

Assateague Island National Seashore Alien Plant Management Program Report 2006 - 2007



Figure 1: *Phragmites australis* at the Verazzano Bridge

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Introduction

Assateague Island National Seashore (ASIS) alien plant management program (APMP) continued during 2006 and 2007. The alien plant species that were monitored and/or treated included: *Ailanthus altissima*, *Alnus glutinosa*, *Artemisia stelleriana*, *Carex kobomugi*, *Clematis terniflora*, *Elaeagnus umbellata*, *Eragrostis curvula*, *Hedera helix*, *Lonicera japonica*, *Lythrum salicaria*, *Miscanthus sinensis*, *Morus alba*, *Pennisetum alopecuroides*, *Phragmites australis*, *Pinus thunbergiana*, *Rosa multiflora* and *Rosa wichuriana*. During this program's implementation ASIS received assistance from the NPS National Capitol Region's Exotic Plant Management Team (NCR EPMT) who helped treat: *P. thunbergiana*, *H. helix*, *L. japonica*, *R. multiflora*, *R. wichuriana*, *E. curvula* and *A. altissima*. All ASIS APMP data have been consolidated and results are summarized in this report.

ASIS staff inventoried and treated alien plant species in the park and around the park's headquarters area, including adjacent lands to the south, where the park has a limited cooperative agreement with the State of Maryland Department of Natural Resources. ASIS staff also assisted Assateague State Park Americorps volunteers by showing them how to survey and treat state park lands for invasive exotic plants. ASIS staff also entered and compiled all APMP data into its Exotic Plant Database. Here, all alien plant monitoring and treatment locations were compiled into a database and species codes were assigned to all sites. This database organizes program data and allows newly discovered alien plant locations to be documented chronologically and systematically.

ASIS APMP protocol dictates that an infested site becomes inactive only after three consecutive years without re-occurrence, therefore infestations that occurred during both 2006 and 2007 are still considered active and monitoring of these sites will continue during 2008.

Methods:

ASIS Alien Plant Management Program Design 2006-2007:

The ASIS APMP did not ultimately adopt the Alien Plant Ranking System (APRS) as described by Chase and Sturm (2006). Instead the ASIS APMP developed its own database using Microsoft Access to suit the data storage needs of this program. Furthermore, the APMP follows the alien species guidelines found at the NPS inventory and monitoring website (<http://science.nature.nps.gov/im/monitor/index.cfm>) and has adopted North American Weed Management Association (NAWMA) standards. The APMP also refers to the Bureau of Land Management's (BLM) Technical Reference 1730-1: Measuring and Monitoring Plant Populations and the Nature Conservancy Weed Handbook for guidance on monitoring and treating targeted alien plant populations.

A project intended to help ASIS begin to treat *P. australis* infestations is scheduled to begin during 2008. Due to the complexities of documenting and treating the sizable and abundant *P. australis* infestations at ASIS, a term lead biological technician position has been created and the incumbent in this position will oversee and coordinate all *P. australis* monitoring and treatment activities.

Data Management

The ASIS APMP database documents new infestations and tracks the development and treatment success of existing infestations. In the APMP database multiple infestations are grouped into sites for record keeping and reporting purposes. Site codes are generated for each individual infestation in the database. A site code is composed of an epithet that is generated by taking the first 2 letters of the plant's genus followed by the first two letters its species name (ie. *Elaeagnus umbellata* becomes ELUM) followed by "Site_" and a number to designate different site locations (ie. ELUM_Site_01). A separate code is used for individual infestations within a particular site. The individual infestation code uses the same species abbreviation naming convention that is used to generate a site code followed simply by the sequential number of the infestation (ie. ELUM_0001). These site and infestation code conventions

facilitate the orderly arrangement and correct parsing of information in the database. These codes allow for the addition of new information and enable annual treatments within sites to be discreetly identified.

Safety Precautions

A non-toxic marker dye has been used in herbicide mixtures since 2004. The dye assures that proper coverage of the herbicide is administered on the foliage of targeted species. It also assures that the applicator will see any possible contamination on his/her protective clothing suit. Proper protective equipment (PPE) will always be essential to the management of exotic plant species at ASIS.

The lead technician responsible for coordinating and implementing the APMP is a certified pesticide applicator in the State of Maryland and is therefore officially permitted to conduct and oversee the herbicide treatments described in this report. Employee safety is important to ASIS, especially when having to work with potentially hazardous materials, therefore making sure that all equipment is in good working order and all permits are current and up to date is an essential component of the ASIS APMP.

Alien Plant Inventory and Monitoring

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

1. The alien plant species is an existing species of management concern at ASIS.
2. The alien plant species is on the Maryland Department of Natural Resources Wildlife & Heritage Services' list of invasive non-native plant species (<http://www.dnr.state.md.us/wildlife/invtintro.asp>)
3. The alien plant species is considered to be potentially invasive by the NPS and its level of abundance at ASIS was found to warrant management consideration.

Island searches for invasive alien plants were conducted during 2006 and 2007. Pathfinder Pro XR Global Positioning System or Garmin GPSmap76CS handheld units were used to record GPS data. Whenever possible the perimeter of larger alien plant infestations were mapped, however some infestations were too difficult to circumnavigate and were therefore documented using point data. The descriptive data recorded for each infestation included: species, abundance (sparse, moderate, or heavy), length (longest axis, m), width (shortest axis, m), height (m), # individuals, phenology and comments. These data were visually estimated in order to increase the efficiency of the monitoring effort.

Results

A summary of the ASIS APMP accomplishments during 2006 and 2007 follows. This summary includes ASIS APMP monitoring and treatment activities as well as those conducted with the assistance of the NCR EPMT. The NCR EPMT worked at ASIS for a week during each of three visits; one in 2006 and two in 2007. During these visits the NCR EPMT helped monitor and treat infestations of *P. thunbergiana*, *H. helix*, *L. japonica*, *R. multiflora*, *R. wichuriana*, *E. curvula*, *M. alba* and *A. altissima*.

***Ailanthus altissima*:**

During 2006 two *A. altissima* sites were treated; AIAL_Site_01, located near the Ocean City inlet and AIAL_Site_04 located at the former location of the Green Run Hotel. Treatments of these sites were conducted in April. Both sites were treated with a basal bark application of a 25% triloxy herbicide solution of Garlon4™ in diesel fuel. One sapling was treated at AIAL_Site_01 and 631 saplings were treated, with the help of the NCR EPMT, at AIAL_Site_04.

During 2007 AIAL_Site_01 was not infested and required no further treatment however AIAL_Site_04 did require further treatment. During March 392 saplings were treated with a 25% triloxy herbicide solution of Garlon4™ in diesel fuel via basal bark application. The site was revisited in June at which time 343 additional saplings were treated with a foliar application of 3% triloxy herbicide Garlon3A™ in water. AIAL_Site_04 was originally infested by mature trees that had produced a substantial seed bank. Therefore, further treatments are expected to be required during years to come.

Additionally, a new site (AIAL_Site_05) was located in July when a single sapling was found on the eastern edge of Pope Island, 200 meters southwest of the Clements Boathouse. AIAL_Site_05 will be treated in 2008.

Alnus glutinosa:

During April 2006, a single *A. glutinosa* tree at ALGL_Site_01, a previously known infestation, was treated by frilling around the base of the tree through the cambium layer with a machete. A 25% triclopyr herbicide solution of Garlon4™ in diesel was then applied to the cut area. 2007 monitoring revealed that the tree had died and no follow up treatment was required.

Artemisia stelleriana:

During April 2006 a small infestation of *A. stelleriana* (ARST_Site_01) from a previously known infestation was treated with a foliar application of 3% triclopyr solution of Garlon 3A™ in water. An additional site, ARST_Site_02, was discovered in the vicinity of kilometer 17 (refers to the approximate distance south of the Ocean City Inlet) in August.

During April 2007, ARST_Site_02 was treated using the same method described above. Both treatments were found to have been successful during monitoring in August 2007. Monitoring and treatment will continue as needed.

Carex kobomugi:

During 2006 active *C. kobomugi* (CAKO) occurrences were monitored. The current limited number of CAKO occurrences on ASIS is attributable to management actions taken for this species since 1999. Six infestations of CAKO (CAKO_0013, 14, 17, 22, 27, and 36) were treated in August of 2006 with a 3% glyphosate herbicide solution of Rodeo™. ASIS staff encountered several of the 2006 treated CAKO sites during other field activities in 2007 and observed that the treatments appeared to have been largely successful. However during 2007 no formal monitoring of these sites was conducted due to time limitations and therefore Table 3 reflects no reduction in size at these sites during 2007. Also during 2007 three new *C. kobomugi* sites were discovered, CAKO_39, 40 and 42. The 2006 treated CAKO sites along with the new CAKO sites will be monitored and (re)treated as needed during 2008.

Clematis terniflora:

During April 2006, *C. terniflora* vines at CLTE_Site_01, which is located near the canoe rental stand at the western end of the Bayside Campground peninsula was treated with a foliar application of a 3% triclopyr solution of Garlon 3A™ in water. The post treatment monitoring at this site revealed few surviving seedlings and this area was not retreated again in 2007.

During November 2007 CLTE_Site_01 was monitored once again at which time it was found to be very active. Several new vines with large amounts of seed had emerged above the canopy of shrubs. The size of the infestation had expanded with new vines being found as much as 100 meters from the epicenter of the original infestation. The CLTE_Site_01 seed bank is well established and it is expected that new seedlings will continue to emerge. Further treatments and monitoring will occur at this site in 2008.

Elaeagnus umbellata:

During May 2006 a single *E. umbellata* tree was discovered on NPS managed land at Elum_Site_02. This island tree was treated with a foliar application of a 3% triclopyr herbicide solution of Garlon 3A™ in water. Additionally, 33 new *E. umbellata* trees at Elum_Site_01, the off-island Park Headquarters area, were treated with 2 different herbicide treatments. In April, the ASIS APMP treated 2 trees with a 25% triclopyr herbicide solution of Garlon4™ in diesel fuel. Then in May, the ASIS APMP and the NCR EPMT treated 31 trees with a 75% triclopyr herbicide solution of Garlon4™ in water using a hack

and squirt method. In June some trees located behind the pole barn at park headquarters were retreated because it was apparent that the previous month's treatment had not been 100% effective.

During 2007 a third of the *E. umbellate* trees that had been treated with the hack and squirt method in 2006 had to be retreated by the ASIS APMP using the 25% triclopyr herbicide solution of Garlon4™ in diesel fuel mixture because they had not been killed by the previous year's treatment. Subsequent monitoring of ELUM_Site_01 revealed that all treated trees had died. As a result of its treatment success rate, the basal bark application of 25% triclopyr herbicide solution of Garlon4™ in diesel fuel solution has been adopted as the preferred treatment method for this species.

Eragrostis curvula:

E. curvula infestations have been treated since 2005 with measurable success. Prior *E. curvula* treatments have included cutting the larger tussocks of this grass with a Stihl™ weedwacker equipped with a hedge trimmer, which allowed the tussocks to be cut at, or near ground level at the start of its growing season in May. Once cut, the fallen material was then raked away into nearby open areas and the tussocks were allowed to regenerate. Once the new growth reached 15 to 20cm in height it was then treated with a foliar application of a 3% glyphosate herbicide solution of Rodeo™ in water.

During 2006, the NCR EPMT helped the ASIS APMP trim and rake the grass tussocks and then the crew experimentally spot sprayed *E. curvula* roadside occurrences from the entrance station to the Ferry Landing intersection on both the eastern and western sides of Bayberry Drive. Later in June the cut tussocks were sprayed by ASIS APMP personnel.

During June 2007 the NCR EPMT returned to ASIS and helped continue to treat *E. curvula* infestations. The 2 previous years of cutting and follow-up spraying had significantly diminished *E. curvula* occurrences on NPS property on the island. Cutting was not needed in 2007 because all of the large tussocks had been controlled. The *E. curvula* occurrences that were present during 2007 are thought to have originated as recruits from the sizeable seed bank that is established along ASIS' roadsides. In one day, all roadsides infestations were treated with the above herbicide mixture by once again spot spraying with backpack sprayers.

Hedera helix:

During 2006 a single *H. helix* plant was discovered at the former Clements inholding, located near km 35. This plant was cut at ground level and treated with a drizzled 100% solution of triclopyr herbicide Garlon 3A™ by ASIS and the NCR EPMT personnel. The cut portion was removed and disposed of off island to prevent it from rooting again. Monitoring during 2007 revealed no reoccurrence of *H. helix*.

Lythrum salicaria:

During 2006 the site where this species had occurred (LYSA_Site_1) was monitored periodically through the summer months. No reoccurrence of *L. salicaria* was observed and because the site has been inactive for over three years it will be delisted, meaning no further monitoring will occur.

Lonicera japonica:

ASIS has used several methods to treat *L. japonica* infestations. All of these methods have worked favorably, however some important differences between these techniques should be considered before opting for one method over another in order to appropriately treat a specific *L. japonica* infestation, see below.

1. Garlon 4™, a Triclopyr ester herbicide combined with diesel fuel is used in cut stump treatments when weather conditions are below freezing because this combination will not freeze. Because *L. japonica* has persistent leaf cover throughout the winter, it is easily seen in contrast to other island vegetation prior to the emergence of new spring growth.

2. Garlon 3A™, a Triclopyr salt herbicide mixed with water and used as a foliar spray is preferred when non-target losses are less acceptable because this mixture is a broad leaf herbicide which can be applied when non-target vegetation is in a leaf off state. However, this herbicide can cause permanent eye damage to applicators and is therefore less desirable for overhead spraying.

3. Rodeo™, a Glyphosate herbicide, is used for cut stump and foliar treatments. It is the best choice for ASIS when conditions are above freezing and when less selective vegetation mortality is acceptable, because it is less expensive and safer (for the applicator not the plants) than the Garlon 3A™.

Foliar spray methods can result in the incidental mortality of non-target adjacent native vegetation while the cut stump treatment is the least likely to disturb non-target plant species. Therefore the cut stump treatment method has been and will continue to be preferred whenever feasible to treat *L. japonica* infestations.

The known *L. japonica* occurrences were regrouped into seven active sites during 2006. The original 4 sites were: LOJA_Site_01: located along the access road to Valentines cabin. LOJA_Site_02: originally located within the Bayside Campground peninsula, was expanded during 2007 to include ASIS' entire developed area. LOJA_Site_03: located along Bayberry Drive within Assateague State Park. LOJA_Site_04: located along the Shell Road and the trail leading to the handicapped accessible duck blind. The 2006 alien plant species surveys resulted in the discovery of three additional *L. japonica* infestations sites. The new sites were LOJA_Site_05: a single plant discovered near the Ocean City inlet. LOJA_Site_06: located within shrub and forested areas between km 17 and 20. Finally, LOJA_Site_07 is located on the mainland within the ASIS headquarters area.

During 2006, *L. japonica* management efforts primarily focused on documenting the expanse and abundance of individual infestation sites however some control measures were also conducted. During April seventeen individual infestations were treated by ASIS personnel at LOJA_Site_02, _04 and _05. Then during May, the NCR EPMT assisted with the treatment of thirteen additional *L. japonica* infestations at LOJA_Site_06. Fall monitoring of treated areas revealed that the methods used were effective.

During 2007 ASIS and NCR EPMT personnel treated *L. japonica* infestations at LOJA_Site_01, _02, _04, _05 _06 and _07. These treatments occurred during March, April, May and June. Post treatment monitoring revealed that some *L. japonica* infestations were still active and as a result these infestations were retreated by ASIS personnel. LOJA_Site_05 is of special significance because it is an early detection site and it is anticipated that aggressive treatment of this site is likely to result in its successful eradication. During the first 3 months of 2007 ASIS assisted the Assateague State Park in mapping their infestations of *L. japonica* with the help of their Americorps crew. Data associated with this site are not presented in the tables of this report because the area is outside of NPS jurisdictional boundaries. However it should be noted that the survey of their area for this species occupied at Loja_Site_03 was found to be nearly 3,500 m². This information was shared with Assateague State Park managers and will hopefully be used to treat their infestations in the near future. They are now aware of the problem that exists there.

Monitoring of treated *L. japonica* infestations has revealed encouraging results, however tall vines remain problematic because it is difficult to spray the tallest infestations. Therefore effective treatment of tall *L. japonica* vines will require more labor intensive cut stump treatments in the future. Also, because many *L. japonica* infestations have proven difficult to treat due to the species' frequent tendency to be interwoven among a dense array of non-target species, it is anticipated that successful control of this species will be an ongoing component of the ASIS APMP for years to come.

***Miscanthus sinensis*:**

By 2006 the large *M. sinensis* infestation at MISI_Site_01 had been greatly reduced due to treatments that occurred during 2004, however after the initial treatment many plants emerged from the site's existing seedbank. In addition monitoring during April 2005 lead to the discovery of 2 remote *M. sinensis* infestation sites (MISI_Site_02 and MISI_Site_03) on the north end of ASIS. During May 2006

MISI_Site_01 and _02 were treated with a foliar application of a 3% glyphosate herbicide solution of Rodeo™ in water.

During 2007 no treatments of *M. sinensis* sites occurred, however monitoring of MISI_Site_01 at the end of the growing season revealed the presence of additional new recruits. Also, a new infestation (MISI_Site_04) was discovered to the west of Hungerford cabin. All MISI sites will be monitored and treated as needed in 2008.

Morus alba:

During 2006 two *M. alba* sites were treated. In June MOAL_Site_01, which is located near park headquarters was treated jointly by ASIS and NCR EPMT personnel. Here three large trees (MOAL_0001, _0002 and _0003) were treated by hacking around their base with a hand axe followed by drizzling a 75% triclopyr herbicide solution of Garlon 3A™ in water into the hacked portion of the cuts. This treatment was not fully successful because a small portion of each tree's cambium layer survived and continued living in a severely weakened state.

During May 2007 retreatment of MOAL_Site_01 was conducted by ASIS personnel. This treatment involved cutting through the last living cambium layer as needed and drizzling a 25% triclopyr herbicide solution in diesel fuel into the cut. Additionally during 2007, MOAL_Site_02 was treated. This site is located on the island in park's developed area and has two known trees (MOAL_0004 and _0005) which were treated by ASIS and NCR EPMT personnel in June by cutting the trees at the ground level and spraying a 50% triclopyr salt herbicide of Garlon 3A™ in water on the cut stump. 2007 monitoring confirmed that all treated *M. alba* have been controlled. No further treatments are anticipated at either of these sites.

Pennisetum alopecuroides:

During September 2007, an infestation of *P. alopecuroides*, measuring approximately 100 m², was discovered near park headquarters. The purple-colored inflorescence of this species is very distinctive. Because the NPS lists *P. alopecuroides* as a potentially invasive alien plant species (see the NPS's Weeds Gone Wild website) it has been added to the ASIS list of alien invasive species and will be treated in 2008.

Phragmites australis:

The ASIS APMP has not targeted *P. australis* for monitoring and management due to the expanse of the infestation by this species on Assateague Island. Sturm (2007) recently learned that ASIS' three ungulate species are facilitating *P. australis*' expansion by stimulating a compensatory growth response wherein *P. australis* establishes new runners and shoots in response to existing levels of herbivory ($\alpha = 0.05$). During September 2007 a small project involving aerial spraying of a 1 hectare infestation of *P. australis* using a glyphosate based herbicide treatment was initiated. The *P. australis*

infestation project area shown in Figure 2 is located near the park headquarters and is immediately adjacent to and southwest of the pedestrian foot bridge.

Figure 2: Phragmites australis project area



This restoration project involves partners from the Maryland Department of Natural Resources, the University of Maryland Eastern Shore (UMES) and Worcester County Public Schools as well as the NPS. Project partners are all working together to coordinate the project, which is primarily intended to serve as an educational opportunity for Worcester County public school students by allowing them to monitor the development of an ecological restoration project.

In addition, funding was obtained during 2007 for the park to begin to address *P. australis* infestations on the island. This project will be implemented from 2008 through 2010.

Pinus thunbergiana:

During May 2006 the *P. thunbergiana* infestation around the grounds of the Clements house (PITH_Site_01) was treated by ASIS and NCR EPMT personnel. Chainsaws and machetes were used to cut both trees and saplings as close to the ground as possible. Because many of the trees had grown to as much as 6 meters tall, a sizeable volume of material was generated. Therefore after cutting, the material was spread about the area and away from the existing structure. Moving the material away from the stumps allowed for easier removal of lower branches, some of which were buried beneath the ground. No herbicide was used during this treatment because *P. thunbergiana* does not regenerate after it has been cut close to the ground.

During April 2007, 37 newly recruited seedlings that had emerged in the year since the initial treatment were cut. ASIS personnel will monitor and treat this infestation as needed during 2008.

Rosa multiflora:

During 2006 ROMU_Site_01, _02, and _03 were retreated since new infestations of *R. multiflora* were discovered at each site. In April, six plants were discovered at ROMU_Site_01 and 1 plant was discovered at both ROMU_Site_02 and _03. In addition, in May ASIS personnel retreated twelve plants at ROMU_Site_01 that had previously been treated in 2005. A foliar application of a 3% triclopyr herbicide solution of Garlon 3A™ in water was used for most of these treatments except for the single plant discovered at ROMU_Site_03. This plant was treated by ASIS and NCR EPMT personnel, who were already in the area treating other species, using a cut stump treatment combined with a 100% triclopyr herbicide solution of Garlon3A™.

During May 2007, two new plants were discovered at ROMU_Site_01 which were subsequently treated by ASIS personnel using a foliar application of a 3% triclopyr herbicide solution of Garlon 3A™ in water. Four previously treated plants also required retreatment at this site. Two of these plants (ROMU_0002 and ROMU_00042) received cut stump treatments followed by a 25% triclopyr herbicide solution of Garlon 4™ in diesel fuel application because their stumps were easily accessible. Whenever possible, cut stump methods are preferred for treating *R. multiflora* infestations because foliar spraying has been less than 100% effective.

Rosa wichuriana:

ASIS' headquarters area was landscaped with non-native *R. wichuriana* plants in 1979, a species that is now recognized by the National Park Service as an invasive species. Since its original planting, *R. wichuriana* has expanded and become 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. The species also occupied an open roadside island near park headquarters. This variety of occupied habitats demonstrates invasive potential of this species. 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.

During 2006 at ROWI_Site_01 *R. wichuriana* infestations were treated using a foliar application of 3% triclopyr herbicide solution of Garlon 3A™ in water. However one area, the headquarters area where *R. wichuriana* was first introduced, had grasses mixed in with it and a combination of a 3% triclopyr herbicide solution of Garlon 3A™ and a 3% glyphosate herbicide solution of Rodeo™ in water was used. This combination treatment was intended to render the entire treatment area devoid of vegetation. Later a tractor was used to remove the dead material with help from the ASIS Maintenance Division and the area was then seeded with grass seed.

During 2007, ROWI_Site_01 was expanded to include additional *R. wichuriana* infestations located east of the maintenance pole barn. These new infestations received their first treatment while

other infestations within the vegetated buffer around park headquarters was retreated by ASIS and NCR EPMT personnel. In 2007 a 3% glyphosate herbicide solution of Rodeo™ in water was used.

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Table 1: 2006 and 2007 ASIS APMP Alien Plant Species Infestation and Treatment Information

Year	Species	Active Sites 2006	Estimated Infestation 2006 (m ²)	% Treated	Treatment Month(s)	Product	Product Amount (liters) ASIS	Product Amount (liters) EPM T	% Conc.	Active Ingredient	Solvent	Treatment Team	Notes
2006	<i>Ailanthus altissima</i>	4	651	100	Apr	Garlon 4* *	1.1	N/A	25	Triclopyr	Diesel	ASIS/EPMT	
	<i>Alnus glutinosa</i>	1	50	100	Apr	Garlon 4* *	0.1	N/A	25	Triclopyr	Diesel	ASIS	
	<i>Artemisia stelleriana</i>	1	600	100	Apr	Garlon 3A*	0.27	N/A	3	Triclopyr	Water	ASIS	
	<i>Carex kobomugi</i>	14	1411	100	Aug	Rodeo***	0.3	N/A	3	Glyphosate	Water	ASIS	
	<i>Clematis terniflora</i>	1	1600	100	Apr	Garlon 3A*	0.09	N/A	3	Triclopyr	Water	ASIS	
	<i>Elaeagnus umbellata</i>	2	20010	100	Apr, May	Garlon 3A*	N/A	0.875	75	Triclopyr	Water	ASIS/EPMT	HQ area
					May	Garlon 3A*	0.1	N/A	3	Triclopyr	Water	ASIS	Bayside Campground
					June	Garlon 4* *	0.187	N/A	25	Triclopyr	Diesel	ASIS	East side of pole barn
	<i>Eragrostis curvula</i>	1	10200	100	May, June	Rodeo***	2.55	N/A	3	Glyphosate	Water	ASIS	
					June	Rodeo***	N/A	3.69	3	Glyphosate	Water	ASIS/EPMT	
	<i>Hedera helix</i>	1	1	100	May	Garlon 3A*	N/A	0.01	100	Triclopyr	None	ASIS/EPMT	
					Apr	Garlon 4* *	0.2	N/A	25	Triclopyr	Diesel	ASIS	Near Ocean City inlet
	<i>Lonicera japonica</i>	6	54950	40	Apr	Garlon 3A*	1.4	N/A	3	Triclopyr	Water	ASIS	
					May	Rodeo***	N/A	0.45	3	Glyphosate	Water	ASIS/EPMT	
	<i>Lythrum salicaria</i>	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	<i>Miscanthus sinensis</i>	3	1740	100	May	Rodeo***	0.1	N/A	3	Glyphosate	Water	ASIS	
	<i>Morus alba</i>	2	130	100	June	Garlon 3A*	N/A	0.075	75	Triclopyr	Water	ASIS/EPMT	
	<i>Pinus thunbergiana</i>	1	500	100	May	N/A	N/A	N/A	N/A	N/A	N/A	ASIS/EPMT	Mechanical removal
					May	Garlon 3A*	N/A	0.03	3	Triclopyr	Water	ASIS/EPMT	
	<i>Rosa multiflora</i>	3	3510	90	May	Garlon 3A*	0.3	N/A	3	Triclopyr	Water	ASIS	
					June	Garlon 3A*	0.3	N/A	3	Triclopyr	Water	ASIS	
	<i>Rosa wichuriana</i>	1	4900	100	July	Rodeo***/ Garlon 3A*	0.2	N/A	3	Glyphosate/ Triclopyr	Water	ASIS	Product combination

* Garlon 3A™ (62719-37)

** Garlon 4™ (62719-40)

*** Rodeo™ (62719-324)

Year	Species	Active Sites 2007	Estimated Infestation 2007 (m ²)	% Treated	Treatment Month(s)	Product	Product Amount (liters) ASIS	Product Amount (liters) EPMT	% Conc.	Active Ingredient	Solvent	Treatment Team	Notes
2007	<i>Ailanthus altissima</i>	5	410	100	Apr, Jun	Garlon 4* *	1.775	N/A	25	Triclopyr	Diesel	ASIS/EPMT	
	<i>Alnus glutinosa</i>	1	0	0	N/A	Garlon 4* *	N/A	N/A	N/A	N/A	N/A	N/A	
	<i>Artemisia stelleriana</i>	2	600	100	Apr	Garlon 3A*	0.03	N/A	3	Triclopyr	Water	ASIS	
	<i>Carex kobomugi</i>	15	1660	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	<i>Clematis temiflora</i>	1	5000	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	<i>Elaeagnus umbellata</i>	2	10000	100	May	Garlon 4* *	0.188	N/A	25	Triclopyr	Diesel	ASIS	East of Polebam
	<i>Eragrostis curvula</i>	1	5000	100	Jun	Rodeo* ** *	N/A	3.7	3	Glyphosate	Water	ASIS/EPMT	
	<i>Hedera helix</i>	1	0	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Not active in 2007
	<i>Lonicera japonica</i>	6	38660	25	Apr, May Mar, Jun	Rodeo* ** * Rodeo* ** *	3.54 N/A	N/A	3 50	Glyphosate Glyphosate	Water Water	ASIS ASIS/EPMT	
	<i>Lythrum salicaria</i>	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	<i>Miscanthus sinensis</i>	4	1030	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	<i>Morus alba</i>	2	130	100	May Jun	Garlon 4* * Garlon 3A*	0.015 N/A	N/A	25 50	Triclopyr Triclopyr	Diesel Water	ASIS ASIS/EPMT	
	<i>Pinus thunbergiana</i>	1	50	100	Apr	N/A	N/A	N/A	N/A	N/A	N/A	ASIS	
	<i>Rosa multiflora</i>	3	1510	100	Apr May	Rodeo* ** * Garlon 4* *	0.25 0.05	N/A	25 25	Glyphosate Triclopyr	Diesel Water	ASIS ASIS	
	<i>Rosa wichuriana</i>	1	1300	100	May	Garlon 3A* Rodeo* ** *	0.128 N/A	N/A	3, 100 3.5	Triclopyr Glyphosate	Water, None Water	ASIS ASIS/EPMT	East of pole bam

* Garlon 3A™ (62719-37)

** Garlon 4™ (62719-40)

*** Rodeo™ (62719-324)

Table 2: 2006 and 2007 ASIS APMP Alien Plant Species Treatment (Rx) Time Log

Year	Species	Month(s)	Rx (*)	Worker(s)		Hours		Total Rx	Comments
				ASIS	EPMT	ASIS	EPMT	Hours	
2006	<i>Ailanthus altissima</i>	Apr	BB	2	2	12	18	29	632 individuals
	<i>Alnus glutinosa</i>	Apr	BB	1	N/A	3	N/A	3	1 individual
	<i>Artemisia stelleriana</i>	Apr	FS	1	N/A	6	N/A	6	
	<i>Carex kobomugi</i>	Aug	FS	1	N/A	15	N/A	15	
	<i>Clematis terniflora</i>	Apr	FS	1	N/A	4	N/A	4	
	<i>Elaeagnus umbellata</i>	May	BB	1	N/A	9	N/A	9	
	<i>Eragrostis curvula</i>	May, Jun	Trimmed, FS	1	2	42	12	54	
	<i>Hedera helix</i>	May	CS	1	1	1	1	2	1 individual
	<i>Lonicera japonica</i>	Apr, May	BB and FS	1	2	18	18	36	1m ² BB, 22000m ² FS
	<i>Miscanthus sinensis</i>	Jun	FS	2	N/A	18	N/A	18	
	<i>Morus alba</i>	May	HS	1	1	4	4	8	
	<i>Pinus thunbergiana</i>	May	CS	1	1	6	6	12	
	<i>Rosa multiflora</i>	May, Jun	CS and FS	1	1	16	3	19	18 indiv (1-CS, 17-FS)
	<i>Rosa wichuriana</i>	Jun, Jul	FS	1	N/A	4	N/A	4	
Total Hours =								219	

* BB = Basal Bark, FS = Foliar Spray, CS = Cut Stump, HS = Hack and Squirt

Year	Species	Month(s)	Rx (*)	Worker(s)		Hours		Total Rx	Comments
				ASIS	EPMT	ASIS	EPMT	Hours	
2007	<i>Ailanthus altissima</i>	Mar, Jun	BB and FS	1	3	12	36	48	735 indiv (392-BB, 343-FS)
	<i>Artemisia stelleriana</i>	Apr	FS	1	N/A	4	N/A	4	
	<i>Elaeagnus umbellata</i>	May	BB	1	N/A	2	N/A	2	32 individuals
	<i>Eragrostis curvula</i>	Jun	FS	1	2	9	18	27	
	<i>Lonicera japonica</i>	Mar, Apr, May, Jun	CS, FS	1	2	63	18	81	
	<i>Morus alba</i>	May, Jun	BB and CS	1	2	5	10	15	
	<i>Pinus thunbergiana</i>	Apr	CS	1	N/A	5	N/A	5	37 individuals
	<i>Rosa multiflora</i>	Apr, May	FS and CS	1	N/A	14	N/A	14	8 indiv (2-CS, 6-FS)
	<i>Rosa wichuriana</i>	May, Jun	FS	1	2	18	18	36	
Total Hours =								232	

* BB = Basal Bark, FS = Foliar Spray, CS = Cut Stump, HS = Hack and Squirt

Table 3: 2006, 2007 ASIS APMP Treatment Information by Infestation Site and Anticipated Monitoring and Treatment Needs for 2008.

Species	Infestation Site	2006 Size	2007 Size	2006 Monitor / (Re)treat	2007 Monitor / (Re)treat	2008 Monitor	Last Year Present	Monitoring / Treatment Responsibility
<i>Ailanthus altissima</i>	AIAL_Site_01	1m ²	0m ²	Yes/Yes	Yes/No	Yes	2006	ASIS
	AIAL_Site_02	0m ²	0m ²	Yes/No	Yes/No	Yes	2005	ASIS
	AIAL_Site_03	0m ²	0m ²	Yes/No	Yes/No	No	2004	ASIS
	AIAL_Site_04	650m ²	400m ²	Yes/Yes	Yes/Yes	Yes	2007	ASIS
	AIAL_Site_05	N/A	10m ²	N/A	Yes/No	Yes	2007	ASIS
<i>Alnus glutinosa</i>	ALGL_Site_01	50m ²	0m ²	Yes/Yes	Yes/No	Yes	2006	ASIS
<i>Artemisia stelleriana</i>	ARST_Site_01	500m ²	500m ²	Yes/No	Yes/Yes	Yes	2007	ASIS
	ARST_Site_02	100m ²	100m ²	No/No	Yes/Yes	Yes	2007	ASIS
<i>Carex kobomugi</i>	CAKO_Site_13	10m ²	10m ²	Yes/Yes	No/No	Yes	2006	ASIS
	CAKO_Site_14	1m ²	0m ²	Yes/Yes	Yes/No	Yes	2006	ASIS
	CAKO_Site_17	900m ²	900m ²	Yes/Yes	No/No	Yes	2006	ASIS
	CAKO_Site_19	0m ²	0m ²	Yes/No	Yes/No	No	2004	ASIS
	CAKO_Site_21	0m ²	0m ²	Yes/No	Yes/No	No	2003	ASIS
	CAKO_Site_22	100m ²	100m ²	Yes/Yes	No/No	Yes	2006	ASIS
	CAKO_Site_27	100m ²	100m ²	Yes/Yes	No/No	Yes	2006	ASIS
	CAKO_Site_30	0m ²	0m ²	Yes/No	Yes/No	No	2003	ASIS
	CAKO_Site_31	0m ²	0m ²	Yes/No	Yes/No	No	2003	ASIS
	CAKO_Site_32	0m ²	0m ²	Yes/No	Yes/No	No	2003	ASIS
	CAKO_Site_35	0m ²	0m ²	Yes/No	Yes/No	No	2005	ASIS
	CAKO_Site_36	100m ²	100m ²	Yes/Yes	No/No	Yes	2006	ASIS
	CAKO_Site_39	100m ²	100m ²	Yes/No	No/No	Yes	2006	ASIS
	CAKO_Site_40	100m ²	100m ²	Yes/No	No/No	Yes	2006	ASIS
	CAKO_Site_42	N/A	250m ²	N/A	Yes/No	Yes	2007	ASIS
<i>Clematis terniflora</i>	CLTE_Site_01	1600m ²	5000m ²	Yes/Yes	Yes/No	Yes	2007	ASIS
<i>Elaeagnus umbellata</i>	ELUM_Site_01	20000m ²	10000m ²	Yes/Yes	Yes/No	Yes	2007	ASIS
	ELUM_Site_02	10m ²	0m ²	Yes/Yes	Yes/No	Yes	2006	ASIS
<i>Eragrostis curvula</i>	ERCU_Site_01	10200m ²	5000m ²	Yes/Yes	Yes/Yes	Yes	2007	EPMT/ASIS
<i>Hedera helix</i>	HEHE_Site_01	1m ²	0m ²	Yes/Yes	Yes/No	Yes	2006	ASIS
<i>Lonicera japonica</i>	LOJA_Site_01	10450m ²	5580m ²	Yes/No	Yes/Yes	Yes	2007	EPMT/ASIS
	LOJA_Site_02	29750m ²	23950m ²	Yes/Yes	Yes/Yes	Yes	2007	EPMT/ASIS
	LOJA_Site_03	State Park	State Park	Yes/No	No/No	No	2007	State Park
	LOJA_Site_04	1800m ²	750m ²	Yes/Yes	Yes/Yes	Yes	2007	EPMT/ASIS
	LOJA_Site_05	100m ²	30m ²	Yes/Yes	Yes/Yes	Yes	2007	ASIS
	LOJA_Site_06	4050m ²	3150m ²	Yes/Yes	Yes/Yes	Yes	2007	EPMT/ASIS
	LOJA_Site_07	8800m ²	5200m ²	Yes/No	Yes/Yes	Yes	2007	EPMT/ASIS
<i>Lythrum salicaria</i>	LYSA_Site_01	0m ²	0m ²	Yes/No	Yes/No	No	2002	ASIS
<i>Miscanthus sinensis</i>	MISI_Site_01	1720m ²	1000m ²	Yes/Yes	Yes/No	Yes	2007	ASIS
	MISI_Site_02	10m ²	10m ²	Yes/Yes	Yes/Yes	Yes	2006	ASIS
	MISI_Site_03	10m ²	10m ²	Yes/No	No/No	Yes	2006	ASIS
	MISI_Site_04	N/A	10m ²	N/A	Yes/No	Yes	2007	ASIS
<i>Morus alba</i>	MOAL_Site_01	10m ²	10m ²	Yes/Yes	Yes/No	Yes	2007	EPMT/ASIS
	MOAL_Site_02	120m ²	120m ²	Yes/Yes	Yes/Yes	No	2007	EPMT/ASIS
<i>Pennisetum alopecuroides</i>	PEAL_Site_01	N/A	100m ²	N/A	Yes/No	Yes	2007	ASIS
<i>Phragmites australis</i> *	PHAU_Site_01	N/A	N/A	N/A	No/Yes	Yes	2007	ASIS
<i>Pinus thunbergiana</i>	PITH_Site_01	500m ²	50m ²	Yes/Yes	Yes/Yes	Yes	2007	EPMT/ASIS
<i>Rosa multiflora</i>	ROMU_Site_01	1700 m ²	200 m ²	Yes/Yes	Yes/Yes	Yes	2007	ASIS
	ROMU_Site_02	10 m ²	10 m ²	Yes/Yes	Yes/No	Yes	2006	EPMT/ASIS
	ROMU_Site_03	1800 m ²	1300 m ²	Yes/Yes	Yes/No	Yes	2007	EPMT/ASIS
<i>Rosa wichuriana</i>	ROWI_Site_01	4900m ²	1300m ²	Yes/Yes	Yes/Yes	Yes	2007	EPMT/ASIS

* See text section for details about ASIS APMP's developing management of this abundant invasive alien species.