

Assateague Island National Seashore Phragmites Control Project Report FY08-FY10



Cristina Torres-Esposito, Biological Technician
Division of Resource Management

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

Phragmites Control Project Report

Introduction

Phragmites australis has gradually (over a period of years or decades) established an expansive foothold on Assateague Island in a variety of coastal habitats. Individual infestations of varying sizes occur throughout the island. Over time *P. australis* infestations have expanded to the point that today vast areas of once diverse native forest, shrub and marsh communities have been replaced with dense monocultures of itself. Due to the serious and continued threat posed by *P. australis* invasion Assateague Island has initiated an ambitious multi-year *Phragmites australis* monitoring and management project. The project has been divided into several sections/faces.

Aerial Survey FY08

During 2008 a project was developed to map the infestations of *P. australis* occurring on the island and to initiate a three year management program based on these initial findings. The first phase of the project was to complete aerial surveys of the islands infestations within the MD portion of the National Seashore. The infestations were mapped using a combination of the on-board helicopter GPS system to record spatial data and assignment of stand characteristics by the accompanying NPS Biological Technician (Jonathan Chase). The stand characteristics were identified and defined by Jonathan and transmitted via radio to the recorder (Micah Ryder). The spatial data collected by the helicopters on-board GPS system in combination with the data recorded on stand characteristics was stored as a set of polygons in ArcGIS depicting the infestations that could be controlled with aerial spraying. To augment the spatial data obtained during the surveys, aerial photos were taken of *P. australis* stands and of the surrounding landscape to visually establish the level of infestation occurring on the island.

To conduct the helicopter operations necessary to accomplish the aerial mapping and spraying portions of the project, a scope of work was written and put out to bid through the DOI NBC Aviation Management Division. Summit Helicopters Inc., based out of Roanoke Virginia, was the lowest bidder and won the contract for the project. All operational planning and data transfer for project logistics was coordinated directly with Summit Helicopters Inc.

After the analysis, editing, and correction of the surveyed polygons was finished, a total of 119 individual infestations greater than ~½ acre in size were mapped, for a combined total of 533.7 acres of infestations. The mapped infestations extended from the end of the shell road on the North End (km 9), to directly adjacent to the state line on the south end (km 36), excluding the state park area (infestations are present in high densities but were not mapped during this project).

Aerial Spray

The second phase of the project was comprised of the selection of targeted *P. australis* infestations and aerial spraying of them. The infestations were selected using a set of parameters to prioritize where spraying would occur based on long-term and short-term project goals, logistical concerns, and natural resource related issues. Aerial spraying was done using a Jet Ranger helicopter equipped with a 50 ft wide spray boom and a 60 gallon tank for FY08 and a 100 gallon tank for FY09. The infestations were sprayed with a solution containing 64 ounces/acre of Habitat® herbicide and 48 ounces/acre of surfactant. This rate was within the recommended rate on the product label, which states that control of *P. australis* is achieved using Habitat® at rates of 4 to 6 pints per acre. The solution was mixed in water to ensure the application of 10 gallons of spray mix per acre of infestation, which equaled an application concentration of 5% Habitat®. This application volume per acre was based upon current rates being used in other east coast *P. australis* management programs.

During FY08, a total of 226 acres of *P. australis* infestations were selected for aerial spraying with 185 acres designated as primary treatment areas and 41 acres designated as backup treatment areas. Additional backup infestations were needed to prepare for the possibility that not all of the areas within each targeted infestation polygon would actually be sprayed. Shapefiles were created of these areas and sent to the contracting helicopter company to load into their navigational equipment for the coordination of the spray operation. A total of 185 acres of Infestations were aerially sprayed during FY08 using an application rate of 64 ounces/acre of Habitat®. A total of 92.5 gallons of the herbicide was applied in the treatment of *P. australis* infestations.

During FY09 the project was comprised of the selection of the remaining previously mapped infestations and aerial spraying of these infestations. In total, 260 acres of *P. australis* infestations were selected for aerial spraying. Shapefiles were created of these areas and sent to the contracting helicopter company to load into their navigational equipment for the coordination of the spray operation. The same company that did the aerial survey and FY08 aerial spraying, Summit Helicopters Inc, sprayed the infested areas during FY09. They used the same spray solution, 64 ounces/acre of Habitat® herbicide and 48 ounces/acre of surfactant. At this application rate a total of 130 gallons of Habitat® herbicide was applied in the treatment of the 260 acres of *P. australis* infestations.

Ground Spray

The effective control of Phragmites is likely to require multiple treatments using a combination of methods including ground spraying with herbicide. During FY09 *P. australis* was not only sprayed aerially, it was also sprayed from the ground. With the assistance of two seasonal crew members, the Phragmites Vegetation Team was able to spray smaller infested areas that were not able to be sprayed aerially. They targeted areas that were less than ½ acre in size. Most of the infestations that were treated were located in the developed area of the park. In order to ground spray the infestations several different types of equipment were used depending on the density of the proposed treated area. Backpack sprayers were primarily used in infestations that ranged from 0-60% density while a 150 gallon skid sprayer was used in 60-100% density areas. In areas ranging from 40-80% density, a combination of the equipments was used in order to maximize time and effort.

The infestations were mapped and sprayed with a solution containing 2% concentration of Habitat® herbicide and 0.5% of surfactant. The solution was mixed in water and sprayed on *P. australis* infestations starting from the crown of the plant and working down covering approximately 70% of the plant. At this application rate, 2% concentrate, a total of 12.3 gallons of Habitat® herbicide was applied in the treatment of 20.3 acres of infestations during FY09.

In order to keep track of the areas that have been ground sprayed and will be sprayed, the Phragmites Vegetation Team created location IDs and several GIS Shapefiles. The entire portion of the Maryland side of Assateague Island has been divided into Location IDs to make it easier for park staff to locate where the team is spraying herbicide. This will assist Park Rangers and Park Staff locate the team in case a problem arises. Also, polygon shapefiles have been created to store the data in a GIS format to better visualize the areas that have been sprayed and get a better idea of how big the infestations are.

For FY10, the Phragmites Vegetation Team has mapped approximately 100 acres of *P. australis* areas that need to be sprayed. These areas are located half in the developed portion of the island and the other half out in the OSV (Over Sand Vehicle) Zone. The team is planning on spraying approximately 40 acres of *P. australis* this fiscal year. So far they have sprayed 5 acres in the developed area of the park for FY10.

In total the Phragmites Vegetation Team along with Summit Helicopter Inc, have sprayed approximately 500 acres of *Phragmites australis* on Assateague Island. (See table 1 and Appendix A for more specific information.)

Prescription burn

The resource management staff and Shenandoah National Park fire staff identified the use of prescribe fire as a viable management technique for *P. australis*. Prescribed burns have been used as part of a management regime to control *P. australis* that threatened the unique natural resources of ASIS. The prescribed burns provided an integral component in the restoration process by removing above-ground *P. australis* biomass in aerially sprayed infestations.

In order for the prescription burn to take place, several important documents had to be created. The Fire Management Plan (FMP) is an appendix to the ASIS Resource Management Plan. Its primary purpose is to integrate fire management objectives with other resource management programs. Activities described in the fire management plan are a part of the effort to maintain and, if necessary, restore natural ecosystem processes to the maximum extent practicable. Along with the FMP, the Assateague Island Annual Prescribed Fire Plan was created. This is an omnibus plan for lands within Assateague Island National Seashore (ASIS) that are to be treated with fire following the application of aerially applied herbicide in an effort to control *P. australis*.

During FY09 the first set of prescription burns were implemented at ASIS. They took place in mid March and took approximately two days, 3/12/09 and 3/21/09, to burn. Due to inclement weather the fire team had to leave and return later on. Six units were selected for the burns comprising of 197 acres spread out across the island. Within these units there were 85.5 acres of *P. australis* infestations that were aerially sprayed.

During FY10 the second set of prescription burns will take place at ASIS. They will take place sometime in February or March. Six units have been selected for the burn. They have been numbered Unit 7 through Unit 12 due to the fact that during the previous year, FY09, there were 6 units burned. The units scheduled to burn during FY10 contain approximately 350 acres and they are spread out across the island, although the majority of the acreage is concentrated between Km 19 and Km 21. Within these units there are approximately 210 acres of *P. australis* infestations that were aerially sprayed.

In total the vegetation management division, with the assistance of the Shenandoah fire staff, has burned approximately 300 acres of Phragmites, which equals more than half of all the *P. australis* sprayed areas. For a summary of the prescription burning that has taken place on ASIS see table 2 and Appendix B.

Fire Effects Monitoring

After the prescription burns were completed for FY09, the Shenandoah Fire staff returned in September to monitor and survey the burn units and to see the effects the fire had on the ecosystems. They planned on returning during late summer to early fall with the aim being to capture the flowering and fruiting stages of as many species as possible.

The purpose of the Fire Effects monitoring survey is to record data vegetation changes within prescribe burned areas in order to track and compare changes in vegetative cover of *Phragmites australis* and of native species. The objectives of the project are:

1. To establish randomly placed monitoring transects within each of the burned units
2. To collect data on vegetation within monitoring plots placed at equal spacing along each monitoring transect

The monitoring locations that were selected for the FY09 Fire Effects Monitoring were located within the six burn units that were created during the prescribe burn that took place during FY09. Transects were randomly placed within each unit. Each unit contained 4 transects. Random placement of the transects was achieved using GIS layers depicting the *Phragmites* infestation boundaries, and the Blackline boundaries. Random coordinates were generated for the starting points of each transect using a random number generator. Random coordinates were generated until four starting points (one for each transect) were found within the Blackline boundary of each site.

After the transect starting points were selected for each of the 24 transects, the marking of each transect commenced. Transects were marked with a series of flags and rebar pounded into the ground along each transect at 10 meter intervals (i.e. 0m, 10m, 20m). Each rebar post was marked with a metal etched plant tag and the starting post at 0m and the ending post at 20m were marked with florescent orange paint for identification purposes. Transects, were placed so that the orientation and sampling order would be from South to North along a bearing of 45 degrees (uncorrected), with all quadrats placed along the eastern side of the transect.

Fire Effects Monitoring will take place again during FY10 for burn units 7 through 12. For FY10 there will be another 24 transects, 4 in each of the units. The transects will be placed within the burn units and also within the *Phragmites* Sprayed areas.

Aerial Spray Transect Monitoring

Monitoring of the aerially treated areas was initiated during the summer of 2008 and will continue through and beyond the duration of the project. Monitoring efforts consisted of visual and quantitative measures of treatment effects. Permanent monitoring transects were established within four infestation treatment sites, each representing one of the dominant habitat types where infestations occurred. Four transects were randomly placed within each site and data collection on *P. australis* stem densities and species presence/absence occurred using .25 m x .25 m sampling quadrats every 2 meters along each transect. Random placement of the transects was achieved using GIS layers depicting the site infestation boundaries, the aerial spray tracks, and the aerial spray swath (50 ft wide along spray track). Transects were marked with a series of PVC piping pounded into the ground along each transect at 5 meter intervals (i.e. 0m, 5m, 10m, 15m, 20m). Each quadrat should be placed along the right hand side of the transect (West side on North to South Transects and South side on West to East Transects) starting at 0 m (i.e. 0-.5 m) and continuing every 2m so that the last quadrat is placed at 20 m (extending to 20.5 m). The long-term collection of data from these monitoring transects will capture changes in site vegetative composition and provide insights to help guide future management and restoration efforts.

Photopoint Monitoring

In order to monitor the effects of aerial herbicide spraying of *P. australis* stands on stand composition and on surrounding vegetation, photo monitoring points were established. A total of 12 sites were selected for photo monitoring. Sites were selected to include the main habitat areas where infestations and spraying occurred during FY08, including: bayside marsh habitat, diverse upland shrub habitat, dune swale shrub habitat, and the two areas in the developed area. Each site had one photo monitoring point established, except for the area in the developed area along Old Ferry Landing Road. Because of its prominent location and exposure to the visitor population, this 16 acre infestation had 4 photo monitoring points (2 along the bayside, 2 along Bayberry Drive) established. The photos of this area will eventually be incorporated into a display showing the treatment and recovery of the area.

Prior to the establishment of the permanent photo monitoring points a GIS shapefile was created to record the point locations and associated data. For each photo monitoring point a GPS point was taken that recorded the UTM coordinates (within 2 meters) of the established point.

The sequence of photo-monitoring will continue for a period of four years, with photo sets being taken at the beginning of the growing season, end of the growing season, and during the winter of each year. After four years the sites should show any signs of reestablishment by *P. australis* that are likely to occur and will also allow sufficient time for native vegetation to reestablish within the treated areas.

Aerial Spray Rare Plant Survey

Monitoring for rare, threatened, and species of management concern plants was done around all the *P. australis* infestations before they were aerially sprayed in FY09. The Phragmites Crew searched a 50 meter overspray buffer for these plant species. This was done in order to prevent these critically important species from being killed by the herbicide spray. When the crew found any of them, they collected data that consisted of the species type, if it was threatened, concerned or rare, and the location where it was found. The data collected was used in order to protect any species that was found before it was sprayed during aerial spray operations. If the proposed spray area could not be altered to protect these species, then the species would be protected from the spray by being covered up just before the spraying commenced and later removing the cover once the spraying was completed. The Phragmites Crew was able to find 2 plants that were threatened and 14 that were of concern during FY09.

Along with searching for these plants before aerial spraying commenced, the Phragmites Vegetation Team also searched any area that was to be ground sprayed for rare, threatened and species of management concern. During all ground spray herbicide applications the team performs a quick survey of the area before they spray it in order to prevent these critically important species from being killed by herbicide. If they find them, they protect them by covering them up until spraying is completed and the plant is not at risk of absorbing any herbicide that might injure or kill it.

Herbicide Control Study

This study is part of the overall *P. australis* management project aimed at systematically controlling infestations with herbicide applications. The Phragmites project requires the use of standardized methods for herbicide application rates and techniques. This study is meant to provide the foundation for herbicide application methods of mixed stands of *P. australis* (less than 60% cover) to be used in ground based spraying operations using a backpack sprayer and/or an ATV or truck mounted sprayer system. The purpose of this study is to compare results of two herbicides, Habitat and Rodeo, using two application techniques on the control of *P. australis* and resulting incidental die-off of native species as well as revegetation by native species. Results of this study will be used to assess the overall impact of *P. australis* control on the surrounding vegetation, to determine the time it takes to treat a given area, and the amount of herbicide needed to control a given area (and by extrapolation, the total cost).

The objectives of this study are:

1. To determine the effects of different herbicide application techniques on kill rates of *P. australis*
2. To determine the effects of different herbicide application techniques on native vegetation in treatment plots
3. To determine the amount of time per unit of measure (acre) each herbicide application method requires
4. To determine the amount of herbicide required to obtain optimal control for each treatment regime

The herbicide control study protocol has been written but the study has not yet been completed. During FY10, the Phragmites Vegetation Team hopes to choose a desired site for the study and complete it.

UMES Project

Throughout the 2008-2009 school year, eighth grade students from Worcester County (Maryland) Public Schools participated in five (or possibly six) fieldtrips to areas infested with *Phragmites australis* on properties managed by Assateague Island National Seashore. During these activities Worcester County Public School teachers assumed all responsibility for student safety and project supervision. Field activities were coordinated with volunteer representatives from the University of Maryland Eastern Shore (UMES), and involved data collection on the vegetative, aquatic and terrestrial fauna communities in project areas using established protocols. Additionally, project activities involved the use of loppers and/or clippers to cut vegetation that was then removed from the *P. australis* infested areas. After each field trip, Worcester County Public Schools provided the National Park Service with the number of participants, a tally of volunteer hours worked and a brief summary of the work accomplished.

Phragmites Database

The Phragmites database contains all the data that has been collected for the Phragmites Control Project. It contains data for monitoring, spraying (aerial and ground) and mapping. To date, all the data that has been collected for the project has been entered into the database. Along with the database, a folder was created to keep a copy of the data in an excel format as well as a folder for the shapefiles of the data. In the database, you can find forms created for each active table in the database as well as drop down menus for fields that repeat themselves to make it easier and more efficient to enter the data.

Documents

A list of all the documents that have been created for the Phragmites Control Project

- ASIS Phragmites Project: Photo-Point Protocol
- ASIS Phragmites Project: Aerial Survey Data Collection & Mapping Protocol
- ASIS Phragmites Project: Herbicide Control Study Methodology
- ASIS Fire Management Plan
- ASIS Prescription Fire Plan 2010
- 2008 Aviation Management Plan
- 2009 Project Aviation Safety Plan
- 2008 Project Aviation Safety Plan
- 2009 Aerial Spray Press Release
- 2008 Aerial Spray Press Release
- 2009 Prescribe Burn Press Release
- 2010 Prescribe Burn Press Release
- Phragmites Aerial Survey Implementation Plan 2008
- Phragmites Project Brochure 2008
- Phragmites Project Brochure 2009
- Phragmites Prescribe Burn Project Brochure 2010
- Why is Assateague Burning 2009
- *P. australis* Monitoring and Management Project 2008 Exotic Report
- *P. australis* Monitoring and Management Project 2009 Exotic Report
- *P. australis* Rare Plant and Species of Management Concern Survey Monitoring Methodology
- *P. australis* Fire Effects Transect Monitoring Methodology
- *P. australis* Ground Spraying Methodology
- *P. australis* Aerial Spray Effects Permanent Transect Monitoring Methodology
- Phragmites Database

Table 1: Acreage of All Treated Infestations of *P. australis* by Habitat Type and Density Class

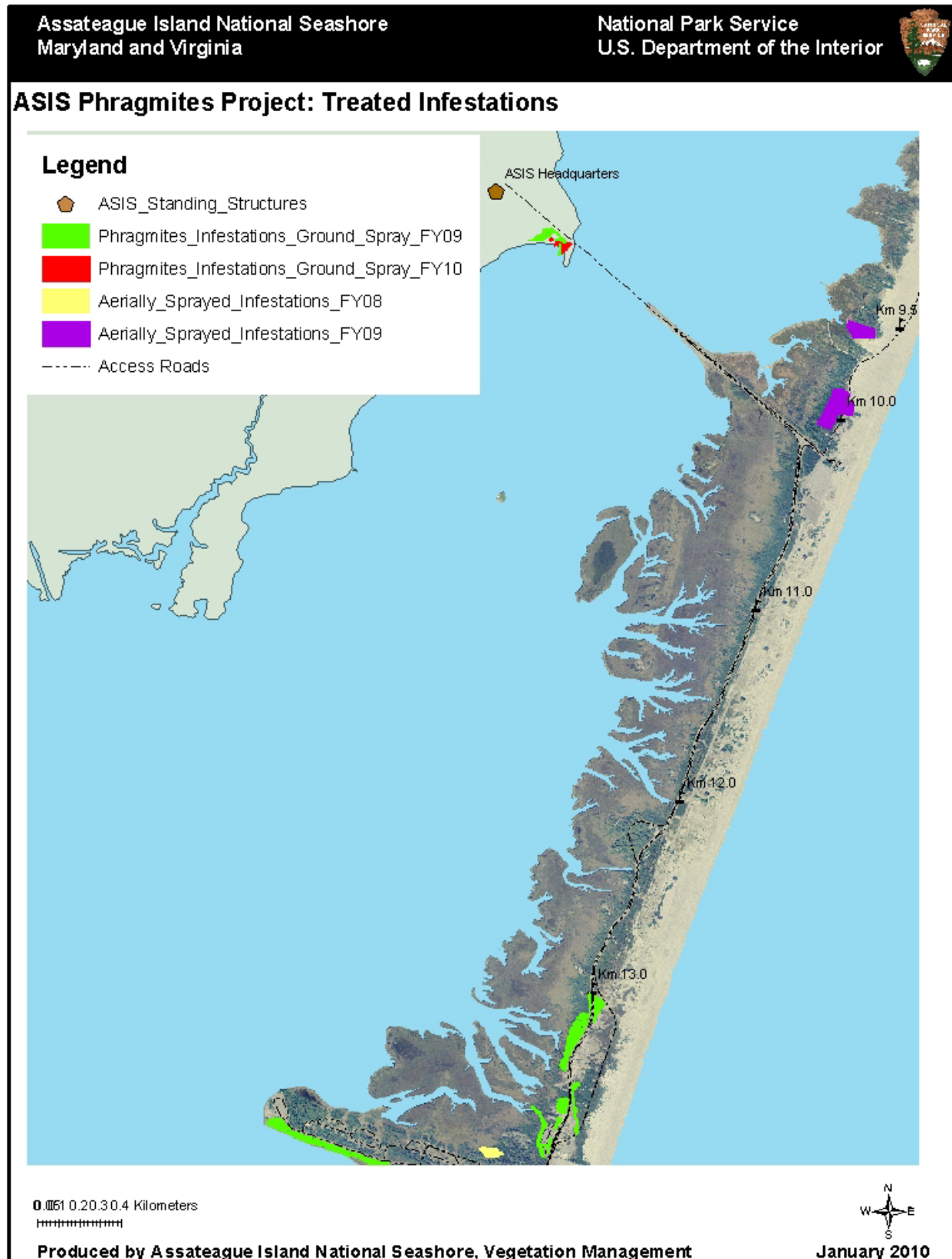
Habitat Type	0-40%	40-60%	60-80%	80-100%	Total Acres	% of Total
Shrub	2.42	159.30	145.31	4.20	311.23	61.3%
Marsh	3.96	2.82	6.65	4.74	18.17	3.6%
Forest	0.75	6.46	0.68	3.53	11.42	2.2%
Shrub/Marsh	0.00	135.48	11.46	1.37	148.31	29.2%
Shrub/Forest	1.31	1.31	16.07	0.00	18.69	3.7%
Total	8.44	305.37	180.17	13.84	507.82	100.0%
% of Total	1.7%	60.1%	35.5%	2.7%	100.0%	

Table 2: Acreage of Prescribe Burn areas by Island Extent and Acreage (FY09 and FY10)

Island Extent	Unit Acres Burned	Phrag Acres Burned	% of Units that is Phragmites
North End (km 0-9.5)	0	0	0%
Developed Area (km 13-16)	35	30.5	87.1%
km 16-22	333	198.7	60%
km 22-27	71.4	20	28%
km 27-32	52.2	25.3	48.5%
km 32-36	50.1	20.7	41.3%
Total	541.7	295.2	55%

Appendix A

Map 1

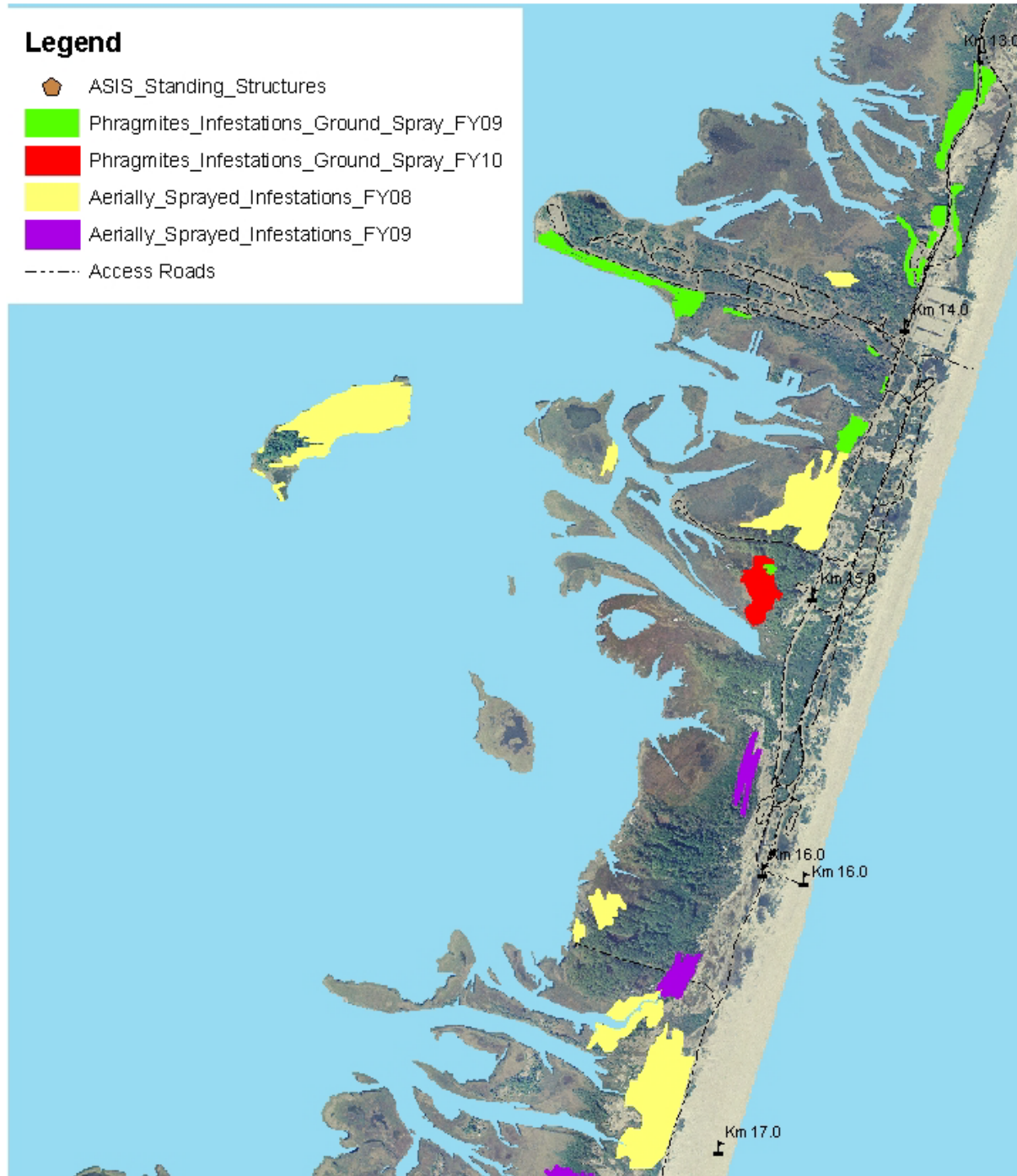


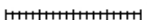


ASIS Phragmites Project: Treated Infestations

Legend

-  ASIS_Standing_Structures
-  Phragmites_Infestations_Ground_Spray_FY09
-  Phragmites_Infestations_Ground_Spray_FY10
-  Aerially_Sprayed_Infestations_FY08
-  Aerially_Sprayed_Infestations_FY09
-  Access Roads



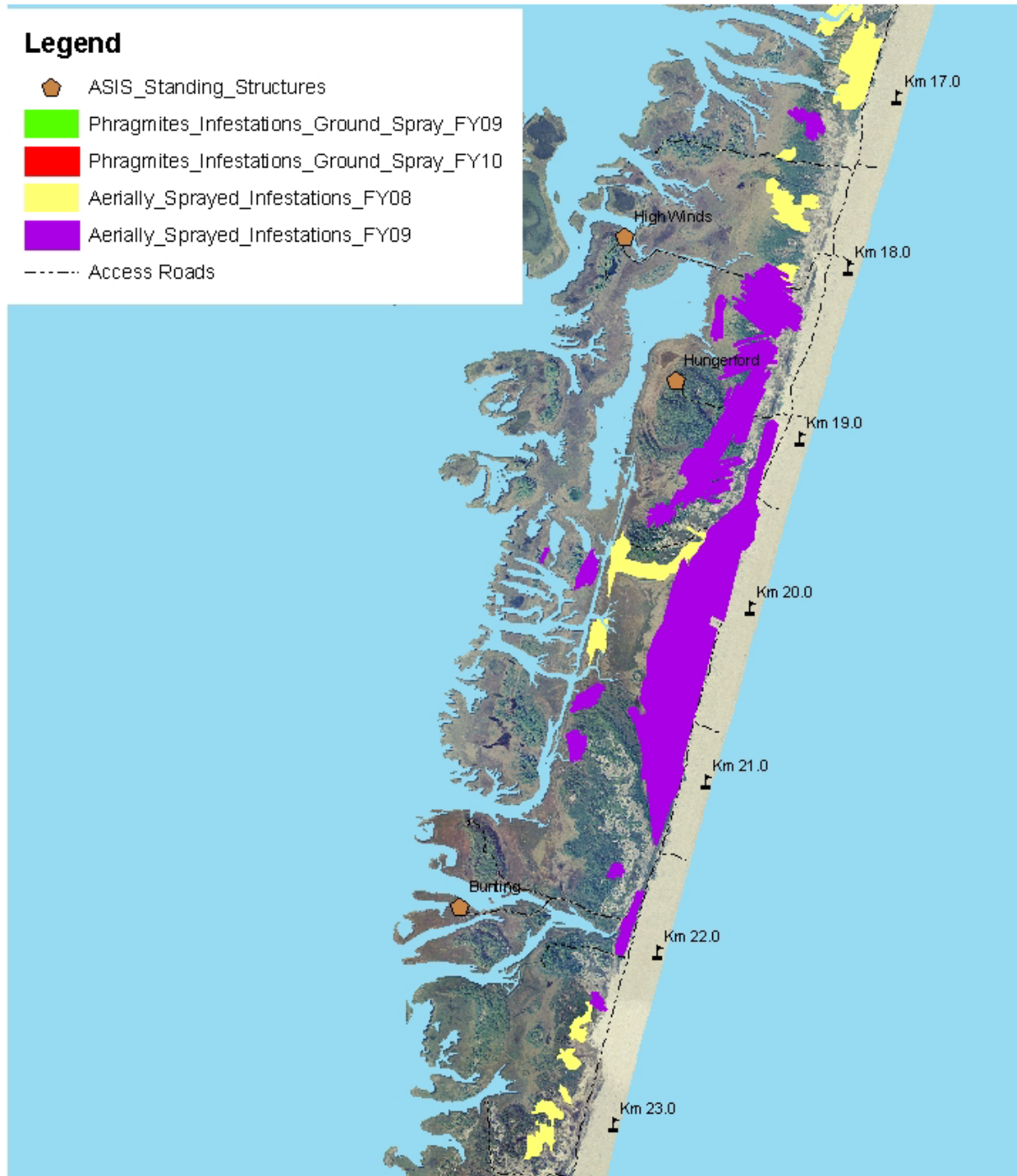
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ASIS Phragmites Project: Treated Infestations

Legend

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-  Phragmites_Infestations_Ground_Spray_FY09
-  Phragmites_Infestations_Ground_Spray_FY10
-  Aerially_Sprayed_Infestations_FY08
-  Aerially_Sprayed_Infestations_FY09
-  Access Roads



0 0.125 0.25 0.5 0.75 1 Kilometers

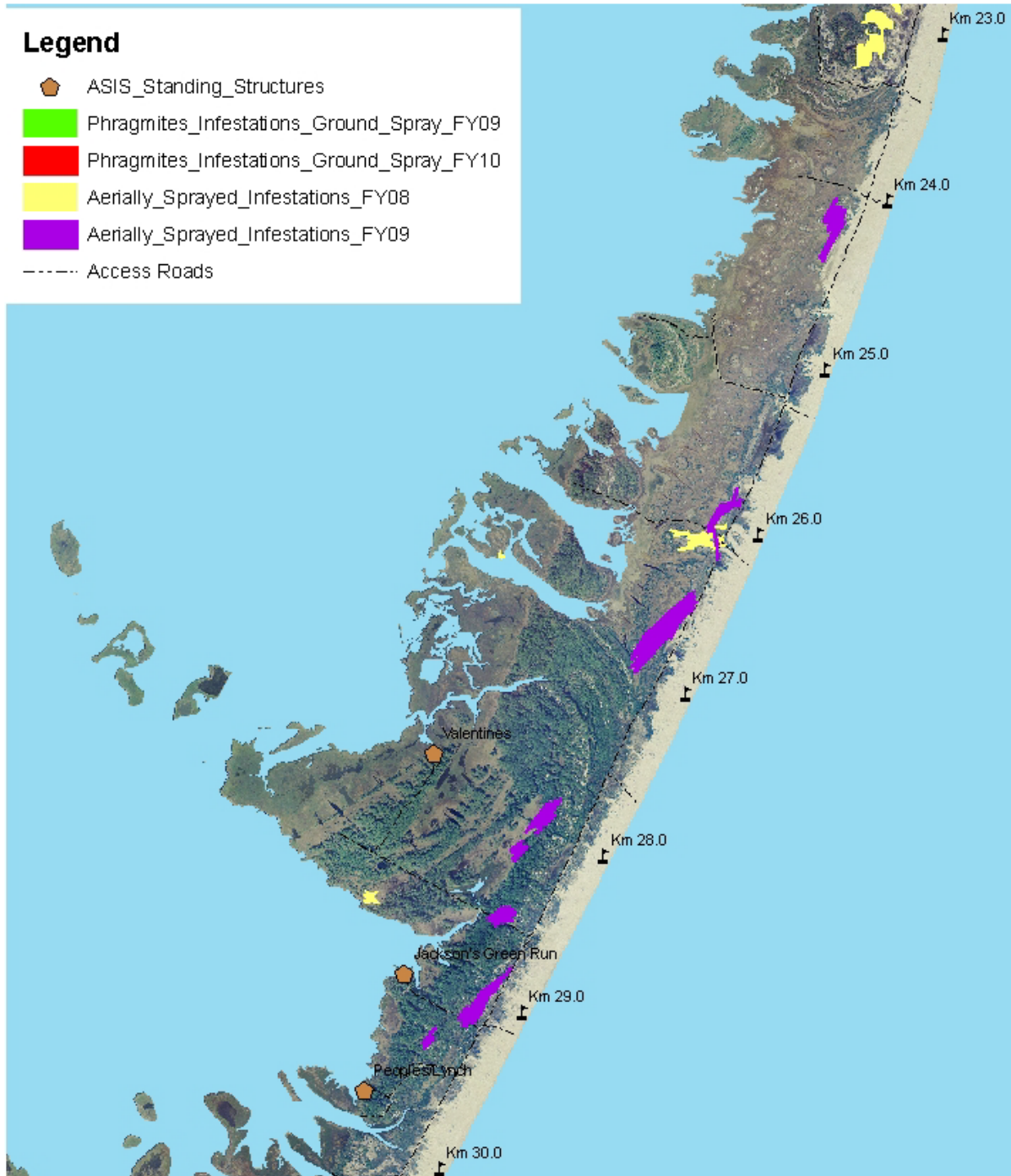


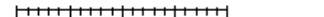



ASIS Phragmites Project: Treated Infestations

Legend

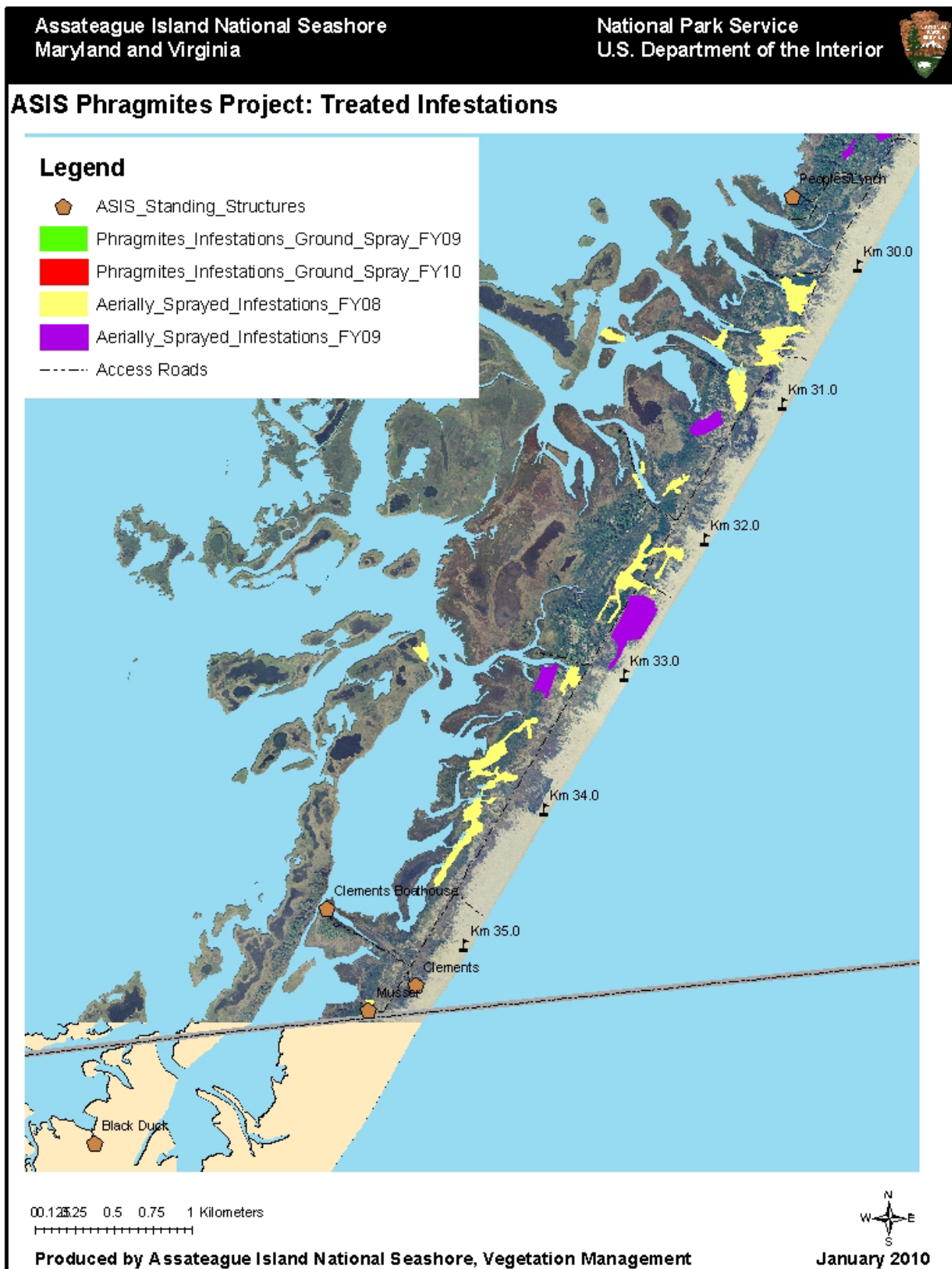
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-  Phragmites_Infestations_Ground_Spray_FY09
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-  Aerially_Sprayed_Infestations_FY08
-  Aerially_Sprayed_Infestations_FY09
-  Access Roads



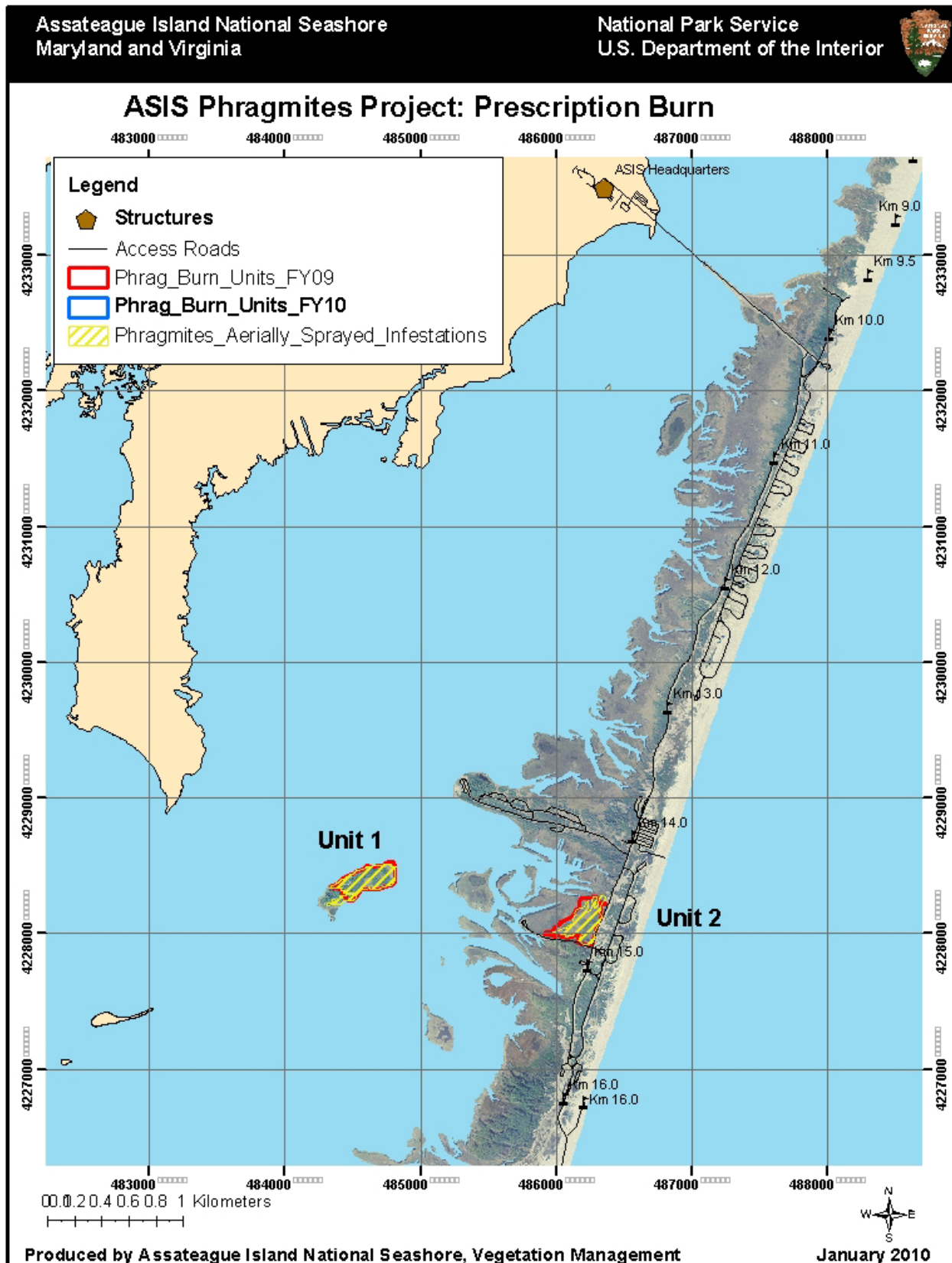
0.125 0.25 0.5 0.75 1 Kilometers




Map 5



Map 1



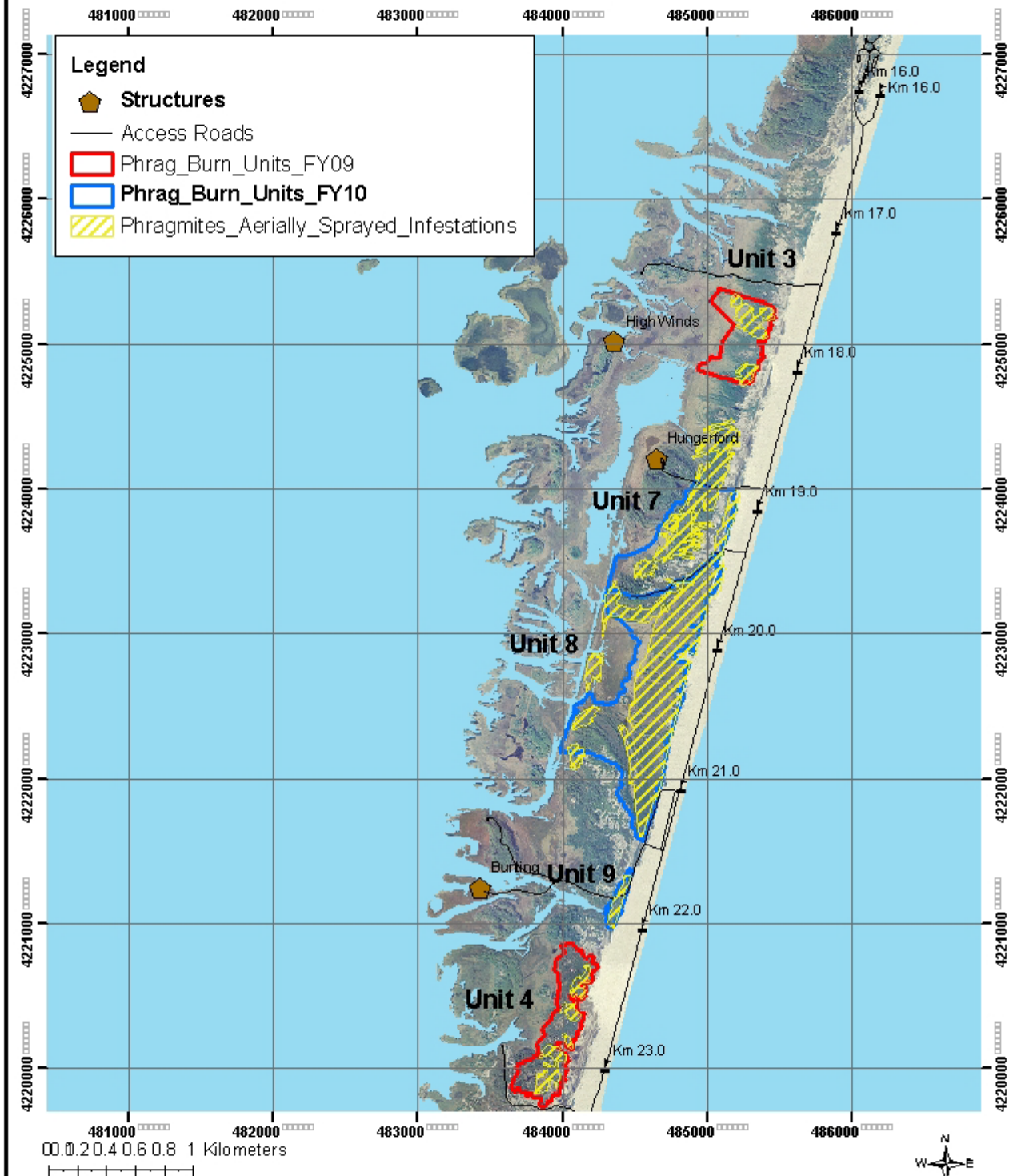
Map 2

Assateague Island National Seashore
Maryland and Virginia

National Park Service
U.S. Department of the Interior



ASIS Phragmites Project: Prescription Burn



Produced by Assateague Island National Seashore, Vegetation Management

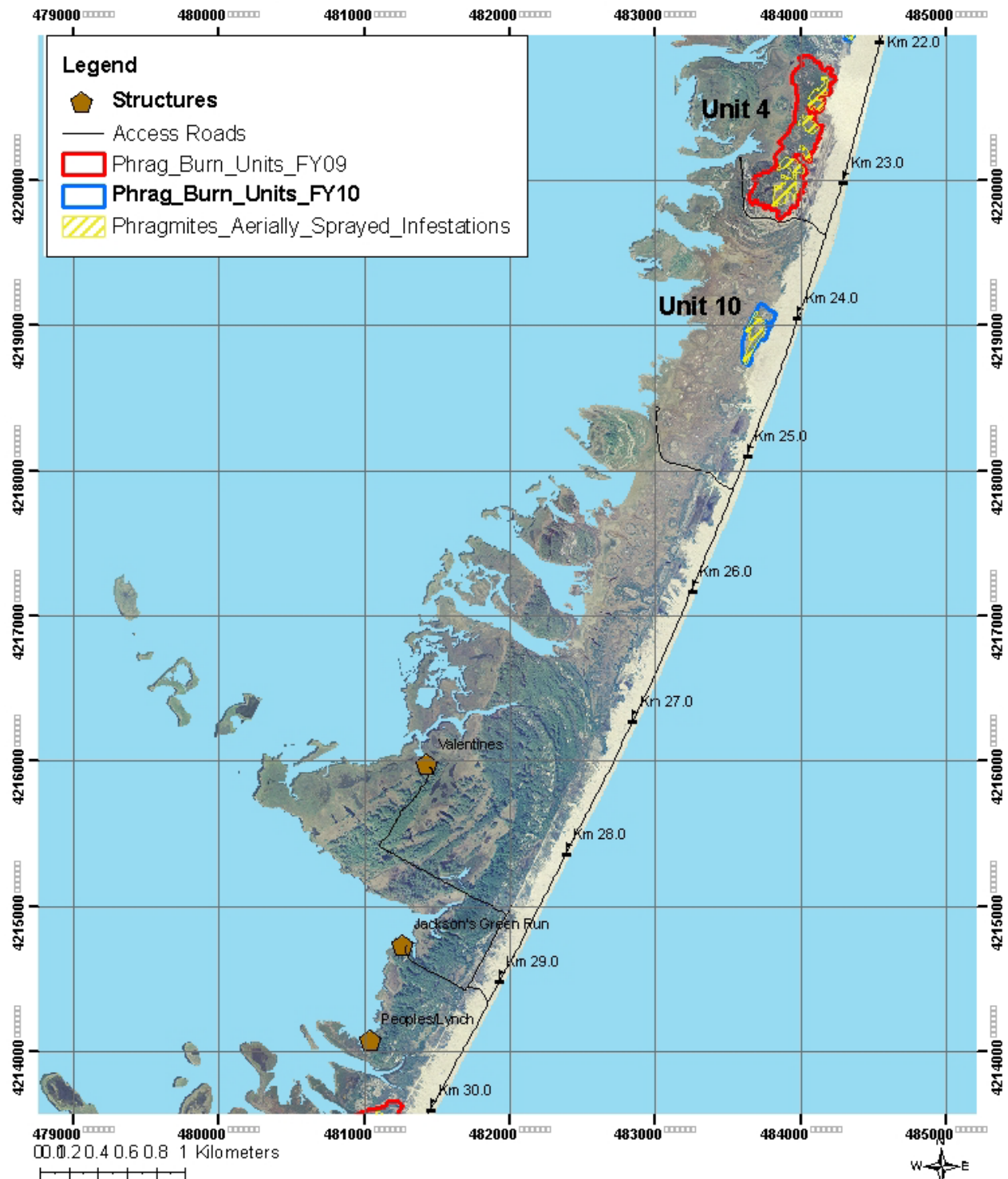
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Assateague Island National Seashore
Maryland and Virginia

National Park Service
U.S. Department of the Interior



ASIS Phragmites Project: Prescription Burn



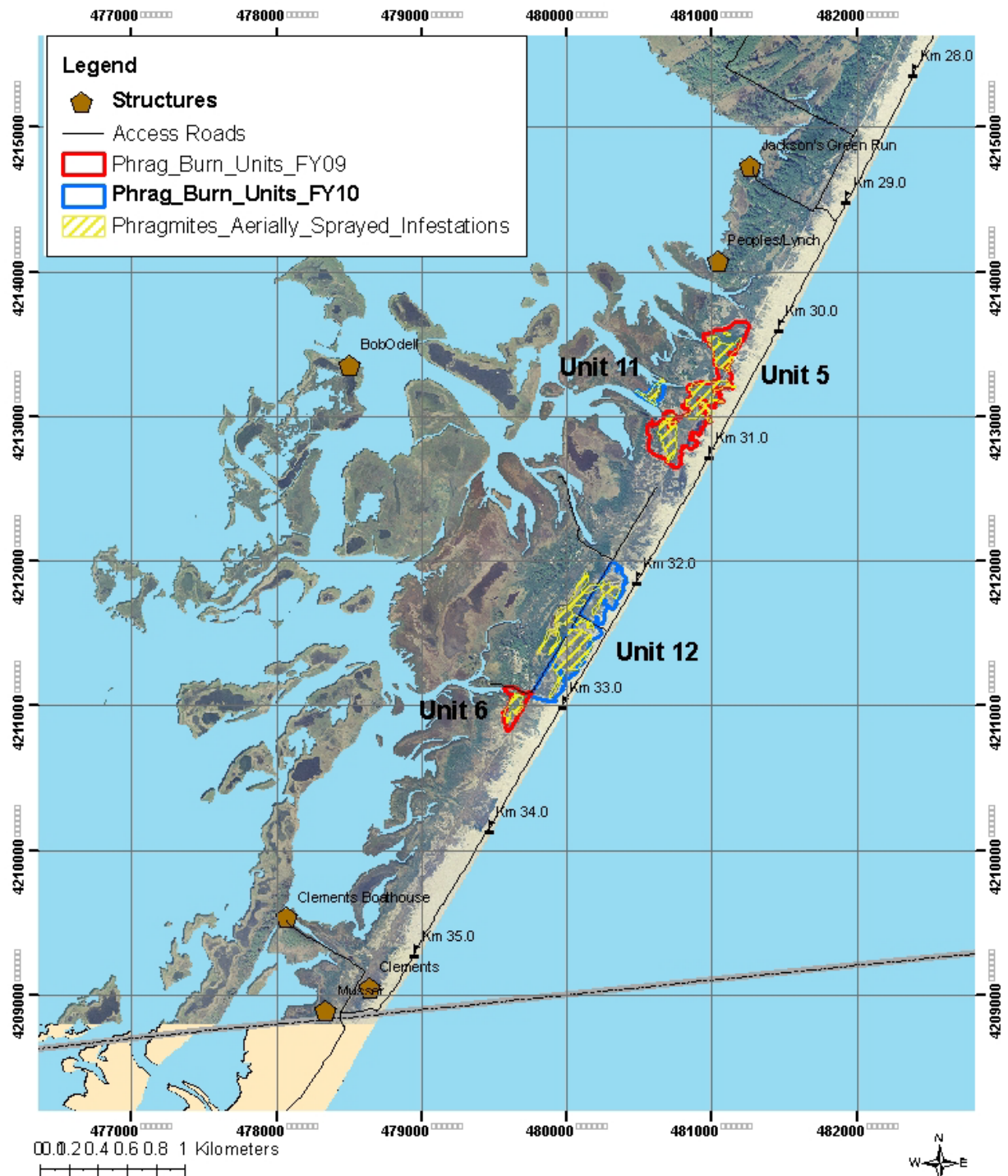
Map

Assateague Island National Seashore
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ASIS Phragmites Project: Prescription Burn



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