treated to the first treatment but working along the southern edge of road that permeates campground loops A, B, and C to the end of the peninsula and including the forest west of loop C. along the southern edge. If time allows, the interior island of the campgrounds should be treated. Also, the Valentines road population and the plants scattered between Km 18 to Km 20 should be revisited. The UTV mounted intellicast sprayer should be used for treatments that can be reached within 300 feet of a roadway, backpacks should be used for more remote treatments. Plants should be treated with a 2% concentration of glyphosate herbicide.

Phragmites australis (Common Reed)

Burn units 7, 8, 9, 10 should be revisited starting in late June to treat reemergent plants in these areas that have been managed in recent years. Specifically, at Unit 7 the southeast corner, at Unit 8 the center region that lies between the polygons treated last in September of 2019 should be investigated (a 62 acre survey area). Also, new transects or trail systems will need to be installed in Burn Unit 7 for the MA-IPMT to be able to gain access there. At Unit 9, which has been completely treated as of 2023, an effort to find any resprouting material should be made throughout the Unit. At Unit 10, which has been completely treated as of 2023 as well, an effort to find any resprouting material should be made throughout the Unit, as well. Once the retreatments are complete from our ASIS team the flagging in Burn Units 7 and 10 should be removed prior to the installation of new flagging in the northern portion of the Unit 7. New transects and trails will need to be installed in the northern portion of Unit 7 by our team at the end of the coming season in advance of the late fall visit from MA-IPMT. The trail system to be installed for this action should originate from the gate at Hungerford road at the beach entrance. Because we will need to revisit the *Paulownia tomentosa* infestation in this area, an access path will further benefit this action and serve more than one purpose. Treatments can also be prioritized at Green Run with the focus beginning at the intersection of Baltimore Ave. and Green Run camp road working to the southwest. Lastly, the infestations discovered at some inholdings during the 2021 season could be treated with the UTV intellicast sprayer, if the roadways have been cut by the maintenance division.

After the summer has passed our team's final 3 weeks will afford time revisit our goals for the MA-IPMT beyond the planned work in Unit 7 and add additional tasks to the anticipated work schedule for them, with a better understanding of the conditions at that time.

Acknowledgments

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Table 3. ASIS Invasive Plant Species and Locations 2023 including status

								Habitat Management Zone Name Yes=Present					Acres Treated in 2023
Species	Invasiveness at ASIS High, Med, Low	MD Noxious	ASIS/MD Tier	MD MISC MOSC List	VA Rank	Newly Emerging	Species Eradicated?	North End	Headquarters	Developed Area	OSV	VA	
<i>Artemisia vulgaris</i> (Mugwort)	High	No	1	Yes	Not Ranked	No	No	No	Yes	Yes	No	No	0.2854
<i>Carex kobomugi</i> (Japanese Sedge)	High	No	1	Yes	High	No	No	Yes	No	Yes	Yes	No	0.0247
<i>Cirsium arvense</i> (Canada Thistle)	High	Yes	1	Yes	High	No	No	Yes	Yes	Yes	No	No	0.1251
<i>Cirsium vulgare</i> (Bull Thistle)	High	Yes	1	Yes	Med	No	No	No	Yes	Yes	No	No	0.0136
<i>Clematis terniflora</i> (Virgin's Bower)	High	No	1	Yes	Not Ranked	No	No	No	Yes	Yes	No	No	0.0400
<i>Microstegium viminium</i> (Japanese Stiltgrass)	High	No	1	Yes	High	Yes	No	No	No	Yes	No	No	0.2404
<i>Miscanthus sinensis</i> (Chinese Silvergrass)	High	No	1	Yes	Med	Yes	No	Yes	No	No	No	No	0.0563
<i>Pennisetum alopecuroides</i> ((syn. <i>Cenchrus purpureus</i>)(Black Fountaingrass))	High	No	1	Yes	High	No	No	No	No	Yes	No	No	0.0675
<i>Rosa multiflora</i> (Multiflora Rose)	High	No	1	Yes	High	No	No	No	Yes	Yes	No	No	0.0166
<i>Trifolium arvense</i> (Rabbit's Foot Clover)	High	No	1	No	Not Ranked	Yes	No	No	Yes	Yes	No	No	0.1013
<i>Arthraxon hispidus</i> (Small Carpetgrass)	High	No	1	Yes	Med	Yes	No	No	Yes	Yes	Yes	No	0.0003

<i>Centaurea stroebe</i> (Spotted Knapweed)	High	No	1	Yes	High	No	No	No	No	Yes	No	No	0.0665
<i>Lonicera japonica</i> (Japanese Honeysuckle)	High	No	1	Yes	High	No	No	Yes	Yes	Yes	Yes	No	1.7401
<i>Phragmites australis</i> (Common Reed)	High	No	1	Yes	High	No	No	Yes	Yes	No	Yes	No	18.797
<i>Ailanthus altissima</i> (Tree of Heaven)	Med	No	2	Yes	High		No	Yes	No	No	No	No	0.0371
<i>Eleusine indica</i> (Wiregrass)	Med	No	2	Yes	Not Ranked	No	No	No	Yes	Yes	No	No	0.2002
<i>Glechoma hederacea</i> (Creeping Charlie)	Med	No	2	Yes	Not Ranked	No	No	No	Yes	No	No	No	0.0578
<i>Salsola kali</i> (Tumbleweed)	Med	No	1	No	Not Ranked	No	No	Yes	No	No	Yes	No	0.0044
<i>Elaeagnus umbellata</i> (Autumn Olive)	Low	No	1	Yes	High	No	No	No	Yes	Yes	No	No	0.0095
<i>Eragrostis curvula</i> (Weeping Lovegrass)	Low	No	1	No	Not Ranked	No	No	No	No	Yes	No	No	0.0178
<i>Lezpedeza cuneata</i> (Chinese Bushclover)	Low	No	1	Yes	High	No	No	No	No	Yes	No	No	0.0005
<i>Ligustrum vulgare</i> (Privet Bush)	Low	No	1	Yes	Not Ranked	No	No	No	Yes	No	No	No	0.0003
<i>Morus alba</i> (White-paper Mulberry)	Low	No	1	Yes	Low	No	No	No	No	No	No	No	0.0002
<i>Pyrus calleryana</i> (Callery Pear)	Low	No	1	Yes	Med	Yes	No	No	Yes	No	No	No	0.0012
<i>Trifolium praetense</i> (Red Clover)	Low	No	1	No	Not Ranked	Yes	No	No	Yes	No	No	No	0.0002
<i>Paulownia tomentosa</i> (Princess tree)	Low	No	1	Yes	High	No	No	No	No	No	No	No	0
<i>Artemisia stelleriana</i> (Dusty Miller)	Low	No	2	No	Not Ranked	No	No	No	Yes	Yes	Yes	No	0.0025
<i>Hedera helix</i> (English Ivy)	Low	No	1	Yes	Med	No	Yes	No	No	No	No	No	0

<i>Vitex rotundifolia</i> (Beach Vitex)	Low	No	1	Yes	Early detection sp. list	No	Yes	No	No	No	No	No	0
<i>Juniperus procumbens</i> (Dwarf Juniper)	Low	No	2	No	Not Ranked	No	Yes	No	No	No	No	No	0
<i>Lagerstroemia indica</i> (Crepe Myrtle)	Low	No	2	No	Not Ranked	No	Yes	No	No	No	No	No	0
<i>Mentha suaveolens</i> (Woolly Mint)	Low	No	2	No	Not Ranked	No	Yes	No	No	No	No	No	0
<i>Pinus nigra</i> (Black Pine)	Low	No	2	No	Not Ranked	No	Yes	No	No	No	No	No	0
Nuisance Weeds	NA	NA	NA	N/A	N/A	No	No	No	Yes	Yes	No	Yes	1.0738
<i>Toxicodendron radicans</i> (Poison Ivy)	N/A	No	N/A	N/A	N/A	No	No	No	Yes	Yes	Yes	No	0.1100

Table 4:
Species Treated at ASIS by Habitat
Management Area

Species (red text=eradicated)	Headquarters									X=Present H=Historical E=Eradicated at present	
	North end	Housing Buffer	Housing Meadow	Southern Border	UMES Buffer	Polebarn Buffer	Sinepuxent Buffer	Visitor Center	Developed Area	OSV	VA District
<i>Ailanthus altissima</i> (Tree of Heaven)	X	-	-	-	-	-	-	-	-	H	-
<i>Artemisia stellariana</i> (Dusty Miller)	H	-	-	-	-	-	-	-	X	H	-
<i>Artemisia vulgaris</i> (Mugwort)	-	-	X	X	X	-	X	X	X	-	-
<i>Arthraxon hispidus</i> (Small Carpetgrass)	X	X	X	-	-	-	X	X	X	X	-
<i>Carex kobomugi</i> (Japanese Sedge)	X	-	-	-	-	-	-	-	X	X	-
<i>Centaurea maculosa</i> (Spotted Knapweed)	-	-	-	-	-	-	-	-	X	-	-
<i>Cirsium arvense</i> (Canada Thistle)	X	-	-	X	X	-	X	X	X	-	-
<i>Cirsium vulgare</i> (Bull Thistle)	X	X	-	-	-	-	X	-	-	-	-
<i>Clematis terniflora</i> (Virgin's Bower)	-	-	-	-	-	-	X	-	X	-	-
<i>Elaeagnus umbellata</i> (Autumn Olive)	-	-	-	H	-	-	X	-	X	-	-
<i>Eleusine indica</i> (Wiregrass)	-	-	-	-	-	-	-	X	X	-	X
<i>Eragrostis curvula</i> (Weeping Lovegrass)	-	-	-	-	-	-	-	-	X	-	X
<i>Glechoma hederacea</i>	-	-	-	-	X	-	-	X	-	-	-

(Creeping Charlie)											
<i>Hedera helix</i> (English Ivy)	-	E	-	-	-	-	-	-	-	E	-
<i>Juniperus procumbens</i> (Dwarf Juniper)	-	-	-	-	-	-	-	-	-	E	-
<i>Lagerstroemia indica</i> (Crepe Myrtle)	E	-	-	-	-	-	-	-	-	-	-
<i>Lezpedeza cuneata</i> (Chinese Bushclover)	-	-	-	-	-	-	X	X	X	-	-
<i>Ligustrum vulgare</i> (Privet Bush)	-	-	-	-	-	H	X	-	-	-	-
<i>Lonicera japonica</i> (Japanese Honeysuckle)	X	X	X	X	X	X	X	X	X	X	-
<i>Mentha suaveolens</i> (Woolly Mint)	-	-	-	E	-	-	-	-	-	-	-
<i>Microstegium viminium</i> (Japanese Stiltgrass)	-	X	X	X	X	X	X	X	H	-	-
<i>Miscanthus sinensis</i> (Chinese Silvergrass)	X	-	-	H	-	-	-	-	-	H	-
<i>Morus alba</i> (White-paper Mulberry)	-	-	-	-	X	-	-	-	X	-	-
Nuisance Weeds	-	-	-	-	-	-	-	-	X	-	X
<i>Paulownia tomentosa</i> (Princess tree)	-	-	-	-	-	-	-	-	H	H	-
<i>Pennisetum alopecuroides</i> (syn. <i>Cenchrus purpureus</i>) (Black Fountaingrass)	X	X	X	X	X	-	X	X	X	-	-
<i>Phragmites australis</i> (Common Reed)	X	-	-	-	-	-	X	-	X	X	X
<i>Pinus nigra</i> (Black Pine)	E	-	-	-	-	-	-	-	E	-	-
<i>Pyrus calleryana</i> (Callery Pear)	-	-	-	-	-	-	X	-	-	-	-
<i>Rosa multiflora</i> (Multiflora Rose)	-	X	-	X	X	X	X	X	X	X	-
<i>Rosa wichuraiana</i> (Memorial Rose)		H	H	H	H	H	H	H	H		

<i>Salsola kali</i> (Tumbleweed)	X	-	-	-	-	-	-	-	X	X	-
<i>Toxicodendron radicans</i> (Poison Ivy)	X	X	X	X	X	X	X	X	X	X	X
<i>Trifolium arvense</i> (Rabbit's Foot Clover)	-	-	-	-	-	-	-	-	X	-	-
<i>Trifolium praetense</i> (Red Clover)	-	-	-	-	-	-	-	X	-	-	-
<i>Vitex rotundifolia</i> (Beach Vitex)	E	-	-	-	-	-	-	-	E	-	-

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https://mda.maryland.gov/plants-pests/Documents/MD_%20FilterGuidanceRevisionPropagulePressure.pdf

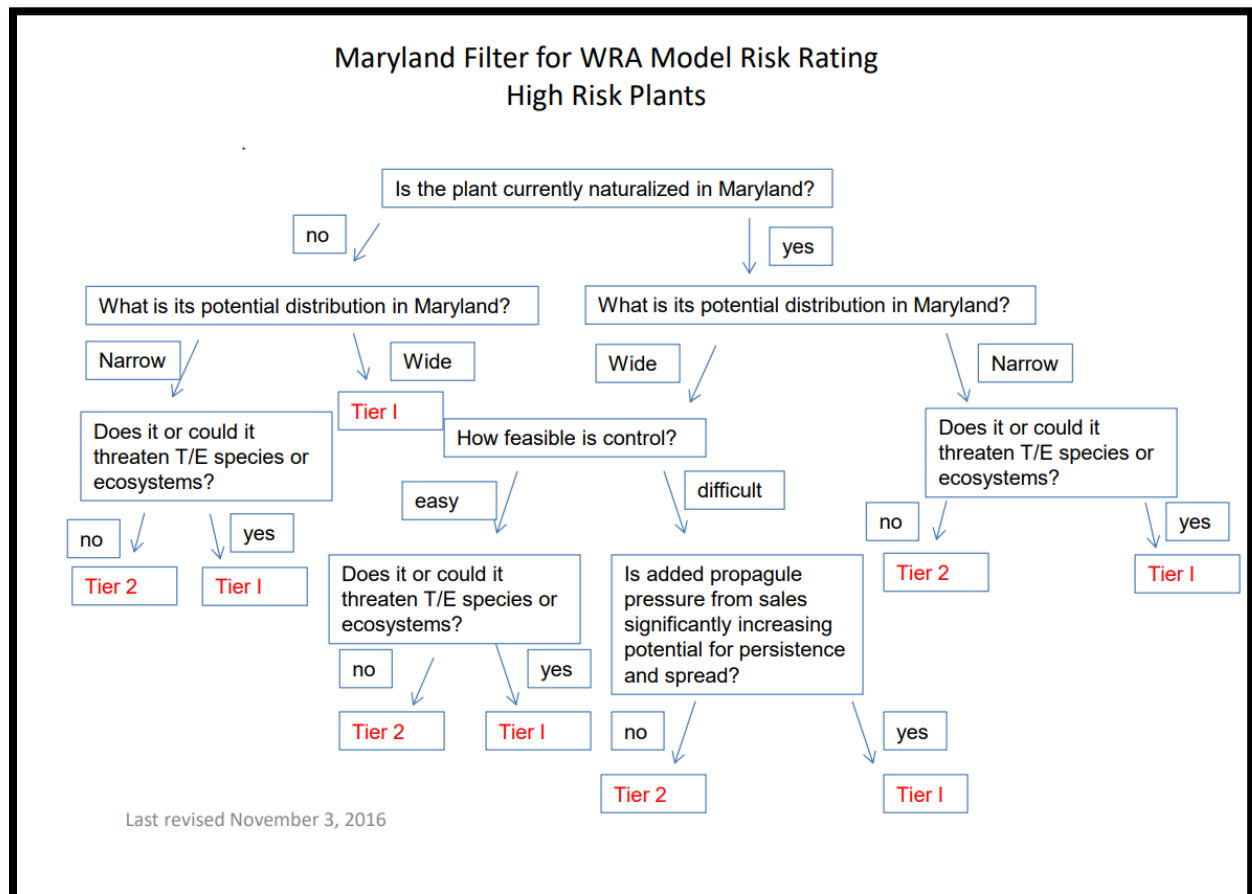
VA RANKING [nh-invasive-plant-list-2023.pdf \(virginia.gov\)](#) from the VA natural heritage program

<https://www.dcr.virginia.gov/natural-heritage/document/nh-invasive-plant-list-2023.pdf>

2016 Draft General Management Plan for Assateague Island National Seashore

Appendices

Appendix A:



Appendix B:
ASIS Workforce

Worker Title	Description of Worker
Registered Technician	This is a park employee who has completed the required annual training sanctioned by the MD Department of Agriculture (MDA). A Registered Technician can apply pesticides autonomously, in operations in which they have been trained, but they may not supervise non-credentialed applicators.
Certified Applicator	This is a park employee who has passed the Core and applicable Category Pesticide Applicator exams and is licensed. A Certified Applicator may apply autonomously and may also supervise other non-credentialed applicators as long as they are on-site.

Appendix C:
Treatment Methods

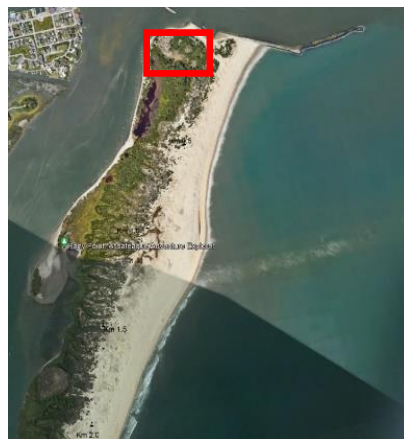
Method	Description of Control Methods
Cut then spray	Remove top growth using hand-held or motorized tools. Typically directed towards woody plants, including vines. Any woody shrubs can be cut to a stump and then immediately treated with a concentrated herbicide solution.
Foliar Spray	An herbicide application to target plant foliage.
Hand Pull	Remove plant from soil by pulling or digging it from the soil using manual equipment.
Basal Bark	Woody species can be stem-treated. Basal bark is an oil-based mixture applied to the lower portion of intact stems.
Cut Stump	Non-suckering woody plants can be cut and stump-treated to prevent regrowth. Oil-based mixtures can also be applied to previously cut stumps by treating the remaining bark as well.
Monitor	Systematic review of site to detect target species, whether new infestation or remnants from previous operation.
Hack and squirt	Woody species can be stem-treated. Hack and squirt is a concentrated mixture applied to fresh, spaced cuts made in the bark.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Ailanthus altissima* (Tree of Heaven)

2023 Activity

0.0371 Acres



The *Ailanthus altissima* trees at the time of discovery on the inlet dunes (Image Credit: J. Chase (NPS))

Map of location at the North end inlet (red box)

Current Conditions:

Ailanthus altissima (Tree of Heaven) was encountered at ASIS in 1984 by botanist Steven Hill at Scotts Point. Later, in 2004 it was again discovered by botanist Chris Lea (100 meters) south of Valentine's inholding. Since 2004 other island locations (Pope island, Scotts Ocean Beach Hotel footprint, dunes at the Inlet Bayshore) were found, located and treated repeatedly and successfully by ASIS. A new site a few hundred meters to the south of the inlet was discovered and treated in 2021 and in 2022, but was inactive in 2023. A single treatment was conducted for this species in March, behind the garage on the south end of the large concession parking lot at the Assateague State Park, that had been found during the 2022 summer season. The stumps of nearly 20 small trees were cut at ground level. This species has required repeated treatments at the north end inlet to contain and maintain it. While some infestations with multiple individuals of varying ages like this have been found and treated in recent years, there is not a trend that indicates there is a marked increase in the infestations of this species at ASIS. This species remains well under control island-wide at present.

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

☒ Polaris (Imazapyr) 25% cut stump

Notes: A discovery of *A. altissima*, made by Jonathan Chase at the inlet forest during treatments of *Miscanthus sinensis* there in early September 2021, returned this species onto our list of targeted plants when a few small saplings were discovered (See image above on left). The inlet area has a long history of small infestations of this species but is very much under control at manageable levels at this time. These plants were treated in late July of 2022 and were inactive in 2023.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Artemisia vulgaris* (Mugwort)

2023 Activity

0.2854 Acres



Image Credit: Doug Goldman, hosted by the USDA-NRCS PLANTS

Current Conditions: *Artemisia vulgaris* (Mugwort) was first encountered in 1984 by botanist Steven Hill on Great Egging Island. Later at the ASIS Sinepuxent Visitor Center landscaping beds in 2012, it was again encountered and then treated for the first time in 2013. This herbaceous species has required annual treatments in the places where it has been discovered at ASIS because it becomes established rhizomes. There were several active sites of this species in 2023; the species is restricted to (8) locations at ASIS. All ASIS sites were visited and/ or treated in 2023. All but site 1.), listed below, were active in 2023.

Areas Currently Infested at ASIS: This species currently occurs at ASIS in (8) active sites in the MD Developed Area, they are: 1.) The eastern guardrail by the entrance to the Park, 2.) The Ranger Contact Station deer checking station on the island, 3.) The north side of Bayside Drive between loops B and C and 4.) The area directly surrounding the trash dumpster at the dump station on Oceanside Drive (discovered 2018) 5.) the southern side of the causeway, just near the Verrazano bridge. 6.) The boneyard, and 7.) Bayside Campground loops B and 8.) The ASIS Headquarters and Maryland Visitor Center.

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Aquaneat, Rodeo (Glyphosate) 2%, Polaris (Imazapyr) 2% —>Foliar application

Notes: A sizable infestation of *A. vulgaris* had appeared in the vicinity of the ASIS Sinepuxent District Visitor Center since 2012, when it was discovered there. This species has been found to be active on the island since then. On the mainland at Park Headquarters, the plants are encountered most frequently in the UMES vegetation buffer that runs the length of our southern property line. Control efforts at the Headquarters and Island infestations during 2023 continued in June, September and October, as an apparent seed bank continues to produce many plants, particularly at the Headquarters property. Of the (8) infestations listed above, (7) were treated in 2023. Triclopyr herbicides like Garlon 3A and Garlon 4 Ultra can be used selectively, so that grasses are not damaged in the treatment areas, which can allow native cover to return more quickly. Replacing cover quickly is helpful when it prevents further productivity of this species in already-infested areas because it repopulates from persistent seed banks. Special attention must be given to the landscaping beds surrounding the Maryland Visitor Center to ensure that this species does not become further established there. This species is spreading in all areas it has infested at ASIS. Treatment and/ or monitoring will continue at all sites in 2024.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Artemisia stelleriana* (Dusty Miller)

2023 Activity

0.0025 Acres



Image credit: Donald Cameron Bugwood.org

Current Conditions:

A small infestation was discovered in August 2004 near the 5.75 Km post on the north end of the island. It is estimated that this infestation occupied less than 500 meters squared in 2005. This infestation was mapped and treated in 2006 and was completely controlled by 2010. A new infestation was discovered in the parking lot island at the Boathouse in 2023.

Specific Infestation Location(s): Boathouse parking lot

Areas Currently Infested at ASIS:

☐ Headquarters (Mainland)

☐ Island (North end)

☒ Island (Developed Area)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2%

Notes:

A single treatment was conducted for this species in May at the Boathouse parking lot island that is closest to the entrance to its west. This small patch is contained within the curbed parking island there. To treat the plants, a 2% solution of Rodeo (glyphosate-based herbicide) was used. Repeated treatments may be needed and monitoring of the site should be conducted for 3 consecutive years along with a similar treatment, if it is encountered, until it is eradicated.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Arthraxon hispidus* (Small carpetgrass)

2023 Activity

0.0003 Acres



Image Credit: Leslie J. Mehrhoff
Invasive.org



Image Credit: J. Chase (NPS)



Image Credit: J. Chase (NPS)

Current Conditions: *Arthraxon hispidus* (Small carpetgrass) was first reported at ASIS by botanist Steven Hill in 1984 and later encountered in 2017 when botanist Sarah Koser of E. A. Engineering and ASIS biological technician Jonathan Chase discovered the grasses growing along the roadside at the end of the Oceanside Drive near the traffic circle while conducting wetland delineations in the Oceanside Campground. Searches for this species were conducted in 2021 in the developed area, the North end and in the OSV. The species was found to be sparse in the forest at the inlet, densely abundant at the Oceanside Campground, and present sparsely on just (2) OSV dune crossings: 1. the road to Valentine's and 2. Pine Tree Camp Road. The headquarters property has some dense patches in open sunlit areas of areas not mowed.

Areas Currently Infested at ASIS: This species is ubiquitous throughout the Developed Area at ASIS particularly along roadsides where it exists in the mowed areas between the roadsides and shrubs. It does not appear to invade well into shaded areas or to become established in the shade; this species appears to prefer full sunlight.

Treatment History: ☐ Newly Encountered ☒ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used: Polaris (Imazapyr) 2% —>Foliar application

Notes: This species has now been encountered at Headquarters, in the OSV, and on the North end as of 2023. Treatments occurred here in 2022: 1.) Oceanside Campground 2.) Sinepuxent Vegetation buffer (Headquarters) 3.) The inlet forest. These areas were selected for treatment because they could control further spread. Areas treated in 2021 remained well under control when observed during the growing season in 2023 and just Valentine's road was treated this season. We are currently managing the spread by targeting places like roadbeds of the OSV before they flower and along roadsides in the developed area. In 2023 the SCA completed a monitoring of their treatments to determine the effectiveness of the 2022 SCA Native Plant CORPS treatment effort. The (3) 30m x 30m plots were monitored at Oceanside Campground and we await the results at this time. These plots are located in the south end of camp between horse camp and loop 2. There are 2 control plots and 1 treatment plot. The treatment plot is the most southern plot and it was treated at the end of August, 2022. The plots were monitored initially in August of 2022 pre-treatment and again in November 2022 post treatment. The plots were monitored once again in 2023, one year after the treatments.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Carex kobomugi* (Asiatic Sand Sedge)

2023 Activity

0.0247 Acres



Image Credits: J. Chase (NPS)

Current Conditions:

Carex kobomugi (Asiatic Sand Sedge) was first encountered at ASIS in 1999 in numerous locations along the length of the island between the high tide line and the shrub zone on the MD portion of the island between and upon dunes. *C. kobomugi* has been treated at ASIS since the year 2000. Successive, annual treatments of the entire island's beaches since 2013 have significantly reduced the occurrence of this species in Maryland. This sedge species is currently present in large colonies on the Chincoteague National Wildlife Refuge, in Virginia. Treatments continued in 2023 in Maryland.

Areas Currently Infested at ASIS:

☒ Island (North end)

☒ Island (Developed Area)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used: Polaris (Imazapyr) 2% —>Foliar application

Notes: Asiatic sand sedge, an invasive plant from Asia, was introduced into the United States for its sand-building capabilities. ASIS Ecologist Chris Lea discovered it for the first time on Assateague Island National Seashore in 1999 at multiple locations on the island. This clonal plant forms dunes in the foredunes, in a niche naturally filled by native Beach Grass (*Ammophila breviligulata*). A specimen of this species is vouchered in the ASIS Herbarium. Treatments for this species have been conducted in 2006, 2008, 2009, 2010, and 2013 through 2023. Since 2015, ASIS has used Imazapyr instead of Glyphosate herbicide and had better results with regards to efficacy. Retreatments are not needed with the use of this herbicide. The frequent treatment of this species on an island-wide scale has helped to make it difficult to detect now, whereas it was once evenly distributed across the length of the island. The annual census for the federally-listed Threatened plant Seabeach Amaranth has been an integral link to the success with the management of this species because *C. kobomugi* plants are discovered during these searches the timing of which, in August, is both amiable to the discovery and treatment of this species. In 2023, infestations (mostly very small colonies, smaller than those pictured above) were discovered during Seabeach Amaranth searches. These occurrences were treated in August after the completion of the census.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Centaurea maculosa* (Spotted Knapweed)

2023 Activity

0.0665 Acres



Image Credits: J.
Chase (NPS)



Current Conditions:

First encountered at ASIS by Steven Hill in 1984, but described as "Rare, seen only along MD bridge causeway, apparently recently introduced", this species would not be reported again until the summer of 2021 when our Vegetation Management Team was surveying invasive plant species in the Oceanside Campground. At the same time it was also rediscovered and reported by a visitor through the iNaturalist ASIS invasive plant watch page ([Assateague Invasive Plant Watch · iNaturalist](#)); this is a terribly invasive plant that received early detection and rapid response actions again in 2022. The known extent of the infestations at ASIS are restricted to the North Beach parking lot and south to the Group camping parking lot and the shrub zone between these two locations.

Treatment History: ☒ Newly Encountered ☒ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2% —>Foliar application

Notes: This species is believed to have been present at the North Beach parking lot less than 3 years based on the size of the rosettes that were discovered. The seeds of every plant were removed and disposed of to the extent possible in late October 2021 and an exhaustive search was made to locate and treat with herbicide, every plant that could be found until the extent of the infestation was determined, which closely surrounded the North Beach Parking lot. The greatest concentration of rosettes was found at the southwest entrance to the parking lot from Bayberry Drive and it is here that the infestation is thought to have begun. In the images above L to R Kate holds a removed seed head, a basal rosette is in the center image and on the right a mature fruiting plant lies in the center of the image indicating the copious amounts of seed this species can produce. The plants are poisonous and must be handled carefully with protective gloves. Treatments occurred in June and October of 2022 at North Beach and the Group Camp parking lot. Every plant was located and treated to the greatest extent possible.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Cirsium arvense* (Canada thistle)

2023 Activity

0.1251 Acres Treated



Image Credit: Al Schneider, hosted by the USDA-NRCS PLANTS



Image Credit: J. Chase (NPS)

Current Conditions:

Cirsium arvense (Canada thistle) was first encountered and subsequently treated in 2009 at the ASIS Headquarters and Developed Area in Maryland. This herbaceous species is restricted to Park Headquarters and the Developed Area in MD.

Specific Infestation location(s): The vegetated buffers surrounding the Headquarters property, within landscaping beds that surround the Maryland Visitor Center, the Boneyard. Sites at Bayside drive along the roadside on the North side of the road and on the north side of the hunt shack at the Ranger Contact station.

Areas Currently Infested at ASIS: ☒ Headquarters (Mainland) ☐ Island (Developed Area)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used: Aquanest, Rodeo (Glyphosate) 2%, Polaris (Imazapyr) 2% —>Foliar application

Notes: This nefarious invader had become established in areas of the Maryland Headquarters starting in 2009 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 2009.

Fifteen treatments were conducted during the months of March, May, June, July, September and November on the Headquarters property to continue the commitment for controlling this terrible invader that threatens the value of the landscaping resources at the ASIS Headquarters.

Seed removal was conducted whenever large involucre were encountered (see image on right above). This action, while tedious, further helps to ensure that seed dispersal is kept to a minimum. A single *C. arvense* plant can produce between 1,500 to 5,300 seeds which we seek to prevent by these actions. (<https://www.invasive.org/weedcd/pdfs/northeast/CANADATHISTLE.pdf>)

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Cirsium vulgare* (Bull thistle)

2023 Activity

0.0136 Acres Treated



Image Credit: Donald Hobern NC State,
Creative Commons 2.0



Image Credit: J.
Chase (NPS)

Current Conditions: *Cirsium vulgare* (Bull thistle) was encountered at the Assateague State Park in 1984 by botanist Steven Hill at which time its abundance was described as infrequent to rare. Preliminary treatments of this species began at ASIS in June, July and November of 2020. Treatments continued in 2023 and additional new plants were discovered.

Specific Infestation Location(s): The known infestations of this species are currently restricted to these locations at ASIS, they are: 1.) The Headquarters property directly around the Maryland Visitor center and 2.) Bayside drive on the island 100 meters east of the exit from loop C on the north side of the roadway, 3.) behind the canoe rental at the end of Bayside Drive, 4.) the boneyard and 5.) the dune that faces the inlet on the North end and south of her in the clearing north of the inlet Forest on its eastern edge.

Areas Currently Infested at ASIS:

☒ Headquarters (Mainland) ☒ Island (North end) ☒ Island (Developed Area) ☒ Island (OSV)

Treatment History: ☐ Newly Encountered ☒ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used: Rodeo (Glyphosate) 2% —>Foliar application

Notes: Life cycle: Biennial. Basal rosette forms the first year. Bolts, flowers, and dies in the second year.

Weedy characteristics: Bull thistle is highly competitive and aggressive, and forms dense colonies that choke out native vegetation important to wildlife and pollinators. Seeds germinate rapidly and are spread by wind. An individual plant can produce up to 100,000 seeds.

Control strategies: Eradicate them in rosette stage in the first year whenever possible. In the second year, do not let them go to flower or seed. To prevent resprouting, cut taproot about 2 to 3 inches below soil surface, while disturbing soil as little as possible. Bag all buds, flowers or seeds. Always use gloves. Repeatedly monitor previous infestations for new growth. Plant desirable native species to outcompete invasive plants. Chemical control can be effective on rosettes.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

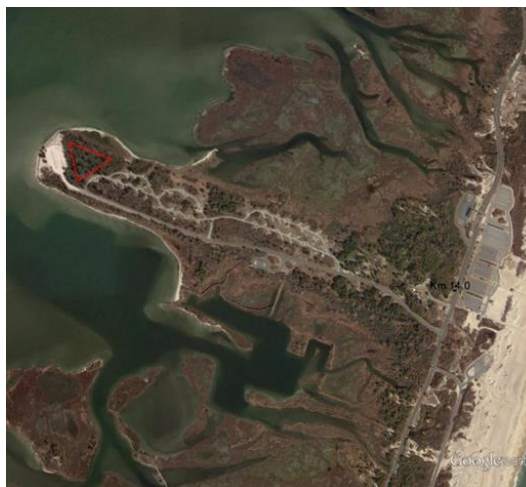
Species Targeted: *Clematis terniflora* (Virginsbower)

2023 Activity

0.0400 Acres



Image Credit: J. Chase (NPS)



Red triangle indicates primary infestation

Current Conditions: *Clematis terniflora* (Virginsbower) was first encountered at ASIS in 1998. Later, when treatments seemed feasible, they were begun in 2004. This species is currently restricted to (4) locations in the ASIS Developed Area.

Specific Infestation location(s): 1.) Behind the canoe rental at the western end of the Bayside peninsula (see red triangle area in map above). 2.) directly East of the intersection of Bayside campground loop C exit on the North side of the Bayside Drive 3.) a newly discovered patch at the end of Oceanside Drive on the east side by the last dumpster 4.) the causeway to the island in Maryland (on State Park lands), and 5.) the Sinepuxent Vegetation Buffer.

Areas currently infested at ASIS: ☒ Island (Developed Area) ☒ ASIS Headquarters

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2% —>Foliar application

Notes: The continuing reoccurrence of *C. terniflora* at the Bayside Peninsula is the result of an abundant seed bank established by the original infestation over many years. This species has been present at the site since the current biological science technician (plants) began working at ASIS in 2003. Six treatments in total were conducted this season at Bayside Canoe and Kayak Rental forest (the original invasion site found more than 2 decades ago that lies between the terminus of the peninsula to the west and the exit of loop C to the east), Bayside Drive 100 meters east of the loop C exit along the north side of the roadway on a berm, Bayside campground site B31 and the most extant site at the end of Oceanside Drive at the 2nd to last parking lot heading south and behind the split-rail fence there. The new infestation that was discovered at the end of end of Oceanside Drive on the east side by the last dumpster which received treatment in 2020 and was again not active at any time during the growing season of 2023. All other sites were active. To be able to access the site behind the canoe rental it has been necessary to create and maintain a series of pathways through the thorny vines that cover the site again in 2024. This has been achieved by using a Stihl brand weed wacker with a hedge trimmer attachment. Further treatments in 2023 will help contain the spread of this vine.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Elaeagnus umbellata* (Autumn Olive)

2023 Activity

0.0095 Acres



Image Credit: Bill Johnson

Current Conditions:

First encountered at ASIS in 2005 and later treated that same year, *Elaeagnus umbellata* (Autumn Olive), a tree species, is restricted to the ASIS Headquarters property and the Developed Area of the island. Six treatments in total were conducted in March, April, July and September at the following sites this season: the east side of the bike rental at the Maryland visitor center, the Assateague State Park west of the Nature Center, loops A and B of Bayside Campground, Bayside Drive 100m east of loop C exit on north side of the road and at the ASIS Headquarters in the Sinepuxent vegetation buffer.

This species is under control and absent but for a few regular reintroductions.

Specific Infestation Location(s): This species emerges in the vegetated buffers surrounding the Headquarters property where birds presumably vector the seeds via their droppings. On the island, a long established grove of trees exists West of the Nature Center in the Assateague State Park. Also, the Bayside campground peninsula has upon occasion, been hospitable to new seedlings becoming established there.

Areas currently infested at ASIS: [X] Headquarters (Mainland) [X] Island (Developed Area)

Treatment History: [] Newly Encountered [] Treated $\leq$ 5 Years [X] Treated $\geq$ 5 Years [] Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2% —>Foliar application, Polaris (Imazapyr) 25% —> cut stump

Notes:

Because a great number of *E. umbellata* trees have been found bordering the Headquarters land in the past, as well as the species being well established throughout South Point, it is believed that this *E. umbellata* will remain on our watch list for many years to come. Some trees can still be found on our neighboring lands at headquarters in 2023 that could be treated in 2024 if time allows. Foliar treatments are less desirable and cut stump or hack and squirt treatments are preferred for larger trees.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Eleusine indica* (Wiregrass)

2023 Activity

0.2002 Acres Treated

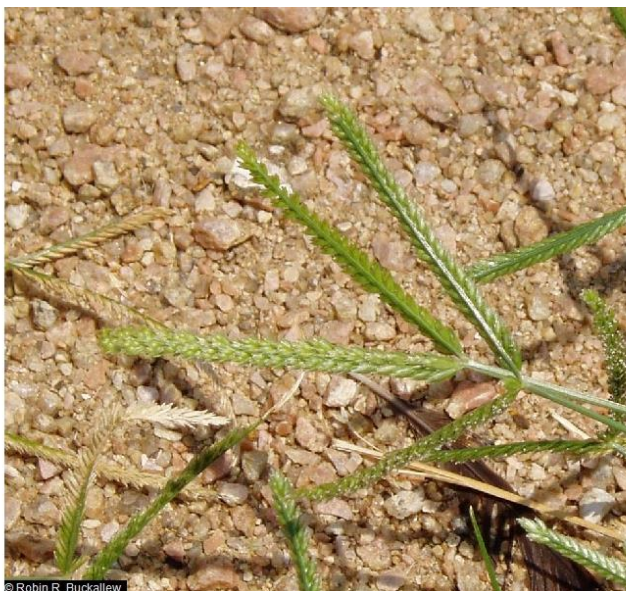


Image Credit: Robin R. Buckallew, hosted by the USDA-NRCS PLANTS Database

Current Conditions:

First encountered at ASIS in 2015 and later treated that same year, *Eleusine indica* (Wiregrass) is restricted to roadsides and bike paths throughout the park. In these locations where it roots through pavement edges breaking them down, periodic treatments are warranted to reduce ongoing degradation from these unwanted plants.

Specific Infestation Location(s):

Roadsides and bike paths throughout the park.

Areas Currently Infested at ASIS:

[X] Headquarters (Mainland)

[X] Island (Developed Area)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Polaris (Imazapyr) 2% —>Foliar application

Notes:

The bike trails and roadways are frequently encroached upon by *E. indica*, which causes the pavement to crumble as the plants make their way through it. Two treatments were conducted to diminish the threat that this species poses to the integrity of pavement edges of bike paths at the following sites: the western side of the Chincoteague National Wildlife Refuge entrance bridge in Virginia during April and the bike path edges between entrance booth E1/E2 and the entrance to the OSV in Maryland during July.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Eragrostis curvula* (Lovegrass)

2023 Activity

0.0178 Acres



Image Credit: J. Chase

Current Conditions:

First Encountered at ASIS in 1971 by botanist Helen Higgins and reported by her as *Eragrostis* sp. (Higgins #43).14339. MD, *Eragrostis curvula* (Lovegrass) has been treated at ASIS since 2005. This grass species is restricted to the Developed Area at ASIS where it has bordered roadways for decades. The Assateague State Park roadsides present a stark contrast by comparison to ASIS roadways, as they have not treated this species and have very large tussocks of the grasses bordering their roads as ASIS once did. In 2023 a new infestation was discovered at the USCG Station at the south of ASIS.

Specific Infestation Location(s):

The footprint of loop A, the original camping sites of the Bayside Campground, later reclaimed and used for park Maintenance in what is now called "the Boneyard". Nearly all of the roadsides in the Developed Area are susceptible to invasion from this species., especially those with slightly elevated and dry, sandy disturbed soils.

Areas Currently Infested at ASIS:

None

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Polaris (Imazapyr) 2% —>Foliar application

Notes: *E. curvula* infestations have been treated in the Developed Area (which it has remained confined to) at ASIS since 2005 and the repeated treatments have successfully kept this species under control at manageable levels. This year a new infestation was discovered in Virginia at the historic U.S. Coast Guard Station at the Chincoteague National Wildlife Refuge in August. In Maryland a few plants were discovered and treated at the Boneyard in the footprint of the first loop of the original Bayside campground loop 1 during November of 2023.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Glechoma hederacea* (Creeping Charlie)

2023 Activity

0.0578 Acres



© Lawrence S. Gilliam 2004

Image Credit: Lawrence S. Gilliam, hosted by the USDA-NRCS PLANTS Database

Current Conditions:

Glechoma hederacea (Creeping Charlie) was first encountered at ASIS in 1984 by botanist Steven Hill at Valentine Cabin at Scotts Point on the island, but can no longer be found there. Discovered on the mainland in 2018 along the southern border of the Headquarters property in the shade of vegetated buffers, ASIS has treated this herbaceous species since that time.

Specific Infestation Location(s):

UMES Vegetation Buffer

Areas Currently Infested at ASIS:

[X] Headquarters (Mainland)

Treatment History: ☐ Newly Encountered ☒ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2% —>Foliar application

Notes:

This species received a single treatment day in July at the Sinepuxent vegetation buffer and throughout the interior and along the southern border of the headquarters property.

Assateague Island National Seashore: Vegetation Management Summary (Year 2022)

Species Targeted: *Hedera helix* (English Ivy)

2023 Activity

Eradicated



Image Credit: Robin R. Buckallew, hosted by the USDA-NRCS PLANTS Database

Current Conditions:

Hedera helix (English Ivy) was first encountered at ASIS in 2006 behind the Clements inholding. Treatments there in 2006 and 2016 eradicated the species. On the mainland, in park housing, a small patch of this vine has been discovered and managed since 2018 where the vine species was last restricted to.

Previous Specific Infestation Location(s):

Behind Bayberry North house in the vegetated buffer.

Areas Currently Infested at ASIS:

[X] Headquarters (Mainland)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☒ Eradicated

Herbicide(s) Used:

No herbicides used in 2023

Notes:

Monitoring of the previously infested areas at Clements inholding and behind Bayberry North house in 2023, did not discover any activity of this species in either area. It is now thought to have been eradicated at ASIS at this time.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Lagerstroemia indica* (Crepe Myrtle)

2023 Activity

Eradicated



Image Credit: Robin R. Buckallew, hosted by the USDA-NRCS PLANTS Database



Map: Inlet area of infestation is indicated by the red square above.

Current Conditions:

Lagerstroemia spp. (Crepe Myrtle) was first encountered at ASIS in 2018 and treated that same year. This tree species is restricted to this single occurrence, which when monitored in 2023 had appeared to have been successfully treated.

Previous Specific Infestation Location(s):

In an open meadow that lies just 100 meters south of the dune that faces the Ocean City inlet.

Areas Currently Infested at ASIS:

None

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

No herbicides used in 2023

Notes:

A cut stump treatment using a 50% solution of Polaris (Imazapyr) herbicide in 2018, was observed to have been effective while monitoring the site in 2020 and again in 2021, but in 2022 a single new tree was discovered and treated in July of 2022. As this species was seen in 2022, it is no longer considered to have been eradicated from the island and monitoring at the site must continue for the next 3 years. No activity was observed in 2023.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Juniperus procumbens* (Dwarf Juniper)

2023 Activity

Eradicated



Image Credit: J. Chase
(NIDCS)

Current Conditions:

Dwarf Juniper was first encountered at ASIS in 2018 and was treated soon after its discovery that same year. This prostrate tree species was restricted to one single infestation site behind Clements inholding, treated in 2021.

Previous Specific Infestation Location(s):

One single infestation site behind Clements inholding at the State Line

Areas currently infested at ASIS:

☒ Island (OSV)

Treatment History: ☒ Newly Encountered ☒ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

No herbicides used in 2023

Notes:

A single Dwarf Juniper shrub was discovered behind the Clement's inholding in October of 2018 when investigations of recruitment of *P. nigra* and *R. multiflora* in the same area turned up this single individual, which was promptly treated along with the other targets that were discovered there. This single plant is thought to be a remnant of the landscaping that once surrounded the house. The site was monitored for activity of *Pinus nigra* and *Rosa multiflora* during the growing season in 2022 at which time the status of the Dwarf Juniper was determined to be inactive. We chose to cut the stump and use a cut stump point source treatment with a concentrate of Imazapyr herbicide in 2022, which appears to have been effective. Monitoring of the site in 2023 indicated the species had been treated successfully.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Lespedeza cuneata* (Chinese Lezpedeza)

2023 Activity

0.0005 Acres



Image Credit: James H. Miller, hosted by the USDA-NRCS PLANTS Database / James H. Miller and Karl V. Miller. 2005. *Forest plants of the southeast and their wildlife uses*. University of Georgia

Current Conditions:

Lespedeza cuneata (Chinese Lezpedeza) was first encountered at ASIS along roadsides, at the Assateague State Park, and at Great Egging Island in 1984 by botanist Steven Hill who recorded that it had “probably been recently introduced”. This shrub species has been treated at ASIS Headquarters since 2009 and at the ASIS Developed Area since 2016. Consecutive annual treatments of both affected areas since 2016 have brought this species to manageable levels park-wide. It is currently restricted to roadways in the Developed Area of Maryland, at Bayside Campground West of the Boneyard (where it was seen to be increasing in 2021), and the unshaded areas of the vegetated buffer behind the Maryland Visitor Center. **Specific Infestation**

Location(s):

In areas of open sunlight directly adjacent to roadways along Bayberry Drive and Bayside Drive and in open areas West of the Boneyard in the footprint of the original Loop A of the Bayside Campground. The vegetated buffer behind the Maryland Visitor Center has small quantities of this species.

Areas Currently Infested at ASIS:

[X] Headquarters (Mainland)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2% —>Foliar application

Notes: This species has been treated throughout the developed area in past years and at present is not highly detectible, but when encountered along with other treatments it is controlled too. Such was the case for 2 treatments this year at the entrance booth guard rails and the visitor contact station where small plants were encountered and treated.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Ligustrum vulgare* (Privet Bush)

2023 Activity

0.0003 Acres



Image Credit: Richard A. Howard, hosted by the USDA-NRCS PLANTS

Current Conditions:

Ligustrum vulgare (Privet Bush) was first encountered at ASIS in 1984 by botanist Steven Hill at Great Egging island, but was described as rare elsewhere. ASIS began treating this shrub species in 2009 when a small grove of shrubs were discovered in the vegetated buffer behind the Maryland Visitor Center. This treatment was later deemed a success and no shrubs were seen on ASIS property until 2019, when a small sapling was found and treated at the only known active site that this species is currently restricted to, the ASIS housing vegetation buffer. In 2022 a small infestation of shrubs was discovered and treated next to the Pole Barn within sight and northwest of the visitor center. In 2023 a single sapling was discovered in the Sinepuxent vegetation buffer behind the Maryland visitor center.

Specific Infestation Location(s):

ASIS Headquarters Vegetation Buffers

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2% —>Foliar application

Notes:

While *L. vulgare* is locally abundant, it has not been a great threat to the National Seashore, perhaps due to intolerance for salt and saturated soils. Treatments with Triclopyr herbicides have been effective for the control of this species at ASIS. Few plants were discovered in 2022. All previous treatments were seen to be effective when observed in 2022.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Lonicera japonica* (Honeysuckle)

2023 Activity

1.7401 Acres



Image Credit: Jeff McMillian,
hosted by the USDA-NRCS
PLANTS Database

Current Conditions:

Lonicera japonica (Honeysuckle) was first encountered at ASIS by botanist Steven Hill in 1984 which he described as being, "infrequent but apparently established in the disturbed sands and shrub successional zone at ASIS and increasing", at the time of his publication. After many years the populations have grown island-wide, but are aggregate in their locations. ASIS has treated this vine species since 2005. The current, sizable populations are restricted to 1.) the ASIS Developed Area, 2.) the shrub successional zone from the beginning of the OSV to Km 19 surveyed in 2021, 3.) along the roadsides to Scotts point, 4.) on the North end at the Shell Road and 5.) at the ASIS Headquarters property.

Specific Infestation Location(s): This species intertwines with other shrub species at ASIS to gain access to sun, in particular *Smilax rotundifolia* (Greenbriar) and *Morella cerifera* (Wax Myrtle) are impacted by the vines growing on them, which can topple them over time, especially during extreme wind events. The developed area is heavily infested while the OSV has small populations.

Areas Currently Infested at ASIS: [X] Island (North end) [X] Headquarters (Mainland) [X] Island (Developed Area) [X] Island (OSV)

Treatment History: [] Newly Encountered [] Treated $\leq$ 5 Years [X] Treated $\geq$ 5 Years [] Eradicated

Herbicide(s) Used: Aquanest, Rodeo (Glyphosate) 2% —>Foliar application

Notes: The 2023 treatments were conducted across the entire headquarters property, at the Bayside campground along the northern edge of the campground loops using the intellicast sprayer mounted from the UTV. The entire peninsula has received treatments now since the 2022 treatment was the interior island of the peninsula and the 2021 treatments were along the southern portion of the campgrounds and the southern portion of the peninsula proper. Still many plants remain and cyclic treatments must continue here to keep the population reduced. Also treated were the infestation lying between Km 19 to Km 19 in the OSV shrubzone that were treated with a backpack sprayer. In August the forest west of loop C on Bayside peninsula was treated with a backpack sprayer. In November, the Valentines road infestations were treated using the intellicast sprayer mounted from the UTV.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

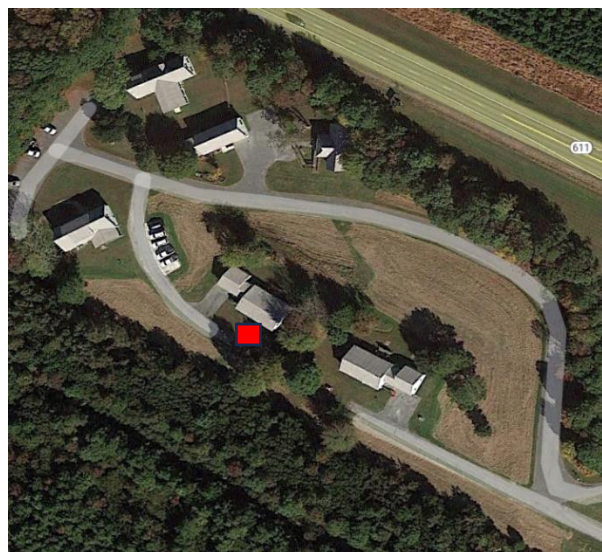
Species Targeted: *Mentha suaveolens* (Wooly Mint)

2023 Activity

Eradicated



Image Credit: NetPS Plant Finder Tool



Current infestation site (marked in red) at the Headquarters housing area

Current Conditions:

Mentha suaveolens (Wooly Mint) was first encountered at ASIS in 2009 at the Headquarters property in the housing area. The herbaceous species has been treated at ASIS since 2009 in the housing area where it has remained restricted to.

Previous Specific Infestation Location(s):

Originally located behind (North of) Greenbriar house and successfully treated there over years, the current infestation lies South of Greenbriar house near a large *Acer rubrum* (Red Maple) tree that was active and treated in October of 2021.

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

No herbicides used in 2023

Notes:

The introduction of this species to the Headquarters property came from an unintentional planting. Presumably, leftover pots of the plants were discarded behind the house, where some individuals became established leading to a perennial patch that was several meters across when discovered and initially treated. While this species has remained at a manageable level it is a reminder that unintended actions in park housing can have consequences on other operations. It is recommended that pots of similar mint species be tended by residents, rather than plantings. The few plants that were seen during other treatments in the same locations in 2021 were treated bringing this species another step closer to eradication. No activity was seen in 2023 at previously treated areas from 2021. We will monitor the site for activity again in 2024.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Morus alba* (White mulberry)

Activity

0.0025 Acres Treated



Image credit: John Cardina, The Ohio State University, Bugwood.org

Current Conditions:

First noted at ASIS in 1984 by Steven Hill, but likely present earlier, and described as, "Introduced, from East Asia, flowers in May. Shrub Succession, disturbed sands. Infrequent to rare." The initial treatments at ASIS began in 2006 at ASIS. The occurrences of this species are rare but they continue to be located and are treated soon after discovery in every instance.

Specific Infestation Location(s): The Maryland causeway, the vegetated buffers at park headquarters, the developed area

Areas Currently Infested at ASIS:

- ☒ Headquarters (Mainland)
- ☐ Island (North end)
- ☒ Island (Developed Area)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Polaris (Imazapyr) 25%

Notes:

White mulberry is a fast-growing, deciduous tree with alternate, toothy leaves. It is native to eastern Asia, and introduced in North America. It is planted widely for wildlife, and may have a tendency to escape from gardens. White mulberry is the primary species on which silkmoth caterpillars (*Bombyx mori*) are bred to produce silk. Its juicy purplish berries are delicious and useful for both wildlife and people. Beware the berries' capacity to stain, however. (gobotany.com)

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Microstegium viminium* (Stiltgrass)

2023 Activity

0.2404 Acres



Image Credit: Ted Bodner, hosted by the USDA-NRCS PLANTS Database / James H. Miller and Karl V. Miller. 2005. *Forest plants of the southeast and their wildlife uses*. University of Georgia Press., Athens.

Current Conditions:

Microstegium viminium (Stiltgrass) was first encountered at ASIS in 2014 by seasonal biological technician Kristina Fahey at the Headquarters property where it was seen encroaching from the South from land owned by the State of Maryland. Treatments of this grass began soon after discovery in 2014. In 2017 the grass was discovered at a well monitoring site on Ferry Landing Road by seasonal biological technician Merritt Kramer that was treated in that same year. The ASIS Headquarters property and Ferry Landing Road were found to be active and were treated in September and October of 2022.

Specific Infestation Location(s):

1.) Park Headquarters: The entire southern border of the property, the vegetation buffer on the East of the property from the Verrazzano bridge to the Paul Sarbanes Coastal Ecology Lab, the meadow that is in the center of park housing and on the island at 2.) Ferry Landing Road from the intersection at Bayberry Drive to the beginning of the salt marsh habitat before the parking lot at the end of the road with some incursion on the south side of the road across from the well site.

Areas Currently Infested at ASIS:

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used: Rodeo (Glyphosate) 2% —>Foliar application

Notes: Consecutive annual treatments since 2017, at both active sites, have helped to keep these infestations at manageable levels. The untreated infestations that lie nearby, or upon the Headquarters southern borders will remain a threat to us for the foreseeable future. In 2023, no activity was observed on the island at Ferry Landing Road and at park Headquarters there were active infestations that required treatments in June, July, August, September, and November. At Headquarters the population is apparently reduced by previous treatments, in the vegetated buffers on our southern and eastern boundaries. No activity was seen on the island in 2023. Monitoring and treatment will continue in 2024.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

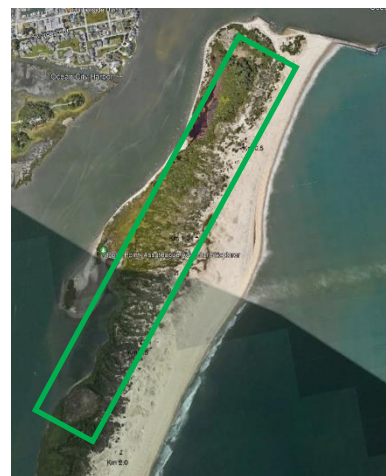
Species Targeted: *Miscanthus sinensis* (Silvergrass)

2023 Activity

0.0563 Acres Treated



Image Credit: J.
Chase (NPS)



Map: Inlet infestation
area (within green)

Current Conditions:

Miscanthus sinensis (Silvergrass) was first at ASIS recorded by botanist Steven Hill in 1984, "at S end of North Beach at roadside". Later encountered by biological technician Jonathan Chase in the forest at the inlet on the North End in 2004 and treated in that same year, it was initially a sizable (@ 1 acre) infestation that still remains active despite periodic treatments. The tall grass species is restricted to the North end population that appears to be expanding as new plants were discovered south of this population near Km 2.

Specific Infestation Location(s):

North end inlet Forest to Km 3 in the shrub zone

Areas Currently Infested at ASIS: [X] Island (North end) [X] Island (OSV)

Treatment History: [] Newly Encountered [] Treated $\leq$ 5 Years [X] Treated $\geq$ 5 Years [] Eradicated

Herbicide(s) Used: Rodeo (Glyphosate) 2%, Polaris (Imazapyr) 2% —>Foliar application

Notes: An expansion at the North end inlet infestation to the south from the forest where the plants were first controlled, was discovered in Fall of 2019 while monitoring the site. The tall grasses had penetrated further into the Wax Myrtle shrubs there and had expanded closer to the wetland that lies to the West of the forest. This area has been targeted for annual treatment since 2020. Because it has found a niche in the thick Wax Myrtle shrubs at this inlet site, it was necessary to cut extensive access trails in 2020 and these were cut again in 2022 for spot treatments. In 2023 the trails were flagged again, but poorly and must be cut/flagged again in 2024. The inlet areas were treated thoroughly in 2023 and very few plants were encountered indicating treatment efficacy for the previous years' treatments in areas that had been managed previously. The new infestation discovered by J. Chase near Km 3 in the shrubs was revisited in 2023 and required additional retreatment. Many plants remain to be discovered and treated between the inlet and Km 2 in 2024.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Morus alba* White Paper Mulberry

2023 Activity

0.0002 Acres



Image Credit:
treeseedonline.com

Current Conditions:

First Encountered at ASIS by Steven Hill in 1984 and reported as being infrequent to rare, this species is well established in communities neighboring the National Seashore. Treated at ASIS since 2005 and restricted to the Headquarters property at this time, though it has been present and treated on the island in the past, *M. alba* is under control at ASIS.

Specific Infestation Location(s): ASIS Headquarters property

Areas Currently Infested at ASIS: The Sinepuxent Vegetation Buffer behind the Maryland Visitor Center.

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Polaris (Imazapyr) 25% —>girdle bark and spray cambium all around cut

Notes:

Found infrequently, but if established in dense vegetation they may go undetected for long periods of time until discovered, *M. alba* trees are rarely encountered at ASIS. However, the many seeds a single tree can produce make each tree a great threat with regards to their prolific seed production. Two small trees were discovered this year, 1. On the Maryland causeway and 2. In the vegetated buffer behind the visitor center.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: Nuisance Weeds

2023 Activity

1.0738 Acres



Trifolium repens

(White clover)

Image Credit: Larry Allain,
hosted by the USDA-NRCS
PLANTS Database



Medicago lupulina (Black
medick)

Image Credit: Jim Stasz, hosted by
the USDA-NRCS PLANTS Database



Cynodon dactylon (Bermuda
grass)

Image Credit: University of
California

Current Conditions: Nearly 30% of all of the vascular plant species in the ASIS herbarium are not native to the island. Some of these species are invasive, while most present no problems at all for land managers. Some of these plant species become an unwanted nuisance in the wrong setting that earn them the title of "Nuisance Weeds". There are many species of Nuisance Weeds at ASIS and they interfere with building maintenance, vehicle storage areas and landscaping in mowed areas. Three prevalent examples of these species are represented above.

Specific Infestation Location(s):

The Virginia Maintenance Compound, the Maryland Boneyard, the vehicle storage area at park Headquarters, park Headquarters landscaping beds, parking lots, and road edges

Areas Currently Infested at ASIS:

Treatment History: [] Newly Encountered [] Treated $\leq$ 5 Years [X] Treated $\geq$ 5 Years [] Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2%, Polaris (Imazapyr) 2% —>Foliar application

Notes: Nuisance weeds (like White clover) in the fenced area of the Virginia Maintenance Compound and poisonous plants (like Poison ivy) in the Boneyard in Maryland's Developed Area require periodic treatment to allow more efficient grounds maintenance, protect worker safety and to keep the areas controlled without using weedwackers that can throw stones into expensive vehicle windows. Controlling these plants where vehicles are stored also prevents the vectoring of weed seeds into natural areas. In parking lots nuisance weeds invade cracks in parking lots and pavement weakening the integrity and lifespan of the surfaces. Treatments for nuisance weeds at ASIS were conducted each month from March through September at the following locations in Virginia: the Wallops Island Maintenance Facility lot, the crabbing decks and bike path at CNWR, in Maryland: the Public Landing repeater, the newly planted landscaping mitigations for the elevated boardwalk, the wastewater treatment plant, all ASIS parking lots (headquarters housing and facilities, the visitor center and all of those on the island).

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Paulownia tomentosa* (Princess tree)

2023 Activity

Monitoring Only



Image Credit: Jeff McMillian, hosted by the USDA-NRCS PLANTS Database



Image Credit: J. Chase



Image Credit: J. Chase

Current Conditions:

Paulownia tomentosa (Princesstree) was first encountered in the shrubs near Kilometer 18 in the OSV at ASIS by biological technician Casey Nolan in 2016, since then just a few new trees have been found and treated elsewhere. At ASIS, this tree species is restricted to 3 sites which need to be monitored post-treatment. These sites are: 1.) the clearing at the inlet north of the Forest, 2.) the Life of the Marsh Trail near the steps and 3.) the site just south of Hungerford's. in Burn Unit 3.

Specific Infestation Location(s):

These sites are: 1.) the clearing at the inlet north of the Forest, 2.) the Life of the Marsh Trail near the steps and 3.) the site just south of Hungerford's.

Areas Currently Infested at ASIS: ☒ Island (OSV) ☒ North End

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

None used in 2023

Notes:

The single *P. tomentosa*, located at (NAD83, UTM Zone 18N) N 4224376, E 485171 in 2016, was monitored in 2019 and is presumed to have been controlled from the 2016 treatment, as there was no activity at the location when monitored in August of 2019. An additional tree N 4223674, E 484833 was located by Tami Pearl and Bill Hulslander in the summer of 2019 and the Vegetation Management team returned to find the tree and to treat it in August of 2019. The tree was cut down and all seeds were collected and bagged up in a black plastic trash bag placed in direct sunlight to heat the seeds on site (and left there as the bag weighed nearly 80 lbs.) to prevent recruitment in the future. No activity was seen at the (3) sites above in 2023, therefore no treatments were conducted.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Pennisetum alopecuroides* Syn. *Cenchrus purpurascens* (Fountain grass)



2023 Activity

0.0675 Acres

Image Credit:
Jim Solomon
Missouri

Current Conditions:

Pennisetum alopecuroides Syn. *Cenchrus purpurascens* (Fountain grass) was first encountered in 2008 by biological technician Jonathan Chase and Terrestrial Ecologist Mark Sturm where the Maryland Visitor now stands. The grass species has been treated at ASIS since 2009 and its populations are restricted to (3) locations. All known locations have been treated in 2023 with success and are currently at manageable levels of control.

Specific Infestation Location(s):

1.) The Headquarters property, particularly along the Southern border, throughout the vegetation buffer East of the Maryland Visitor Center comprising several acres of infested area and 2.) a newly discovered patch (2019) behind the Bayside canoe rental at the tip of Bayside peninsula in the forest there that was observed to be active and more distributed than previously thought in 2021. These were treated in September of 2022. A single plant was found near the 3.) newly discovered *M. sinensis* at Km 2 and promptly treated in November of 2022. All known occurrences were treated in 2023 except those discovered between Km 2 and the southern entrance to the inlet forest.

Areas Currently Infested at ASIS: ☒ Headquarters (Mainland) ☒ Island (Developed Area) ☒ North End

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Aquaneat, Rodeo (Glyphosate) 2%, Polaris (Imazapyr) 2% —>Foliar application

Notes: The infestation at the ASIS Headquarters is most certainly the result of introduction from our neighboring golf course where mowed clippings containing seeds were deposited adjacent to natural areas where they were able to recruit themselves. Once established, they flourish in any range of sunlight and form dense monoclinal stands in the understory, as well as in the open. Many consecutive years of treatments ('09, '10, '14, '16-'23) have been necessary to bring the infestations under control at ASIS Headquarters. The threat remains on our untreated neighboring lands to the South. All sites must be revisited each year until the seed bank is depleted at each site.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Phragmites australis* (Common Reed)

2023 Activity

28.1 Acres treated



Burn Unit 9 (Left, Center), MA IPMT (Right): Image Credits: J. Chase (NPS)

Current Conditions: Botanist Steven Hill described *Phragmites australis* (Phragmites) in 1984 in his Annotated Checklist of the Vascular Flora of Assateague Island (Maryland and Virginia), as "Frequent to infrequent, but abundant in some areas, forming large colonies as at Great Egging Island and the State Park". In 2008, aerial mapping of ASIS with an helicopter recorded 533.7 acres in Maryland. Aerial treatments followed, in high density patches starting in 2008 and ending in 2009, then prescribed fire for 2 cycles starting in 2009 and ending in 2010. Ground treatments have occurred at ASIS since 2009 that focus on patches with lower densities (<60%). Invasive Plant Management Teams (IPMTs) help annually, when possible, to treat large portions of this species. Phragmites is ASIS's greatest invader.

Specific Infestation Location(s): This grass species is largely restricted to the center of the island where it cohabitates with tall Wax Myrtle shrubs that complicate treatments. Widespread regionally, this species is less prone to invasion into ASIS's low salt marshes, but it thrives in the shrub zone of the island.

Areas Currently Infested at ASIS:

[X] Headquarters (Mainland) [X] Island (North end) [X] Island (Developed Area) [X] Island (OSV)

Treatment History: [] Newly Encountered [] Treated $\leq$ 5 Years [X] Treated $\geq$ 5 Years [] Eradicated

Herbicide(s) Used: (Polaris (Imazapyr) 2%) —>Foliar application. (See 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.)

Notes:

A total of 16 treatment days were conducted by ASIS personnel and then the the Mid-Atlantic Invasive Plant Management Team (MAIPMT) assisted us on an additional 4 days of treatments at the end of the season. These treatments occurred in April, July, August September and November. The ASIS personnel performed chemical treatments at the CNWR bridge and in Burn Units 6, 9, 12, behind the MD visitor center, along Valentines road, at Green Run by the intersection of Bayberry Dr. ASIS personnel also cut trails for access in Burn Units 7 and 10 that assisted the MAIPMT in November. The MA IPMT treated common reed in Burn Units 7, 8 and 10, south of Km 23.4 and at the Maryland visitor center.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Pinus nigra* (Black Pine)

2023 Activity

Eradicated on ASIS land



Image Credit: J. Chase
(NPS)

Current Conditions:

Botanist Steven Hill described *Pinus nigra* (Austrian Pine) in 1984 in his Annotated Checklist of the Vascular Flora of Assateague Island (Maryland and Virginia), as "Frequently planted in State Park, also frequent but declining at Great Egging Island and HiWins cabin, all MD". ASIS has treated *P. nigra* at Clements inholding since 2006, at HiWins cabin since 2015. All ASIS sites are at manageable levels but still produce occasional saplings that are easily identified and removed at intervals of several years. The tree species is abundant in the Assateague State Park but eradicated at ASIS.

Previous Specific Infestation Location(s):

Clements inholding, HighWinds inholding, a single tree at ASIS Headquarters in a landscaped bed, the Assateague State Park

Areas Currently Infested at ASIS:

[X] Headquarters (Mainland) [X] Island (Developed Area) [X] Island (OSV) [X] North End

Treatment History: [] Newly Encountered [] Treated $\leq$ 5 Years [X] Treated $\geq$ 5 Years [] Eradicated

Herbicide(s) Used: No herbicides used in 2023

Notes: *Pinus nigra* (Black Pine) is planted as an ornamental species in our region and was planted with this intention at several locations on Assateague Island. In all cases, except those where mowing occurred around planted trees, the planted trees have been able to recruit new individuals. A very sizable population of hundreds of individuals persists in the Assateague State Park. Treatment of this species is easily accomplished by cutting the trees down at their bases, however seedlings will emerge for many years from sites that have had established mature trees in them. Just a single tree was treated on the North end in July of 2021, when it was discovered during treatments of *Miscanthus sinensis* in the forest near the inlet, since then no additional trees have been discovered on ASIS lands on the island. Ornamental plantings at the park Headquarters remain but do not recruit, while the Assateague State Park has a wild population that is well established, especially near the concession area and their island Headquarters.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Pyrus calleryana* (Callery Pear)

2023 Activity

0.0012 Acres



Image Credit:

<https://www.blossomcity.net/>

Current Conditions:

First Encountered at ASIS Treated at ASIS since Restricted to

Specific Infestation Location(s):

Areas Currently Infested at ASIS:

☒ Headquarters (Mainland)

☐ Island (North end)

☐ Island (Developed Area)

Treatment History: ☒ Newly Encountered ☐ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2%

Notes:

A new invader to ASIS, the Callery pear was discovered in the drainage ponds of the Maryland visitor center in 2022. Later in May the tree was treated with a foliar chemical application of a 2% solution of Rodeo herbicide. Two trees have been found/ treated there behind the visitor center to date. We believe this to be an incidental introduction, most likely from a bird.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Rosa multiflora* (Multiflora rose)

2023 Activity

0.0166 Acres Treated



Image Credit: J. Chase

Image Credit: James H. Miller, hosted by the USDA-NRCS PLANTS Database / James H. Miller and Karl V. Miller. 2005. *Forest plants of the southeast and their wildlife uses*. University of

Current Conditions:

The presence of *Rosa multiflora* (Multiflora rose) at ASIS was first described by botanist Steven Hill in 1984 as "Rare, only one plant seen in the State Park near S end along road. May become a serious weed". This shrub species has been treated at ASIS since 2005 at Bayside Campground peninsula and at park Headquarters where the populations are currently at manageable levels. On the island this species is currently restricted to the Developed Area, but it has been controlled elsewhere on the island. Special attention was given to locate and treat this species throughout the Bayside Peninsula in 2021.

Specific Infestation Location(s): In open gaps where sunlight is abundant in the shrub zone, or edges of forest. The vegetated buffers at the ASIS Headquarters and vegetated "islands" at Bayside Campground are frequented by birds that drop seed from populations outside ASIS that quickly become established and have the potential to be spread elsewhere on the island from these if not regularly located and treated these sites would be highly infested.

Areas Currently Infested at ASIS:

☒ Headquarters (Mainland) ☒ Island (Developed Area) ☒ Island (OSV)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

Rodeo (Glyphosate) 2%, Polaris (Imazapyr) 2% —>Foliar application

Notes: Treatments of this species occurred in March, April and July at the at the Sinepuxent Vegetation buffer, Bayside Canoe and Kayak rental, North of Loop C Bayside Campground Dump Station, Loops A and B Bayside Campground, Life of the Marsh Trail surrounding the parking lot, at the Oceanside Drive 2nd to last parking lot, the Loop C Dump Station. Small shrubs were located and treated at these locations. These were mostly small, new shrubs that are the likely offspring from larger shrubs treated in recent years. The number of occurrences of this species have been significantly reduced by our continued efforts; where once there were many large shrubs at Bayside, now there are just young recruits.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Rosa wichuraiana* (Memorial rose)

2023 Activity

Monitoring Only



Image Credit: A. Barra Real Jardín Botánico,



Image Credit: J. Chase (NPS)

Current Conditions: *Rosa wichuraiana* (Memorial rose) was planted in the triangle at the entrance to ASIS housing as part of an extensive landscaping project of the grounds in 1979, much of which still remains unchanged today. In 2004, biological technician Jonathan Chase observed that the plant had escaped into all of the adjacent vegetated buffers of the Headquarters property and also to the South. This vine-like shrub is no longer restricted to the mainland at Park Headquarters since its discovery at the Bayside Campground (see right image above) in June of 2021, but has been treated and was inactive in 2023.

Specific Infestation Location(s): Vegetation buffers near its original planting site at the Headquarters property, Bayside Campground

Areas Currently Infested at ASIS: ☐ Island (North end) ☒ Headquarters (Mainland) ☒ Developed Area (Maryland) ☐ Island (OSV)

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used: None used

Notes: Since its original planting, *R. wichuriana* had expanded and became widespread in the surrounding Headquarters area. Birds may have facilitated seed dispersal and adjacent vegetated buffers near the location where *R. wichuriana* was first introduced eventually became heavily infested. When in the open, *R. wichuriana* typically presents a prostrate growth form while by comparison it typically exhibits a climbing vine growth form in shaded areas. This variety of occupied habitats demonstrates the invasive potential of this species. Treatments that occurred in June and September of 2020 along the southern border of HQ, Bayside Campground, as well as at the Housing and Sinepuxent vegetation buffers were seen to be successful during other treatments in the same locations during 2023. Additional periodic treatments are essential to finding offspring from the previous infestations and also new recruits. It is also possible that new plants are introduced by birds into these buffers from neighboring lands where the plant is thought to have escaped in the years when the planting was still unrecognized as being invasive (1979 to 2004 are the years that passed between planting and treatments).

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Salsola kali* (Tumbleweed)

2023 Activity

18 Plants Pulled



Image Credit: Kelly Taylor

Current Conditions:

First reported on ASIS by Elizabeth Higgins in 1971 and just recently treated at ASIS since 2021, this Chenopodiaceae family member is restricted to the beaches of the island where it is encountered in small numbers annually.

Specific Infestation Location(s): the sparsely vegetated habitat of the beaches of the island

Areas Currently Infested at ASIS:

☐ Headquarters (Mainland) ☒ Island (North end) ☒ Island (Developed Area) ☒ Island (OSV)

Treatment History: ☐ Newly Encountered ☒ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used:

No herbicides used– Hand Pulling Only

Notes:

This species is most detectible during the time of the annual Seabeach Amaranth census in late July and early August and it occurs in the same habitat as this T&E species. This species is easy to remove by pulling, but must be done with leather gloves or a pair of pliers due to the spiny protuberances that the plant produces. Also, if grazed, the cut stem can appear to be very similar to the stem of Seabeach Amaranth and can be mistaken for a grazed Seabeach Amaranth. It is recommended that all occurrences of this species be removed manually during the Seabeach Amaranth census in all future years. If this is too time consuming during the Amaranth census, areas of abundance can be noted and returned to when it is more convenient. In comparison to the previous year when 801 plants were pulled, there were just 18 to pull in 2023.

Assateague Island National Seashore: Vegetation Management Summary (2023)

Species Targeted: *Toxicodendron radicans* (Poison Ivy)

2023 Activity

0.1100 Acres



Image Credit: Jeff McMillian, hosted by the USDA-NRCS PLANTS Database

Current Conditions:

Toxicodendron radicans (Poison Ivy) is a native plant at ASIS. It is widespread in this region and can present a threat to visitors and employees when it occurs in places that they may easily come into contact with.

Specific Infestation Location(s):

Island wide

Areas Currently Infested at ASIS:

[X] Headquarters (Mainland)

[X] Island (North end)

[X] Island (Developed Area)

Treatment History: [] Newly Encountered [] Treated $\leq$ 5 Years [X] Treated $\geq$ 5 Years [] Eradicated

Herbicide(s) Used:

Polaris (Imazapyr) 2%

Notes: This native plant can present a problem to visitors along trail edges, bathroom entrances and campsites. When the hazard threshold is reached (the plants are very likely to contact visitors and employees in the listed locations) we take action and treat these plants to mitigate the hazard it presents. In June of 2023 the following campsites were thoroughly treated for all instances of this species: Tingles, Pine Tree and Pope Bay. In 2023, all of the sites visited in 2022 will be treated again to protect park visitors and ASIS workers.

Assateague Island National Seashore: Vegetation Management Summary (2023)

Species Targeted: *Trifolium arvense* (Rabbit's Foot Clover)

2023 Activity

0.1013 Acres



Image Credit: J. Chase

Current Conditions:

First Encountered at ASIS Treated at ASIS since Restricted to

Specific Infestation Location(s):

Areas Currently Infested at ASIS:

☐ Headquarters (Mainland) ☒ Island (Developed Area) ☐ Island (North end) ☐ Island (OSV)

Treatment History: ☒ Newly Encountered ☐ Treated $\leq$ 5 Years ☐ Treated $\geq$ 5 Years ☐ Eradicated

Herbicide(s) Used: Rodeo (Glyphosate) 2%, Polaris (Imazapyr) 2%

Notes:

Present at ASIS since at least 1984, when Steven Hill described it as, [sic] "infrequent to locally frequent especially in the State Park and Great Egging Island". This species presents a threat to the horses of ASIS because it contains compounds that can cause symptoms including photosensitivity and liver damage. Not easily detectible since 2004 (Chase 2024) our actions this year were to begin to bring this species, now indicating signs of advancing its invasion curve, more under control. It must be reduced in numbers to prevent a rapid increase in its abundance to prevent it entering the containment phase of the invasion curve. Three treatment days in the month of May were conducted to begin the treatment of this invasive, noxious plant species. A foliar chemical application of a 2% solution of Rodeo herbicide was utilized for the treatments. All parking lots in Maryland were visited and if the plant was encountered it was treated, where the islands within nearly all but the group camp lot were becoming infested. In 2024, a complete treatment of all parking lots and roadsides will be scheduled to more aggressively control this rapidly emerging invader.

Assateague Island National Seashore: Vegetation Management Summary (Year 2023)

Species Targeted: *Vitex rotundifolia* (Beach Vitex)

2023 Activity

Eradicated



Image Credits:
J. Chase (NPS)



Current Conditions:

First Encountered at ASIS in 2009 and treated on the north end of ASIS that same year there are no known occurrences of this species on ASIS that are not under control. A single plant was found and treated in June of 2021 near the end of Bayside peninsula on its northern shore.

Previous Specific Infestation Location(s): North end, Bayside peninsula

Areas Currently Infested at ASIS: None known

Treatment History: ☐ Newly Encountered ☐ Treated $\leq$ 5 Years ☒ Treated $\geq$ 5 Years ☒ Eradicated

Herbicide(s) Used:

Polaris (Imazapyr) 2% —>Foliar application

Notes: This species has been encountered only twice at ASIS since 2003. In 2009 a single plant was found on the north end that was treated and eradicated that same year. Once again, in June of 2021 a single plant was found near the end of Bayside peninsula on its north shore (see image on right above for the location and the image to the left is what the plant actually looks like up close) that was promptly treated. Imazapyr herbicides are very effective at treating this species. When they are larger shrubs, a hacked stem treatment with 20% Imazapyr is effective when multiple wounds are made along stems and are painted/ treated with the solution. Smaller plants can be treated with a foliar application of a 2% solution of Polaris (Imazapyr) herbicide. No activity was observed at the treatment site in 2023 and no action was required. Monitoring of the site will continue until 2024.